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BREAKING THE CYCLE OF BINGE EATING: CAUSES, CONSEQUENCES AND INTERVENTION IMPLICATIONS

Tese de Doutoramento em Psicologia, especialidade em Psicologia Clínica, orientada pelo Professor Doutor José Pinto Gouveia e pelo Professor Doutor James Stubbs, e apresentada à Faculdade de Psicologia e de Ciências da Educação da Universidade de Coimbra

Dezembro de 2016



UNIVERSIDADE DE COIMBRA

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Causes, consequences and intervention implications

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One thing depends on the manifestation of all things, and what makes the all possible is the one. One is all, and all is one. In the one you touch the all, and in the all you touch the one. Everything in the universe is present in each of us. I am in you, and you are in me.

Thich Nhat Hanh & Cheung (2010, p. 220)

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Enquadramento: A Perturbação de Ingestão alimentar Compulsiva (PIAC) foi recentemente reconhecida oficialmente como uma entidade clínica singular. A PIAC é caracterizada por episódios recorrentes de ingestão alimentar compulsiva (IAC) acompanhados de uma percepção de perda de controlo sobre o comportamento alimentar. *Distress* emocional e vergonha parecem desempenhar um papel determinante nesta perturbação. A PIAC é a perturbação alimentar com maior prevalência. Tende a iniciar-se no final da adolescência ou início da idade adulta e a persistir ao longo da vida. A PIAC é comum em indivíduos com excesso de peso/obesidade, podendo igualmente manifestar-se em indivíduos com peso normal. A IAC é também um traço distintivo da Bulimia Nervosa (BN), uma importante característica associada da Anorexia Nervosa (AN), e ocorre ainda na população geral em diferentes graus de severidade. A IAC é um problema de saúde público dada a sua comorbilidade com problemas psicológicos e físicos e o papel que desempenha no desenvolvimento e manutenção da obesidade, um problema de proporções epidémicas na sociedade ocidental atual. Muitas questões permanecem acerca dos mecanismos envolvidos no continuum da ingestão alimentar compulsiva. A presente dissertação teve como objectivo desenvolver um modelo conceptual compreensivo focado nos mecanismos psicológicos que atuam na vulnerabilidade e manutenção deste fenómeno. Com base neste conhecimento, esta dissertação pretendeu ainda contribuir para o avanço de abordagens terapêuticas para a IAC e problemas associados.

Método: Esta dissertação inclui 20 estudos, com desenhos transversais e longitudinais. Os estudos foram realizados em amostras específicas distintas, incluindo amostras não-clínicas compostas por adolescentes do sexo feminino, mulheres e homens da população geral, participantes do sexo feminino com excesso de peso/obesidade e com perturbações do comportamento alimentar. Os participantes foram avaliados através de instrumentos de auto-resposta focados na avaliação de experiências interpessoais precoces, processos psicológicos e de regulação emocional e comportamento alimentar perturbado. Em estudos específicos, as participantes foram também avaliadas através de entrevistas clínicas semiestruturadas.

Resultados: Os dados indicaram que a IAC é prevalente na população em geral, em indivíduos com diferentes graus ponderais, num continuum de severidade. Os estudos revelaram que: i) Percepções de inferioridade e experiências interpessoais precoces negativas (e.g., vitimização entre pares) podem constituir experiências elicitadoras de vergonha. Percepções de

inferioridade e vergonha da imagem corporal associam-se a sintomas de comportamento alimentar perturbado em adolescentes do sexo feminino, tanto transversal como longitudinalmente. ii) A vergonha da imagem corporal tem um efeito específico na IAC, superior ao efeito da afetividade negativa geral. O autocriticismo parece ser um mecanismo específico através do qual a vergonha focada na imagem corporal influencia a IAC. iii) Percepções de inferioridade, vergonha e autocriticismo associam-se a dificuldades de regulação do comportamento alimentar e perda de peso em indivíduos com excesso de peso/obesidade. iv) Percepções de inferioridade e memórias de vergonha associam-se a maior inflexibilidade psicológica relacionada com o comportamento alimentar e imagem corporal. v) Fusão cognitiva com experiências e memórias de vergonha relacionadas com a imagem corporal e preocupações extremas com a alimentação, predizem a severidade da sintomatologia de IAC em doentes com PIAC. A PIAC partilha com a AN e a BN a característica de sobrevalorização do peso e forma corporais, a qual alimenta percepções de inferioridade, autocriticismo e vergonha. vi) Regulação emocional adaptativa através de flexibilidade psicológica, autotranquilização e autocompaixão, poderá diminuir o comportamento alimentar perturbado e promover bem-estar psicológico. vii) Uma intervenção breve de baixa intensidade focada no desenvolvimento destas capacidades em indivíduos da população geral com PIAC mostrou-se eficaz na redução da sintomatologia de IAC.

Conclusões: Esta dissertação contribui para uma maior compreensão das variáveis contextuais, interpessoais e auto-avaliativas e dos processos de regulação emocional envolvidos na vulnerabilidade e manutenção do espectro da IAC. Os dados obtidos foram integrados num novo modelo compreensivo funcional do ciclo da IAC. Os resultados sugerem que a IAC pode ser compreendida como o resultado e uma forma de evitamento experiencial de experiências internas associadas a uma percepção de um *Eu* vergonhoso. Este modelo clarifica igualmente o papel de processos adaptativos de regulação emocional que poderão interromper os mecanismos que mantêm a perturbação. Esta dissertação fornece dados empíricos que estimulam a investigação futura e o desenvolvimento e aperfeiçoamento de abordagens preventivas e de intervenção na IAC e problemas associados.

Background: Binge Eating Disorder (BED) was recently officially recognized as a distinct clinical entity. BED is characterized by recurrent binge eating episodes during which individuals have a sense of lack of control over the eating behaviour. Emotional distress and shame feelings seem to play a determinant role in this disorder. BED is the most prevalent eating disorder. It typically begins in late adolescence or early adulthood and tends to persist through midlife. BED is common in overweight/obese individuals, but may also occur in normal weight individuals. Binge eating symptomatology is also a hallmark feature of Bulimia Nervosa (BN), a prominent associated feature of Anorexia Nervosa (AN), and is also present in the general population in different degrees of severity. Binge eating is a public health problem by virtue of its psychological and physical comorbidities and for its role in the development and maintenance of obesity, a problem of epidemic proportions in our current western society. Many questions remain regarding the mechanisms involved in the continuum of binge eating symptomatology. The current dissertation aimed to develop a comprehensive conceptualization model focused on the psychological mechanisms operating in the vulnerability and persistence of this phenomenon. By building on this knowledge, this dissertation further aimed to contribute to advances in treatment approaches for binge eating and associated problems.

Method: This dissertation includes 20 studies, with cross-sectional and longitudinal designs. The studies were conducted in distinct specific samples, including nonclinical samples of adolescent girls, women and men from the general community, obese/overweight female participants and female patients with eating disorders. Participants were assessed through self-report measures assessing early interpersonal experiences, psychological and emotion regulation processes and disordered eating symptoms. In specific studies, participants were also assessed through semi-structured clinical interviews.

Results: Findings indicated that binge eating symptomatology is prevalent in the general population, in individuals with different weight ranges, in a continuum of severity. Studies revealed that: i) self-perceptions of inferiority and early negative interpersonal experiences (e.g., peer victimization) can be shame-eliciting experiences. Perceptions of inferiority and body image shame are associated with adolescent girls' disordered eating symptoms, both cross-sectionally and longitudinally. ii) Body image shame has a specific effect on binge eating symptomatology, above the effect of overall negative affectivity. Self-criticism may be a specific mechanism

through which body image shame influences binge eating symptomatology. iii) Perceptions of inferiority, shame and self-criticism may predispose to poor self-regulation of eating behaviour and weight loss difficulties in overweight/obese individuals. iv) Perceptions of inferiority and shame memories are associated with greater psychological inflexibility related to eating behaviour and body image. v) Cognitive fusion with body image shame-related experiences and memories, and extreme concerns with eating, predict the severity of binge eating symptomatology in BED patients. BED shares with AN and BN the feature of overvaluation of body weight and shape, which further fuels self-perceptions of inferiority, self-criticism and shame. vi) Adaptive emotional regulation through psychological flexibility, self-reassurance and self-compassion and may reduce disordered eating symptomatology and improve psychological well-being. vii) A brief low intensity intervention focused on helping individuals from the general community with BED develop these capacities was effective in reducing binge eating symptomatology.

Conclusions: This dissertation contributes to a greater understanding of the contextual, interpersonal and self-evaluation variables and the emotion regulation processes involved in the vulnerability and persistence of the spectrum of binge eating. The current findings were integrated into a novel comprehensive functional model of the cycle of binge eating symptomatology. These findings suggest that binge eating may be understood as the result and a form of experiential avoidance from the internal experiences related to a sense of being a shameful self. This model also clarifies the role of adaptive emotion regulation processes that may disrupt the mechanisms maintaining disordered eating. This dissertation provides evidence that stimulates future research and the development and refinement of preventive and treatment approaches for binge eating and related problems.

Binge eating has a long history, emerging from early descriptions of bulimic problems. Ancient authors such as Hippocrates, Aristoteles and Xenophon, used the term *Boulimos* to define binge eating as episodes of overeating triggered by a 'sick' intense form of hunger, distinct from ordinary hunger (Liddell & Scott, 1972). In the 18th century new descriptions of binge eating began to emerge. James (1743) described two forms of binge eating problems: *true boulimus*, which involved intense concerns with food and episodes of overeating; and *caninus appetitus*, characterized by episodes of overeating followed by vomiting. The recognition of the concept of binge eating resulted in its inclusion in the *Encyclopaedia Britannica*, in 1979, and the *Dictionnaire de Medicine et Chirurgie*, in 1983, further stimulating the interest in this phenomenon and in its shared and distinctive features with other forms of disordered eating. Nonetheless, over recent decades, clinicians and researchers have focused heavily on Bulimia Nervosa (BN) and Anorexia Nervosa (AN), with the study and treatment of Binge Eating Disorder (BED) receiving far less attention, a situation that has persisted until quite recently.

Binge eating syndrome was first coined by Stunkard (1959) in his published clinical observations that some obese individuals reported having distressing episodes of overeating. He defined binge eating as having the following primary characteristics: i) eating binges are experienced as outside of the individuals' control, ii) binges involve the consumption of large amounts of food in relatively short periods, iii) the binge eating episode is often related to a specific precipitating event and is followed by emotional distress and self-condemnation. Despite the clinical pertinence of these observations, the delineation of binge eating as a clinically significant, distinctive disorder only came to be established forty years later.

The inclusion of BED in the Appendix B – "Criteria Sets and Axes Provided for Further Study" – of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, APA, 1994) stimulated further and more intensive investigation of this problem. Many researchers and clinicians recognized that a significant number of individuals with eating disorders did not fit into the DSM-IV established categories of AN and BN, and that many individuals with a "not otherwise specified" catch-all diagnosis actually presented fairly specific and distinctive features pertinent to the phenomenon of binge eating (Brody, Walsh, & Devlin, 1994; Wilfley, Wilson, & Agras, 2003; Wonderlich, Gordon, Mitchell, Crosby, & Engel, 2009). In 2013, BED was finally approved for DSM-5 as its own category of eating disorder

(APA, 2013). Binge eating is currently recognized as a public health problem, that causes significant emotional distress and impairment, and that is associated with excess weight, obesity and obesity-related physical and emotional problems. This is particularly important in modern society given the prevalence of sub-clinical and clinical binge eating symptomatology in a relatively large proportion of the general population who are engaged in attempts to manage their own weight (de Zwaan, 2001; Kinzl, Traweger, Trefalt, Mangweth, & Biebl, 1999). Researchers at the Cognitive and Behavioural Centre for Research and Intervention (CINEICC) of the University of Coimbra, have been among the investigators interested in this problem and contributed significantly to the understanding and treatment of eating disorders, namely BED.

My interest in the study of eating psychopathology goes back to when I was completing my Psychology degree at this same institution that hosted me in the execution of the current dissertation. By then, CINEICC had already a prolific history in the research and treatment of eating disorders, framed by the emergent Third-wave Cognitive-Behavioural approaches. Stimulated by their research findings and clinical observations I became particularly drawn to understand the role that adaptive emotion regulation played in the continuum of eating psychopathology, which was the focus of my master's degree dissertation. I then became particularly interested in understanding the processes underlying what perhaps is the symptom that individuals with eating disorders fear the most and that is also distressing to so many individuals, especially those with weight management difficulties: losing control over eating and binge eating.

Binge eating behaviours do not occur exclusively in clinically established eating disorders. Throughout their lives, many people experience some degree of concern over their eating behaviour, finding themselves engaging in attempts to restraint their eating, or (over)eating as a way to comfort themselves, with these eating behaviours being usually paired with concerns about their body weight, size and shape. However, these concerns can range from transient preoccupations and occasional overeating or emotional eating, repetitive overeating and failures to follow a healthy balanced diet, intense fears and loss of control over eating, to recurrent episodes of binge eating. These more severe forms of eating dysregulation are often accompanied by intense negative evaluations about one's body and a negative sense of self, shame, guilt and self-criticism. In the execution of this dissertation a dimensional perspective on binge eating was adopted, viewing it as occurring along a continuum of varying severity in the population (Davis, 2013; Gormally, Black, Daston, & Rardin, 1982; Hudson, Hiripi, Pope, &

Kessler, 2007; Kessler et al., 2013). BED is situated in the extreme end of this continuum, but difficulties in regulating eating behaviour, including compulsive eating, or episodic overconsumption of food in response to certain stimuli (e.g., negative affect), may also be problematic, contribute to the "epidemic" rates of obesity we are now facing, the maintenance of obesity prevalence and may be causally involved in the high rates of relapse seen in weight management attempts. These problems, with different degrees of severity, are extremely common in our modern Western culture, affecting our friends, partners, mothers, sisters and daughters, as well as our fathers, brothers and sons.

Ironically, while BED is the most prevalent eating disorder, it is still the most understudied of the eating disorders and many questions remain about the phenomenon of binge eating⁽¹⁾. As it will be described in this dissertation, some theoretical models have been proposed to understand binge eating problems and to guide treatment approaches. However, these models suffer from limitations that currently limit the ability to deliver effective preventive and treatment interventions. More recent approaches, namely based on contextual behavioural science (Lillis & Hayes, 2008; Juarascio, Manasse, Schumacher, Espel, & Forman, 2016; Sandoz, Wilson, & DuFrene, 2010; Tirch, Schoendorff, & Silberstein, 2014) and on evolutionary functional analysis of social motivation and emotion regulation systems (Gilbert, 1997, 2003, 2005, 2007, 2014; Goss & Allan, 2009, 2010; Goss & Gilbert, 2002; Kelly & Carter, 2015; Stubbs, Gale, Whybrow, & Gilbert, 2012), have been applied to the understanding and treatment of many forms of mental health problems, and seem to provide a potential avenue for the development of effective interventions for BED and associated problems.

Taking into account the contribution of existing conceptualizations, the aim of this dissertation is to expand current knowledge on binge eating by developing and examining a conceptual model that explores the role of variables and processes that have hitherto received little or no attention. The development of a comprehensive, integrated view requires a critical examination of the contextual variables influencing our emotional and motivational systems and how these in turn, may affect our ability to regulate eating behaviour. We are living in a hedonistic and

⁽¹⁾ In the scientific literature the term 'binge eating' is often synonymous with BED. In the current dissertation, 'binge eating' will be used to define binge eating symptomatology (including binge eating-related emotions, cognitions and behaviours) that may occur in the general population along a continuum. The term 'BED' will be used when referring to binge eating as the DSM-5 (APA, 2013) formal clinical diagnosis.

increasingly rank-based competitive society, that offers us a plentiful food environment, in which food, hedonism and reward are aggressively promoted (Power, 2012; Speakman, 2004; Stubbs et al., 2012; Swinburn et al., 2011) but that at the same time emphasizes the pursuit of a slender physical appearance (Buote, Wilson, Strahan, Gazzola, & Papps, 2011; Strahan, Wilson, Cressman, & Buote, 2006) as an important domain for self-evaluation and for how others evaluate us (i.e., whether we are criticized, discriminated against or rejected by others or whether we are accepted, valued or deemed to be desirable and promoted in social situations; Gilbert, 2002; Pinto-Gouveia, Ferreira, & Duarte, 2014). Our society also stigmatizes those who do not meet socially prescribed norms or socially promoted ideals. In the context of physical appearance and related behaviours this means that those who are overweight, obese or who overeat are often stigmatized, despite the fact we all at some point in our lives exhibit some or all of these traits (Latner, O'Brien, Durso, Brinkman, & MacDonald, 2008; Puhl & Heuer, 2009, 2010; Schafer & Ferraro, 2011). These conflicting messages create the climate for people to develop shame feelings about themselves and their physical appearance, to experience emotional distress, and to use food as a way to cope, even that in the long term this generates further problems.

Binge eating has been conceptualized as a maladaptive strategy used to avoid or escape disturbing thoughts or difficult emotions, in the absence of more adaptive emotion regulation processes (Goldfield, Adamo, Rutherford, & Legg, 2008; Goss & Gilbert, 2002; Heatherton & Baumeister, 1991). There is evidence that negative experiences in childhood and adolescence are associated with the development of maladaptive emotion regulation and mental health problems, such as eating psychopathology (Ferreira, Matos, Duarte, & Pinto-Gouveia, 2014; Gupta, Rosenthal, Mancini, Cheavens, & Lynch, 2008; Schore, 1994, 2001). On the other hand, positive early interpersonal experiences are associated with later adaptive emotion regulation (Richter, Gilbert, & McEwan, 2009). Current conceptual models recognize the role of negative affect, emotion regulation and interpersonal experiences on binge eating (Goss & Allan, 2009; Goss & Gilbert, 2002; Pike et al., 2006; Spoor et al., 2006; Stice, 2001, 2002; Stice, Akutagawa, Gaggar, & Agras, 2000; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002; Striegel-Moore et al., 2005). But *how* do negative early experiences with significant social agents (e.g., our parents/caregivers or peers) potentially render an individual more vulnerable to develop problems with body image and eating behaviour? What are the specific dimensions of negative affectivity that may drive binge eating and *how*? Do shame feelings, namely those related to our first point of contact with others – through our own bodies –, play a specific role in the

vulnerability and persistence of disordered eating symptoms, namely binge eating? What are the emotion regulation processes involved in these complex associations? What processes may offer protection against these variables and promote well-being? Can these processes be developed into effective interventions?

The goal of the current dissertation is to address these questions. Understanding the mechanisms underlying the development and persistence of disordered eating, binge eating, body image-related difficulties and ill-being is a pressing need for the development and refinement of prevention and intervention strategies for these problems in our society. Thus, based on an evolutionary (Gilbert et al., 2014; Gilbert, 1997, 1998, 2002, 2003, 2007; Goss & Allan, 2009, 2010; Goss & Gilbert, 2002) and a functional contextual perspective of body image, weight and eating-related problems (Hayes, 2004; Hayes, Strosahl, & Wilson, 1999; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Hayes, Strosahl, Bunting, Twohig, & Wilson, 2004; Sandoz et al., 2010; Tirsch et al., 2014), the primary aims of the current dissertation were twofold:

First, to develop an integrative comprehensive model that would offer a new lens through which to understand binge eating and related problems. This involved:

- i) the development and examination of assessment measures to evaluate constructs relevant to body image and eating-related problems and for the construction of this model;
- ii) the identification of risk factors and processes involved in the vulnerability and in the persistence of body image-related problems and dysregulation of eating behaviour, occurring in individuals ranging from the general community, to clinically significant symptoms occurring in eating disorder samples;
- iii) the identification of potential protective mechanisms that would buffer against the impact of factors promoting vulnerability to disordered eating and that would be associated with increased quality of life and well-being.

Second, by developing a greater understanding of the complex phenomenon of binge eating, including its features, manifestations and related problems, this work aimed to contribute to the development of improved prevention and intervention approaches to this problem.

The current thesis is organized in three parts.

Part I – Introduction includes two chapters. **Chapter 1** presents a general review of the existing literature covering the themes that are the focus of this work. This chapter characterizes binge eating, its main features, occurrence within the eating disorders spectrum and its association with overweight and obesity. This chapter also presents a critical overview of theoretical frameworks used in the conceptualization of binge eating with a particular focus on an evolutionary functional perspective. **Chapter 2** describes the rationale linking the specific objectives of the empirical studies into a logical line of research enquiry to address the aims of this thesis.

Part II – Empirical studies of this dissertation includes, in 6 chapters, the empirical studies addressing the specific aims of this thesis.

Chapter 3 describes 6 studies involving the development and evaluation of measures to assess key constructs related to body image and eating-related problems central to the investigation of binge eating. These studies also facilitated a greater understanding of specific processes that may buffer against the occurrence and severity of binge eating symptoms in female samples of the general population.

Chapter 4 outlines 4 empirical studies focused on adolescence, a critical period of increased vulnerability for the development of mental health problems, especially eating psychopathology. These studies explored the role that individual and interpersonal variables related to self-perceptions of inferiority, shame-eliciting victimization experiences, body image shame and self-criticism, play in the development of disordered eating symptoms and emotional difficulties in adolescent girls. We also explored how memories of warmth and safeness may promote adaptive emotion regulation through self-reassurance abilities, which may buffer against the impact of these negative experiences.

Building on the previous chapter, 2 studies on **Chapter 5** retrospectively examined the association between early memories of body image-related shame-eliciting victimization experiences, current emotion regulation difficulties, and binge eating symptoms, in nonclinical adult samples from the general population. This chapter also includes a study examining binge eating symptomatology as a functional defensive strategy in face of shame and self-criticism.

Having explored the mechanisms involved in the vulnerability to disordered eating symptoms and occurrence of binge eating symptoms in varying degrees of severity, studies on **Chapter 6** further examined mechanisms of vulnerability to and maintenance of binge eating in individuals

where problems in regulating eating behaviour acquire a more severe meaning and may carry serious mental and physical health implications. This chapter therefore included: an empirical study conducted in women with overweight/obesity; 2 empirical studies of patients with the diagnosis of BED; and 1 study in patients with AN, BN and BED.

Chapters 3-6 provided a body of evidence describing: i) the factors involved in the vulnerability and persistence of disordered eating symptoms and related psychological difficulties; and ii) factors that could potentially buffer against the impact of maladaptive psychological mechanisms underlying disordered eating symptoms. Approaches to prevention and treatment should not focus solely on alleviation of symptoms and/or adherence to adaptive behaviours, but also on improving an overall sense of well-being of the individual. **Chapter 7** presents 2 studies investigating the role of compassionate self-reassuring capabilities on well-being in young women with normative weight ranges, and in overweight/obese women.

Chapter 8 presents an empirical study that explored the efficacy of a brief intervention for BED which specifically targeted the psychological mechanisms identified in the previous studies as being implicated in the persistence and severity of binge eating symptoms.

Part III – General discussion includes the final chapter – **Chapter 9** – which offers a general overview of the conclusions and contributions of each study and synthetically integrates them into a model of binge eating symptomatology. This chapter offers a discussion of the clinical and research implications of the investigations presented in this thesis. This section also details the main methodological limitations of the studies and suggests avenues for future research.

Part I

Introduction

Chapter 1

Theoretical background

Chapter 2

Aims of this thesis

Chapter 1

Theoretical background

1. Binge eating: Definition and characteristics

1.1. Current definition of Binge Eating Disorder

Binge eating involves recurring episodes of eating significantly larger amounts of food, in a short period of time, than most people would eat under similar circumstances. These episodes are associated with a feeling of lack of control over the eating episode (i.e., a sense that one cannot stop eating or control the quantity or quality of the food that is being consumed). During these episodes individuals may eat faster than normal, until feeling uncomfortably full, and food consumption is not necessarily motivated by hunger (Brownley, Berkman, Sedway, Lohr, & Bulik, 2007). The person may binge eat alone to hide the behaviour due to embarrassment, and feel guilty, depressed or disgusted after the episode. Individuals experience marked distress about these behaviours (APA, 2013; Brownley et al., 2007; Latner & Clyne, 2008). Emotional distress and psychological stressors often also precede the eating binges (Haedt-Matt & Keel, 2011; Hilbert & Tuschen-Caffier, 2007; Macht, 2008).

The occurrence of binge eating episodes is a hallmark feature of BN and BED, and may also occur in AN. The diagnosis of BED requires that patients present "objective" binge eating episodes, that is, episodes where an objective unusually large amount of food is ingested (Fairburn & Cooper, 1993). Nonetheless, while in BN the binge episodes are followed by compensatory behaviours such as vomiting or laxative abuse, individuals diagnosed with BED do not engage in such compensatory behaviours. Moreover, there is evidence that individuals with BED do not engage in extreme restrictive eating, which often occurs in individuals diagnosed with AN or BN (Castonguay, Brunet, Ferguson, & Sabiston, 2012).

For the diagnosis of BED, individuals must experience significant distress regarding binge eating, which includes negative feelings during and after the eating episode, such as shame, disgust with oneself and guilt. This distress may also involve concerns about the effect of the recurrent episodes on self-esteem, body weight and shape. However, unlike AN and BN, the diagnosis of BED does not consider the cognitive criterion that body weight and shape unduly influences self-evaluation.

For both BN and BED diagnoses binge eating episodes occur, on average, at least once a week during the past 3 months.

DSM-5 also proposes a severity specifier for BED that includes four severity groups based on the frequency of binge eating episodes: mild, that involves 1-3 episodes per week; moderate, referring to 4-7 episodes per week; severe, which involves 8-13 episodes per week; and extreme, which involves 14 or more episodes per week (APA, 2013).

1.2. Epidemiology of binge eating

1.2.1. Prevalence

Most BED epidemiological studies have been conducted in female samples recruited from weight loss programmes (Brody et al., 1994; Striegel-Moore & Franko, 2003), but recently there has been an increase in the number studies using representative community samples (Hudson et al., 2007; Kessler et al., 2013). Existing studies suggest a growth in the prevalence of BED from earlier studies (Spitzer et al., 1992; Spitzer et al., 1993) until the present time. However, the methodological differences across studies may result in differences in the prevalence rates found. For instance, the use of self-report questionnaires may lead to a large proportion of false positives (Celio, Wilfley, Crow, Mitchell, & Walsh, 2004) and the differences in the definition of binge eating episodes among different measures may result in biased results (Fairburn & Beglin, 1994; Grilo, Masheb, & Wilson, 2001). Therefore, new studies should consider the updated BED diagnostic criteria (APA, 2013) to give more consistent estimates of prevalence rates.

Initial epidemiological studies revealed that approximately 2% to 4.6% of individuals from community samples met DSM-IV criteria for BED (Spitzer et al., 1992; Spitzer et al., 1993). Studies using self-report measures suggested a prevalence between 1.2% to 4.6% (Götestam & Agras, 1995; Smith, Marcus, Lewis, Fitzgibbon, & Schreiner, 1998), and interview-based studies indicated prevalence rates ranging from 1% to 3.3% (Bruce & Agras, 1992; Hay, 1998; Hudson et al., 2007; Kinzl et al., 1999; Preti et al., 2009). A more recent interview-based study examined the prevalence of BED using DSM-IV criteria across 14 countries (Kessler et al., 2013). Results indicated a prevalence estimate of 1.9% for BED, with a lifetime prevalence ranging from 0.2% to 4.7%. The prevalence in Portugal was 0.8% and the lifetime prevalence estimate was 2.4%. Using a two-stage design, Ribeiro and colleagues (2014) found the prevalence of BED in a Portuguese college sample to be 0.5% (sex ratio of females to males of 3:1). So, on aggregate, it is reasonable to assume that the prevalence of BED is between 1-5% in the general population, although evidence is skewed towards female respondents.

BED is more common in the general population than BN and AN (Favaro, Ferrara, & Santonastaso, 2003; French, Jeffery, Sherwood, & Neumark-Sztainer, 1999; Hay, 1998; Hudson et al., 2007; Kessler et al., 2013; Kinzl et al., 1999; Smith et al., 1998; Striegel-Moore & Franko, 2003). And probably even more than these disorders, BED represents a public health problem because of its chronic nature, association with lower quality of life, psychiatric comorbidity and overweight/ obesity (Ágh et al., 2015; de Zwaan, 2001; Hudson et al., 2007; Kessler et al., 2013; Striegel-Moore & Franko, 2003). In this context, it is interesting to note that studies using self-report measures found that 28.8%-30.1% of individuals seeking weight loss treatment met the criteria for BED (Spitzer et al., 1992; Spitzer et al., 1993). Similar patterns were found in interview-based studies, producing prevalence estimates of 12.1%-18.8% in the same populations (Brody et al., 1994; Ramacciotti et al., 2000).

Comparing to the other eating disorders, the gender imbalance concerning the prevalence of BED is less pronounced (Barry, Grilo, & Masheb, 2002). Women are ~ 1.5 times more likely than men to have BED (Buote et al., 2011; Spitzer et al., 1992; Spitzer et al., 1993; Wilson, 1993). Recent studies indicate that the lifetime prevalence for BED are 2% for men and 3% for women (Hudson et al., 2007; Kessler et al., 2013).

1.2.2. Course

Compared to AN and BN, BED presents a later age of onset (Barry et al., 2002; Kessler et al., 2013; Spitzer et al., 1993). Individuals with BED often report that binge eating started in late adolescence or the early 20s (Hudson et al., 2007; Kessler et al., 2013; Spitzer et al., 1993; Stice, Marti, & Rohde, 2013). BED tends to persist for a longer duration and can be a fluctuating persistent condition. In fact, individuals with BED rarely experience prolonged period without any problem with binge eating. Crow and colleagues (2002) in a large community-based longitudinal study over 4-years found that full syndrome or subthreshold BED tends to persist in most individuals, who can maintain the disorder or cycle between full or sub-clinical BED. The average age for treatment-seeking is 45 years, although many individuals report that binge eating began 20 years earlier (Mussell et al., 1995).

1.3. BED and other eating disorders

BED and BN share important clinical features, namely the occurrence of objective binge eating episodes. Nonetheless, there are important distinctions between these disorders. Etiological

models of BN implicate dieting or restrained eating as central for the development of binge eating (Polivy & Herman, 1985; Stice, 2001; Stice, Ziemba, Margolis, & Flick, 1996). However, BED patients tend to present significantly lower dietary restraint (Masheb & Grilo, 2000; Stunkard & Messick, 1985). Laboratory studies indicate that in individuals with BN eating binges were higher in carbohydrates and sugar content than in individuals with BED (Fitzgibbon & Blackman, 2000). Individuals with BED were found to consume more calories in nonbinge meals (Guss, Kissileff, Devlin, Zimmerli, & Walsh, 2002). In BED the onset of dieting more frequently occurs after the onset of binge eating (Binford, Mussell, Peterson, Crow, & Mitchell, 2004; Mussell et al., 1995; Spitzer et al., 1993). In models for the development of BED, binge eating appears to operate as a means to modulate negative emotional states and this seems to be a key factor in the development and maintenance of the disorder (Agras & Telch, 1998; Binford et al., 2004; Haedt-Matt & Keel, 2011; Heatherton & Baumeister, 1991; Hilbert & Tuschen-Caffier, 2007; Masheb & Grilo, 2006; Stein et al., 2007). These distinctions highlight the relevance of examining the specific functional aspects of binge eating as a form of affect regulation in individuals struggling with BED.

Nonetheless, as it will be explored further in this dissertation, there are a number of similarities between BED, BN and AN, regarding associated general psychopathology and body image and eating-related psychopathology. Patients with BED present similar levels of dysfunctional attitudes regarding eating, weight and shape, to patients with AN and BN (Barry, Grilo, & Masheb, 2003; Grilo et al., 2009; Grilo, Ivezaj, & White, 2015; Grilo, Masheb, & White, 2010; Wilfley, Schwartz, Spurrell, & Fairburn, 2000) and the psychological mechanisms underlying the severity of the eating disorder may also be the same.

As other eating-related disturbances, binge eating occurs in a continuum of severity (Fairburn, 2008; Gormally et al., 1982) and with varying degrees of psychological and physical co-morbidity in the general population (Johnson, Rohan, & Kirk, 2002; Kinzl et al., 1999; Ribeiro, Conceição, Vaz, & Machado, 2014). In fact, binge eating symptoms, including the emotions, cognitions and eating behaviours associated with binge eating, are estimated to occur in 10-20% of the general population (Johnsen, Gorin, Stone, & le Grange, 2003; Spitzer et al., 1993; Striegel-Moore et al., 2009). Also, occasional binge eating episodes may occur in individuals who do not meet the criteria for BED (Hudson et al., 2007). When these episodes become more frequent, compulsive and are associated with significant emotional distress, a diagnosis of BED may apply. Binge eating

symptomatology can therefore be understood as a complex dimensional phenomenon, with BED laying at the higher end of this spectrum of severity (Davis, 2013).

1.4. Binge eating and obesity

Binge eating occurs in obese and normal weight individuals, and can even occur in underweight individuals (Didie & Fitzgibbon, 2005; Kessler et al., 2013). Nonetheless, a large proportion of individuals with BED do have higher Body Mass Index (BMI) in comparison to individuals without eating disorders (Kessler et al., 2013), and an expansive literature relates BED to overweight and obesity (Bruce & Agras, 1992; de Zwaan, 2001; Spitzer et al., 1992; Spitzer et al., 1993; Yanovski, 1993). Recent epidemiological studies in community samples using interview methods found that individuals with BN and BED present higher BMIs than individuals without eating disorders, with a larger percentage of individuals with BN and BED being overweight (1.3% for both BN and BED) or obese (10.3% for BN and 16.8% for BED; Kessler et al., 2013).

However, different percentage rates have been found for the amount of individuals with obesity and BED depending on methodologies used and samples examined. Studies based on self-report data found that 20-30% of obese individuals in weight control treatments met the DSM-IV diagnostic criteria for BED (Ricca et al., 2000; Spitzer et al., 1993). Other interview-based estimates report lower rates of approximately 5% BED in weight control treatments samples, and 10-25% for any binge eating symptomatology (Williamson & Martin, 1999).

The obese population is more at risk of preventable disease and psychological ill health. It would appear that binge eating has particularly negative psychological effects on this population, as its occurrence (compared to non-occurrence) is associated with greater medical and psychiatric morbidity (Bulik, Sullivan, & Kendler, 2002; Dingemans, Bruna, & Van Furth, 2002; Greeno, Wing, & Shiffman, 2000; Ramacciotti et al., 2000; Wonderlich et al., 2009), reductions in health-related quality of life (Ágh et al., 2015; Rieger, Wilfley, Stein, Marino, & Crow, 2005), perceptual body weight and shape-related disturbances and eating-related difficulties (Dingemans et al., 2002; Mussell et al., 1995; Peterson, Latendresse, Bartholome, Warren, & Raymond, 2012; Valdo Ricca et al., 2009; Spitzer et al., 1993), and worse treatment outcomes (de Zwaan et al., 2010; White, Kalarchian, Masheb, Marcus, & Grilo, 2010).

2. Conceptual models

Binge eating is a complex phenomenon with many factors contributing to its development and maintenance. The following etiological models are most commonly used to inform research and clinical approaches to binge eating: i) the dietary restraint model (Polivy & Herman, 1985); ii) negative affect and emotion regulation models (Heatherton & Baumeister, 1991; Polivy & Herman, 1993); iii) Interpersonal Theory model (Wilfley et al., 2002); and iv) transdiagnostic and integrative models (Fairburn, 2008; Fairburn, Cooper, & Shafran, 2003; Goss & Allan, 2009; Lillis & Kendra, 2014; Sandoz et al., 2010; Stice, 2001; Stice et al., 2001). These models have important strengths (Iacovino, Gredysa, Altman, & Wilfley, 2012; Pennesi & Wade, 2016) and have contributed greatly to understanding and treating binge eating. However, they also have important limitations and many questions still remain about the processes involved in the vulnerability to, development and persistence of binge eating problems. Resolving some of these unanswered questions may facilitate the development of more effective interventions to reduce binge eating symptomatology and its negative impact on psychological health and well-being.

2.1. Dietary Restraint

The dietary restraint model proposes that dietary restraint (i.e., the effort or attempt to restrict food intake for weight loss or maintenance; Polivy & Herman, 1985) drives binge eating (**Figure 1**). Implicit in this model is the notion that food restriction triggers physiological signals that act as cues prompting a subsequent increase in food intake. This theory has been supported by some studies that suggested that caloric deprivation results in counterregulatory eating (Agras & Telch, 1998; Herman & Mack, 1975; Polivy & Herman, 1985). Other studies suggest that these etiological models may be more applicable to BN than to BED, as in BN dieting or caloric restriction usually precedes the onset of binge eating, which is not often the case in BED (Marcus, Moulton, & Greeno, 1995; Polivy & Herman, 1993; Spitzer et al., 1992; Spitzer et al., 1993; Wilson, Nonas, & Rosenblum, 1993). Research on dietary restraint as an underlying mechanism for binge eating has produced mixed findings (Cooper, Clark, & Fairburn, 1993; Howard & Porzelius, 1999; Schaumberg, Anderson, Anderson, Reilly, & Gorrell, 2016) in support of the restraint model. Dietary restraint is a complex construct and its impact on eating behaviour may be influenced by other mechanisms not considered in this model. Factors such as sociocultural pressures to reach thinness, ideal-body internalization and body image dissatisfaction may underlie attempts to restrict eating behaviour. How these factors may

contribute to the aetiology and maintenance of binge eating behaviours will be explored in more detail below.



Figure 1 | Dietary restraint model

2.2. Affect models

The negative affect and emotion regulation models propose that negative affect is both a risk and maintenance factor of binge eating (**Figure 2**; Leehr et al., 2015; Polivy & Herman, 1993). Indeed, negative affect is considered as both a distal (e.g., negative affect prospectively predicts binge eating; Stice, 2001; Stice, Presnell, & Spangler, 2002), and proximal trigger of binge eating (e.g., negative emotional states precede and instigate binge eating; Greeno et al., 2000; Macht, 2008; Masheb & Grilo, 2006; Polivy & Herman, 1993). According to these models, most notably the Escape Model of binge eating (Heatherton & Baumeister, 1991; Heatherton, Polivy, Herman, & Baumeister, 1993), individuals engage in binge eating when they experience negative emotions and cognitions and are unable to adopt adaptive emotion regulation strategies to cope with them. Binge eating is then used as a means to reduce these aversive states by allowing the temporary avoidance, reduction or distraction from these aversive emotional states and negative self-awareness (Arnow, Kenardy, & Agras, 1992; Heatherton & Baumeister, 1991; Polivy & Herman, 1993). From this perspective, binge eating may be conceptualized as a maladaptive affect regulation strategy maintained by the short-term reduction in negative affective states (Telch, Agras, & Linehan, 2000).

Some studies have suggested that bingeing provides temporary relief from negative emotions and transiently improves mood (Stickney, Miltenberger, & Wolff, 1999). Other studies have found that a consequence of bingeing was a further deterioration in mood (Haedt-Matt & Keel, 2011; Hilbert & Tuschen-Caffier, 2007; Stein et al., 2007). Relatively little is known about the specific processes and mechanisms that may underlie the complex association between negative affect and binge eating (Whiteside et al., 2007).



Figure 2 | Negative Affect model of binge eating

2.3. Interpersonal Model

The Interpersonal Theory model (ITP; Wilfley et al., 2002) is based on the Interpersonal Theory (Sullivan, 1953) and suggests that interpersonal problems and deficits in social functioning result in negative affect and low self-esteem, which in turn, triggers binge eating in some people. This model also posits that binge eating is a dysfunctional strategy to cope with these negative emotions and self-evaluations. The IPT model for binge eating (Figure 3) is supported by evidence that interpersonal problems or deficits (Fairburn et al., 1998; Pike et al., 2006; Striegel-Moore et al., 2005; Tasca, Balfour, Presniak, & Bissada, 2012) and difficulties in adaptively coping with negative affect (Arcelus, Haslam, Farrow, & Meyer, 2013; Heatherton & Baumeister, 1991; Whiteside et al., 2007) play a significant role in the development and maintenance of disordered eating, namely binge eating.

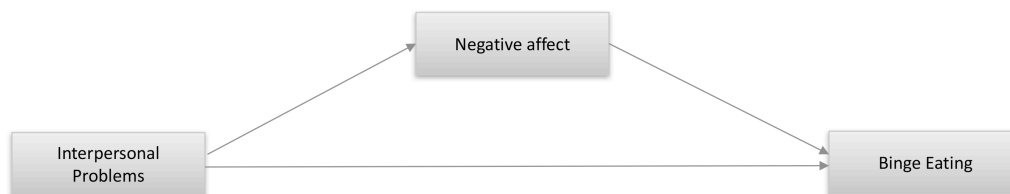


Figure 3 | IPT model for binge eating

Research generally supports the adequacy of this model in the understanding of BED. Some findings do indeed suggest that difficulties with interpersonal relationships can give rise to distressing feelings, and some individuals with BED cope with these feelings through binge eating behaviours (Ivanova et al., 2015; Lo Coco et al., 2016). Studies have also supported the adequacy of this model in the understanding of loss of control eating and binge eating symptomatology in nonclinical female samples. A study in children and adolescents provided evidence that interpersonal problems were associated with negative affect, which in turn, was linked to loss of control of eating (Elliott et al., 2010). Ansell, Grilo and White (2012), found in a sample of women

from the general population, that interpersonal problems had a significant indirect association with loss of control of eating, binge eating symptomatology and eating psychopathology symptoms, via depressive symptoms (considered as a measure of negative affect). However, the authors cautioned that specific interpersonal difficulties (e.g., affiliation) may play a distinctive effect on binge eating and that constructs other than overall negative affectivity should be investigated to clarify the complex associations between interpersonal difficulties and the occurrence and frequency of binge eating and associated eating psychopathology features. Moreover, not all interpersonal difficulties are associated with binge eating and different people may have a number of different factors predisposing them to binge eat.

Recent studies have also investigated whether this model could be applicable to samples other than BED but in which difficulties in regulating eating behaviour is a prominent feature. Lo Coco and colleagues (2016) found that the IPT model may apply to the obese population, with negative affect being both triggered by and triggering interpersonal problems, with both having an important effect on disordered eating symptoms.

Together these findings support that the IPT model has potential to explain aspects of binge eating, but current evidence suggests the model cannot be simplistically analyzed. It is also evident from this body of evidence that negative affect may not actually be a unitary or overarching construct. There may be specific aspects to negative affect linked to interpersonal difficulties that should be explored and defined to better understand the complex associations between negative affect, psychosocial variables, and how they interact to influence binge eating symptoms and their associated features. It seems that these models may not be applicable to all individuals and that for some other under-investigated or as yet poorly understood variables may also contribute to the phenomenon of binge eating.

2.4. Integrative models: Does dietary restraint and negative affect drive binge eating?

Other models have integrated concepts from the dietary restraint models and emotion/affect regulation-based models. Stice's dual-pathway model of bulimic spectrum pathology (Stice, 1994, 1998, 2001) posits that the sociocultural pressures (i.e., from peers, family and the media) to reach thinness, along with the internalization of the thin ideal, promote body image dissatisfaction (these concepts are discussed in more detail below). Discontent with body image, in turn, is theorized to foster dieting behaviours, which are adopted as a means to control weight

and change body shape to conform to the sociocultural ideal physical appearance. According to this model dieting also contributes to negative affect because of the effect of caloric deprivation on mood and because of perceived/actual failures in the control of eating behaviour and weight. Binge eating symptoms may then occur as a consequence of elevated dietary restriction, as a means to seek comfort or distraction from negative affect/cognitions, or through the combination of these two mechanisms.

There is consistent prospective evidence supporting the proposed associations between the variables included in this model (Allen, Byrne, La Puma, McLean, & Davis, 2008; Holmes, Fuller-Tyszkiewicz, Skouteris, & Broadbent, 2014; Stice, 1998, 2001; Stice & Agras, 1998; Stice, Marti, & Durant, 2011; Stice et al., 2002).

However, even though this seems to be a well-validated etiological model of bulimic symptoms, evidence regarding the pathway from dieting to binge eating in BED is mixed. Clinical observations and empirical evidence demonstrate that for many individuals with BED, binge eating preceded or happened in the absence of attempts to diet (Agras & Telch, 1998; Binford et al., 2004; Mussell et al., 1995; Spitzer et al., 1993). Also, experimental studies examining the effect of caloric deprivation have provided inconsistent evidence of the link between dieting and binge eating (Howard & Porzelius, 1999). This suggests that the link between dietary restraint and disordered eating symptoms is not straightforward (e.g., Ouwens, van Strien, van Leeuwe, & van der Staak, 2009; Schaumberg et al., 2016) and that this link may be influenced by other psychological processes not currently included in the theoretical models reviewed above.

Recent advances in the examination of the dual-pathway model suggest that it should be expanded to consider mechanisms underlying the relationship between negative affect and binge eating symptoms. In a study conducted in a non-clinical sample of adolescent girls and a clinical sample of patients with eating disorders (meeting DSM-IV criteria for AN, BN, BED and EDNOS; APA, 1994), Van Strien, Engels, Van Leeuwe, and Snoek (2005) examined an extended version of the original dual-pathway model (**Figure 4**). This version considered that the link between negative affect and overeating would be mediated by lack of interoceptive awareness and emotional eating. Results indicated that this extended model presented a better fit to the data than the original model, for both samples. The association between negative affect and overeating/binge eating, mediated by emotional eating and lack of interoceptive awareness was significant for both samples, albeit markedly stronger for the clinical sample. The authors concluded that the original model may be too limited to understand binge eating in patients with

eating disorders. In fact, understanding how some people experience difficulties in recognizing internal cues of hunger and satiety, along with a tendency to respond to negative emotional states through eating, may help clarify the relationship between negative affect and binge eating (Whiteside et al., 2007).

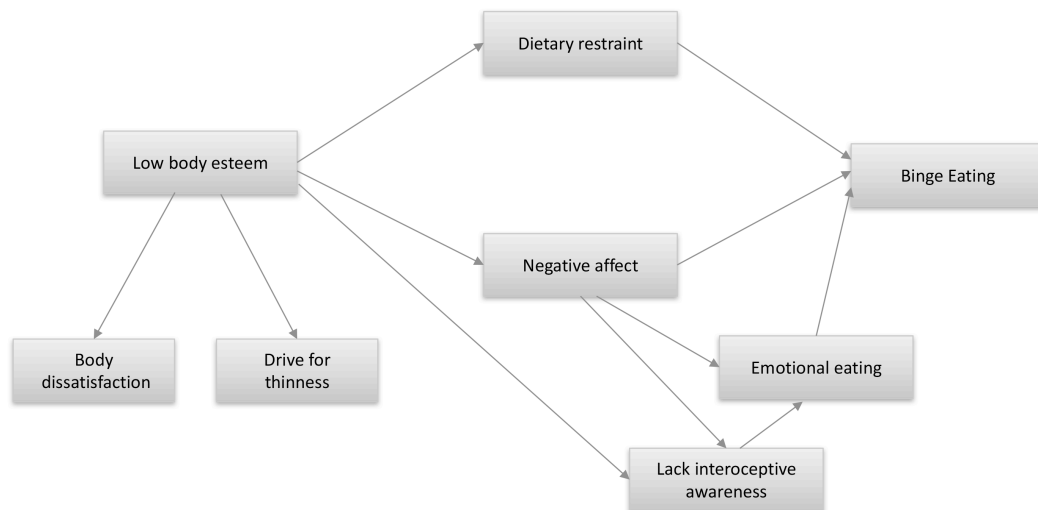


Figure 4 | Extended dual-pathway model of binge eating

Overall this integrated model offers a potentially valuable framework to investigate the onset of bulimic symptoms (Dakanalis, Timko, et al., 2014). Empirical evidence is supportive of the model, but a large amount of the variance in binge eating symptoms is still unaccounted for, suggesting a need to consider additional (as yet unmeasured) predictors in the model. Also, while evidence suggests (Holmes et al., 2014) that the model is particularly useful to predict the *development* of binge eating, it remains unclear whether it is applicable to the *maintenance* of binge eating symptoms across the whole spectrum of disordered eating, including clinically significant cases, most notably BED.

2.5. Binge Eating within the Transdiagnostic model for Eating Disorders

Fairburn's cognitive-behavioural transdiagnostic approach to eating disorders (Fairburn, 2008; Fairburn et al., 2003) is currently recognized as the most comprehensive model of eating disorders (Figure 5). This approach is derived from the Cognitive-Behavioural Therapy and is

based on the notion that eating disorders share the same underlying distinctive psychopathology, which translates into specific characteristics, attitudes and behaviours (Fairburn, 2008; Fairburn et al., 2003; Fairburn & Cooper, 2007; Fairburn & Harrison, 2003; Favaro et al., 2003). In fact, this approach posits that the way these disorders are defined as distinct nosological entities is somehow arbitrary as "more or less the same psychopathology is seen across the eating disorder diagnoses, and its severity is much the same too" (Fairburn, 2008, p. 10).

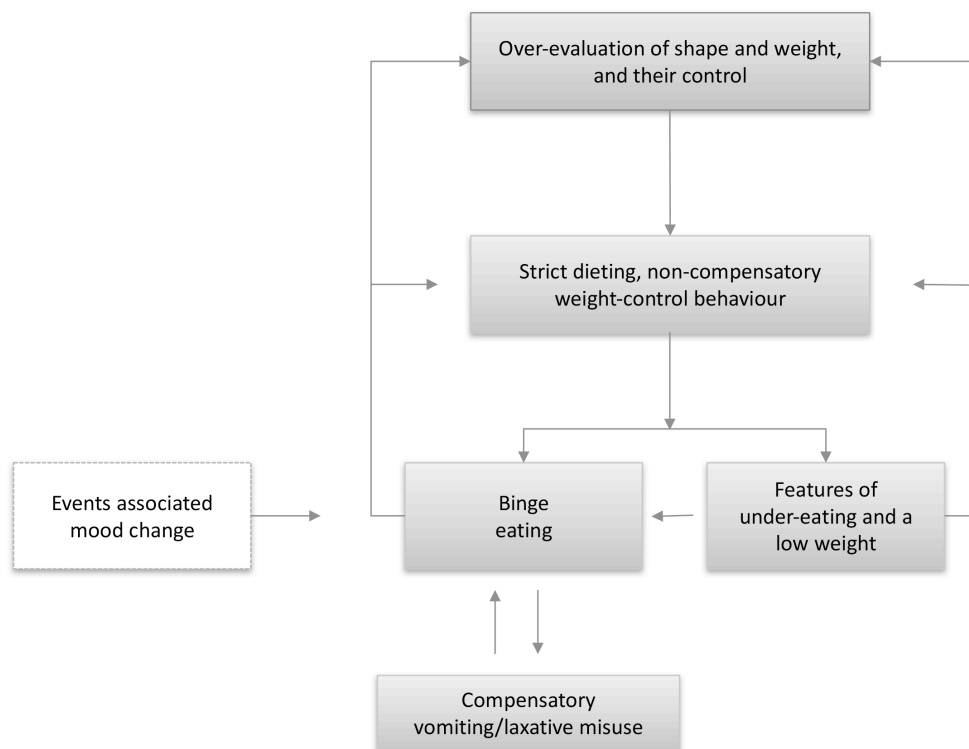


Figure 5 | Transdiagnostic cognitive-behavioural model of maintenance of eating disorders (adapted from Fairburn, 2008)

According to the transdiagnostic model, eating disorders are cognitive problems that share the same "core psychopathology" and transdiagnostic mechanisms, which account for the persistence of the disorder (Cooper & Fairburn, 1993; Fairburn, 2008; Fairburn et al., 2003). It is this "core psychopathology" that brings these disorders closer together and clearly differentiates them from other clinical conditions (Meyer, Waller, & Waters, 1998; Murphy, Straebl, Cooper, & Fairburn, 2010) and healthy controls (Grilo et al., 2008; McFarlane, McCabe, Jarry, Olmsted, & Polivy, 2001). This "core psychopathology" refers to the overvaluation of body weight, shape and the ability to control them (Cooper & Fairburn, 1993; Fairburn, 2008). This dysfunctional scheme

for self-evaluation is key to the maintenance of these disorders (Fairburn et al., 2003; Fairburn, Peveler, Jones, Hope, & Doll, 1993). This overvaluation means that unlike most people whose self-worth is based on their achievements and performance in a variety of domains of their lives (e.g., work, quality of interpersonal relationships, performance in sports), in individuals with eating disorders their sense of self-worth is primarily or even exclusively determined by their weight and body shape, and by their ability to control them. Overvaluation of weight and shape is distinct from body image dissatisfaction or shape and weight-related concerns, which may be more contingent upon mood or actual physical appearance. Overvaluation of weight and shape represents a stable construct that reflects core negative beliefs about the self (Cooper & Fairburn, 1993; Fairburn, 2008). The clinical features of eating disorders, including the distinctive attitudes and behaviours presented by these patients regarding body weight, shape and eating behaviour, stem directly from this "core psychopathology", and these clinical features, in turn, reinforce this over-evaluation and the disorder.

Patients with eating disorders feel a need to control body weight, shape and eating, to an extent that has a great impact on eating habits. Patients engage in sustained and extreme attempts to restrict eating behaviour, in qualitative (e.g., excluding all carbohydrates) or quantitative (e.g., eating 800 kcals a day) terms. In addition, their eating behaviour becomes dominated by multiple demanding, rigid, highly specific dietary rules designed to control and limit food intake, and that are also used as a measure for self-evaluation (Fairburn, 2008; Fairburn et al., 2003). According to this model, dieting characterizes the initial stage of the eating disorder. It is important to note that many people engage in dieting practices, some of which are extreme, and do not develop an eating disorder. The combination of predisposing factors (e.g., individual, sociocultural, and familiar) may account for why some individuals persist and intensify pathological dieting. If dietary restraint is successful and patients are able to sustain dietary restriction (i.e., effective undereating in the physiological sense), this often results in a significant weight loss and in the development of adverse physical (e.g., cardiovascular problems, bone density impairments) and psychosocial consequences (e.g., social withdrawal, increased obsessionality) that are in themselves consequences and maintenance mechanisms of the disorder (Murphy et al., 2010).

Other features of eating disorders that derive from and feed the "core psychopathology" of these patients include the frequent body weight and shape checking (e.g., repeatedly weighing oneself, pinching or measuring parts of the body, or analyzing one's body in the mirror) or body

weight and shape avoidance (e.g., avoiding mirrors, social situations where one's body may be more exposed) and negatively comparing one's physical appearance to others, which increase the over-concern with body weight, shape and eating (Shafran, Fairburn, Robinson, & Lask, 2004)

Binge eating is another feature of patients with eating disorders. In fact, as mentioned above binge eating is a defining feature of BN, BED, and a prominent associated feature of AN and EDNOS. Binge eating is theorized to emerge within the context of the inflexible dietary plan that patients with eating disorders follow or struggle to follow. Failing to meet the rigid, highly demanding and specific dietary rules that these patients impose to themselves is virtually inevitable (and this is true to all individuals who engage in dieting behaviours). When this happens, patients tend to react excessively negatively and to see this as evidence for their poor self-control and lack of self-worth (given that it is for these patients contingent with body weight and shape and their ability to control them). Often they tend to temporarily abandon their efforts to restrict eating behaviour. This gives rise to a pattern of eating in which attempts at dietary restriction are followed by episodes of binge eating. This cyclical pattern is often seen in patients with BN (Cooper & Fairburn, 1993; Fairburn, 2008; Fairburn et al., 2003; Fairburn & Harrison, 2003).

Binge eating is experienced by patients as highly distressing and as evidence for their lack of self-worth. These episodes greatly intensify the patients' concerns with their body weight and shape and future attempts to control eating behaviour. Binge eating is therefore theorized to maintain the "core psychopathology" of eating disorders. In agreement with affect/emotion regulation approaches, this model also suggests that difficult life events and associated negative affect increase the likelihood of binge eating. By allowing a temporary relief or distraction from these negative internal experiences, binge eating is maintained through negative reinforcement. Binge eating may be followed by compensatory behaviours (e.g., vomiting or laxative misuse; Fairburn, 2008).

This model additionally proposes that besides these distinctive features of eating disorders, some patients may also present other features that may contribute to the maintenance of the disorder and that should be addressed in treatment. These include clinical perfectionism, low self-esteem and interpersonal difficulties (Fairburn, 2008; Fairburn & Harrison, 2003).

The transdiagnostic migration between the established diagnoses over the course of the disorder is another prominent hallmark of this model. According to this approach the restrictive stage of the disorder usually occurs in the onset of adolescence and, when a significant amount of weight

is lost, patients usually meet the diagnostic criteria for AN. However, binge eating and weight gain are common consequences among these patients, with around half of them progressing to BN or to EDNOS. Notably the age of onset of BN is late adolescence and throughout the course of the disease patients tend to migrate between full and subthreshold BN or EDNOS. The authors also propose that other patients tend to meet diagnostic criteria for BN or EDNOS from the outset and move between the two diagnoses over the course of the disorder (Fairburn, 2008; Fairburn et al., 2003; Fairburn, Cooper, Doll, Norman, & O'Connor, 2000; Fairburn et al., 2003). Nonetheless, evidence is scant on whether BED follows these migration patterns or whether there are specific pathways proposed by this model that may be more applicable to BED than others. Future research that investigates the applicability of this model considering the currently established definitions of BED (which now shares with BN the same criteria regarding the required frequency on binge eating episodes) are required to ascertain how close is BED to the other eating disorders regarding fundamental maintenance mechanisms of these disorders.

2.5.1. Does BED fit into the "core" of eating disorders?

Generally, clinicians and researchers tend to corroborate Fairburn's proposal that overvaluation of shape and weight is at the "core" of eating disorders, regardless of the diagnostic group (Fairburn et al., 2003; Grilo, 2013). As such, this dimension has been considered a diagnostic criterion for AN (i.e., "undue influence of body shape and weight on self-evaluation") and BN (i.e., "self-evaluation is unduly influence by body shape and weight" (APA, 2013). The role that overvaluation of weight and shape plays in BED has also been largely debated but this dimension was omitted from the BED's diagnostic scheme in DSM-5.

There is evidence that individuals with BED present levels of shape and weight concerns similar to individuals with AN and BN, and higher than normal weight and overweight/obese individuals without BED (Eldredge & Agras, 1996; Goldschmidt et al., 2010; Lewer, Nasrawi, Schroeder, & Vocks, 2016; Masheb & Grilo, 2000; Striegel et al., 2010; Wilfley et al., 2000). Several studies have shown that overvaluation of weight and shape in individuals with BED is significantly associated with elevated levels of eating-related psychopathology (Grilo et al., 2009; Grilo et al., 2015; Grilo et al., 2010; Grilo et al., 2008), and body image difficulties (Pearl, White, & Grilo, 2014; Reas, Grilo, Masheb, & Wilson, 2005), and worse post-treatment outcomes (Masheb & Grilo, 2008). There is also research showing that the overvaluation of shape and weight used in determining self-worth in patients with BED is associated with general psychopathology,

psychosocial impairment, and decreased quality of life, despite degrees of overweight (Grilo et al., 2009; Grilo et al., 2015; Grilo et al., 2008; Latner & Clyne, 2008; Mond, Hay, Rodgers, & Owen, 2007). Goldschmidt and colleagues (2010) found that overvaluation of shape and weight was associated with impaired psychosocial functioning in women with BED, including increased general psychopathology, social dysfunction, and binge eating-related distress. Moreover, overvaluation of shape and weight significantly predicted the diagnosis of BED in relation to other psychiatric disorders. A recent study conducted in obese patients with BED revealed that this process of excessively basing one's self-evaluation on weight and shape significantly mediated the association between self-esteem and the internalization of weight bias stigmatization (Pearl et al., 2014). Weight bias stigmatization is significantly associated with a series of physical and mental health negative consequences, including the degree of disordered eating behaviours such as binge eating (Latner et al., 2008; Pearl et al., 2014).

Some evidence therefore suggests that overvaluation should be a required criterion addition for BED (Hrabosky, Masheb, White, & Grilo, 2007; Mond et al., 2007), while other indicates that it should be considered as a diagnostic specifier providing information regarding the severity of the disorder (Goldschmidt et al., 2010; Grilo et al., 2009; Grilo et al., 2015; Grilo et al., 2010; Grilo et al., 2008). The exclusion of excessive emphasis on shape and weight for one's sense of self-worth from the diagnostic features of BED in DSM-5 (APA, 2013), remains controversial, may have implications for advances in future prevention and treatment approaches and is an issue still to be resolved. Current evidence suggests a need for continued research into the role that physical appearance plays in the development and maintenance of BED, the severity of binge eating symptoms and associated physical and emotional difficulties (Ahrberg, Trojca, Nasrawi, & Vocks, 2011).

3. Acceptance and Commitment Therapy transdiagnostic approach to eating psychopathology

A more recent approach to understand eating psychopathology is framed within the Acceptance and Commitment Therapy model (ACT; Hayes et al., 1999). ACT follows a transdiagnostic perspective that is applicable not only to eating disorders but to a wide spectrum of mental health difficulties. Although the ACT model recognizes the utility of syndrome classification, as a means to facilitate the communication between clinicians and researchers, it offers a

fundamentally different conceptualization and treatment approach to psychological problems, including eating disorders (**Figure 6**). ACT has its theoretical roots on Relational Frame Theory (RFT), a basic science model of human language and cognition (Barnes-Holmes, Barnes-Holmes, Hayes, & McHugh, 2004; Barnes-Holmes, Hayes, & Dymond, 2001; Hayes, Strosahl, & Wilson, 2012; Torneke, 2010), and is founded on functional contextualism, focusing therefore on the context in which behaviours emerge and the functions and mechanisms through which the behaviours are maintained (Hayes et al., 1999).

According to the ACT model psychological suffering is an inevitable experience because the human brain operates through complex language and cognitive mechanisms that make psychological pain possible in the absence of an actual painful stimulus (Fletcher & Hayes, 2005; Hayes et al., 1999; Torneke, 2010). For instance, a memory of being criticized by a parent or mocked by our friends in school, may be just as painful as if the event was taking place and felt similarly threatening as a threat to our physical self (Luoma & Platt, 2015). Moreover, because human language allows the arbitrary connection between virtually all stimuli, psychological suffering may become a ubiquitous experience (e.g., having one's body exposed, for instance when going to the beach, can occasion painful thoughts and emotions about one's body weight or shape and fears of judgment from others, regardless of the occurrence of actual aversive consequences in that moment; Barnes-Holmes et al., 2004). This has consequences for one's behavioural repertoire, which becomes narrower and more inflexible. This tendency to view cognitive events as though they were literally true, and for one's behaviours and experience to become overly dominated by cognition (e.g., stop going to the beach) rather than by other sources of behavioural regulation or direct experiences, is known as cognitive fusion (Gillanders et al., 2014; Hayes, 2004; Hayes et al., 2006; Hayes et al., 2012; Luoma & Hayes, 2003; Orsillo, Roemer, & Holowka, 2005).

Moreover, this model theorizes that as human behaviour evolved to avoid painful stimuli, our internal experiences (painful thoughts, difficult emotions, memories, sensations) can become targets of avoidance. Experiential avoidance involves the attempt to change, escape, diminish or control the occurrence of these internal experiences (Blackledge & Hayes, 2001; Hayes, 2004; Hayes et al., 1999). This process is however futile because we are not able to control these internal events the way we may be able to avoid or control external threats. Thus, experiential avoidance may carry the unintended opposite consequence of increasing the intensity,

frequency and dominance of such unwanted internal experiences (Hayes et al., 2006; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996).

Cognitive fusion and experiential avoidance are conceptualized as key mechanisms contributing to, and maintaining psychological inflexibility, which ACT posits as being at the core of human suffering and of the many forms of psychopathology (Hayes et al., 2006), including eating disorders (Dudek, Ostaszewski, & Malicki, 2014; Masuda, Boone, & Timko, 2011; Merwin & Wilson, 2009; Merwin et al., 2011; Sandoz et al., 2010). Psychological inflexibility also involves and is fostered by the inability to contact the present moment and one's life values and by an inflexible and rigid self-identity (e.g., "Being fat makes me inferior and unlovable"). Thus, according to the ACT model, psychological problems are not caused by negative thoughts or emotions. They are a consequence of this tendency to become entangled and overly dominated by thoughts and emotions, establishing a rigidly inflexible relationship with one's conceptualizations about oneself or the world, engaging in attempts to avoid negative thoughts and emotions, while losing touch with what is truly important and valued and could bring a sense of purpose and overall well-being (Hayes et al., 1999; Hayes et al., 2012; Kashdan & Rottenberg, 2010; Merwin & Wilson, 2009; Sandoz et al., 2010). The model proposes that these processes reinforce psychological inflexibility (Hayes et al., 1999; Hayes et al., 2006; Kashdan & Rottenberg, 2010).

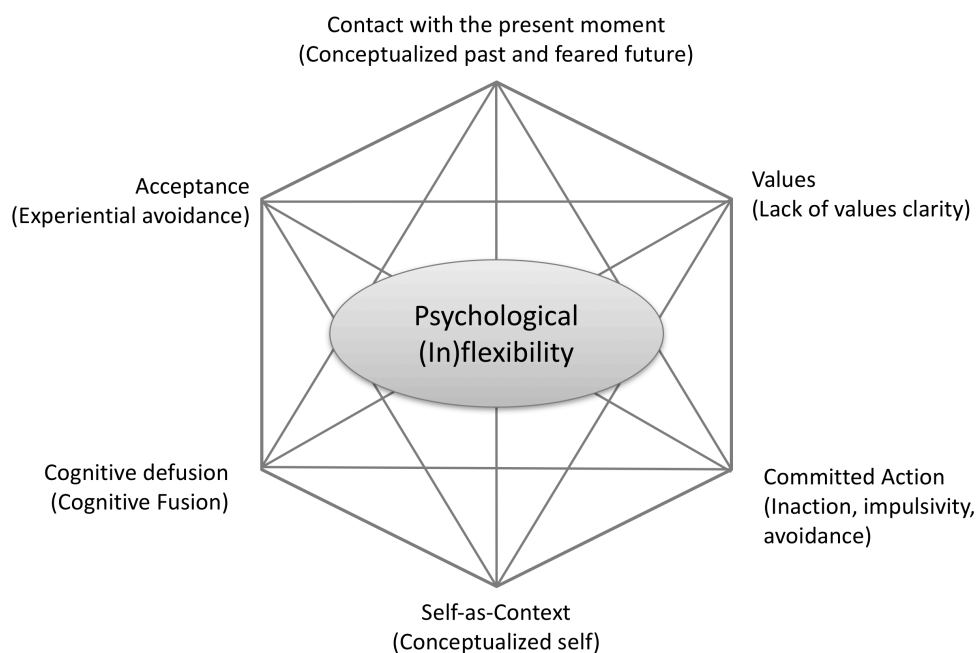


Figure 6 | ACT model of psychopathology and therapy (adapted from Hayes, 2004).

There is now a consistent body of evidence that psychological inflexibility and the processes of cognitive fusion and experiential avoidance contribute to a broad range of physical and mental health problems (Hayes, 2004; Hayes et al., 2006). Studies also suggest that these constructs are relevant to weight control (Forman et al., 2013; Hooper, Sandoz, Ashton, Clarke, & McHugh, 2012; Lillis & Hayes, 2008; Lillis, Hayes, Bunting, & Masuda, 2009; Lillis & Kendra, 2014) and body image and eating related problems (Ferreira, Palmeira, & Trindade, 2014; Ferreira & Trindade, 2015; Ferreira, Trindade, Duarte, & Pinto-Gouveia, 2015; Hill, Masuda, & Latzman, 2013; Juarascio, Forman, & Herbert, 2010; Juarascio et al., 2016; Manlick, Cochran, & Koon, 2013; Masuda et al., 2011; Moore, A., Hill, & Goodnight, 2014; Sandoz, Wilson, Merwin, & Kellum, 2013; Trindade & Ferreira, 2014; Wendell, Masuda, & Le, 2012).

Disordered eating and related problems are conceptualized in ACT as problems of psychological inflexibility (Sandoz et al., 2010) and are understood from a functional contextual perspective, that is, by looking at the context from which they emerge and by considering the role they are playing in the life of the person. From a functional contextual perspective, our modern sociocultural context, that informs the individual that a slender physical appearance is socially valued and should be pursued as means to obtain social approval and acceptance, plays an important role in shaping the person's attitude towards eating, body weight and shape. The meaning attributed to food and eating is also very much influenced by this sociocultural context. For humans, the function of eating, greatly surpasses the biological function of keeping us alive. Since the day we are born, eating becomes contingent on social reinforcement. From the infant-mother interaction while feeding, to the child who is praised or criticized by the amount or type of food he/she have eaten or by eating at a certain pace, to social situations and celebrations (e.g., Christmas, family or friends' reunions), to moments when food is used as a way to soothe distress (e.g., offering a candy to a child after vaccination) social and emotional contingencies around food are constantly reinforced in our culture (Dudek et al., 2014; Sandoz et al., 2010), although the magnitude and direction of such reinforcement varies hugely between individuals and situations. The social context may also shape the relationship one establishes with one's internal experiences. There is evidence that the quality of rearing experiences is associated with later difficulties in experiencing certain negative emotions deemed as aversive and with experiential avoidance (Dinis, Carvalho, Pinto-Gouveia, & Estanqueiro, 2015; Gratz, Bornovalova, Delany-Brumsey, Nick, & Lejuez, 2007). From an early age children are encouraged to label certain emotions as bad and to solve or avoid them as a way to self-regulate (Thompson & Goodman, 2010). From the ACT perspective, disordered eating and related problems emerge

from this context in which certain internal experiences are seen by the individuals aversive and *need* to be avoided (Hayes et al., 2006; Sandoz et al., 2010; Sandoz et al., 2013).

Disordered eating symptoms may then be seen as a result from the entanglement with body image (e.g., rigid cognitions and beliefs that one's self-worth and happiness are contingent on pursuing a specific physical appearance) and eating (e.g., disturbing and unwanted thoughts about craving certain foods, fears of losing control over eating and guilt about the perceived failure in following a rigid dietary plan) related cognitions (Ferreira, Pinto-Gouveia, & Duarte, 2011; Masuda et al., 2011; Sandoz et al., 2010; Wendell et al., 2012). These cognitions may then come to dominate behaviour, either by promoting attempts to follow and maintain excessively rigid dietary rules and/or by enticing overeating or binge eating as means of escaping such negative thoughts, and unwanted emotions or physical sensations (Hill, Masuda, Melcher, Morgan, & Twohig, 2015; Lillis, Hayes, & Levin, 2011; Sandoz et al., 2010). Although disordered eating symptoms may have different manifestations in different individuals and depending on different contexts, these symptoms – extreme attempts to adopt inflexible eating patterns (while neglecting contextual cues and at the expense of physical and mental health), overeating, loss of control of eating, binge eating, body image avoidance – ultimately serve the same *function* of trying to manage and/or escape negative cognitions and emotions (Manlick et al., 2013; Sandoz et al., 2010). Nonetheless, as the person's behaviour becomes overly dominated by these attempts, his/her sense of self and behaviours become increasingly inflexible and tend to be maintained despite actual aversive consequences. In this context, the person moves further away from his/her personal goals and values and experiences increased psychological ill-being and suffering (Hayes, 2004; Lillis & Kendra, 2014; Merwin & Wilson, 2009; Sandoz et al., 2010).

Despite these compelling suggestions, the role that the processes of cognitive fusion and experiential avoidance play on the continuum of binge eating symptomatology were never systematically investigated.

4. Eating psychopathology from an evolutionary perspective

4.1. The importance of social attractiveness

Our mind and brain is the result of evolution, of pre-existing designs that were adapted to changing environments. The human brain shares with other species many functions and

motivations, such as reproduction, gaining and defending territory, displays of aggressiveness and submissiveness, the establishment of alliances and social hierarchies and infant-caring motivations and behaviours. The competencies for complex thinking, reflection, theory of mind and self-awareness, emerged later in the evolutionary history (Buss, 2003; Gilbert, 1989, 2002). Our brain is therefore the product of a series of changes and adaptations that undoubtedly offered humans' an evolutionary advantage, but that can also create difficulties and disadvantages in our modern environment.

Humans are highly sensitive to signals of disapproval, criticism or rejection from others, because belonging to the group was critical to survival. From the beginning of human history, a series of mental mechanisms and competencies may have developed to track whether one presented characteristics valued by the social group. Those who presented those qualities may have had better access to social resources essential for their survival and prospering, such as the support from others, the establishment of advantageous social alliances and sexual partners. Those seen as lacking such qualities may have lost in this competition for social resources and suffered the threat of being ostracized, abandoned or rejected. These competencies to track whether one is valued by the group and to attend to such social threats, are set from early childhood onwards through adolescence and involve self-other representations, theory of mind (i.e., the ability to make judgements about what others may be thinking), awareness of the contingencies for approval and disapproval, and competencies for role-taking and understanding social rules (Gilbert, 1989, 2002).

Theoretical accounts suggest that humans are highly motivated to compete to be approved, accepted and valued and to avoid being stigmatized or rejected (Baumeister & Leary, 1995; Kurzban & Leary, 2001; Leary, 2007). To succeed in the dynamics of this competition, humans try to stimulate a positive image of oneself and positive emotions in others, to be perceived as an attractive social agent and a valuable resource (Gilbert, 1997, 2002, 2003; Gilbert, 2007). The display of aggressiveness and dominance over others to defend the self, gain resources and get to high rank positions have also been strategies commonly used by humans (and other animals) throughout history (Gilbert & McGuire, 1998). To track one's attractiveness to others, one has to be aware of what are the qualities valued by the social group, within a specific sociocultural context (e.g., physical appearance, display of aggressiveness and dominance, or display of caring and cooperative features). When one perceives that one lacks such qualities, and instead is an unattractive social agent, shame is activated.

4.2. What is shame? - Definition and characterization

Shame is a powerful, painful and complex emotion that permeates the human experience (Gilbert, 1997, 1998; Kaufman, 1989; Nathanson, 1994). Shame is defined as a secondary, higher-order or self-conscious emotion (Gilbert, 2002; Lewis, 2003; Tangney & Dearing, 2002; Tangney & Fischer, 1995) that unfolds from humans' competencies to construct the self as a social agent, and from the need to compete to be acceptable or desirable to others and avoid social threats (Gilbert, 1989; Gilbert & McGuire, 1998). Shame is therefore a self-focused but inherently social emotion (Leeming & Boyle, 2004) that involves both self-evaluations and evaluations of the self as it believes to exist for others (Gilbert, 1989, 2003; Tangney & Dearing, 2002). According to the evolutionary biopsychosocial model of shame (Gilbert, 1997, 1998, 2002, 2003, 2007), shame is conceptualized as being activated in the face of social threats, involving perceived losses in social status, and experiences of being diminished, ridiculed, devalued, discredited, dishonoured, demoted, ostracized or rejected by others (Gilbert, 1997, 1998, 2007; Kaufman, 1989; Nathanson, 1994; Tangney & Fischer, 1995). In the face of such threats to the social self, a blend of negative primary emotions (e.g., anxiety, anger, disgust) and behavioural (e.g., inhibition, submissiveness, concealment) outputs may be activated (Lewis, 2003; Tangney & Fischer, 1995). In fact, shame can be understood as an "affective-defensive response to the threat of, or actual experience of, social rejection or devaluation, because one is, or has become an unattractive social agent" (Gilbert, 2002, p. 7) and may be demoted, excluded or rejected by the social group, instead of chosen for important advantageous social relationships (e.g., receiving support from others, establishing alliances, forming sexual bonds, pursuing status-related resources).

Shame is a subjective experience in the sense that it emerges from the meaning attributed to the event rather than the actual event (Tangney & Dearing, 2002; Tangney & Fischer, 1995), and while some individuals may be able, to some extent, to tolerate shame, others find shame unbearable and find themselves engaging in several ways to avoid shame-eliciting situations/contexts or the emotion itself. Also, the focus of shame may vary (e.g., physical appearance, personal characteristics or certain behaviours) and is very much if not almost entirely influenced by sociocultural norms and values (Fessler, 2007; Leeming & Boyle, 2004).

Shame has been highlighted as a key factor contributing to a variety of mental health problems, including depression (for a review see Kim, Thibodeau, & Jorgensen, 2011), anxiety (Fergus, Valentiner, McGrath, & Jencius, 2010; Irons & Gilbert, 2005; Pinto-Gouveia & Matos, 2011), social anxiety (Gilbert, 2000a; Matos, Pinto-Gouveia, & Gilbert, 2013), paranoia (Matos et al.,

2013; Pinto-Gouveia, Matos, Castilho, & Xavier, 2014), personality disorders (Brown, Linehan, Comtois, Murray, & Chapman, 2009; Schoenleber & Berenbaum, 2010), and body image disturbances and eating disorders (Ferreira, Matos, et al., 2014; Ferreira, Pinto-Gouveia, & Duarte, 2013a, 2013b; Gee & Troop, 2003; Goss & Allan, 2009; Keith, Gillanders, & Simpson, 2009; Matos, Ferreira, Duarte, & Pinto-Gouveia, 2015; Pinto-Gouveia, Ferreira, et al., 2014; Swan & Andrews, 2003; Troop, Allan, Serpell, & Treasure, 2008). Nonetheless, key to understand the effect that shame may have on psychological health is to consider: i) the social context that determines what is valued and what makes the individual shameful; ii) what is the individual responsibility to that context and to that experience of believing to be shameful.

4.2.1. The internal and external dimensions of shame

Drawing on what was outlined above, shame can be understood as an internal warning signal that one has lost attractiveness in the social domain, is not able to create positive feelings in others but rather is stimulating a negative view of the self (e.g., as unattractive, flawed, inferior) and negative feelings in others (e.g., contempt, anger, disgust). Hence, this negative affective experience is a socially-shaped (involving negative social evaluations that one has lost value as a social agent) self-focused (involving self-related cognitions and evaluations) phenomenon. Thus, in the conceptualization of shame, an important distinction has been made between external shame and internal shame (Gilbert, 1989, 1997, 1998, 2002, 2003).

In external shame one's attention and cognitive processing is externally focused on how one exists in the minds of others. Thus, it refers to evaluations focused on how one believes others judge and feel about oneself, involving the sense that one is failing to create positive feelings of the self in the minds of others but rather that others are looking down on the self, criticizing the self and seeing the self as flawed, inadequate, worthless, or unattractive. The fear in external shame lies in being rejected, excluded, ostracized or even attacked by others. These evaluations activate therefore a series of defensive behaviours aimed at diminishing such threats through avoidance of exposure, submissiveness, appeasement or concealment. Stigma consciousness is a concept related to external shame as it involves evaluations that one has characteristics that are stigmatized or that makes one belong to a stigmatized group (Pinel, 1999).

Internal shame involves negative self-evaluations of the self as being personally flawed, inadequate, inferior, worthless, undesirable and unattractive (Gilbert, 1998, 2003; Kaufman, 1989; Nathanson, 1994). Thus, in internal shame, the attentional and cognitive processing are

inwardly focused on one's attributes, features, emotions, behaviours, shortcomings and flaws, activating attempts to control, conceal, compensate for, or even get rid of certain parts of the self (Gilbert, 2007). Internal shame can then be understood as the internalization and identification with the minds' of others, such as the person starts to self-devalue and criticizing the self.

4.3. Self-criticism

Self-criticism can be conceptualized as an internal shaming process (Gilbert, 2002, 2007, 2010; Gilbert, Clarke, Hempel, Miles, & Irons, 2004). It functions as a self-monitoring strategy that activates an internal hostile signal when the self faces setbacks, difficulties, limitations or social threats to one's social status. In this sense, self-criticism can be understood as a maladaptive emotion regulation process that has the function of activating defensive responses to cope with such threats and improve or correct one's behaviours or personal features to (re)gain attractiveness (Gilbert, 1989, 2000b; Gilbert & Irons, 2005).

Self-criticism has been conceptualized as a complex construct occurring in a continuum with distinct functions (Driscoll, 1989; Gilbert et al., 2004; Thompson & Zuroff, 2004). Self-criticism may alert the individual of its flaws and influence necessary change, but in the other end of the spectrum reside self-attacking and self-disapproving thoughts and self-hatred, which discourage the individual (Holm-Denoma, Otamendi, & Joiner, 2008). Gilbert and colleagues (2004) suggested that self-criticism involve self-evaluations and feelings of inadequacy and inferiority related to personal failures or setbacks, focused on aspects of the self that should be corrected or improved; and a more severe form of self-criticism, characterized by feelings of disgust, contempt, aversion and hatred for the self along with desires of self-punishment (i.e., to hurt, persecute or attack the self). A more constant tendency to cope with setbacks of failures through this hostile form of self-relating, in which the individual persecutes and attacks the self, and the consequent activation of defensive strategies (e.g., submission) leads to feelings of constant defeat against one's own attacks, increasing the vulnerability to psychological suffering. There is consistent evidence that self-criticism, specially in this more pathogenic form, is associated with poorer mental health (Castilho, Pinto-Gouveia, & Duarte, 2015; Gilbert et al., 2010; Harman & Lee, 2010; Luyten et al., 2007; Pinto-Gouveia, Castilho, Matos, & Xavier, 2013), namely binge eating (Dunkley, Masheb, & Grilo, 2010; Dunkley & Grilo, 2007).

4.4. Evolution of emotion regulation systems

Humans' motivations for gaining social status, developing advantageous social relationships, creating attachment and caring for offspring are guided and strengthened by emotional systems (Gilbert, 1989, 2010). Emotions signal whether we are being successful or not in achieving these biosocial goals, regulating motivation, attention and behaviour (Panksepp, 1998). Based on evolutionary analysis and affective neuroscience research (Depue & Morrone-Strupinsky, 2005; LeDoux, 1998; Panksepp, 1998), Gilbert (2005, 2007, 2009) outlined a model that describes three major types of emotion regulation systems. These are complex interacting systems and the model is illustrative rather than exhaustive. A depiction of these systems is presented in **Figure 7**.

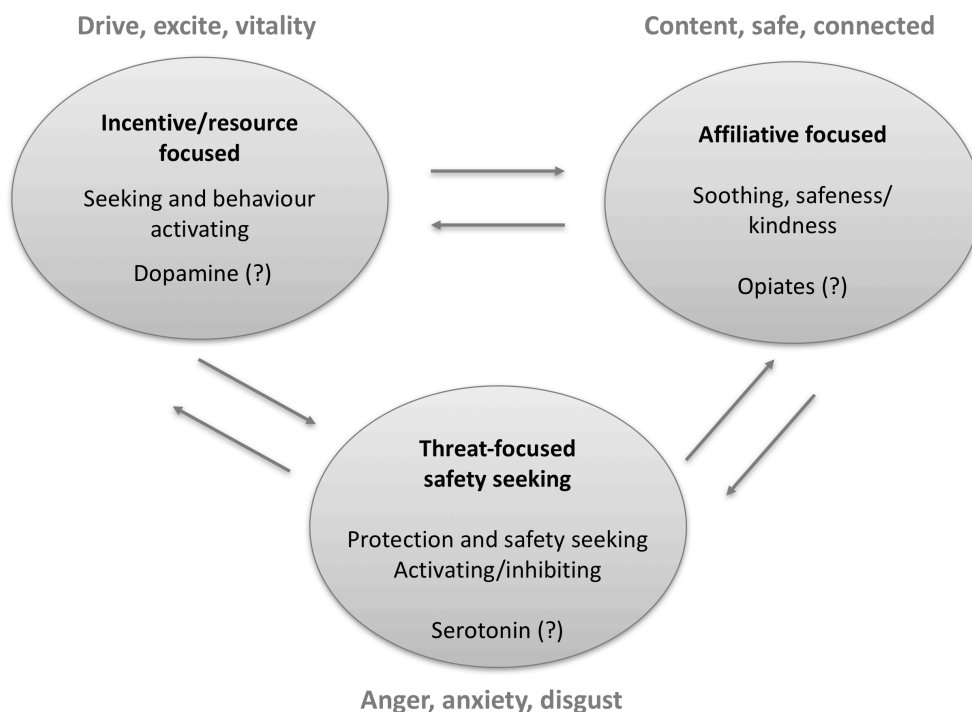


Figure 7 | Affect regulation systems (adapted from Gilbert, 2005).

The first system is the threat and protection system, a system that evolved to quickly detect potential threats (through attention focusing and biasing) and respond to them with defensive emotions (e.g., anger, anxiety or disgust), and defensive behaviours (e.g., fight, flight and submission). Due to our evolved capacity for symbolic thinking, the threat system can be activated not only by external stimuli (e.g., threatening social interactions, including criticism, rejection, physical attacks), but also by internal stimuli, including shame and self-criticism (e.g., a

sense of being inferior, unattractive, worthless, self-hatred, self-contempt), rumination, worry, conditioned emotional memories (e.g., of early adverse experiences with attachment figures or peers). Research suggests that negative early life experiences (e.g., victimization experiences) may sensitize the threat protection system, contribute to the construction and rigidification of a shameful sense of self, and to the development of conditioned defensive strategies. These are particularly important assumptions for the current dissertation which examined the role of adverse events in childhood and adolescence and how they may come to be associated with threat-focused emotions and cognitions, notably shame and self-criticism, and disordered eating behaviours. From what has been explored before, eating as way to escape or diminish the intensity of negative emotions may be understood as a maladaptive threat-based response. Nonetheless, these relationships were never extensively examined.

The drive-resource activation system evolved as a means to keep the self motivated to engage in behaviours that contribute to pursuing and achieving important resources and awards (e.g., food, sexual opportunities, alliances, territories), through the activation of a range of positive feelings that energize, give pleasure, excite and give joy when these goals are attained. This system is thought to be associated with the dopamine system, giving rise to arousal and feeling energized. For instance, positive feelings of excitement, achievement and pride when starting a new diet operate through this system. Nonetheless, these positive emotions are often fleeting, as perceived failures in maintaining the diet may activate the threat system, triggering threat-based emotions and defensive behaviours (which may circularly intensify the activation of the drive system).

A different type of positive feelings involve those associated with the safeness soothing system. It involves feelings of peaceful well-being, quiescence and contentment with the way things are in the moment. It is associated with endorphins/opiates and with the affiliative hormone oxytocin and is believed to mediate feelings of well-being, fulfillment, social safeness and contentment (Depue & Morrone-Strupinsky, 2005; Gilbert, 2009, 2010). This system is associated with the attachment system, being activated by signals of acceptance, care, support and kindness from others (Bowlby, 1969; Porges, 2007). These social signals stimulate the development of safe internal working models of the self and others and are fundamental to down-regulate threat (Cacioppo, Berston, Sheridan, & McClintock, 2000; Gilbert, 2009, 2010; Gilbert et al., 2009; Matos, Pinto-Gouveia, & Duarte, 2015)

4.5. How do early life experiences shape self-identity and emotion regulation?

As a highly social species, some aspects of humans' physiological and psychological states are regulated through social relationships (Baumeister & Leary, 1995; Bowlby, 1969; Buss, 2003; Cozolino, 2007; Gerhardt, 2004; Gilbert, 1989; Schore, 1994; Siegel, 2001). We seek to stimulate a positive image of the self in the minds of others to establish advantageous relationships, and to avoid losing care and support, being rejected or even attacked by others (Gilbert, 1989). Early positive social relationships stimulate the safeness system and promote a sense of being loved, accepted, valued, cared for and chosen by other for important social roles (e.g., as a friend, a team member, a lover) and promote feelings of safeness, connectedness, and of belonging (Baumeister & Leary, 1995; Bowlby, 1969; Gilbert, 2005, 2010). There is evidence that growing up with a sense of safeness, of being nurtured, supported and cared for within the family is associated with physical and mental health, with positive emotion regulation and protects against various forms of psychopathology (Cacioppo et al., 2000; Cheng & Furnham, 2004; DeHart, Pelham, & Tennen, 2006; Irons & Gilbert, 2005; Matos et al., 2015; Mikulincer & Shaver, 2004; Richter et al., 2009; Schore, 1994, 2001).

On the contrary, growing up in a neglecting, rejecting, shaming, critical and abusive environments is associated with the activation of the threat system and evidence show that this has detrimental effects in later physiological and emotional regulation, increasing the vulnerability to physical and mental health problems (Gilbert, Cheung, Grandfield, Campey, & Irons, 2003; Perris & Gilbert, 2000; Schore, 1994, 2001). These early experiences may then lay the foundation for a shameful sense of self.

Moreover, there is compelling evidence that these experiences may have enduring detrimental effects throughout one's life. There is now a wealth of evidence that recollections of shame experiences from childhood and adolescence can be threat-activating memories that function as traumatic memories, eliciting symptoms of intrusion, hyperarousal and avoidance (Matos & Pinto-Gouveia, 2010; Matos, Pinto-Gouveia, & Duarte, 2012, 2013; Pinto-Gouveia & Matos, 2011). Moreover, these memories may structure autobiographical knowledge and become central to self-identity, structuring one's life story, forming a reference point to attribute meaning to past, present, and future experiences, and greatly influencing one's behaviours and social interactions (Dinis et al., 2015; Matos et al., 2012, 2015; Pinto-Gouveia et al., 2013; Pinto-Gouveia & Matos, 2011). These shame traumatic and central memories have been linked to a

series of indicators of poor psychological adjustment in adulthood, including increased external and internal shame, self-criticism, avoidance, depressive, anxiety and stress symptoms, social anxiety, paranoid symptoms and dissociation, in nonclinical samples from the general population (Dinis et al., 2015; Matos & Pinto-Gouveia, 2010; Matos, Pinto-Gouveia, & Costa, 2013; Matos et al., 2012; Matos, Pinto-Gouveia, & Duarte, 2013; Matos et al., 2015; Matos et al., 2013; Pinto-Gouveia et al., 2013; Pinto-Gouveia & Matos, 2011). Recent studies also found that recollections of shame experiences from childhood and adolescence, central to identity and with traumatic characteristics, play a significant role in the severity of eating disorders' symptoms presented by patients with eating disorders (Ferreira, Matos, et al., 2014; Matos et al., 2015).

4.5.1. The importance of attractiveness in the critical life period of adolescence

The dawning of adolescence intensifies the competition for social attractiveness. In fact, during this crucial developmental stage, alongside major physical changes, a series of relational and contextual changes are also precipitated. There is a movement away from the family towards peers, which become the key source for self-evaluation, support, approval and to define one's social status (Allen & Land, 1999; Wolfe, Lennox, & Cutler, 1986). This increases the adolescent concern about the features that are valued by the peer group and whether one is failing to display attractiveness or not (Eder, 1995; Gilbert & Irons, 2009). As the need to be seen as attractive by the peer group to belong and to seek key biosocial goals becomes prominent, so does the potential to experience shame and self-criticism. Perceptions of inferiority when comparing oneself with others, fears of or actually experiencing discrimination, rejection, criticism, teasing, belittle, physical attacks, or other forms of peer bullying and victimization, may be particularly harmful shame experiences and significantly impact psychological adjustment (Copeland et al., 2015; Cunha, Matos, Faria, & Zagalo, 2012; Gilbert & Irons, 2009; Hawker & Boulton, 2000; Pinel, 1999; Smith & Brain, 2000).

In particular, victimization experiences are considered as a risk factor for the development of disordered eating symptoms (Engström & Norring, 2002; Kaltiala-Heino, Rimpelä, Rantanen, & Rimpelä, 2000), namely binge eating (Fairburn et al., 1998; Striegel-Moore et al., 2002). Cross-sectional and longitudinal studies indicate that weight and appearance-related teasing are significantly associated with body image and eating-related problems in adolescence (for a review see Menzel et al., 2010). Moreover, research suggests that negative interpersonal experiences can have a negative effect on eating behaviour even when these are not specifically

focused on the weight or appearance dimensions (Kaltiala-Heino, Rissanen, Rimpela, & Rantanen, 1999; Lunde, Frisén, & Hwang, 2006). It may be argued that adolescents' attempts to alter their body weight, size or shape (e.g., through the adoption of restrictive eating patterns) may be a strategy adopted to become closer to a valued ideal, to regain social status and avoid the social threat of being an inferior, ostracized and devalued social agent (Gilbert & Thompson, 2002; Goss & Gilbert, 2002; Pinto-Gouveia, Ferreira, et al., 2014). Nonetheless, these assumptions have never been systematically examined.

4.6. The mismatch between evolution and our modern sociocultural context

In light of the approach we have been exploring, social relationships are vital for our sense of safeness, to attain important biosocial goals and ultimately to our survival. Thus, for millions of years, humans have competed to be seen as attractive and obtain others' approval and acceptance and elicit their investment to assure a secure social rank position and access important social resources (Gilbert, 1997, 2002, 2003; Leary, 2007). Hence, to assure that one is displaying attractive features to others, one must be aware of what are the qualities valued by the social group, to have a feel of whether others are perceiving one as an attractive social agent, and/or in which domains one should invest in (Gilbert, 1997, 2000, 2002).

As our body is a part of us that can easily be observed and assessed by others, it early became an indicator of one's social attractiveness and a predictor of acceptance by the social group (Gatward, 2007; Gilbert, 2002; Abed, 1998). Nonetheless, what is valued or defined as attractive or unattractive by the social group is shaped by the cultural values adopted within a specific social ecology. The individuals' experience with his/her own body is therefore inherently associated with how one appears to others, being influenced by the sociocultural norms that inform the individual of what is acceptable, valued and appreciated, and what is unattractive and may render the individual vulnerable to stigmatization and to losses in social status (Abrams, 1996; Cohen, 2001; Gilbert, 2002).

4.6.1. Body image as a source of shame

"I never really wanted to be beautiful", she tells the doctor (...)

"I want to belong; I want to be like everybody else".

(Serling & Heyes, 1960; The eye of the beholder)

Whether a certain physical appearance makes the individual attractive to the social group is greatly determined by the sociocultural values adopted by the group, within a specific cultural context at a specific period of time (Gilbert, 2002). The determinants of physical attractiveness have clearly shifted throughout the centuries. In fact, up until the nineteenth century excess weight and obesity were synonymous of beauty, health and high social status. Also, whereas in societies where food is scarce (e.g., certain African countries; Mokhtar et al., 2001), obesity is still a symbol of privilege and status, this is clearly not the case in today's culture.

In modern Western societies there is an emphasis in feminine attractiveness based on an excessively thin body shape (Buote et al., 2011; Strahan et al., 2006; Sypeck et al., 2006). Physical attractiveness is theorized by some authors (Fredrickson & Roberts, 1997; Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998) as a key component of the female gender role, with women constantly facing messages that their worth and how others treat them depends on how others perceive their physical self. According to the self-objectification theory (Fredrickson & Roberts, 1997; Fredrickson et al., 1998), women may then come to view themselves as objects for others to view and analyze. This process may then cause women to also scrutinize and monitor their physical appearance as they were outside observers, leading to an 'objectified body consciousness' (McKinley & Hyde, 1996). This particular form of consciousness involves three dimensions: body surveillance, which involves viewing the body as from an external perspective; body shame, entailing negative feelings about the self if one is failing to meet body standards; and appearance control beliefs, involving beliefs that one should be able control one's physical appearance).

The way media portrays and use women's bodies, and promotes the idea that the sociocultural thin ideal is easily attainable may contribute to this process. Furthermore, a pervasive message in our society is that thinness does not only equate having a body aesthetically attractive, but also mirrors social attractiveness, valued personality characteristics (e.g., willpower, determination self-control), happiness, power and success (Gilbert & Thompson, 2002; Strahan et al., 2006; Sypeck et al., 2006). These widespread messages are thought to be an important cause for why so many women feel dissatisfied with their body image (Buote et al., 2011; Strahan et al., 2006) – a phenomenon so common that is referred to as a normative discontent with the body (Rodin, Silberstein, & Striegel-Moore, 1984; Thompson, Heinberg, Altabe, & Tanleff-Dunn, 1999).

Body image dissatisfaction can begin early in life, with young adolescent girls being a particularly vulnerable population (Cash & Pruzinsky, 2002; Cusumano & Thompson, 2001; S. Gilbert & Thompson, 2002). In fact, among the other social and contextual challenges adolescents face in this developmental period of life, the onset of puberty and the physical transformations it carries (e.g., increase in body fat, enlargement of hips), may pull adolescent girls away from the sociocultural thin ideal. In fact, this unrealistic ideal is hardly attainable for most women, and reaching it may even be incompatible with normal physical maturation and health. On the contrary, pubertal maturation among boys brings them closer to the muscularity ideal. Thus, there is evidence that while adolescence girls experience greater body image dissatisfaction, body image satisfaction increases in boys during adolescence (Bearman, Presnell, Martinez, & Stice, 2006; Fortes, Conti, Almeida, & Ferreira, 2013).

Nonetheless, feeling dissatisfied about one's physical appearance, that is, perceiving that one's physical appearance is different or distant from the ideal body image, it not the same as body image shame. While many women who feel dissatisfied with their body image may feel ashamed because of their body, body image shame is not related with the aesthetics of physical appearance, but with what the body represents – the closeness or distance from a secure social rank position (Ferreira et al., 2013a). In this sense, even though women historically have been a more vulnerable target of messages proclaiming the importance of physical attractiveness and of displaying certain physical characteristics, the role that the physical appearance domain may have on one's sense of self-worth and of fitting within the social world, may operate similarly between men and women (e.g., Adams, Turner, & Bucks, 2005; Calogero, 2009; Dakanalis & Riva, 2013; Grogan & Richards, 2002; McCabe & Ricciardelli, 2003 ; McCreary & Sasse, 2002).

From this perspective, body image shame can be conceptualized as involving negative shaming evaluations that one's physical attributes (body shape, size, weight) make others view the self negatively, as unattractive, undesirable, defective, different, and which may cause them to criticize, reject, demote, cast aside or even attack the self (Gilbert, 2002; Gilbert & Thompson, 2002). As it has been previously explored, these negative evaluations about how one exists for others can also be internalized as negative self-evaluations of the self (e.g., as being inferior, rejectable, worthless), along with self-contempt disgust or even hatred (Gilbert, 2002; Matos, Pinto-Gouveia, & Duarte, 2013). These complex cognitive and affective states are thought to activate a series of defensive attitudinal and behavioural responses to protect the self against such social threats, including avoiding exposing one's body to others scrutiny or desires to

hide/conceal the body or parts of it (Gilbert, 2002), and can have a detrimental impact in eating behaviour (Dakanalis, Clerici, et al., 2014; Ferreira, Matos, et al., 2014; Ferreira et al., 2013a; Fitzsimmons-Craft, Bardone-Cone, & Kelly, 2011; Kelly & Carter, 2013; Matos et al., 2015; Noll & Fredrickson, 1998; Pinto-Gouveia, Ferreira, et al., 2014).

4.6.2. Stigmatization of overweight and overeating

Our current sociocultural context clearly establishes that a slender (in the case of women) or a muscular body (in the case of men) and restrictive eating patterns should be pursued as means to be valued and praised by the social group (Adams et al., 2005; Ferreira et al., 2013a; Gilbert, 2002; Grogan & Richards, 2002; McCabe & Ricciardelli, 2003 ; Pinto-Gouveia, Ferreira, et al., 2014), and that failing to meeting these standards increases the risk of social diminishment, ostracism, criticism or rejection (Kurzban & Leary, 2001; Puhl & Brownell, 2001; Puhl & Heuer, 2009; Puhl & Heuer, 2010). Nonetheless, this pressuring, punitive and discriminative current context may have a paradoxical effect, potentially undermining one's ability to regulate eating behaviour and contributing to the growth of eating-related problems and obesity (Stubbs et al., 2012).

Humans evolved in a context of relative food scarcity with occasional periods of abundance. Thus, like other animal species, humans evolved to be optimal foragers in resource limiting environments, as consuming more food than needed, when it was available, and storing the energy in the form of fat, was essential for prospering and survival (Lieberman, 2006; Stubbs & Tolcamp, 2006). In fact, evolution has selected our behaviour and physiological systems to overeat when energy sources are available and to store energy to prepare for times of uncertainty. Nonetheless, this design, that was highly adaptive in contexts where energy availability was inconsistent and unpredictable, is no longer adaptive in our current environment (Power, 2012). Our culture has outraced evolution, as humans have manipulated the environment to maximize food availability and eliminate scarcity. We created environments where high energy-dense food is greatly abundant and available, and requires minimal energy expenditure to obtain. With our evolutionary design still operating in a context of abundance, difficulties in regulating eating behaviour and consequently problems with managing weight, may emerge as an almost inevitable outcome in our modern society (Stubbs et al., 2012).

Another aspect of our evolutionary design may account for the complex relationship we have with food. With human's more recently evolved abilities for complex thinking, reflection,

reasoning and self-awareness, food has acquired functions other than to suppress a physical need. As we mentioned before, food is often used as a reward, as a means to cement social bonds, and as a way to comfort others and the self in contexts of emotional distress.

So humans are now amidst a series of conflicting pressures: we are designed by evolution to consume and store energy to compensate for periods of scarcity, but are living in an environment of unparalleled abundance. In this context, overweight and obesity has become an increasingly probable outcome for the majority of us, which is reflected in the epidemic rates of obesity we are now facing (McPherson, Marsh, & Brown, 2007; Swanton & Frost, 2007; Swinburn, Sacks, Hall, & McPherson, 2011; WHO, 2013). Notwithstanding, a slender (for women) or muscular (for men) physical appearance is advocated in our society as the desirable and socially attractive norms, and overeating, excess weight and obesity are highly stigmatized conditions (Chen et al., 2007; Latner et al., 2008; Puhl & Heuer, 2009; Puhl & Heuer, 2010; Schafer & Ferraro, 2011).

Drawing on what has been outlined above, perceptions that one is negatively evaluated by others, that others judge the self and desire to exclude, reject or even attack the self is highly painful and distressing. In face of these negative shame feelings and evaluations, which may be internalized in the form of self-criticism, eating may emerge as a possible solution to seek some comfort (Del Parigi, Chen, Salbe, Reiman, & Tataranni, 2003; Leehr et al., 2015; Pecina & Smith, 2010) and attempt to avoid or escape these aversive internal experiences (Heatherton & Baumeister, 1991; Polivy & Herman, 1993; Goss & Gilbert, 2002).

Therefore, these complex social and emotional dynamics may greatly influence one's eating behaviour, contribute to the development and maintenance of disordered eating symptoms such as binge eating, and undermine one's ability to maintain healthy eating behaviours and weight.

4.6.3. The shame-shame cycle in binge eating problems

Based on the evolutionary biopsychosocial model of shame, Goss and Gilbert (2002) proposed a process model for eating disorders that explores the functional role of disordered eating behaviours to cope with shame. This model considers how background factors such as genetics, personal variables (e.g., interpersonal sensitivity) and attachment experiences, and the sociocultural pressures that glorify thinness and stigmatize obesity, may give rise to external

shame and influence internal shame and self-identity. According to this model, individuals who feel vulnerable to potential social threats, may attempt to control over eating, body weight and shape as means to become closer to an ideal that others value and consequently avoid inferiority and devaluation (Ferreira et al., 2013a; Pinto-Gouveia, Ferreira, et al., 2014). When these attempts succeed, this may give rise to feelings of pride and power. But when they experience that they are failing in maintaining this rigid control, they may experience further shame. The authors suggested that this characterizes the shame-pride cycle of the restrictive stage of eating psychopathology.

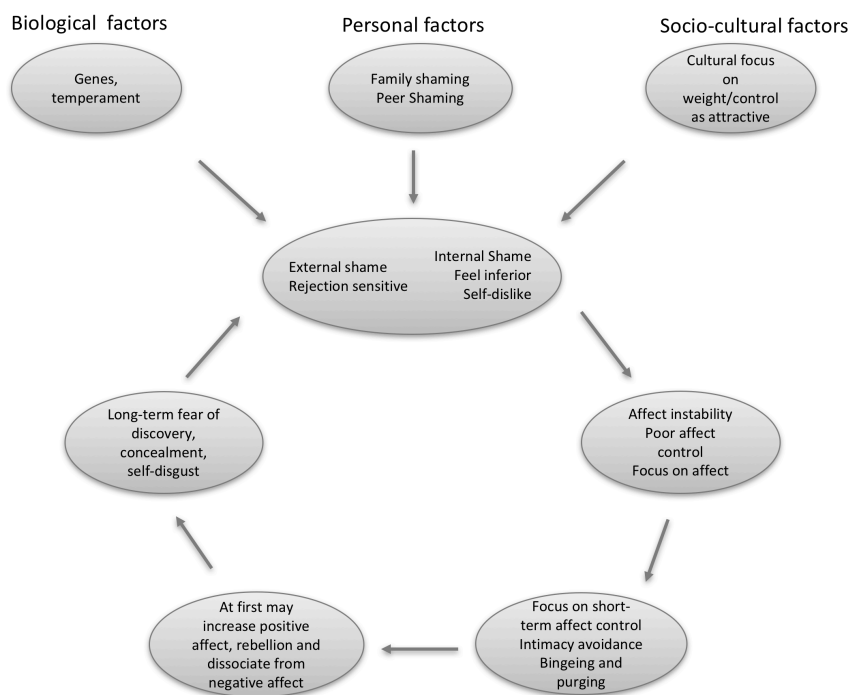


Figure 8 | Model of the shame-shame cycle in binge eating (Adapted from Goss & Gilbert, 2002)-

For binge eating problems (Figure 8), Goss and Gilbert (2002) suggested that the same background factors increase vulnerability to shame. In this case, however, eating may be used as a way of temporarily regulating and control painful thoughts and feelings, among which shame-related cognitions and emotions may be the most powerful. Nonetheless, using food to self-soothe is not effective, as people in the medium and long term may find themselves feeling disgusted by their eating behaviour, concerned about the effect it will have on their weight, more threatened by possible social disparagement, and pressured to hide this behaviour. This is

believed to fuel a shameful sense of self, a sense of internal personal unattractiveness and self-contempt, contributing therefore for a self-perpetuating shame-shame cycle.

This model is an important contribution to understand the function of disordered eating symptoms (Ferreira, Palmeira, et al., 2014; Ferreira et al., 2013b; Kelly & Carter, 2013; Matos et al., 2015; Pinto-Gouveia, Ferreira, et al., 2014) and has guided the development of interventions for eating disorder pathology focused on the development of self-compassion abilities as an antidote to shame and self-criticism (Adams & Leary, 2007; Braun, Park, & Gorin, 2016; Gale, Gilbert, Read, & Goss, 2014; Gilbert et al., 2014; Goss & Allan, 2010; Kelly & Carter, 2015; Pinto-Gouveia et al., 2016). Nonetheless, research on this model in relation to the continuum of binge eating symptomatology is scarce. Also, no study to date had addressed the questions regarding how early negative interpersonal experiences may influence self-identity related to physical appearance, one's proneness to experience shame and self-criticism and how these mechanisms interact with other psychological processes (e.g., psychological inflexibility) that may render the individual vulnerable to difficulties in regulating eating behaviour and binge eating.

Chapter 2

Aims

The previous chapter outlined the main features of binge eating and the place of this phenomenon within eating disorders and overweight/obesity. Binge eating is a central feature of the diagnostic category of BED, which, despite being the most prevalent eating disorder remain the most under investigated. Binge eating symptomatology is also a hallmark feature of BN, and a prominent associated feature of AN. Whether there are other similarities (e.g., regarding the role of body image in self-identity and shared transdiagnostic mechanisms maintaining the psychopathology) between these conditions remain a pressing research question (Grilo et al., 2015). Binge eating is also present, in varying degrees of gravity, in the general population. Additionally, it is strongly associated with psychosocial impairment and excess weight and obesity (de Zwaan, 2001; Hudson et al., 2007; Kessler et al., 2013; Marsha D. Marcus, Wing, & Lamparski, 1985; Stunkard, 1994; Yanovski, 1993). This disordered eating behaviour is therefore a significant public health problem with significant implications of physical and mental health in a large spectrum of the population.

The previous chapter also presented a critical overview of the theoretical frameworks that have been considered in the conceptualization of binge eating. Despite their important contributions these models may be more applicable to understand the vulnerability to bulimic symptomatology (e.g., Spoor et al., 2006; Stice, 2001; Stice et al., 2000; Stice et al., 2011; Stice et al., 2002; Stice et al., 1996) and transposing their assumptions to the vulnerability and persistence of binge eating symptomatology may limit the development of effective preventive and intervention approaches. Existent models recognize the importance of considering the role of negative affect and emotion regulation in the understanding of binge eating symptomatology (e.g., Goldfield et al., 2008; Goss & Gilbert, 2002; Heatherton & Baumeister, 1991; Wilfley et al., 2002). Nonetheless, the specific nature of negative affectivity and the psychological processes underlying and contributing to the occurrence and persistence of binge eating symptomatology in the varying subclinical and clinical conditions in which it manifests, are aspects that remained unclear. Distilling the role of risk factors and the mechanisms through which they may influence the development and maintenance of the continuum of body image-related difficulties, disordered eating and binge eating symptomatology in the general population is key to the development and refinement of prevention and intervention approaches for these problems.

The evolutionary and biopsychosocial perspective of emotional regulation systems (Gilbert, 1989, 1997, 1998, 2002, 2003, 2007, 2010), and the ACT functional contextual perspective on psychological and behavioural problems (Hayes, 2004; Hayes et al., 1999; Hayes et al., 2006;

Hayes et al., 2004; Sandoz et al., 2010; Tirsch et al., 2014) seem to be promising approaches to the understanding and treatment of eating-related difficulties (Goss & Allan, 2009, 2010; Goss & Gilbert, 2002; Juarascio et al., 2016; Kelly & Carter, 2015; Lillis & Hayes, 2008; Lillis et al., 2009; Lillis & Kendra, 2014; Merwin & Wilson, 2009; Pinto-Gouveia et al., 2016; Sandoz et al., 2010). Nonetheless, it is not clear how the assumptions of these perspectives can be integrated to formulate a greater understanding of the *function* of dysregulated eating behaviour, the mechanisms underlying the development and maintenance of binge eating symptomatology and its psychological and physical comorbidities.

The current dissertation aims to provide an integrative perspective on the continuum of difficulties in regulating eating behaviour, ranging from individuals from the general population across different BMI categories, to overweight and obese individuals, to clinical samples with eating disorders, with BED laying at the upper end of this spectrum. The empirical studies presented in this dissertation aim therefore at contributing for the development of a comprehensive conceptualization lens through which to understand the role of risk factors (including shame-eliciting experiences in early life) and of the mechanisms involved in the vulnerability and persistence of these difficulties.

By building on the knowledge of the complexity of the phenomenon of binge eating and associated problems, this dissertation further aims to contribute to the development and refinement of emerging prevention and intervention approaches focused on the development of adaptive emotion regulation processes that promote eating regulation (e.g., based on compassion, mindfulness and values-based processes; Gilbert et al., 2014; Goss & Allan, 2010; Kelly & Carter, 2015; Kristeller & Wolever, 2010; Lillis et al., 2009; Lillis & Kendra, 2014).

The investigation presented in this dissertation was guided by these two overarching aims, which were broken into specific research objectives. The chapters included in the second part of this dissertation are comprised by 20 empirical studies; 17 of these empirical studies are published or in press in international scientific peer reviewed journals and 3 are submitted for publication. The chapters included in **Part II** of this dissertation and the respective empirical studies aimed at addressing specific aims and testing a specific set of hypotheses, which will be outlined below.

The development of a new comprehensive model of binge eating symptomatology required the development and/or examination of measures that would allow for the assessment of the continuum of binge eating symptomatology (including the emotions, cognitions and behaviours related to binge eating (Gormally et al., 1982), of key risk factors for binge eating

symptomatology (such as body image-related victimization experiences and body image shame), and of eating-related psychological processes that may promote or protect against binge eating.

Chapter 3 includes a set of empirical studies that focused on the assessment of such measures. These studies also clarified the pertinence of the constructs covered by these measures on the understanding of the occurrence and severity of binge eating symptoms in samples from the general population. The specific goals of this chapter entailed:

- i) The expansion of the assessment of binge eating (Gormally et al., 1982) to nonclinical populations and the examination of the occurrence and distribution of binge eating symptoms in women from the general community.
- ii) The development of a novel measure that would allow for the assessment of the multifaceted experience of body image shame, namely that would capture the external (involving perceptions that one's body image is at the root of negative evaluations and criticism from others, and avoidance or distress felt in social situations in which this may occur) and internal (entailing negative self-evaluations because of one's body image and desires to conceal body image) dimensions of body image shame.
- iii) The development of a new measure of victimization experiences in childhood and adolescence related to body image (i.e., overall physical appearance and not just weight-related experiences) that would include direct and more indirect (e.g., rejection) forms of victimization perpetrated by peers and parents (or other relevant caregivers during that period of life), and that would allow for the assessment of the frequency and the emotional impact of these experiences.
- iv) The development of a measure that would capture the tendency to become entangled with the content of unwanted and disturbing thoughts related to dimensions relevant to the understanding of disordered eating symptoms, namely food cravings and impulses to eat.
- v) The assessment of adaptive forms of eating, notably intuitive eating (Tylka & Kroon Van Diest, 2013), and examine the potential buffering effect of this mechanism on the association between negative affectivity and binge eating symptoms.

- vi) The evaluation of emotional eating (Arnow, Kenardy, & Agras, 1995) in samples of women from the general community and the examination of the association between emotional eating and binge eating. An important aim was also to investigate whether the ability to tolerate and accept painful or disturbing cognitions and emotions, namely those related to body image (Sandoz et al., 2013), without engaging in reactive attempts to avoid them, would moderate the relationship between the tendency to eat in response to negative emotions and the engagement in binge eating symptoms.

Building on prior investigation that suggested that early shame-eliciting experiences impact later emotion regulation capabilities (Richter et al., 2009; Matos et al. 2015) and that negative interpersonal experiences and emotion regulation deficits influence binge eating (Fairburn et al., 1998; Ouwens et al., 2009; Pike et al., 2006; Spoor et al., 2006; Stice, 2001; Stice et al., 2002; Striegel-Moore et al., 2002; Striegel-Moore et al., 2005; Van Strien et al., 2005), we developed a series of studies focusing on the critical developmental stage of adolescence, a period of heightened sensitivity to shame and of increased vulnerability for the development of body image and eating-related problems. **Chapter 4** outlines 4 empirical studies conducted in samples of adolescent girls that aimed therefore at understanding the role of shame feelings and self-criticism as key mechanisms through which individual and interpersonal variables (including weight and body image dissatisfaction, perceptions of inferiority in comparison to others and victimization experiences perpetrated by peers) impact on the development of disordered eating symptoms and emotional difficulties in this important period of life. We also aimed to understand whether early positive interpersonal experiences and consequent positive emotion regulation could counteract the effect of these negative experiences. Therefore, the specific aims of this chapter were as follows:

- i) To examine the prevalence of body image dissatisfaction and eating psychopathology symptoms in a nonclinical sample of adolescent girls. Also, to understand whether the effect of well-known risk factors – BMI, body dissatisfaction, social comparison - on disordered eating would be mediated by the process of psychological inflexibility.
- ii) To test a theoretical model that proposes that victimization experiences perpetrated by peers in adolescence may be internalized in the form of body

image shame and self-criticism, which in turn, become associated with the severity of disordered eating symptoms and depressive symptoms.

- iii) To examine whether adolescent girls who reported memories of growing up in a warm and supportive childhood environment would have higher self-reassuring and self-soothing abilities. Additionally, to investigate whether those self-reassuring abilities would moderate the impact of bullying on body image shame and eating pathology.
- iv) To provide a more robust evidence on the mechanisms through which victimization experiences with peers may influence later difficulties in regulating eating behaviour, through a prospective study conducted in adolescent girls over three years. In particular, this study sought to investigate the influence of victimization experiences on the individual differences of the longitudinal trajectories of body image shame and disordered eating symptoms and how these variables interact over time.

Chapter 5 extended this line of inquiry by focusing on the occurrence of binge eating symptoms in adult nonclinical samples from the general population and by examining the role that early victimization-related memories, namely those focused on body image, play on current binge eating symptoms. Furthermore, these studies extended the investigation on the role that emotion regulation processes play in the aforementioned associations. The specific aims of the current chapter involved:

- i) To expand current conceptualizations of binge eating symptoms as a way to escape from negative affect (Wilfley et al., 2002). In particular, we aimed at clarifying the role of shame and self-criticism as specific emotional aspects and processes that underlie binge eating symptoms, above overall negative affectivity, underlie binge eating symptoms.
- ii) To retrospectively investigate whether memories of negative body-image related experiences of teasing and bullying in childhood and adolescence, would have an effect on binge eating severity symptoms, via their effect of current body image shame and psychological inflexibility focused on the body image dimension. We also aimed at clarifying the distinctive effect that the perpetrator

of these experiences – peers vs. parents (or other caregivers) – play on the aforementioned associations.

- iii) To investigate the specific effect of early shame memories related to body image on the definition of self-identity and how these memories come to be associated with binge eating symptoms. In particular, this study aimed at extending research to men and understanding gender differences in the pathways connecting shame experiences, body image difficulties, self-criticism and binge eating symptoms.

Chapter 6 aimed at further understanding how the psychological processes identified in the previous studies would account for the persistence of disordered eating symptoms in individuals in which problems with regulating eating behaviour are more severe and may have serious mental and physical health implications, namely individuals with excess weight and obesity and patients with clinically established eating disorders, namely BED. Hence, this chapter comprises 4 empirical studies which specific aims were:

- i) To examine the role that self-perceptions of inferiority, shame, and self-criticism play in difficulties in regulating eating behaviour and weight in women with excess weight and obesity attending a community-based weight management programme.
- ii) To analyse whether patients with BED share with patients with AN and BN key features of eating psychopathology, namely: overvaluation of body shape, weight and eating; indicators of mental health distress; self-perceptions of inferiority, shame and self-criticism. Moreover, to test whether the "core" of eating psychopathology of the three eating disorder diagnoses – the undue influence of body image on one's sense of self-worth – feeds the painful affect of shame, via the maladaptive processes of self-criticism and social comparison.
- iii) To analyze the effect of memories of specific shame-eliciting experiences in childhood and adolescence and how they may function as traumatic memories that become central to the self-identity of patients with BED. Specifically, we aimed at analysing the psychological processes through which these memories may have an effect on the severity of binge eating symptoms presented by these patients.

- iv) To investigate a model examining the effect of the specific negative emotion of shame on the excessive focus on cognitions about body image and eating, which were hypothesized as mediator mechanisms accounting for the severity of binge eating symptomatology of patients with BED

Chapter 7 presents studies that aimed at expanding the investigation on positive emotion regulation processes that potentially counteract the deleterious effect of body image difficulties, shame and self-criticism, and promote well-being. Understanding the beneficial role of these processes may inform the development of treatment approaches to eating and weight-related problems that effectively address positive emotion regulation. Thus, in the current chapter we included 2 empirical studies that aimed:

- i) To examine whether self-compassion would mediate the association between body image dissatisfaction and negative social comparisons and quality of life in young women, with normative weight ranges.
- ii) To understand the distinctive pathways through which self-criticism vs. self-reassurance influences the well-being of women with overweight and obesity.

Based on the evidence provided by the empirical studies presented in the previous chapters, **Chapter 8** presents a study that aimed at developing and testing the efficacy of a low-intensity intervention for BED that addressed the mechanisms found to be relevant for the persistency and severity of the disorder.

General methodology

The empirical studies presented in this doctoral dissertation had cross-sectional and longitudinal designs, the different samples used to conduct the studies (i.e., nonclinical samples of adolescent girls, women and men from the general community, obese/overweight female participants of a weight management programme and female patients with eating disorders) were assessed through self-report measures and some through semi-structured clinical interviews. All ethical requirements were followed to conduct the studies presented in the current dissertation.

The design of the empirical studies, the procedures for data collection, the characteristics of the samples, the interviews and self-report measures used, the statistical software programmes

adopted and the statistical procedures followed are detailed in each empirical study and therefore are not detailed in this section².

² The Reference section at the end of this dissertation refers to the references cited in Part I and Part III. The reference list of each individual study as published/submitted for publication is provided in each study at the respective reference section.

Part II

Empirical studies

Chapter 3

Assessment of body image and disordered eating-related constructs

Chapter 4

Adolescence: Processes involved in the vulnerability to disordered eating symptoms

Chapter 5

Emotion regulation processes and eating behaviour in the adult general community

Chapter 6

Emotion regulation processes and eating behaviour in obesity and eating disorders

Chapter 7

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Chapter 8

Binge eating: Advances in treatment and future directions

Chapter 3

Assessment of body image
and disordered eating-related constructs

Chapter overview

- Study I** Expanding Binge eating Assessment: Validity and Screening value of the Binge Eating Scale in women from the general population.
- Study II** Body image as a source of shame: A new measure for the assessment of the multifaceted nature of body image shame.
- Study III** Body image as a target of victimization experiences by peers/parents: Development of the Body Image Victimization Experiences Scale.
- Study IV** Caught in the struggle with food craving: Development and validation of a new cognitive fusion measure.
- Study V** Psychometric properties of the Intuitive Eating Scale-2 and association with binge eating symptoms in a Portuguese community sample.
- Study VI** Returning to emotional eating: The Emotional Eating Scale psychometric properties and association with body image flexibility and binge eating.

Study I

Expanding Binge eating Assessment: Validity and Screening value of the Binge Eating Scale in women from the general population

Adapted from:

Duarte, C., Pinto-Gouveia, J., & Ferreira, C. (2015). Expanding binge eating assessment: Validity and screening value of the Binge Eating Scale in women from the general population. *Eating Behaviors*, 18 41–47. doi: 10.1016/j.eatbeh.2015.03.007

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Abstract

There is growing recognition that binge eating is a prevalent problem with serious implications for both clinical and nonclinical samples. The current study aimed at examining the factor structure, psychometric properties and the screening usefulness of the Binge Eating Scale (BES) in a large sample of female college students and women from the Portuguese general population.

A sample of 1008 participants was collected to conduct a confirmatory factor analysis and test the BES psychometric properties; 150 participants were further evaluated through the Eating Disorder Examination 16.0D to assess the discriminant validity of the BES.

Results confirmed that the BES presents a sound one-dimensional factorial structure, with very good construct reliability and convergent validity. Also, the scale presented very good retest-reliability. Findings also offered evidence that the BES is positively associated with measures of eating and general psychopathology, and BMI. Furthermore, the BES revealed an excellent performance (96.7%) on discriminating clinically significant cases of binge eating, showing a sensitivity of 81.8% and a specificity of 97.8%.

Results support the validity and usefulness of the BES as an assessment and screening tool for binge eating in women from the general population.

Keywords: Binge eating; Confirmatory factor analysis; Psychometric properties; discriminant validity

1. Introduction

Binge eating has been increasingly recognized as a serious condition with severe implications in both clinical and nonclinical populations (Kessler et al., 2013; McManus & Waller, 1995). Binge eating is characterized by the occurrence of episodes of eating, in a discrete period of time, a definite large amount of food, with a sense of lack of control over eating (i.e., a feeling that one cannot stop eating or control what or how much one is eating). These episodes are often preceded by emotional distress and may be seen as a maladaptive attempt to avoid or escape disturbing thoughts and emotions (Arnou, Kenardy, & Agras, 1995; Goldfield, Adamo, Rutherford, & Legg, 2008; Heatherton & Baumeister, 1991), but these behaviours often generate great levels of shame and distress over the episode and its consequences. Binge eating

behaviours are the hallmark feature of Binge Eating Disorder (BED) and Bulimia Nervosa (BN), but can also be present in Anorexia Nervosa or other forms of eating disorders (American Psychiatric Association, 2013).

Nevertheless, binge eating behaviours are also significantly prevalent among individuals without eating disorders (Johnsen, Gorin, Stone, & le Grange, 2003; Johnson, Rohan, & Kirk, 2002; Kinzl, Traweger, Trefalt, Mangweth, & Biebl, 1999). In fact, recent research reports growing prevalence rates of binge eating problems among the community (de Zwaan, 2001; Ribeiro, Conceição, Vaz, & Machado, 2014; Striegel-Moore & Franko, 2003), with women being more likely to present these problems than men (Hudson, Hiripi, Pope, & Kessler, 2007; Kessler et al., 2013). Among the female population a study revealed that up to 40% college students report binge eating symptoms (Saules et al., 2009). Also, research shows that even subclinical binge eating symptoms or partial syndromes may be very distressing and have a significant negative impact in individuals' physical and mental health (Striegel-Moore et al., 2000). In particular, findings from both clinical and community-based studies offer evidence that suggests that binge eating is associated with psychiatric comorbidities (e.g., anxiety and depressive symptoms; Hudson et al., 2007; Preti et al., 2009; Ricca et al., 2000), overweight, obesity and poorer outcomes in weight loss treatments (Hudson et al., 2007; Kessler et al., 2013; Ricca et al., 2000; Villarejo et al., 2012; Wilfley, Wilson, & Agras, 2003).

The assessment of binge eating offers some challenges given its private nature and because it is associated with aspects that are difficult to declare (e.g., shame about the episode) and to recall (e.g., severity of the episodes). It is consensual that investigator-based interviews are the most valid method to accurately assess binge eating. Specifically, the Eating Disorder Examination — EDE (Fairburn & Cooper, 1993) is considered to be the most accurate assessment tool for eating disorders, since it allows the interviewer to define some ambiguous terms and ask additional questions to facilitate a better recall of some symptoms and the identification of their frequency and severity (e.g., binge eating episodes). However, clinical interviews require extensive preliminary training and individual administration, and are expensive and time consuming (Wilson, 1993).

In order to overcome some of these constraints, there has been an effort on the examination of measures that may provide a rigorous assessment of behaviours and attitudes that characterize eating psychopathology, but that diminish the costs and burden in both the participant and researcher caused by interview-based methods (Celio, Wilfley, Crow, Mitchell, & Walsh, 2004).

In particular, self-report measures have been highlighted as useful alternatives to assess the experience of binge eating, such as the Questionnaire on Eating and Weight Patterns — QEWP-R (Yanovski, 1993), the questionnaire version of the EDE, the Eating Disorder Examination Questionnaire — EDEQ (Fairburn & Beglin, 1994), and the Binge Eating Scale — BES (Gormally, Black, Daston, & Rardin, 1982).

The Binge Eating Scale (Gormally et al., 1982) was originally developed to assess affective/cognitive aspects and behavioural manifestations of binge eating problems in obese persons. This instrument has been widely used as a dimensional measure of the severity of binge eating, as a screening tool (Freitas, Lopes, Appolinario, & Coutinho, 2006; Greeno, Marcus, & Wing, 1995) and as a useful instrument of treatment outcomes (e.g., Katterman, Kleinman, Hood, Nackers, & Corsica, 2014; Telch, Agras, & Linehan, 2001). Studies, mainly conducted in obese patients and bariatric surgery candidates, have demonstrated that the BES has high sensitivity and specificity for discriminating between binge eaters and non-binge eaters, presenting similar results to those obtained by reliable and supported semi-structured interviews (Celio et al., 2004; Freitas et al., 2006; Greeno et al., 1995; Grupski et al., 2013; Robert et al., 2013). Furthermore, a growing body of research has been showing that the BES presents good validity both in clinical (e.g., obese patients, BED patients; Timmerman, 1999; Dezhkam, Moloodi, Mootabi, & Omidvar, 2009; Hood, Grupski, Hall, Ivan, & Corsica, 2013), as well as in nonclinical samples (e.g., college students; Anton, Perri, & Riley, 2000; Gordon, Holm-Denoma, Troop-Gordon, & Sand, 2012; Meno, Hannum, Espelage, & Low, 2008).

Regardless of its wide use, research on the dimensionality and psychometric properties of the BES, remains scarce. Also, most studies examining the validity of the scale have been conducted with obese women seeking or undergoing weight loss treatments (Hood et al., 2013). In particular, the adequacy of this scale and its psychometric properties in nonclinical samples is unknown. The current study aimed at examining the BES factorial structure through a confirmatory factor analysis, and its validity in a large sample of women from the Portuguese general population. Furthermore, the current study assesses the distribution of the severity of binge eating symptoms, and the sensitivity and specificity of the BES in discriminating clinically significant binge eating.

2. Material and methods

2.1. Participants

A total of 1008 female participants were enrolled in this study. The sample comprised college students ($n = 553$; 54.9%), mean age 20.76 ($SD = 2.27$), and participants from the general population ($n = 455$; 45.1%), mean age 39.48 ($SD = 10.05$). The participants' age ranged from 18 to 60, with a mean age of 29.21 ($SD = 11.63$). Also, participants presented a mean of 13.24 ($SD = 2.63$) years of education. Participants' body mass index (BMI) mean was 22.90 ($SD = 3.79$). Seventy-three participants (7.2%) were underweight ($BMI < 18.5$), 684 (67.9%) had a normal weight ($18.5 \geq BMI \leq 24.99$), 194 (19.2%) were overweight ($25 \geq BMI \leq 29.99$), and 57 (5.7%) participants were obese ($BMI \geq 30$), according to the standard classification, which reflects the BMI distribution in the Portuguese general female population (Póinhos et al., 2009). In particular, the students presented a mean BMI of 21.67 ($SD = 3.08$), and the participants from the general population a mean BMI of 24.40 ($SD = 4.03$). There was a difference in BMI mean values between the groups ($t = 12.069$; $p = .000$), which was expected considering the BMI distribution in young and older adult women in the Portuguese general population.

Thirty participants were randomly selected from the total sample to answer to a second administration of the BES to test the scale's temporal stability (after a one-month period).

2.2. Measures

Binge Eating Scale (BES; Gormally et al., 1982). The BES comprises 16 items measuring key behavioural (e.g., rapid eating, eating large amounts of food), and affective/cognitive symptoms (e.g., guilt, feeling out of control or unable to stop eating) that precede or follow a binge. Each item contains 3 to 4 statements that are weighted response options, which reflect a range of severity for each measured characteristic. Participants are asked to select the statement that best describes their experience. Example:

1. I usually am able to stop eating when I want to. I know when "enough is enough".
2. Every so often, I experience a compulsion to eat which I can't seem to control.

3. Frequently, I experience strong urges to eat which I seem unable to control, but at other times I can control my eating urges.

4. I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily.

The scale's possible total scores range from 0 to 46, with higher scores indicating more severe binge eating symptoms. Individuals may be categorized into three groups as defined by established cut scores of binge eating severity (Marcus, Wing, & Lamparski, 1985): no or minimal binge eating (score ≤ 17), mild to moderate binge eating (score 18–26) and severe binge eating (score ≥ 27).

The version of the scale used in the current study underwent a rigorous adaptation procedure. Prior permission to use the BES was obtained from the authors of the original version of the scale (Gormally et al., 1982). A bilingual researcher translated and adapted the scale into European Portuguese. The translation was analysed by researchers with a large experience in the field. The comparability of content was also corroborated through stringent back-translation procedures, with the cooperation of a bilingual researcher. An initial version of the adapted scale was then completed by 50 college students and was preliminarily analysed. A final version of the scale was obtained after conducting some minor adjustments in order to ensure the fidelity of the scale.

2.2.1. *Eating Disorder Examination 16.0D* (EDE 16.0D; Fairburn, Cooper, & O'Connor, 2008; Ferreira, Pinto-Gouveia, & Duarte, in preparation)

The EDE is an investigator-based semi-structured clinical interview that provides a comprehensive assessment of the frequency and intensity of key behavioural and psychological aspects of eating disorders. It comprises four subscales that reflect the severity of eating psychopathology: restraint, eating concern, weight concern and shape concern. A global score may be obtained by calculating the mean of the subscales' scores. Furthermore, the EDE allows for a thorough assessment of the specific psychopathology of patients with binge eating, such as the presence and frequency of binge eating episodes, features associated with binge eating (e.g., eating much more rapidly than normal), and distress over the episode. The administration of the EDE requires an experienced interviewer and takes 60–90 min. Research has shown that EDE presents high values of internal consistency, discriminant and concurrent

validity, and test–retest reliability (for a review see Fairburn, 2008). The Portuguese version of the EDE (Ferreira et al., in preparation) was used in the current study as a diagnostic measure in a subsample of 150 participants. The EDE presented a high internal consistency, with Cronbach's alpha values ranging from .74 to .90 in the subscales, and of .94 in the total score.

2.2.2. *Eating Disorder Examination Questionnaire* (EDE-Q; Fairburn & Beglin, 1994; Machado et al., 2014)

The EDE-Q is the self-report version of EDE, providing a similarly comprehensive assessment of disordered eating behaviours. The EDE-Q comprises 36 items focusing on the past 28 days and provides the same four subscales of the EDE that reflect eating psychopathology severity. Research also supports that EDE-Q presents good psychometric properties (Fairburn, 2008). In this study, the Portuguese version of the EDE-Q (Machado et al., 2014) was used, which presented a Cronbach's alpha value of .95, and the subscales presented values ranging from .76 to .92.

2.2.3. *Emotional Eating Scale* (EES; Arnow et al., 1995; Portuguese version by Duarte & Pinto-Gouveia, 2015)

The EES is a self-report measure that assesses the tendency to overeat in response to emotional stimuli. It includes 25 distinct emotions (e.g., discouraged, irritated, angry) that comprise 3 subscales — anger/ frustration, anxiety, and depression. Participants are asked to rate, using a 5-point Likert scale (ranging from 0 = “no desire to eat” to 4 = “an overwhelming urge to eat”), the degree to which they desire to eat in response to each mood state. For the purpose of this study, only the total score of the EES was considered. The scale presented good construct and discriminant validity as well as good internal consistency (Arnow et al., 1995). The scale also revealed good psychometric properties in its Portuguese version (Duarte & Pinto-Gouveia, 2015). The scale revealed very good internal consistency in this study, with a Cronbach's alpha of .92.

2.2.4. *Depression Anxiety and Stress Scales — 21* (DASS21; Lovibond & Lovibond, 1995; Portuguese version by Pais-Ribeiro, Honrado, & Leal, 2004)

The DASS21 measures levels of depression, anxiety and stress symptoms. The scale comprises 21 items with the 3 subscales including 7 items each. Participants are asked to rate the

frequency, using a 4-point scale (0 = “did not apply to me at all” to 3 = “applied to me very much or most of the time”), with which they experience the symptoms. Higher scores reflect increased levels of psychopathology symptoms. The scale shows adequate internal consistency in its original and Portuguese versions (Lovibond & Lovibond, 1995; Pais-Ribeiro et al., 2004). Cronbach's alpha values of .87, .84 and .90 were verified in the current study for the subscales depression, anxiety and stress, respectively.

2.2.5. BMI

Participants' BMI was calculated by dividing self-reported current weight (in kg) by height squared (in m).

2.3. Procedure

Data collection followed ethical requirements, with all participants being fully informed about the voluntary nature of their cooperation, the confidentiality of the collected data, and after they provided their informed consent. The study aims and instructions were standardized for all participants and measures were administered in the presence of one of the researchers. The students completed the set of self-report measures at the end of a lecture with the consent of the respective educational institution's board. The remainder participants comprised the staff of distinct institutions (e.g., schools, private companies, retail services). The study was presented to and approved by the professional institutions' boards, which publicized the study to their staff. One researcher was present at an authorized break to provide the self-report measures and standardized instructions to participants who voluntarily agreed to participate.

Furthermore, of the total sample, 150 participants were further assessed by a semi-structured clinical interview for eating disorders (EDE 16.0D; Fairburn et al., 2008). This subsample comprised 92 (61.3%) college students, with a mean age of 21.20 ($SD = 1.81$) and a mean BMI of 22.57 ($SD = 3.55$); and 58 (38.7%) women recruited within the general population, with a mean age of 39.57 ($SD = 9.43$), and a BMI mean of 24.44 ($SD = 4.29$). These participants were recruited with the assistance of undergraduate Psychology students who were offered 0.5 credits for their cooperation in recruiting potential participants for the study (female college students and women from the general population) who would be required to attend the research unit for an individual assessment. Each participant was given the same

standardized information and instructions, and filled the same set of self-report questionnaires; on a date previously scheduled with each participant, the participants were asked to return the self-report measures in a sealed envelope and were afterwards assessed by an interviewer blind to the self-report measures' scores.

2.3.1. Calculation

The structure of the scale was analysed through a confirmatory factor analysis. The MPLUS software (version 5, Muthén & Muthén, 2010) was used, given the non-normal categorical type of this scale. The construct reliability and convergent validity of the scale were further established through the calculation of the internal consistency, Composite Reliability and Average Variance Extracted.

The association between the BES and the other eating and general psychopathology self-report measures, and BMI, was assessed by computing Pearson product–moment correlation coefficients. Retest reliability was analysed through the comparison of the first and second administration (after a one-month period) mean values of the scale through t-tests for dependent samples and through Pearson product– moment correlations.

The concurrent validity of the BES was further assessed ($n = 150$) by calculating the sensitivity, specificity, and overall prediction of the scale through a binary logistic regression. Specifically, we tested the ability of the BES at the cut-off of 17 (i.e., mild to moderate binge eating; Marcus et al., 1985) to correctly identify individuals with clinically significant binge eating (as determined by the EDE 16.0D; Fairburn et al., 2008). This threshold was selected, instead of 27 (i.e., severe binge eating), to avoid false negatives. The receiver operating characteristic (ROC) curve was further used to examine the association between the sensitivity and specificity of the scale, illustrating the scale's discriminant performance (Hosmer & Lemeshow, 2000).

These analyses were conducted using IBM SPSS Statistics 20 (Statistical Package for the Social Sciences, Armonk, NY, USA).

3. Results

3.1. Descriptives

The BES total score mean was 6.95 ($SD = 6.62$), with values ranging from 0 to 39. Also, no significant differences were observed between the students ($M = 7.31$; $SD = 6.67$) and participants of the general population ($M = 6.51$; $SD = 6.54$) that comprised the sample ($t_{(1006)} = 1.922$; $p = .055$). The distribution of BES responses scores within the established cut-offs was 92.7% ($n = 935$) for absent to minimal binge eating, 5.5% ($n = 55$) for mild to moderate binge eating, and 1.8% ($n = 18$) for severe binge eating. The means and standard deviations of the remaining study variables (**Table 1**) were similar to those obtained in previous studies with nonclinical samples (Duarte & Pinto-Gouveia, 2015; Fairburn, 2008; Henry & Crawford, 2005). Furthermore, the participants' BMI mean was within the normal weight range.

Table 1

Means (M), Standard Deviations (SD), and Product-moment Pearson correlations between the BES and EDE 160.D ($n = 150$), and the self-report measures ($N = 1008$).

	<i>M</i>	<i>SD</i>	BES
BES	6.95	6.62	-
EDE 16.0D - Restraint	1.15	1.31	.55***
EDE 16.0D - Eating Concern	0.31	0.74	.66***
EDE 16.0D - Shape Concern	1.29	1.28	.58***
EDE 16.0D - Weight Concern	1.20	1.24	.59***
EDE 16.0D - Total	0.99	1.02	.66***
EDEQ - Restraint	0.80	1.09	.36***
EDEQ - Eating Concern	0.53	0.85	.69***
EDEQ - Shape Concern	1.42	1.46	.66***
EDEQ - Weight Concern	1.34	1.36	.66***
EDEQ - Total	1.02	1.05	.67***
EES - Total	46.27	15.97	.55***
DASS21 - Depression	3.56	3.94	.31***
DASS21 - Anxiety	3.09	3.72	.24***
DASS21 - Stress	6.28	4.68	.30***
BMI	22.90	3.79	.35***

Note. *** $p < .001$

3.2. Confirmatory factor analysis

A CFA was conducted to confirm the BES one-dimensional factorial structure using the robust weighted least squares estimator, which accounts for non-normal categorical distributions (Flora & Curran, 2004; Wirth & Edwards, 2007). Each item was specified to load on a single factor, as initially suggested by the original authors of the scale (Gormally et al., 1982) and consistent with the common use and interpretation of the scale. The following goodness of fit indices were selected to evaluate the adequacy of the tested model: the chi-square goodness-of-fit (χ^2); the Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI), with values $\geq .95$ indicating an excellent model goodness of fit; the root mean square of approximation (RMSEA), which suggest an excellent model fit with values $\leq .06$; and the weighted root mean square residual (WRMR), with values close to 1.0 being considered indicators of excellent fit (Hu & Bentler, 1999).

Results indicated a very good fit to the data [$\chi^2_{(104)} = 380.556$; $p < .001$; CFI = .97; TLI = .96; RMSEA = .05 (.05 to .06; $p = .333$); WRMR = 1.22]. Regarding the local adjustment indices, all items revealed standardized regression weights (SRW) above the recommended cut-off point of .40, that ranged between .45 (item 13) and .82 (item 10). The squared multiple correlation (SMC) results confirmed the instrument reliability, with all items presenting values ranging from .20 (item 13) to .67 (item 10; Tabachnick & Fidell, 2013).

The model was further evaluated through the examination of the modification indices. A large modification index was verified between the errors of items 14 and 6 (74.21), which were correlated. This procedure resulted in an improvement of the global adjustment indices, with the model presenting an excellent fit [$\chi^2_{(103)} = 309.144$; CFI = .98; TLI = .97; RMSEA = .05 (CI = .04 to .05; $p = .940$); WRMR = 1.09]. The quality of the model was also examined through the local adjustment indices (Table 2). Results confirmed that all items revealed adequate SRW, and SMC's results confirmed the instrument reliability.

3.3. Reliability analysis

Results indicated that the BES presented a Cronbach's alpha value of .88. All items revealed moderate to high item-total correlations (above .42, with the exception of item 13, which revealed a correlation of .27), pointing out the quality and suitability of the items. Furthermore, the removal of any item would not increase the internal consistency of the scale (Table 2).

The scale's reliability was further examined through the Composite Reliability (CR) and Average Variance Extracted (AVE), which were manually calculated using the respective formulas (Fornell & Larcker, -1981). Results revealed a CR of .96, which indicate very good construct reliability. Regarding the AVE, results indicated a value of .61, confirming the instrument convergent validity.

Table 2

Standardized regression weights (SRW), Squared Multiple Correlations (SMC), corrected Item-total correlations (r) and Cronbach's Alpha if item deleted ($N = 1008$)

Items	SRW	SMC	r	α
1	.69	.48	.48	.87
2	.56	.31	.42	.88
3	.74	.55	.58	.87
4	.76	.58	.44	.87
5	.60	.36	.47	.87
6	.70	.50	.57	.87
7	.81	.65	.62	.87
8	.73	.53	.60	.87
9	.68	.46	.55	.87
10	.82	.68	.67	.86
11	.76	.58	.60	.87
12	.69	.47	.52	.87
13	.45	.20	.27	.88
14	.76	.58	.65	.86
15	.69	.48	.55	.87
16	.65	.42	.49	.87

3.4. Temporal stability

Results showed a high significant positive correlation between the first and second administrations of the BES ($r = .84$). Results of the t-tests for dependent samples showed that there were no significant differences between the first ($M = 6.43$; $SD = 6.54$), and the second ($M = 6.47$; $SD = 6.88$) assessment moments ($t_{(29)} = .05$, $p = .962$).

3.5. BES association to other measures

Pearson product–moment correlation coefficients (**Table 1**) revealed positive and high associations between the BES and EDE 16.0D total score and subscales. Regarding the correlations between the BES and EDE-Q, a self-report measure of eating psychopathology, results indicated a positive and high correlation between the BES and the EDE-Q total score, and the subscales shape and weight concern and, especially, eating concern. A positive but moderate correlation was found between the BES and EDE-Q restraint subscale. Furthermore, binge eating, as measured by the BES, was positively and strongly correlated with emotional eating (EES).

Regarding the association between the BES and overall psychopathology, results indicated significant positive correlations with DASS21 subscales of depression, stress and anxiety.

Finally, a positive moderate correlation was found between the BES and BMI.

3.6. Concurrent validity

Of the 150 participants who were assessed through the EDE 16.0D, 11 participants were identified as presenting clinically significant binge eating, with 9 (6%) meeting the diagnostic criteria for BED and 2 (1.33%) meeting the diagnostic criteria for BN (American Psychiatric Association, 2013).

Results indicated that when applying the cut-off score of ≤ 17 , the proportion of correctly classified cases was 96.7%. The BES showed a sensitivity value of 81.8% and a specificity value of 97.8%. The results of the ROC curve (**Fig. 1**) confirmed that the BES presents an excellent precision in the detection of clinically significant cases of binge eating in the general population, with an area under the curve (AUC) of .90 (CI = .76, 1.00; $p < .001$; Hosmer & Lemeshow, 2000).

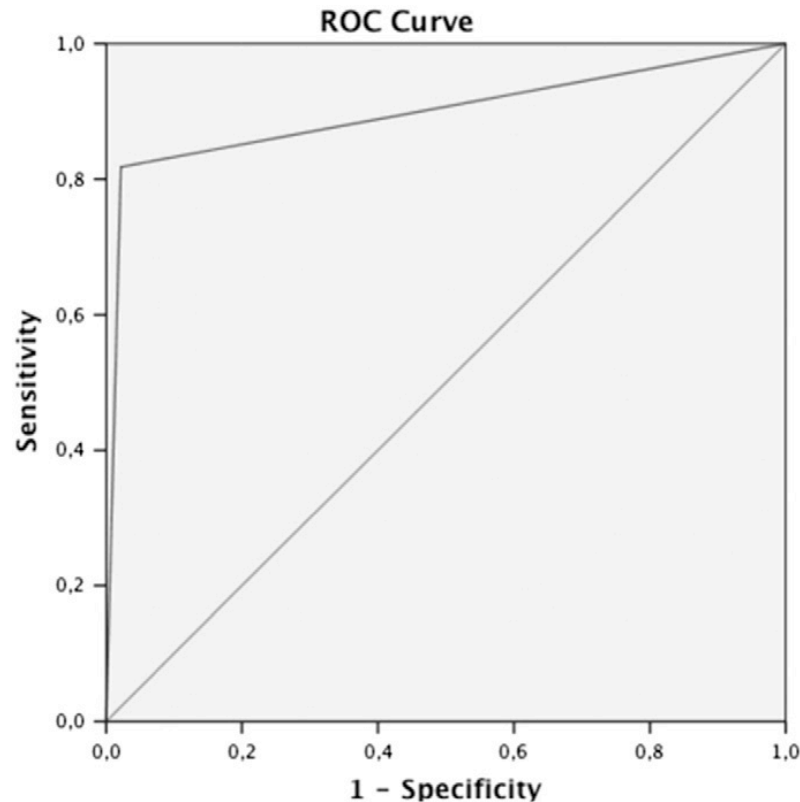


Figure 1 | ROC curve showing BES accuracy as a screening tool for binge eating, with 95% confidence intervals.

4. Discussion and conclusions

The BES is one of the most widely used measures of binge eating attitudinal and behavioural manifestations. Also, it has been recognized as a valid instrument to assess binge eating symptoms from a dimensional perspective, both in clinical and nonclinical samples. Nevertheless, the BES factorial structure and validity were never formally assessed in women from the general population. The current study aimed at testing the adequacy of the BES as a one-dimensional measure of binge eating severity, as well as its psychometric properties and utility in discriminating women with clinically significant binge eating, within a large community sample.

A CFA confirmed that BES has a sound factorial structure, supporting its use as a measure of the severity of binge eating in the general population. Specifically, the global and local adjustment indices confirmed the suitability of a one-factor model, as it has been commonly interpreted. The analysis of the local adjustment indices supported the adequacy of the model (Tabachnick & Fidell, 2013).

Moreover, results indicated that the BES is a reliable self-report instrument. In fact, the scale revealed a high internal consistency, with a value similar to what was found in other nonclinical samples (Anton et al., 2000; Gordon et al., 2012; Meno et al., 2008). Also, most items presented moderate to high item-total correlations confirming the quality and adequacy of the items comprising the overall scale. The scale's reliability and items' convergent validity were also confirmed through the high values of CR and AVE, respectively. The BES was also shown to present high test–retest reliability.

Furthermore, results revealed that binge eating as assessed by the BES was positively associated with increased severity of eating psychopathology as measured by a gold standard interview of eating psychopathology – EDE 16.0D (Fairburn et al., 2008) – and the adapted self-administration version of this interview (EDE-Q; Fairburn & Beglin, 1994). These findings are in line with prior research that has demonstrated that binge eating is associated with greater body image and eating-related psychopathology (Anton et al., 2000; Striegel-Moore et al., 2000). Moreover, findings indicated that the BES is associated with a higher tendency to eat in response to negative affective states, theoretical and empirical accounts on binge eating, supporting the conceptualization of binge eating as a maladaptive reactive attempt to cope with negative and undesirable emotional states (Arnouk et al., 1995; Goldfield et al., 2008; Heatherton & Baumeister, 1991).

Additionally, results indicated that in women from the general population binge eating is also significantly linked to higher levels of depressive, stress and anxiety symptoms. These findings add to prior evidence on the association between binge eating and indicators of poor mental health and well-being (Hudson et al., 2007; Kessler et al., 2013). Moreover, a positive and moderate association between binge eating and increased BMI was found, which also supports previous research (Villarejo et al., 2012; Wilfley et al., 2003).

Findings are consistent with prior evidence suggesting that binge eating problems are present in female samples of the general population in varying degrees of severity (Anton et al., 2000; Kessler et al., 2013; Ribeiro et al., 2014). The current study confirmed these findings and extends them by supporting the adequacy of a self-report measure to identify women within the community that present clinically significant levels of binge eating problems.

In fact, this study further allowed attesting for this measure's ability to predict and discriminate cases from non-cases of binge eating in women from the general population. The ROC curve analysis indicated that when the commonly applied cut-off score of ≤ 17 is used,

81.8% of women with clinically significant binge eating symptoms (sensitivity) and 97.8% of women without clinically significant binge eating (specificity) were correctly identified. These findings are similar to those reported in other studies conducted with clinical samples (e.g., patients seeking behavioural or surgery weight loss interventions; Freitas et al., 2006; Grupski et al., 2013; Ricca et al., 2000). However, these studies reported slightly higher sensitivity and lower specificity, which may be explained by the characteristics of the samples investigated. To our knowledge, this is the first study that used a sample of women from the general population with a wide age and BMI ranges. These findings offer support for the use of the BES as a screening instrument of clinically significant binge eating symptoms, which may be particularly useful in epidemiological and community-based intervention programmes for disordered eating behaviours.

This study's findings need to be interpreted taking into consideration some limitations. Since this is the first study that examined the factorial structure and psychometric properties of the BES in the general population, future research should be conducted to corroborate these findings. Studies should further investigate whether the one-dimensional model confirmed in this study remains invariant in other samples. This model should be tested in other female samples comprising different age ranges, for instance older women. Furthermore, the findings regarding the classification accuracy of the BES should be corroborated in future research using larger samples in order to confirm the ability of the BES to discriminate clinically significant cases of binge eating problems in the community. Also, even though research is consistent on demonstrating that women present higher levels of binge eating than men, the prevalence of binge eating in men, although lower, is not negligible. Thus, future studies should test the adequacy of this scale in addressing binge eating symptoms in men.

Nonetheless, the current study confirms that the BES has a sound psychometric structure and is a reliable and useful measure to assess binge eating severity in women from the general population. Furthermore, this study offers new contributions on how BES operates on the identification of clinically significant levels of binge eating, further supporting the use of this measure to describe and investigate this serious condition.

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Contributors

Authors Cristiana Duarte and José Pinto-Gouveia designed the study, prepared the measures and wrote the protocol. Author Cristiana Duarte recruited and assessed the participants. Authors Cristiana Duarte and Cláudia Ferreira conducted literature research and provided summaries of previous research studies, conducted the statistical analysis and wrote the manuscript throughout its development stages. José Pinto-Gouveia supervised and contributed throughout the conduction of these tasks and approved the final manuscript.

Conflict of interest

The authors declare no conflicts of interest.

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Study II

Body image as a source of shame: A new measure for the assessment of the multifaceted nature of body image shame.

Adapted from:

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Abstract

Theoretical and empirical accounts highlight the link between shame and body image difficulties, and disordered eating behaviours. Specifically, body image shame seems to play a particularly important role in this association. The current study aimed at developing and validating a new measure of body image shame and its phenomenology, the Body Image Shame Scale (BISS). Distinct samples of women from the general and student populations were used to test the BISS factorial structure using principal component analysis (PCA) and confirmatory factor analysis (CFA), and to examine the psychometric properties of the BISS. Principal component analysis results indicated that the scale presents a two-factor structure assessing an externalized and an internalized dimension underlying body image shame, which explains a total of 62.41% of the variance. A confirmatory factor analysis further corroborated the adequacy of this structure, which revealed good global and local adjustment indices. The BISS also presented very good internal consistency, construct and discriminant validities and good test–retest reliability. The scale also showed good concurrent and divergent validities. Furthermore, the scale discriminates between women with higher or lower levels of disordered eating behaviours. Finally, a mediation analysis revealed that the BISS fully mediates the previously established association between external shame and eating psychopathology. The BISS is a psychometrically robust and short measure of body image shame and its external and internal dimensions.

Key Practitioner Message:

The BISS is a brief and reliable self-report instrument of body image-related shame.

The BISS assesses the phenomenology of body image shame considering an externalized dimension and an internalized dimension, which may have important clinical implications.

The BISS presents very good internal consistency, construct and discriminant validities, test–retest reliability, concurrent and divergent validities, and accurately distinguishes between women with higher and normative levels of disordered eating behaviours.

Body image shame, as assessed by the BISS, contributes to a better understanding of eating psychopathology with findings suggesting that the association between external shame and eating psychopathology fully depends on the extent to which one’s body image becomes the source of shame, with the consequent activation of defensive attitudes and behaviours.

Keywords: body image shame, body image, eating psychopathology, psychometric properties, confirmatory factor analysis

Introduction

Body image may be an indicator of women's attractiveness and rank in the social world (Buote, Wilson, Strahan, Gazzola, & Papps, 2011; Ferreira, Pinto-Gouveia, & Duarte, 2013a; Pinto-Gouveia, Ferreira, & Duarte, 2014). Evolutionary and cultural approaches have suggested that evolution has shaped the human brain to be extremely sensitive to social cues of approval (versus criticism) and acceptance (versus rejection), and to develop mechanisms that stimulate positive affect and beliefs about the self in the mind of others (Gilbert, 1992, 1997, 2000), motivating them to establish advantageous relationships with the self (e.g., as an ally, friend and sexual partner; Baumeister & Leary, 1995).

In order to assure the creation of a positive image of oneself, one has to be aware of the qualities valued by the social group within a certain context (Cohen, 2001) to track whether others perceive him/her as attractive and to know which domains one should invest in (Gilbert, 1997, 2000, 2002). The display of an attractive physical appearance, a part of us that is readily observable and assessed by others, has always been a particularly important indicator of social attractiveness, especially among women (Ferreira et al., 2013a; Gatward, 2007; Gilbert, 2002; Gilbert, Price, & Allan, 1995; Myers & Crowther, 2009).

In modern Western societies, feminine attractiveness has been represented by thinness, which became a mirror of desirable psychological characteristics, success, power and happiness (e.g., Engeln-Maddox, 2006). This sociocultural context clearly defines that a slender body shape should be pursued (to be valued by the social group; Stice, Schupak-Neuberg, Shaw, & Stein, 1994; Wiseman, Gray, Mosimann, & Ahrens, 1992) and that not fitting within these patterns (e.g., overweight) should be avoided in order to reduce the threat of being criticized, blamed, attacked or rejected (Puhl & Heuer, 2009). In this sense, perceiving that one is failing to reach such desirable sociocultural standards and a positive view of oneself is a major threat and may have enduring effects (Gilbert, 1992, 1997; Gilbert & McGuire, 1998; Schore, 1994). Hence, one's physical appearance may be a source of shame.

Shame has been defined as a multifaceted, self-conscious and socially shaped emotion that emerges in the context of competition for social attractiveness. Shame acts as a warning sign

that the self exists negatively in the mind of others, thus standing at risk of being rejected, excluded, passed by or harmed (Gilbert, 1998, 2002, 2007; Lewis, 2003; Liotti & Gilbert, 2011; Tangney & Dearing, 2002). Such negative evaluations about how one thinks others see and judge the self (e.g., as bad, unattractive, flawed and a worthless and rejectable social agent) have been conceptualized as external shame. In this case, the focus of attention is on the external world with the individual anticipating that his/her exposure to others may lead to social diminishment or rejection and possibly engaging in attempts to avoid displaying unattractive features to others (Gilbert, 1997, 1998, 2002; Lewis, 1992). These evaluations can be internalized with one starting to view oneself in the same devaluing manner others might. Here, the focus of attention, feelings and negative judgements are self-directed, and encompass what has been referred to as internal shame (Gilbert, 1998, 2002; Mikulincer & Shaver, 2005).

This deleterious emotion of shame has been regarded as playing a central role in a series of psychopathological conditions (e.g., Kim, Thibodeau, & Jorgensen, 2011; Matos, Pinto-Gouveia, & Gilbert, 2013), namely body image and eating-related psychopathology (e.g., Goss & Allan, 2009; Grabhorn, Stenner, Stangier, & Kaufhold, 2006; Swan & Andrews, 2003; Troop, Allan, Serpell, & Treasure, 2008). In particular, recent studies show that shame has a major impact on body image dissatisfaction and disordered eating behaviours, both in patients with eating disorders and non-clinical samples (e.g., Ferreira et al., 2013a; Ferreira, Pinto-Gouveia, & Duarte, 2013b; Pinto-Gouveia et al., 2014).

Specifically, perceptions that one's body is unattractive and falls short of what the sociocultural context defines as a desirable physical appearance has also been regarded as a source of distress and body image and eating-related psychopathology, namely among women (Bessenoff & Snow, 2006; Castonguay, Brunet, Ferguson, & Sabiston, 2012; McKinley, 1998; Noll & Fredrickson, 1998). These experiences have been related to the emotion of shame regarding one's body image.

Following a biopsychosocial approach (Gilbert, 1998, 2002, 2007), shame regarding body image involves negative evaluations that one has physical attributes (body shape, size or weight) believed to be viewed by others as unattractive and that place oneself in a vulnerable and unwanted social rank; these evaluations may also be inwardly focused (Gilbert, 2002; Gilbert & Thompson, 2002). As shame evolved as an affective-defensive response to protect the self against such (perceived) loss of attractiveness in the eyes of others (Gilbert, 1997, 1998), a series of defensive attitudinal and behavioural outputs may be activated in response to these

evaluations regarding one's physical appearance. These may include wanting to hide or conceal the body or to avoid social situations in which one's physical appearance may be exposed to the scrutiny of others (Gilbert, 2002). However, these responses may have a paradoxical effect, enhancing shame and the pathogenic impact of these experiences in one's life.

Nevertheless, the role of body shame and related phenomenology on eating and body image-related difficulties and well-being remains poorly documented. Also, different measures or assessment methods have been used to explore this construct. Nevertheless, they seem not to be clearly focusing on body image shame and related cognitions and behaviours and/or have some methodological limitations. One of these measures is the Objectified Body Consciousness Scale (McKinley & Hyde, 1996). This scale is based on the concept of objectified body consciousness, which entails women's tendency to scrutinize their bodies as outside observers and to constantly monitor how close/distant they are to/from the sociocultural ideal standard. This tendency is assumed to have an impact on women's shame, which is assessed in the Objectified Body Consciousness Scale by the Body Shame subscale ($\alpha = .75$; e.g., 'I feel ashamed of myself when I haven't made the effort to look my best'). The Derriford Appearance Scale (DAS59 and DAS24; Carr, Harris, & James, 2000; Carr, Moss, & Harris, 2005) also targets self-consciousness of appearance (e.g., 'My self-consciousness of appearance makes me irritable at home'), and has been suggested as useful in the assessment of some aspects related to body shame. Even though these are valid measures, they focus only on a sense of self-consciousness related to body image, and fail to specifically address body image shame and its phenomenology.

Furthermore, the Experiences of Shame Scale (Andrews, Qian, & Valentine, 2002) includes a subscale of shame regarding body image, which assesses (through four items) the experiential, cognitive and behavioural dimensions of body image shame. Even though this may offer important information, the use of single items to assess each dimension does not allow a clear examination of the phenomenology of this emotion related to body image. More recently, Conradt et al. (2007) developed the Weight and Body-related Shame and Guilt Scale, which aims at evaluating shame regarding body shape or weight (e.g., 'I am ashamed of myself when others get to know how much I really weigh'), and guilt concerning one's eating and exercise patterns, and weight control. Although Weight and body-related Shame and Guilt Scale is a valid measure, it was designed for obese individuals, and thus, it is not generalizable to other samples.

Aims

The main aim of this study was the development of a scale that specifically assessed body image shame: the Body Image Shame Scale (BISS). It has been suggested that the focus of shame — a more externally focused shame, or an internalized shame as negative self-devaluation and criticism — has important clinical implications, namely in the onset and course of body image disturbances and disordered eating behaviours (Goss & Allan, 2009; Goss & Gilbert, 2002; Troop et al., 2008). Thus, this distinction is an important aspect to consider in the evaluation of shame regarding one's physical appearance. Therefore, we intended to develop a scale that would allow for the operationalization of body image shame as involving two dimensions: one focused on the external world that would assess perceptions that one's body image may elicit negative evaluations or criticism in others, with avoidance of or distress felt in social contexts in which this may occur; and a dimension inwardly focused, involving negative perceptions about one's body image and its effect on one's social standing, and consequent behaviours of body image concealment. The current study examines the factor structure of this new measure through an exploratory factor analysis and a confirmatory factor analysis, in a wide sample of female college students and women from the general population. Furthermore, the psychometric properties of the BISS were analysed. Finally, this study aimed at further contributing to the understanding of the role that shame plays in eating psychopathology, by considering the specific mediator effect of body image shame.

Method

Participants

A total of 958 women participated in the study. Distinct samples comprising both college students and participants from the general population were used to conduct the studies.

Sample 1. The scale was first examined in 443 participants, with ages ranging from 18 to 59, and with a mean age of 23.54 ($SD = 8.04$) and of 14.04 ($SD = 1.79$) years of education. Mean body mass index (BMI) was 22.38 ($SD = 3.43$).

Sample 2. Data from 515 participants were used to conduct the confirmatory factor analysis and to further test BISS validity. Participants presented ages ranging from 18 to 37, with a mean age

of 21.83 years old ($SD = 4.16$) and of 14 ($SD = 1.99$) years of education. Participants presented a mean BMI of 21.73 ($SD = 2.96$).

Sample 3. Fifty-two participants were additionally asked to complete the retest version of the BISS.

Measures

Participants completed a battery of self-report questionnaires designed to measure body image shame, eating psychopathology, shame, social comparison through physical appearance, and psychopathological symptoms.

Body Mass Index

We calculated participants' BMI by dividing the current weight (in kg) by height squared (in m).

Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Portuguese version by Machado et al., 2014)

The Eating Disorder Examination Questionnaire (EDE-Q) is a self-report version of the well-established investigator-based interview, the EDE (Cooper & Fairburn, 1987; Fairburn & Cooper, 1993) that provides a similarly comprehensive assessment of the specific psychopathology of disordered eating behaviours. The EDE-Q comprises 36 items focusing on the past 28 days. This self-report questionnaire includes four subscales: restraint (five items), eating concern (five items), weight concern (five items) and shape concern (eight items). The items comprising these subscales are rated for frequency of occurrence (items 1–15; on a scale ranging from 0 = 'No days' to 6 = 'Every day') or for severity (items 29–36; on a scale ranging from 0 = 'Not at all' to 6 = 'Markedly'). A global EDE-Q score can also be obtained by calculating a mean of the four subscale scores. Higher scores indicate greater levels of disturbances. Research supports that this scale holds good psychometric properties.

Other as Shamer Scale (OAS; Goss, Gilbert, & Allan, 1994; Portuguese version by Matos, Pinto-Gouveia, & Duarte, 2011)

The OAS is a self-report measure that assesses external shame, that is, global judgements regarding how people believe others view them, involving evaluations that others look down on,

and negatively evaluate the self (Goss et al., 1994). It comprises 18 items regarding which respondents are asked to indicate the frequency on a five-point scale (0 = 'Never' to 4 = 'Almost always') of their shame feelings and experiences (e.g., 'I think that other people look down on me'). Higher scores on this scale indicate high external shame. In the original study, as well as in the Portuguese version, the scale showed good reliability, with Cronbach's alphas of .92 (Goss et al., 1994) and .91 (Matos et al., 2011).

Social Comparison through Physical Appearance Scale (Ferreira et al., 2013a)

This scale assesses the subjective perception of one's social ranking in comparison to others using physical appearance as a reference. It comprises two scales assessing this social comparison process relatively to proximal targets (friends, colleagues and other known girls; 12 items), and distal targets (models, actresses, and other celebrities; 11 items). Participants are instructed to select a number, using a scale ranging from 1 to 10, that best translates the way they feel in relation to the comparison targets. Higher scores represent more favourable comparisons. In the original study, the scale revealed good psychometric properties with Cronbach's alpha values of .94 and .96 for the Peers and Models subscales, respectively.

Depression Anxiety and Stress Scales—21 (DASS21; Lovibond & Lovibond, 1995; Portuguese version by Apóstolo, Mendes, & Azeredo, 2006)

The DASS21 is a short form of the Lovibond and Lovibond's (1995) 42-item self-report measure scale that assesses levels of depression (DEP; e.g., 'I couldn't seem to experience any positive feeling at all'), anxiety (ANX; e.g., 'I was aware of dryness of my mouth') and stress symptoms (STR; e.g., 'I found it hard to wind down'). The three subscales comprise seven items each. Using a 4-point scale (0 = 'did not apply to me at all' to 3 = 'applied to me very much, or most of the time'), respondents are asked to indicate the frequency with which they experienced each symptom over the past week. Higher results indicate higher levels of emotional distress. The original as well as the Portuguese versions of the scale revealed adequate internal consistency (DEP = .88, ANX = .82, and STR = .90, in the original version; and DEP = .85, ANX = .74, and STR = .81, in the Portuguese version).

The Cronbach's alpha values for the variables considered in the current study are reported in **Table 3**.

Procedure

Data collection followed ethical requirements. After the Ethic Committees and boards of the institutions involved approved the study, the researchers presented the study to the students and the women from the general population as a research about emotions and behaviours related to body image and well-being. Participants were fully informed about the voluntary nature of their cooperation and the confidentiality of the data collected, which was only used for research purposes. After participants gave their informed consent, author CD administered and collected the self-report measures, with the assistance of undergraduate students. Standardized instructions were given to all participants. The female students completed the assessment protocol at the end of a lecture. The women from the general population comprised a convenience sample collected within the staff of distinct institutions (e.g., schools, private companies and retail services) and completed the questionnaires during a break, with permission from the professional institutions' boards.

Development of the Body Image Shame Scale

The BISS was developed to measure the experience and phenomenology of body image shame. Authors CD, JPG and CF generated two sets of items designed to measure (1) an externalized dimension involving negative feelings and perceptions that one's body image may be an object of negative scrutiny, criticism by others and diminishment, along with the activation of defensive responses to such threat (e.g., avoidance of social contexts); (2) an internalized dimension of body shame, which comprises self-focused negative self-evaluations based on one's body image and consequent behaviours to control body image exposure (i.e., concealment). Item generation was based on literature review and on clinical experience. This process resulted in a pool of 38 items (seven of which assessed a positive accepting relationship with one's body image, added to ascertain the scale's face validity and thus not included in the following analysis). This preliminary version of the scale was administered to a group of patients with eating disorders with high levels of shame. They were asked to complete the scale and comment on whether the items reflected their body-related shame experiences. The items were further subject to discussion and revision. Minor changes of wording were conducted, and some items were dropped. The scale resulted in 27 items, which were submitted to an exploratory factor analysis with the aim of reaching a short reliable measure.

The scale instructions ask respondents to rate each item according to whether it translates the frequency with which they experience feelings or experiences of shame regarding body image, using a 5-point Likert scale (ranging from 0 = 'Never' to 4 = 'Almost always').

Analytic Strategy

In the development of the scale, a principal components analysis with a maximum likelihood extraction and direct Oblimin rotation was conducted. Furthermore, internal consistency was evaluated by computing Cronbach's alpha coefficients, and item-total correlations were computed for each of the items comprising the two subscales of the BISS.

Moreover, the obtained structure was confirmed through a Confirmatory Factor Analysis. Construct reliability and convergent validity were further established through the calculation of the composite reliability (CR) and of the average variance extracted (AVE). The software AMOS (Analysis of Moment Structures, software version 18, SPSS Inc. Chicago, IL, USA) was used in these analyses.

The relationship between the BISS and other self-report measures was assessed by computing Pearson product-moment correlation coefficients. Retest reliability was analysed through the comparison of the first and second administration (after a one-month period) mean values of the scale through Dependent Samples t-tests and through Pearson product-moment correlations. The ability of the scale to discriminate between a group of women from the general population with normative levels of eating psychopathology and a group with higher eating difficulties was assessed through t-tests for two independent samples.

The mediator effect of body shame, as measured by the BISS, on the association between a global measure of shame (OAS; independent variable) and eating psychopathology (EDE-Q; criterion variable) was examined. The mediator effect was tested through linear regressions following Baron and Kenny's (1986) four-step model. According to this procedure, mediation is established when the independent variable significantly predicts the dependent variables and the mediator, and when the mediator significantly predicts the dependent variable, when controlling for the independent variable. There is a total mediator effect when the previously significant association between the independent and the dependent variable is no longer significant with the introduction of the possible mediator on the model (Baron & Kenny, 1986).

The analyses were conducted using IBM SPSS Statistics 20 (Statistical Package for the Social Sciences, Chicago, IL, USA).

Results

Preliminary Data Analyses

Preliminary data analyses were conducted to test for the multivariate normality assumption. The obtained Skewness and Kurtosis values did not represent a significant bias to normal distribution ($Sk < |3|$ and $Ku < |10|$; Kline, 2005).

Scale Development

Exploratory Factor Analysis

A principal component analysis was conducted (Sample 1), and a direct oblimin rotation was applied since it was expected to find two related dimensions. The suitability of the data to conduct the analysis was confirmed through the Kaiser-Meyer-Olkin test (.95) and through the Bartlett's sphericity test ($\chi^2_{(351)} = 7907.28, p \leq .001$). In the first non-rotated analysis, the Kaiser-Guttman criteria suggested the decision of retaining four factors. Nevertheless, the Catell's scree test suggested that a two-factor structure was more adequate.

Taking this into account, the analysis was recalculated with a direct oblimin rotation forcing a two-factor solution, which explained 53.77% of the scale variance. All items presented communalities above .5. The examination of the factorial loadings indicated the progressive deletion of three items for presenting factorial loadings below .45 on either of the factors. The removal of these items resulted in an increase of the amount of variance explained to 55.65%. Furthermore, two items were excluded since, in the first case, the item content replicated another item and, in the second case, the item loaded on a factor in which it was not theoretically expected to.

In order to reach a short and reliable measure, a final analysis was conducted retaining the seven items of each subscale with the highest factorial loadings and that were theoretically consistent and more strongly captured the constructs under analysis. The final structure explained a total of 62.41% of the variance. The first factor — externalized body shame — explained 50.84% of the

variance and assesses perceptions of inferiority and that one's physical appearance may be the target of negative scrutiny and criticism by others, with the avoidance of social situations in which this may occur. The second factor — internalized body shame — explained a total of 11.57% and captures the engagement in body concealment driven by self-loathing based on one's physical appearance. **Table 1** presents the BISS 14-item structure, communalities and factorial loadings of each item.

Table 1*Factorial Loadings and Communalities (n = 443)*

Items	1	2	h^2
25. I feel uncomfortable in social situations because I feel that people may criticize me because of my body shape.	.88	.06	.72
6. I avoid social situations (e.g., going out, parties) because of my physical appearance.	.80	.08	.58
34. The relationship I have with my physical appearance makes it difficult for me to feel comfortable in social situations.	.81	.10	.75
33. I do not like to exercise in front of others because I am afraid of how they might evaluate me.	.77	.00	.59
32. My physical appearance makes me feel inferior in relation to others.	.71	.11	.62
18. The relationship I have with my body prevents me from having an intimate relationship with someone.	.71	.03	.52
24. I avoid moving my body (for example, dancing) in public places because I feel I am exposing my physical appearance to the criticism of others.	.70	.04	.53
15. I choose clothes that hide parts of my body that I consider ugly or disproportional.	.16	.94	.72
29. There are parts of my body that I prefer to hide.	.04	.89	.75
22. I feel bad about myself when I use clothes that reveal my body shape.	.06	.81	.72
2. I avoid wearing tight clothes that reveal my body shape.	.01	.76	.59
21. I pay close attention to the movements and posture of my body to hide parts that I do not like.	.07	.73	.60
8. It bothers me to see my body undressed.	.17	.64	.57
14. When I see my body in the mirror I feel I am a defective person.	.28	.51	.50
Eigenvalues	7.12	1.62	

Internal Consistency

Results indicated that the 14-item structure obtained revealed a very good internal reliability with a Cronbach's alpha value of .92. Also, the first subscale presented a Cronbach's alpha of .89,

and the second one presented a Cronbach's alpha of .90. All items showed moderate to high item-total correlations (all above .58), pointing out the quality and suitability of the items. Specifically, results revealed that all single items are associated with the total of each respective subscale, with values ranging from .63 and .80 for the first factor, and .60 and .79 for the second factor. Furthermore, the removal of any item would not increase the internal reliability of the total scale or of each subscale.

Confirmatory Factor Analysis and Psychometric Properties of the Body Image Shame Scale

Confirmatory Factor Analysis

A CFA was conducted to confirm the previously found two-factor structure of the BISS, having maximum likelihood as the estimation method (sample 2). Each item was specified to load on its respective latent first-order factor. The two latent factors previously identified were specified to load on a second-order factor of body image shame. A series of goodness-of-fit indices were selected to evaluate the suitability of this structure. First, results indicated a significant chi-square goodness-of-fit ($\chi^2 = 369.96$; $p < .001$). Even though this result may suggest that the data are not consistent with the measurement model, it is consensual that this indicator is problematic since it may be biased due to sample size (DeCoster, 1998). Other goodness-of-fit indices were therefore selected to overcome this limitation. The normed chi-square (in which values varying between 2 and 5 show a good global adjustment of the model; Arbuckle, 2008; Tabachnick & Fidell, 2007) was used. Also, the following relative fit indices were considered: the normed fit index (NFI), which indicates a good fit when values are superior or equal to .90 (Arbuckle, 2008); the comparative fit index (CFI) and the Tucker and Lewis index (TLI), both of which indicate a good fit when values range from [.90 – .95], and a very good fit with values above .95 (Brown, 2006) Additionally, the parsimony normed CFI (PCFI), in which values between 0.6 and 0.8 indicate a good fit, was analysed. Finally, the values of the root mean square error of approximation (RMSEA) were examined considering that values between .05 and .08 indicate a good fit and that a model presents a very good fit with a RMSEA value below .05 ($p \leq .05$; Arbuckle, 2008).

The indicators revealed that this structure had an acceptable fit (Table 2). Furthermore, the quality of the model was examined through the local adjustment indices. Results indicated that

the two first-order factors — externalized body shame and internalized body shame — significantly loaded on the second-order factor (.85 and .94, respectively). Furthermore, all items revealed standardized regression weights ranging from .61 to .88 in the first subscale, and .73 and .87 in the second subscale. That is, all values were above the recommended cut-off point of .40. Also squared multiple correlations results confirmed the instrument reliability, with all items presenting values ranging from .37 to .77 (above the .25 cut-off point; Tabachnick & Fidell, 2007).

Table 2

Global adjustment indices (n = 515)

	$\chi^2/(df)$	NFI	CFI	TLI	PCFI	RMSEA
BISS – Initial model	4.57	.93	.94	.93	.79	.08
BISS – Final model	3.40	.95	.96	.96	.78	.07

Note: BISS, Body Image Shame Scale; NFI, normed fit index; CFI, comparative fit index; TLI, Tucker and Lewis index; PCFI, parsimony normed comparative fit index; RMSEA, root mean square error of approximation.

Nevertheless, the modification indices were analysed, and results suggested the progressive correlation of the errors of items 8 and 14, and of items 25 and 24. The correlation of these errors resulted in an improvement of the global adjustment indices, with the model presenting a good to very good fit (**Table 2**). The quality of the model was also examined through the local adjustment indices. Again, all estimates were significant. In particular, results indicated that all items revealed adequate standardized regression weights, which varied from .61 (item 18) to .89 (item 34) in the first subscale, and .74 (items 2, 21 and 8) and .87 (item 22) in the second subscale. That is, all values were above the recommended cut-off point of .40 (Tabachnick & Fidell, 2007). Squared multiple correlations results confirmed the instrument reliability, with all items presenting values ranging from .38 (item 18) to .79 (item 34).

Validity Analyses

The CR and AVE were calculated manually by computing the respective formulas (Fornell & Larcker, 1981). Results indicated that the first factor revealed a CR of .94, whereas the second factor showed a CR of .95. Furthermore, the BISS total score showed a CR of .96. These findings indicate that the scale and respective subscales have very good construct reliability. Regarding the AVE, results indicated a value of .69 for the first factor, and of .75 for the second one, which confirmed the instrument convergent validity.

The discriminant validity of the factors was assessed through the comparison of the AVE of each factor with the squared correlation between the factors. Given that the AVE values were higher than $R^2 = .62$, results indicated that the two factors have adequate discriminant validity.

Retest Reliability

The temporal stability of the scale was tested through dependent samples t-tests, which showed that there were no significant differences between the scores of the two assessment moments of the BISS ($t_{\text{Externalized Body Shame}(51)} = 0.16, p = .871$; $t_{\text{Internalized Body Shame}(51)} = 0.11; p = .913$; $t_{\text{Total}(51)} = 0.00, p = 1.000$). Product-moment Pearson correlations were conducted as a further analysis of test-retest reliability, and results indicated high significant positive correlations between the test and retest versions of the BISS subscales ($r_{\text{Externalized Body Shame}} = .66$; $r_{\text{Internalized Body Shame}} = .73$) and global score ($r = .75$).

Relationships between Body Image Shame Scale and Other Measures

Product-moment correlation coefficients (Table 3) indicated that the two subscales and the BISS total score were significantly and positively correlated with external shame (OAS). It is noteworthy that the externalized body shame subscale showed a higher positive correlation with a global measure of external shame.

Table 3

BISS product-moment Pearson correlations with other measures and Cronbach's alphas (n = 515)

	α	BISS	BISS_External	BISS_Internal
OAS	.95	.53***	.55***	.46***
SCPAS_Peers	.93	-.44***	-.41***	-.42***
SCPAS_Models	.96	-.53***	-.46***	-.51***
EDE-Q_Total	.93	.70***	.58***	.70***
EDE-Q_Restraint	.77	.42***	.34***	.43***
EDE-Q_Eating Concern	.71	.60***	.55***	.57***
EDE-Q_Shape Concern	.91	.73***	.59***	.74***
EDE-Q_Weight Concern	.82	.67***	.55***	.67***
DEP	.89	.39***	.41***	.33***
ANX	.80	.28***	.28***	.25***
STR	.88	.31***	.30***	.28***
BMI		.38***	.28***	.41***

Note. OAS = Other as Shamer Scale; SCPAS = Social Comparison Through Physical Appearance Scale; EDE = Eating Disorder Examination – Questionnaire; DEP, ANX, STR = Depression, Anxiety and Stress Scales of DASS-21; BMI = Body Mass Index. *** $p < .001$

However, results showed that the subscales and total score of the BISS were negatively linked, with moderate to high correlations, with favourable social comparisons through physical appearance with peers and models.

Regarding the associations between this new measure of body shame and eating psychopathology-related measures, results show that the subscales and global score of the BISS were significantly and positively linked with the EDE-Q subscales. In particular, higher positive correlations were found between the BISS overall score and subscales, namely internalized body shame and shape and weight concern subscales of the EDE-Q. Furthermore, the subscales and total score of the BISS were significantly and positively linked to BMI, but with low to moderate correlations.

Finally, results showed low to moderate associations between the BISS and its subscales and depressive, anxiety and stress symptoms.

Body Image Shame Scale and Eating Psychopathology

To ascertain whether the BISS would discriminate women with higher disordered eating behaviours from other participants with normative scores on the EDE-Q total score, considering community norms (Fairburn & Beglin, 1994), we compared two samples selected from the total sample. The group with higher levels ($n = 102$) was selected on the basis of the cut-off point of one standard deviation above EDE-Q total score mean. The other group comprised 106 controls randomly selected within the remaining participants.

The two samples presented the same demographic characteristics. Particularly, regarding age, the group with higher disordered eating behaviours levels ($M = 21.27$, $SD = 3.97$), and the control group ($M = 21.50$, $SD = 4.30$), did not present significant differences ($t_{(206)} = 0.392$; $p = .695$). Also, in relation to years of education ($M = 13.85$, $SD = 1.42$; $M = 14.25$, $SD = 1.92$; respectively), there were no significant differences between the groups ($t_{(206)} = 1.71$; $p = .089$).

Results indicated that participants with higher levels report significantly higher scores of externalized body shame ($M = 1.36$, $SD = 0.93$) in comparison with the control group ($M = 0.38$, $SD = 0.51$; $t_{(206)} = 9.28$; $p < .001$), and of internalized body shame ($M = 2.49$, $SD = 0.78$; $M = 1.00$, $SD = 0.89$, respectively; $t_{(206)} = 12.78$; $p < .001$). Also, the two groups present statistically significant differences regarding the BISS global score ($t_{(206)} = 12.53$; $p < .001$), with the group

with higher disordered eating behaviours presenting a mean of 1.92 ($SD = 0.76$), whereas the control group presented a mean of 0.69 ($SD = 0.65$).

Mediator Analysis

A series of preliminary analyses were conducted to confirm the suitability of the data to conduct regression analyses to test the mediator effect of body image shame (BISS), on the association between a global measure of shame (OAS) and eating psychopathology (EDE-Q; **Figure 1**). The values of Skewness and Kurtosis as well as the visual inspection of the variables distributions corroborated the assumption of normality (Kline, 2005; Tabachnick & Fidell, 2007). The assumptions of normality, linearity and homoscedasticity, independence of errors and multicollinearity were confirmed (Tabachnick & Fidell, 2007).

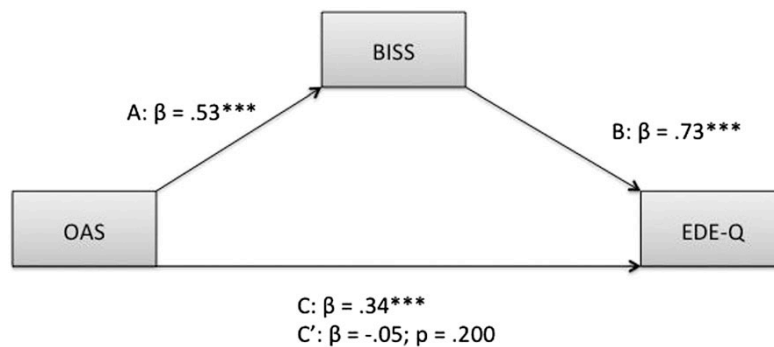


Figure 1. The association between external shame (independent variable; Other as Shamer Scale [OAS]) and eating psychopathology (dependent variable; Eating Disorder Examination Questionnaire [EDE-Q]), with body image shame (mediator; Body Image Shame Scale [BISS]) as a mediator ($n = 515$). A: the relation between the independent variable and the mediator; B = the relation between the mediator and the dependent variable; C = the direct effect between the independent and the dependent variables; C' = the indirect effect of the independent variable on the dependent variable when controlling for the mediator; *** $p < .001$

A regression analysis was conducted with OAS entered as the independent variable, and EDE-Q as the dependent variable. This model was significant ($F_{(1,513)} = 66.66; p < .001$) and accounted for 11.5% of eating psychopathology' variance. The following analysis confirmed that OAS significantly predicted BISS ($F_{(1, 513)} = 202.17; p < .001; R^2 = .28$). A regression analysis entering EDE-Q as the criterion variable and OAS and BISS as the predictors was then performed. Results indicated that this model was significant ($F_{(2, 512)} = 250.427; p < .001$), accounting for 49% of eating psychopathology's variance. Furthermore, findings showed that the BISS completely mediated the relationship between a global measure of shame and eating psychopathology, since OAS β reduced to non-significance with the introduction of the mediator. Finally, the

significance of the indirect effect of OAS on EDE-Q (through its effect on BISS) was confirmed through the Sobel test, which indicated that body image shame fully mediates the association between overall shame and eating psychopathology ($z = 12.83$; $p < .001$).

Discussion

There has been a growing interest on how physical appearance may operate as an indicator of one's social rank and attractiveness, as well on the impact this may have on the engagement in disordered eating behaviours and body image disturbances, namely among women (Ferreira et al., 2013a, 2013b; Pinto-Gouveia et al., 2014). The painful emotion of shame related to body image arises in this context of humans' competition for being attractive social agents (Gilbert, 2002). This study presents the development and validation of the BISS, a brief and reliable self-report instrument that allows for the assessment of the phenomenology of body image-related shame. Furthermore, this study explored the associations between this new assessment tool and other measures of shame, social rank, overall psychopathology symptoms and body image and eating-related psychopathology.

The structure of the BISS was first examined through a PCA in a sample of 443 female participants. This initial analysis indicated a clear distinction of two dimensions, as theoretically expected: the externalized body shame (seven items), where the focus of attention is on the external world on how others may negatively evaluate or criticize the self because of one's physical appearance, with the avoidance of social situations that may set the context for such scrutiny; and internalized body shame (seven items), an inwardly focused dimension of shame that involves depreciative self-evaluations and concealment behaviours.

The factorial structure obtained was further corroborated through a CFA, which confirmed the adequacy of this two-factor structure underlying a higher-order factor of body image shame. In particular, the global and local adjustment indices proved the suitability of the BISS factorial structure taking into consideration the recommended standards (e.g., Tabachnick & Fidell, 2007). The correlated errors between two items in each subscale were estimated following standard recommendations (Brown, 2006; Kline, 2005). This resulted in a very good adjustment of the model.

Furthermore, the current study confirmed that the BISS total score and subscales have high internal consistency. Also, results of the item-total correlation analyses corroborated the quality

and adequacy of the items to each respective subscale and overall scale. The composite reliability was high for both factors, and the AVE, which is an indicator of convergent validity of the factors, was also adequate. The scale also presented adequate discriminant validity and showed to be stable over time.

In addition, the BISS presented good concurrent and divergent reliabilities. In fact, this new measure of body image shame was positively correlated with a measure of external shame, and negatively correlated with favourable perceptions of social rank based on physical appearance (in comparison to peers as well as to women representative of the sociocultural thin ideal — models, actresses or celebrities). In particular, as expected, higher correlations were found between external shame and the externalized body shame subscale, whereas internalized body shame was more highly (negatively) correlated with the perception of one's rank position within the social world.

Furthermore, significant and strong associations between the BISS and eating psychopathology were found, namely with the EDE-Q dimensions referring to body shape and weight concerns. Also noteworthy is the fact that body image-related shame was likewise positively correlated with women's levels of anxiety, depression and stress. These findings suggest therefore that shame focused on this specific domain of body image (which can be an important indicator of social rank; Ferreira et al., 2013a) is a damaging emotion that may have a negative impact on women's sense of well-being. Additionally, it was found that body image shame and its dimensions were significantly associated with increased BMI. This was also an expected result, since a higher BMI brings one closer to features that society determines should be avoided to prevent the creation of negative feelings and evaluations in others about the self, and feelings of inferiority and inadequacy (Gilbert, 2002; Puhl & Heuer, 2009). This study also confirmed the new measure's ability to distinguish between cases with higher levels of disordered eating behaviours from participants with lower levels.

Finally, the current study confirmed that this specific scale of body image shame further contributes to the understanding of eating psychopathology. In fact, the mediation analysis confirmed the well-established association between OAS and eating-related difficulties (e.g., Ferreira et al., 2013a, 2013b; Pinto-Gouveia et al., 2014), but it added that this relationship is fully dependent on the presence of body image-related shame and consequent attitudes and behaviours. Hence, perceiving that others view us negatively may lead to eating psychopathology only when one's body image is understood as placing us in a vulnerable and

threatening position in the social world, with the consequent activation of a series of defensive outputs (e.g., avoidance and concealment). In this sense, disordered eating behaviours, such as pathological dieting and purging behaviours, may be understood as maladaptive control strategies to attempt to change what is perceived as the cause of shame — one's body image.

This study's findings need to be interpreted taking into consideration some limitations. This was the first study examining the structure of a new measure of body image shame in a large sample of female Portuguese participants, and allowed us to confirm that this construct comprises two distinct dimensions. However, to ensure the plausibility of this structure, future research should be conducted to test the model invariance in other samples and in other languages (e.g., English). For instance, future validation of the scale should be conducted in other female samples comprising different age ranges (e.g., adolescents) and in specific risk groups in which physical appearance is a central element for self and others evaluations (e.g., models, actresses and dancers).

Moreover, a limitation in this study was the absence of a clinical sample. Future studies should investigate the psychometric properties of this measure in clinical samples with eating and weight-related disorders and further test the ability of this scale to discriminate cases from noncases of eating disorders (e.g., anorexia, bulimia nervosa and binge eating disorder) or patients struggling with weight control difficulties (e.g., obesity). Nevertheless, our findings showed that the BISS is able to discriminate a group with higher levels of disordered eating behaviours from a group with lower levels. Taken together, our findings seem to support the relevance of this measure in clinical settings. The assessment of body image shame phenomenology seems particularly important given the implications that this painful emotion may have on the therapeutic process (e.g., motivation, disclosure in treatment and dropout rates; e.g., Goss & Allan, 2009). Thus, future work should further investigate the utility of the BISS in clinical settings and its sensitivity to therapeutic changes along psychological interventions.

Also, the significant associations found in the current study between the BISS and a measure of overall psychopathology open new possibilities for further examining the role of body image shame on indicators of mental health, well-being and quality of life.

In conclusion, this study showed that BISS is a valid, robust, short and reliable measure of body image shame and related attitudes and behaviours. Moreover, this study adds to the existing knowledge on shame and on how physical appearance may be a source of shame, by presenting

the development of the first scale that allows for the assessment of body image shame as a multifaceted response involving an external and an internal dimension. Hence, the BISS seems to be an important contribution for body image and eating-related problems' clinical and research fields.

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Study III

Body image as a target of victimization experiences by peers/parents: Development of the Body Image Victimization Experiences Scale

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Abstract

This study developed and established the psychometric properties of the Body Image Victimization Experiences Scale (BIVES). The BIVES retrospectively assesses the frequency (Part A – frequency) and effect (Part B – impact) of victimization experiences pertaining to body image, perpetrated by peers and parents/caregivers in childhood and adolescence.

Distinct samples of Portuguese women were recruited in 2013-2014: two nonclinical samples of the general population ($n = 1,177$), aged 18-60 years, and a clinical sample of patients with Binge Eating Disorder (BED; $n = 73$), aged 19-59 years. An Exploratory Factor Analysis was conducted in 632 participants. A Confirmatory Factor Analysis (CFA) and the scale's psychometric properties were tested in 545 participants. The ability of the BIVES to discriminate the clinical from a nonclinical sample was examined.

The scale presented two factors indicating the sources of the victimization – peers and parents. CFA results confirmed the scale's structure. The BIVES presented very good internal consistency, construct and discriminant validity, good test-retest reliability, and was associated with related constructs, body image shame and eating psychopathology. The scale adequately discriminated between the clinical sample and a nonclinical sample.

The BIVES is a valid and reliable measure that allows for a comprehensive assessment of body image-related victimization experiences.

Keywords: Body image; Body image victimization; Eating psychopathology; Psychometric properties; Confirmatory Factor Analysis

Introduction

Body image has been a salient area of research, with negative self-perceptions about body image being consistently related to poorer mental health (Cash 2004), especially eating psychopathology (e.g., Stice, Marti, and Durant 2011). Nonetheless, such self-perceptions may be greatly influenced by one's perceptions of evaluations by others (Ferreira, Pinto-Gouveia, and Duarte 2013; Pinto-Gouveia, Ferreira, and Duarte 2014; Gilbert 2002), and research results suggests the negative effects of others' criticism, rejection or even attacks

because of one's physical appearance (Duarte, Pinto-Gouveia, and Ferreira 2014; Duarte, Pinto-Gouveia, Ferreira, and Batista 2015; Duarte, Pinto-Gouveia and Rodrigues, 2015). Especially among women, bullying or teasing (a more verbal form of victimization characterized by insults, name-calling or negative comments) by peers about physical appearance has been associated with poorer psychological adjustment, feelings of inferiority and shame, body dissatisfaction and disordered eating, namely binge eating (Lunde, Frisén, and Hwang 2006; Matos et al. 2015; Sweetingham and Waller 2008; Menzel et al. 2010; Haines et al. 2006). Body image-related victimization perpetrated by family members, particularly by both parents, have also been associated with body image dissatisfaction and disordered eating (Haines et al. 2006; Keery et al. 2005; Libbey et al. 2008; Thompson and Sargent 2000).

The most widely used and validated measures to assess teasing about physical appearance are the Physical Appearance Related Teasing Scale (PARTS; Thompson et al. 1991) and its later version, the Perception of Teasing Scale (POTS; Thompson et al. 1995). These scales assess the frequency of weight and size-related teasing. In particular, the POTS assesses the history of the frequency and the emotional impact of experiences of being teased about abilities/competencies and being overweight. Although considered a reliable measure, the POTS is focused on verbal negative interactions about the particular feature of being overweight (and not overall physical appearance). Even though children with excess weight may be at higher risk of victimization and eating disorders (e.g., Fox and Farrow 2009), perceptions that one's body image may be at the root of social diminishment, regardless of actual weight status, has also been associated with eating psychopathology (Ferreira, Pinto-Gouveia, and Duarte 2013). Thus, a measure focusing on experiences related to body image may be more inclusive than one exclusively targeting experiences related to being overweight. Moreover, the POTS does not specify the source of the teasing (the items refer to a generic source, e.g., "People made jokes about you being too heavy"), which limits its use in research.

In fact, prior evidence suggests that the source of victimization can have a differential impact in later indicators of psychological adjustment (e.g., Matos, Pinto-Gouveia, & Costa, 2014), namely in body image and eating-related difficulties (e.g., Keery et al. 2005; Matos et al. 2015; Thompson and Sargent 2000). Therefore, a measure that assesses the

potential distinct effect of victimization experiences perpetrated by different agents may be particularly useful. Although modifications to existent measures were made to broaden their use, e.g., by adding items addressing the specific source of the victimization (e.g., parents; Keery et al. 2005), they have limited psychometric support. The use of single-item or dichotomous measures have also been used. However, these are not well-validated and may underestimate the strength of the associations between teasing and negative outcomes (Menzel et al. 2010).

The current study developed and assessed the psychometric properties of the Body Image Victimization Experiences Scale (BIVES). This measure comprises experiences that involve direct and indirect (e.g., rejection) forms of victimization related to one's body image (i.e., overall physical appearance), that occurred during childhood and adolescence, considering two distinct sources: peers and parents (or other relevant caregivers). This new measure addresses the frequency and the impact of the victimization experiences related to body image perpetrated by peers and by parents/caregivers, based on the evidence that more than the presence, the severity of the bullying and teasing experiences may play a particularly important role in determining the negative effect of these experiences (Herbozo and Thompson 2006). Although evidence has suggested that body image-related issues are prevalent in both genders (McCreary and Sasse, 2002; Pila, Brunet, Crocker, Kowalski, and Sabiston, 2016), especially for women, body image-related experiences seem to play a significant role in self-evaluation, and in current and later psychological adjustment (Menzel et al. 2010; Pinto-Gouveia et al. 2014). Therefore, the BIVES factor structure was tested in distinct clinic and non-clinic-based samples of women with an ample age range.

The construct validity of the BIVES was examined via relationships with other measures of relational experiences in childhood and adolescence, within the family (Gilbert et al. 2003; Richter, Gilbert, & McEwan, 2009) and with peers (Rigby and Slee 1993). We further aimed to contribute to the extant evidence on the association between body image-related victimization and psychological functioning (e.g., Lunde et al. 2006; Menzel et al. 2010; Haines et al. 2006; Libbey et al. 2008), by examining the associations between the BIVES and self-criticism, body image shame, general psychopathology and eating psychopathology symptoms.

Methods

Participants

Female undergraduate students and women from the Portuguese general community who voluntarily accepted to take part in the research, were recruited in their respective educational institution or place of work by online advertisements in the institutions' websites and by communications from members of the Boards of the institutions. Females aged from 18 to 60 years old, with a minimum of 4 years of education were eligible. The institutions scheduled the assessment sessions, and all participants who consented to take part in the study completed the self-report measures. A total of 1,207 participants (718 students and 489 participants from the general population) were recruited in 2013-2014. Data from 30 participants (2.48%; 19 students and 11 participants from the general population) who had not completed at least 90% of the measures were excluded from the analyses.

We first recruited a convenience sample of 632 participants (371 students and 261 women from the general population) to examine the scale's factorial structure and internal reliability estimates. Additionally, a distinct convenience sample of 545 participants (328 students and 217 women from the general population) was recruited to conduct a Confirmatory Factor Analysis (CFA) and to examine further the scale validity. Of this latter sample of 545, a convenience subsample of 30 participants from institutions that approved a follow-up assessment was invited to complete the retest of the BIVES after a one-month period. At the first assessment these participants were asked to indicate a personal code to match the two surveys.

An additional sample of patients with Binge Eating Disorder (BED) was used to test the scale's ability to discriminate a clinical sample from participants from the general population. The recruitment was part of a larger study investigating factors related to the vulnerability and maintenance of eating disorders' symptoms. The study was presented to the practitioners at an eating disorders care unit at the Hospitalary Centre of the University of Coimbra, who then identified 89 potential participants and referred them to the researchers. Patients aged between 18 and 60 years, with a current diagnosis of BED (evaluated by the Eating Disorder Examination 16.0D; Fairburn, Cooper, and O'Connor

2008), and without current comorbid severe mental disorders (according to DSM-5 criteria; American Psychiatric Association 2013), current pregnancy, or severe medical or endocrine disorders were eligible. Seventy-three participants met eligibility criteria and all consented to complete the BIVES.

Procedure

Approval for the study protocol was obtained from the involved institutions' Ethics Committees and Boards. Participants were informed about the aims of the study and the voluntary and confidential nature of their cooperation. Written informed consents were obtained from all participants. The authors administered the questionnaires assisted by undergraduate students. The students were recruited within distinct courses of the University of Coimbra (a campus that is part of the public university system and is attended by students from all over the country) and completed the measures at the end of designated lectures. The general population participants comprised convenience samples recruited from the staff of schools, private companies, and retail services from the central region of Portugal, that were asked to complete the self-report measures at a previously authorized break.

Scale development

The BIVES was developed to assess childhood or adolescence experiences of bullying and teasing related to physical appearance by peers (friends or colleagues) or by parents (or other caregivers). Item development was based on a literature review (e.g., Herbozo and Thompson 2006, Keery et al. 2005, Menzel et al. 2010, Sweetingham and Waller 2008), prior research and clinical experience. The authors generated a pool of 28 items that covered the continuum of victimization experiences, including the more direct (e.g., name-calling, being made fun of, or criticism) and indirect (e.g., rejection, exclusion, being commented about) forms that body image-related victimization experiences can take. The instructions ask participants to recall experiences during their childhood and adolescence of being the target of negative interactions related to their physical appearance, and to indicate their frequency (Part A). Participants are also asked to indicate the extent to which each experience (if it occurred) affected/upset them (Part B). Part A and Part B are

rated using a 5-point Likert scale ranging, respectively, from 1 = *Never* to 5 = *Very frequently* and from 1 = *Nothing* to 5 = *A lot* (total score for both parts is derived from the mean of all item scores and ranges between 1 and 5).

The items were discussed with other researchers with clinical experience with body image and eating disorders. The initial version of the scale was administered to an independent sample of 118 female undergraduate students aged from 18 to 43 years (*Mean* = 20.57; *SD* = 2.91 years), with 14 to 18 years of education (*Mean* = 14.18; *SD* = 0.69 years) and with a mean body mass index (BMI) of 21.61 (*SD* = 2.89). Data collection followed the procedures described above. Students were asked to provide their feedback on item clarity. This first draft was then revised by the research team taking into account these preliminary quantitative and qualitative analyses. Items with very low estimates or with redundant content were dropped, and adaptations to some items and minor changes of wording were made. Eighteen items were retained in this process of refining the scale.

Measures

Early Life Events Scale (ELES; Gilbert et al. 2003) assesses emotional memories in one's family regarding feeling (un)valued, threatened and having to behave submissively. The scale includes 15 items (e.g., "I experienced my parents as powerful and overwhelming") in which participants are asked to answer to what extent each item is true for them (ranging from 1 = *Completely untrue*, to 5 = *Very true*). Items are summed to obtain a total score (score range 15-75). Higher values indicate more negative emotional memories. Gilbert et al. (2003) found the total scale to have a Cronbach's alpha of 0.92 (0.89 in the current study).

Peers Relations Questionnaire (PRQ; Rigby and Slee 1993) includes 20 items measuring relational experiences, including of victimization by peers (e.g., "I get called names by others"). Items are rated on a 4-point scale (1 = *Never* to 4 = *Very often*) and summed to obtain a score ranging from 5 to 20 (the higher the score, the more frequent the experiences). The PRQ is a reliable bullying measure (with Cronbach's alpha estimates ranging from 0.86 to 0.78; Rigby and Slee 1993). In this study, instructions were adapted to address bullying experiences in childhood and adolescence (Cronbach's alpha of 0.86).

Early Memories of Warmth and Safeness Scale (EMWSS; Richter et al. 2009), with 21 items, measures early memories of feeling warm, safe and cared for (e.g., “I felt safe and secure”). Participants rate the frequency in which they experienced these feelings (0 = *No, never* to 4 = *Yes, most of the time*). A total score (total score range 0-84) is obtained by summing the items; higher scores indicate more positive emotional memories. The scale had a Cronbach’s alpha of 0.97 in the original (Richter et al., 2009) and in the current study.

Forms of Self-Criticizing & Self-Reassuring Scale (FSCRS; Gilbert et al. 2004), with 22 items, includes two subscales that measure two forms of self-criticism – inadequate self (e.g. “There is a part of me that feels I am not good enough”) and hated self (e.g., “I have a sense of disgust with myself”); and a third subscale measuring the ability to self-soothe – reassured self (e.g., “I can still feel lovable and acceptable”). Items are answered on a 5-point Likert scale (0 = *Not at all like me*, to 4 = *Extremely like me*; score range 0-4 obtained as the mean of item scores). The Cronbach’s alpha estimates were 0.90, 0.86 and 0.86 for the inadequate self, the hated self and the reassured self subscales in the original study (Gilbert et al. 2004), and 0.77, 0.90, 0.88, in the current study, respectively.

Body Image Shame Scale (BISS; Duarte, Pinto-Gouveia, Ferreira, and Batista 2015) is a 14-item measure of body image shame (e.g., “My physical appearance makes me feel inferior in relation to others”). Each item is rated according to the frequency with which respondents experience body image shame (0 = *Never* to 4 = *Almost always*; score range 0-4 calculated as the mean of item scores), with higher scores indicating higher levels of body image shame. The scale has high internal consistency (with an estimate of 0.96; Duarte, Pinto-Gouveia, Ferreira, and Batista 2015), with a Cronbach’s alpha of 0.94 in this study.

Eating Disorder Examination 16.0D (EDE 16.0D; Fairburn et al. 2008) and *Eating Disorder Examination Questionnaire* (EDE-Q; Fairburn and Beglin 1994). The EDE provides a comprehensive evaluation of the diagnostic criteria for eating disorders and the frequency and severity of eating disorders’ symptoms. It includes 4 subscales: restraint (e.g., “Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded?)”; eating concern (e.g., “Have you had a definite fear of losing control over eating?”); weight concern (e.g., “Has your weight

influenced how you think about (judge) yourself as a person?"); and shape concern (e.g., "Has your shape influenced how you think about (judge) yourself as a person?"). A total score is derived from the mean of the subscales' scores (score range: 0-6). Higher scores indicate higher eating psychopathology severity. The EDE-Q is the self-report version of the EDE. The score range also varies between 0 and 6. In this study we used the EDE-Q total score. EDE-Q shows good psychometric properties with Cronbach's alpha estimates of 0.97 in community samples (Machado et al. 2014) and 0.95 in the current study.

Binge Eating Scale (BES; Gormally et al. 1982; Duarte, Pinto-Gouveia, and Ferreira 2015) assesses the behavioural, emotional and cognitive dimensions of binge eating. It comprises 16 items that include three or four statements (reflecting a rating of severity ranging from 0 – no difficulties– to 3 – severe problems; score range 0-46) and respondents are asked to select the one that best describes their experience (e.g., "I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily"). The scale has good psychometric properties with Cronbach's alpha estimates of 0.88 in community samples (Duarte, Pinto-Gouveia, and Ferreira 2015) and 0.88 in this study.

Depression Anxiety and Stress Scales – 21 (DASS21; Lovibond and Lovibond 1995). The DASS21, with 21 items, assesses depressive (e.g., "I couldn't seem to experience any positive feeling at all"), anxiety (e.g., "I was aware of dryness of my mouth") and stress (e.g., "I found it hard to wind down") symptoms. Respondents rate how frequently they experienced each symptom over the past week (0 = *Did not apply to me at all* to 4 = *Applied to me very much, or most of the time*). The scores are obtained by summing the items' scores, which range from 0-21 for the depression, 0-20 for the anxiety and 0-21 for the stress subscales. Cronbach's alpha estimates were 0.88, 0.82 and 0.90, respectively (Lovibond and Lovibond 1995). In this study the values were: 0.87, 0.84 and 0.90, respectively.

Body mass index (BMI). Participants' BMI was calculated by dividing self-reported current weight (in kg) by self-reported height squared (in m).

Data analysis

Descriptive statistics (means and standard deviations) and reliability analyses (Cronbach's alpha, item-total correlations) were conducted. A Principal Components Analysis (PCA) was conducted to identify the number of factors best describing the underlying pattern of correlations among the items. The scale's internal consistency was assessed through Cronbach's alpha coefficients and item-total correlations. A CFA was conducted using the Maximum Likelihood estimation method. Recommended goodness of fit measures were selected to examine the global adjustment of the model (Tabachnick and Fidell 2013). Construct reliability and convergent validity were examined through the Composite Reliability (CR) and the Average Variance Extracted (AVE).

Retest reliability was analysed through t-Tests for Dependent Samples and Pearson product-moment correlations. The association between the BIVES and the other study variables was assessed by Pearson product moment correlations. A MANOVA was conducted to examine demographic and weight characteristics differences between women from the general population and the clinical sample using the General Linear Model for multivariate analysis. Differences in the BIVES' scores between these groups were calculated through a MANCOVA retaining as a covariate BMI because the first analysis indicated significant differences between the two groups in this variable (considering the criteria of $p < .050$). The criterion Wilks' Lambda was used to assess the significance of the effects (Tabachnick and Fidell 2013). Partial eta squares (η^2) were used to analyse effect sizes, that is, the amount of the total variation owing to the factor excluding the effects of other factors from the non-error variation (Norman and Streiner, 2008). Preliminary analyses were conducted to confirm the assumptions of normality and homogeneity of variances were met. The SPSS and AMOS software (v. 21, Chicago, IL, USA) were used to conduct the analyses.

Results

Participants' characteristics

The BIVES scale was first examined in 632 participants ranging in age from 18 to 60 (*Mean* = 28.22; *SD* = 11.38) years, and from 4 to 21 (*Mean* = 13.03; *SD* = 2.63) years of education; 371 (58.7%) were students, 118 (18.7%) reported having a middle class profession, 99 (15.7%) low-income, 18 (2.8%) high-class professions, 24 (3.8%) were unemployed or reported other situations, and 2 (0.3%) did not provide information on socioeconomic status. Participants' mean BMI was 22.66 (*SD* = 3.67); 7.7% were low weight (BMI < 18.5); 69.7% were normal weight (BMI ≥ 18.5 - ≤ 24.9); 17.5% were overweight (BMI ≥ 25.0 - ≤ 29.9); 4.3% presented class I obesity (BMI ≥ 30.0 - ≤ 34.9), and 0.8% class II obesity (BMI ≥ 35.0 - ≤ 39.9; WHO, 1995).

The sample used to conduct the CFA (*n* = 545) presented ages ranging from 18 to 60 years old (*Mean* = 28.97; *SD* = 11.96), and years of education ranging from 4 to 26 (*Mean* = 13.47; *SD* = 2.72); 328 (60.2%) were students, 101 (18.5%) reported having a middle class profession, 76 (14%) low-income, 16 (2.9%) high-class professions, 18 (3.3%) were unemployed or in other situations, and 6 (1.1%) did not provide information. Mean BMI was 23.09 (*SD* = 3.79); 6.2% presented low weight; 66.5%, normal weight; 21.9% were overweight; 4.3% presented class I obesity, and 1.1% class II obesity (World Health Organization, 1995). The two samples did not significantly differ by age ($F_{(1)} = 1.267$; $p = 0.261$) or BMI distribution ($\chi^2_{(4)} = 6.398$; $p = 0.171$). The second sample (*n* = 545) had a higher mean of years of education (*Mean* = 13.48; *SD* = 2.72), in comparison to the first (*n* = 642; *Mean* = 13.02; *SD* = 2.63; $F_{(1)} = 8.131$; $p = 0.007$). As expected, students (*Mean* = 20.69, *SD* = 2.22) were younger than participants from the general population (*Mean* = 40.05, *SD* = 10.18; $F_{(1)} = 2313.78$; $p < 0.001$), had more years of education (*Mean* = 13.40, *SD* = 12.99; $F_{(1)} = 6.60$; $p = .010$) and had lower BMI ($\chi^2_{(4)} = 126.453$; $p = < 0.001$; Poínhos et al. 2009), but students and participants from the general community were considered together to examine the measure in the continuum of the overall population.

The clinical sample had ages ranging from 19 to 59 years (*Mean* = 38.22; *SD* = 10.75) years, a mean of 13.71 (*SD* = 3.84) years of education and a mean BMI of 34.41 (*SD* = 7.53);

15.1% had normal weight, 13.7%, were overweight, 28.7% ($n = 21$), class I obesity; 15.1% class II obesity, and 27.4% class III obesity.

Exploratory Factor Analyses

First, the Part A – frequency was analysed. The Kaiser-Meyer-Olkin measure of sampling adequacy (0.93) and the Bartlett's Test of Sphericity ($\chi^2_{(153)} = 8246.29$; $p < 0.001$) supported the data adequacy. In a non-rotated analysis, the Kaiser-Guttman criteria suggested the retention of three factors (eigenvalues of 8.26, 2.84 and 1) that accounted for 45.87%, 15.75% and 5.57% of the variance, respectively. A Parallel Analysis indicated two factors with eigenvalues larger than the parallel eigenvalues of the components derived from the randomly generated correlation matrix. A second PCA with Direct Oblimin rotation was conducted, forcing a two-factor solution. This solution explained 61.63% of the variance, with the first factor – including the items referring to peers – explaining 45.87% and the second – including the items referring to parents – 15.75%. Two items were removed because they did not meet face validity and presented the lowest factor loadings on each respective factor: the item “At school I felt that my friends/colleagues with better appearance were more popular” presented loading of 0.61 on the factor Peers; and the item “My mother/father used to worry a lot about me getting fat” presented a loading of 0.43 on the factor Parents. This decision resulted in an increase of the amount of variance explained to 65.89%.

Also, results indicated that the internal consistency would improve with the deletion of four additional items. Following a conservative approach to achieve a psychometrically and theoretically robust scale, these items were progressively deleted. This two-factor solution explained a total of 73.76% of the variance, with the factor peers accounting for 53.33% and the factor parents for 20.42%. The scale presented a Cronbach's alpha of 0.92, and the factors 0.93 and 0.92, respectively, indicating an excellent internal consistency (DeVellis 2011). Item-total correlations were above 0.69 for peers and 0.65 for parents.

The same procedure was followed regarding the Part B – impact. The KMO was 0.93 and the Bartlett's test of sphericity was significant ($\chi^2_{(153)} = 8396.36$; $p < 0.001$). Results indicated two factors with eigenvalues above 1 (8.67 and 2.63) that explained a total of 62.75% of the variance. The Parallel Analysis confirmed the retention of two factors. The

final structure accounted for 72.58% of the variance, with the peers factor accounting for 54.13% and the parent factor for 18.45%. This part had an excellent internal consistency ($\alpha = 0.92$), as well as the peers factor ($\alpha = 0.93$) and parents factor ($\alpha = 0.92$). Item-total correlations were above 0.66 for the peers subscale and above 0.71 for the parents (Table 1).

Table 1.

Means (M), Standard Deviation (SD), Communalities (h^2), Factor loadings (λ) of each factor, item-total correlations (r) and Cronbach's alpha if item deleted (α ; n = 632)

Items	Part A – Frequency								Part B – Impact						
	M	SD	h^2	$\lambda F1$	$\lambda F2$	r	α	M	SD	h^2	$\lambda F1$	$\lambda F2$	r	α	
Peers															
3 – My physical appearance used to be a reason for my colleagues/friends to mock me.	1.45	0.92	0.85	0.94	-0.03	0.88	0.91	0.75	1.47	0.77	0.94	-0.04	0.87	0.90	
1 – My colleagues/friends called me names because of my weight/body shape.	1.48	0.92	0.82	0.93	-0.06	0.85	0.91	0.84	1.53	0.79	0.88	-0.02	0.84	0.91	
8 – I was pointed at by my colleagues/friends because of my weight or body shape.	1.39	0.88	0.82	0.91	-0.01	0.86	0.91	0.63	1.34	0.84	0.93	-0.03	0.87	0.90	
5 – My colleagues/friends tormented me because of my physical appearance.	1.38	0.86	0.78	0.88	0.01	0.83	0.92	0.62	1.35	0.74	0.87	-0.01	0.80	0.91	
16 – At school I was left out/excluded because of my body shape.	1.19	0.64	0.64	0.77	0.07	0.73	0.93	0.31	1.00	0.56	0.71	0.01	0.66	0.93	
14 – My colleagues/friends made fun of me when I exercised.	1.29	0.80	0.61	0.76	0.03	0.69	0.93	0.44	1.20	0.62	0.79	-0.00	0.70	0.92	
Parents															
15 – My mother/father said or did things that made me feel bad about my physical appearance.	1.18	0.62	0.82	-0.04	0.92	0.84	0.89	0.28	0.95	0.77	-0.08	0.91	0.80	0.90	
7 – My mother/father made negative comments about my weight or body shape.	1.27	0.74	0.81	-0.02	0.91	0.85	0.89	0.43	1.13	0.80	0.04	0.87	0.85	0.89	
9 – My mother/father used names like “fat” to describe me.	1.14	0.60	0.75	0.01	.086	0.79	0.90	0.22	0.87	0.72	-0.04	0.86	0.76	0.90	
4 – My mother/father criticized me because of my weight or body shape.	1.30	0.79	0.75	0.02	0.85	0.80	0.90	0.51	1.24	0.75	-0.07	0.81	0.80	0.90	
13 – My mother/father made jokes about my body shape or weight.	1.14	.052	0.65	-0.07	0.84	0.71	0.91	0.21	0.79	0.65	0.10	0.84	0.71	0.91	
12 – My mother/father commented aloud my physical appearance with other family members.	1.27	0.69	0.57	.019	0.65	0.65	0.92	0.42	1.08	0.63	0.14	0.71	0.71	0.91	

Note. Part A – Frequency item scores range 1-5; Part B – Impact item scores range 1-5

Confirmatory Factor Analyses

A two-factor model regarding Part A – frequency was tested. The initial analysis indicated a poor model fit [$\chi^2_{(53)} = 517.62, p < 0.001$; CMIN/DF = 9.77, CFI = 0.91; TLI = 0.89; RMSEA = 0.13]. The analysis of the Modification Indices and items' content supported the specification of correlations between the measurement errors of the items 16 and 14 (100.86), in peers, and of the items 15 and 9 (109.39), and 7 and 4 (80.83), in parents. A second analysis indicated that the model presented good global fit [$\chi^2_{(50)} = 220.49; p < 0.001$; CMIN/df = 4.41; CFI = 0.97; TLI = 0.96; RMSEA = 0.08].

The same two-factor structure was tested for Part B – impact. Results indicated the following model fit: $\chi^2_{(53)} = 388.18, p < 0.001$; CMIN/DF = 7.32, CFI = 0.93; TLI = 0.91; RMSEA = 0.11. We specified the correlated measurement errors between items 14 and 16, in the peers subscale (75.14), and 7 and 4 (62.03) in the parents. This resulted in an overall improvement of the model fit [$\chi^2_{(51)} = 215.77, p < 0.001$; CMIN/DF = 4.23, CFI = 0.97; TLI = 0.96; RMSEA = 0.08]. Both parts A and B revealed good local adjustment indices (Table 2; Tabachnick and Fidell 2013).

Table 2

Standardized Regression Weights (SRW) and Squared Multiple Correlations (SMC; n = 545)

Items	Part A – Frequency		Part B – Impact	
	SRW	SMC	SRW	SMC
Peers				
3	0.93	0.86	0.91	0.84
1	0.83	0.62	0.88	0.77
8	0.89	0.80	0.86	0.73
5	0.81	0.66	0.82	0.67
16	0.67	0.45	0.62	0.38
14	0.70	0.49	0.65	0.42
Parents				
15	0.86	0.75	0.89	0.79
7	0.88	0.77	0.84	0.71
9	0.77	0.59	0.77	0.59
4	0.83	0.68	0.80	0.63
13	0.74	0.54	0.73	0.54
12	0.75	0.56	0.76	0.58

Validity and Reliability Analyses

In Part A the two factors revealed a CR of 0.95. The peers factor presented an AVE of 0.78 and the parent factor 0.77, suggesting adequate convergent validity. The factors showed good discriminant validity since the AVE of each factor was higher than their squared correlation. Both factors in Part B– impact revealed a CR of 0.95 and an AVE of 0.75, thus revealing good convergence. The factors also revealed good discriminant validity.

Test-retest reliability

Results showed no significant differences between the test and retest regarding the Part A ($t_{Peers(29)} = 0.38, p = 0.708$; $t_{Parents(29)} = 0.35, p = 0.728$) and Part B ($t_{Peers(29)} = 0.94, p = 0.356$; $t_{Parents(29)} = 0.58; p = 0.565$). The test and retest for Part A were strongly positively correlated ($r_{Peers} = 0.83$; $r_{Parents} = 0.80$) and Part B ($r_{Peers} = 0.89$; $r_{Parents} = 0.86$).

BIVES correlations with other measures

Results (Table 3) revealed positive moderate associations between the BIVES subscales. Positive associations were found between the BIVES, namely the parents subscale, and negative emotional memories with family. Large to moderate positive correlations were found between the peers subscale, and peer bullying. In contrast, the BIVES subscales were negatively correlated, with a low magnitude, with memories of warmth and safeness. The BIVES subscales were negatively associated with self-reassurance, and positively associated with self-criticism, and depressive, anxiety and stress symptoms. Results showed positive and moderate correlations between the BIVES and body image shame, eating psychopathology, and binge eating symptomatology. Positive significant but small associations were found between the BIVES factors and current BMI.

Table 3

Correlations (two-tailed Pearson's r) between the BIVES Part A (Peers and Parents Frequency) and Part B (Peers and Parents Impact) and early life negative (ELES) and positive (EMWSS) experiences, bullying experiences (PRQ), forms of self-criticism (FSCRS), body image shame (BISS), eating psychopathology (EDEQ) and binge eating (BES), depression anxiety and stress (DASS21), and BMI.

		Peers Frequency	Peers Impact	Parents Frequency	Parents Impact
	Peers Frequency	1			
BIVES	Peers Impact	0.77 ^{***}	1		
	Parents Frequency	0.48 ^{***}	0.42 ^{***}	1	
	Parents Impact	0.44 ^{***}	0.48 ^{***}	0.78 ^{***}	1
		0.28 ^{***}	0.21 ^{***}	0.41 ^{***}	0.31 ^{***}
ELES		0.52 ^{***}	0.43 ^{***}	0.20 ^{***}	0.17 ^{***}
PRQ-R		-0.27 ^{***}	-0.23 ^{***}	-0.25 ^{***}	-0.22 ^{***}
EMWSS		0.29 ^{***}	0.29 ^{***}	0.28 ^{***}	0.31 ^{***}
FSCRS	Inadequate self	0.29 ^{***}	0.29 ^{***}	0.28 ^{***}	0.31 ^{***}
	Reassured self	-0.09 [*]	-0.10 [*]	-0.11 ^{**}	-0.09 [*]
	Hated self	0.33 ^{***}	0.28 ^{***}	0.29 ^{***}	0.27 ^{***}
BISS		0.41 ^{***}	0.37 ^{**}	0.32 ^{***}	0.37 ^{***}
EDEQ		0.38 ^{***}	0.37 ^{***}	0.39 ^{***}	0.43 ^{***}
BES		0.33 ^{***}	0.31 ^{***}	0.35 ^{***}	0.38 ^{***}
DASS21	Depression	0.25 ^{***}	0.24 ^{***}	0.22 ^{***}	0.22 ^{***}
	Anxiety	0.26 ^{***}	0.22 ^{***}	0.21 ^{***}	0.19 ^{***}
	Stress	0.28 ^{***}	0.29 ^{***}	0.25 ^{***}	0.23 ^{***}
BMI		0.18 ^{***}	0.14 ^{**}	0.20 ^{***}	0.19 ^{***}

Note. BIVES, Body Image Victimization Experiences Scale (Part A – Frequency scores range 1-5; Part B – Impact scores range 1-5); ELES, Early Life Events Scale (scores range 1-5); PRQ-R, Peers Relations Questionnaire-Retrospective (scores range 1-5); FSCRS, Forms of Self-Criticizing/Reassuring Scale (scores range 0-4); BISS, Body Image Shame Scale (scores range 0-4); EDEQ, Eating Disorder Examination Questionnaire (scores range 0-6); BES, Binge Eating Scale (scores range 0-3); DASS21, Depression Anxiety and Stress Scales (scores range 0-4); BMI, Body Mass Index. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Victimization experiences measured by BIVES and binge eating

To evaluate BIVES' ability to discriminate patients with BED and women from the general population, we compared the BIVES between the clinical sample ($n = 73$) and a sample randomly selected from the overall sample ($n = 75$). Results of the MANOVA indicated that the two samples did not present significant differences regarding age ($F_{(1)} = 3.36$, $p = 0.069$) and years of education ($F_{(1)} = 2.62$, $p = 0.108$). The patients presented significantly

higher BMI ($F_{(1)} = 125.38; p < 0.001$). Therefore, this variable was controlled for in a 2 (clinical condition) x 4 (frequency and impact of victimization experiences with peers and parents) MANCOVA. Results indicated a significant main effect of the clinical condition on the BIVES' subscales, *Wilks' Lambda* = 10.42, $p < 0.001$, with a large effect (partial $\eta^2 = 0.23$). The patients reported significantly higher frequency and impact of body image-related victimization experiences by peers and parents in comparison to the general population sample (Table 4).

Table 4

BIVES factors comparison between the clinical sample (n = 73) and the sample from the general population (n = 75)

	Clinical <i>Mean (SD)</i>	General population <i>Mean (SD)</i>	<i>F; df</i>	<i>Significance</i>
Peers Frequency	2.74 (1.38)	1.38 (0.68)	20.86; 1	< 0.001
Peers Impact	3.42 (1.80)	1.34 (1.69)	30.62; 1	<0.001
Parents Frequency	2.19(1.18)	1.23(1.95)	18.40; 1	<0.001
Parents Impact	2.68(1.95)	0.74 (1.24)	29.28	<0.001

Discussion

Being victimized in childhood and adolescence may have deleterious and enduring consequences for mental health, namely eating psychopathology (e.g., Menzel et al. 2010). Hence, the development of measures that contribute to a wider understanding of the role that being the victim of negative experiences related to body image on negative outcomes among women is particularly relevant. The current study presents the development and validation of the BIVES, a retrospective measure of the frequency of victimization experiences about body image, and their emotional impact, inflicted by distinct sources: peers and parents/caregivers.

In both the frequency and impact parts of the scale, two distinct factors emerged, which referred to victimization experiences perpetrated by peers (e.g., colleagues and friends) and by parents (e.g., mother and father or other caregivers), with six items each. Two CFAs confirmed the plausibility of this two-factor model (Tabachnick and Fidell 2013), supporting that the scale had a consistent factor structure across independent samples. The BIVES internal consistency and item-total correlation analyses confirmed the quality

and adequacy of the items to each respective factor. The BIVES factors in both parts also presented high convergent and discriminant validity, and temporal stability examined over a one-month period. Thus, the current data demonstrate that the BIVES is a brief and psychometrically sound measure. Unlike other widely used measures that focus on specific aspects of the physical appearance (e.g., excess weight; Thompson et al., 1995) as the potential reason for being the target of negative social interactions, the BIVES assesses victimization experiences related to physical appearance in general. Given the growing evidence suggesting the negative effects of perceptions that one's physical self may be the cause for negative social experiences, despite actual physical appearance characteristics (e.g., Ferreira et al. 2013; Duarte, Pinto-Gouveia, and Rodrigues, 2015), the use of a generic body image-focused victimization scale holds significant potential for researchers and clinicians. Moreover, by allowing the assessment of the occurrence and impact of these experiences perpetrated by two relevant distinct sources – peers and parents – this measure may be an important contribution for the development of conceptualization models and clinical research investigating the specific effect of these experiences on a series of psychological adjustment indicators and processes.

The current study also demonstrated the validity, specificity and potential utility of the BIVES given the pattern of relationships that were found with other measures assessing relational experiences in childhood and adolescence and negative psychological symptoms and processes. These findings confirmed the instrument convergent validity by demonstrating that victimization experiences focused on the body image domain are related but do not overlap with more general negative interactions experienced in childhood and adolescence. Moreover, the BIVES was positively associated with current levels of self-criticism (Gilbert et al. 2004), which has been associated with poor mental health indicators, namely eating psychopathology (Duarte et al. 2014; Duarte, Pinto-Gouveia, and Rodrigues 2015; Pinto-Gouveia, Ferreira, and Duarte 2014). Also, body image-related victimization experiences were positively linked with depressive, anxiety and stress symptoms, current body image shame and eating psychopathology, namely binge eating. These findings add to previous evidence demonstrating the role of these experiences on disordered eating symptomatology (e.g., Menzel et al. 2010) and on the individual self-evaluation and psychological and interpersonal functioning (Duarte, Pinto-

Gouveia, and Rodrigues 2015; Haines et al. 2006; Lunde et al. 2006; Matos et al. 2015; Menzel et al. 2010; Pinto-Gouveia et al. 2014).

Our findings are also aligned with prior research conducted in eating disorders samples (e.g., Matos et al. 2015) as it demonstrated that a sample of women diagnosed with an eating disorder, in comparison to women from the general population, recalled having been more frequently teased and bullied about their body image both by their peers and parents, and also that these experiences had a greater emotional impact. Hence, these findings point to important directions of research focused on the potential negative effect that these types of experiences, may have on individuals' body image, eating behavior, self-evaluation and overall well-being. In particular, the BIVES provides a means to test these associations considering the specific effect of the occurrence and emotional impact of victimization experiences perpetrated by distinct relevant social agents.

An important limitation of this study was the retrospective nature of the measure and the fact that current psychosocial adjustment may bias self-assessment of recollection of earlier experiences. Nonetheless, the main aim of this research was to develop and validate a new measure that could contribute for a wider assessment of experiences of victimization regarding one's body image and their perceived impact. Future research may focus on investigating causality mechanisms related to such experiences by testing the use of this measure on longitudinal designs. The sampling method was also a limitation as the nonclinical samples comprised convenience samples that were not representative of the general population, reducing generalizability of results and having the potential for social acceptability bias. Moreover, although the study was conducted in women, which is considered a relevant population in which body-image related experiences play a significant role in current and later psychological adjustment, growing evidence demonstrate these experiences may also have a deleterious effect in men (e.g., Menzel et al., 2010; Pila et al., 2016). Therefore, future research should examine the BIVES' measurement model invariance and correlates in male participants. Also, the scales' structure invariance and psychometric properties should be tested in other samples (e.g., adapting the time frame to apply the scale to adolescents; clinical samples) and other languages (e.g., English speaking countries).

In conclusion, the BIVES is a psychometrically robust measure that allows for a brief and valid assessment of the frequency and effect of body image-related victimization experiences, considering two distinct sources – peers and parents. The findings suggested the usefulness of this new measure in clinical settings as well as in research investigating risk and protective factors for psychological adjustment, and body image and eating difficulties.

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Study IV

Caught in the struggle with food craving: Development and validation of a new cognitive fusion measure

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Abstract

Cognitive fusion has been related to the development and maintenance of a series of mental health difficulties. Specifically, growing research on eating psychopathology has been demonstrating the important role of cognitive fusion related to body image in these disorders. Nonetheless, cognitive fusion specifically focused on eating remained to be investigated. The current study aimed at developing and validating the Cognitive Fusion Questionnaire - Food Craving, a measure assessing the extent to which an individual is fused with food-craving undesirable and disturbing thoughts and urges.

This study was conducted with distinct samples comprising men and women from the student and general population. A principal component analysis was conducted to assess the scale's structure, which was further examined in a confirmatory factor analysis. The scale's reliability and validities were also analysed.

Results indicated that the CFQ-FC presented a one-dimensional structure with 7 items, accounting for 66.14% of the variance. A CFA confirmed the plausibility of the measurement model, which was found to be invariant in both sexes. The CFQ-FC also revealed very good internal consistency, construct reliability, temporal stability, and convergent and divergent validity, being positively associated with similar constructs and with indicators of eating and general psychopathology. CFQ-FC also discriminated individuals with clinically significant symptoms of binge eating from participants with no symptoms. Finally, the CFQ-FC presents incremental validity over a global measure of cognitive fusion in predicting eating psychopathology, namely binge eating.

The CFQ-FC is a psychometrically sound measure that allows for a brief and reliable assessment of eating-related cognitive fusion. This is a novel measure that may significantly contribute for the assessment of this specific dimension of cognitive fusion and for the understanding of its role in eating psychopathology.

Keywords: Cognitive fusion, Food craving, Eating psychopathology, Binge eating, Psychometric properties, Confirmatory factor analysis

1. Introduction

The role that food craving plays on individuals' ability to regulate eating behaviour within the current food rich environment has been a growing area of research. Food craving can be defined as involving the experience of intrusive thoughts, urges or desires, often felt as distressing, for particular foods (Hill, 2007; Lowe & Levine, 2005; Weingarten & Elston, 1990). Difficulties in managing food cravings have been associated with perceptions of lack of control and compulsive eating behaviours (e.g., binge eating; Greeno, Wing, & Shiffman, 2000; Joyner, Gearhardt, & White, 2015; Waters, Hill, & Waller, 2001), overweight and obese status (Flegal, Carroll, Ogden, & Curtin, 2010; White, Whisenhunt, Williamson, Greenway, & Netemeyer, 2002), and indicators of impaired psychological adjustment (e.g., depressive symptoms; Hill, 2007; Lafay et al., 2001; Rogers & Smit, 2000). Therefore, the identification of the processes involved in food craving regulation is considered critical and requires particular attention. Existent approaches to eating and weight-related difficulties usually addressed food craving by promoting self-regulation and cognitive control strategies (e.g., distraction, cognitive restructuring), which have revealed limited efficacy or were even found to be problematic (e.g., Marcks & Woods, 2005). For instance, a strategy commonly adopted to manage food cravings is thought suppression, which has been identified as having the paradoxical effect of increasing difficulties in regulating eating behaviour (Erskine, 2008; Hooper, Sandoz, Ashton, Clarke, & McHugh, 2012). Thus, there has been a recent effort in developing alternative and more effective approaches for the understanding and management of food cravings.

In particular, Acceptance and Commitment Therapy (Hayes, 2004; Hayes, Strosahl, & Wilson, 1999) interventions have been showing promising results in a range of eating and weight-related difficulties in which food cravings play an important role (e.g., Forman, Hoffman, Juarascio, Butryn, & Herbert, 2013; Jenkins & Tapper, 2014; Juarascio, Forman, & Herbert, 2010; Lillis, Hayes, Bunting, & Masuda, 2009). ACT encourages an accepting, nonjudgemental stance towards thoughts and feelings and behaviour change committed with one's well-being to foster psychological flexibility. According to this perspective, human suffering is conceptualized as resulting from psychological inflexibility (Greco, Lambert, & Baer, 2008; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Kashdan & Rottenberg, 2010).

Cognitive fusion and experiential avoidance have been conceptualized as key mechanisms implicated in psychological inflexibility (Hayes et al., 2006). Cognitive fusion refers to the tendency to become entangled with one's internal events (such as thoughts, perceptions,

sensations and emotions) perceiving these transitory mental contents as permanent and as reflecting reality (Gillanders et al., 2014; Hayes et al., 2006; Hayes, Strosahl, Bunting, Twohig, & Wilson, 2004; Luoma & Hayes, 2003). As a consequence, one's behaviours tend to become dominated by these private events, rather than by previous experiences and their direct consequences. Thus, maladaptive experiential avoidance strategies may be adopted as reactive attempts to avoid, escape or diminish such undesirable private events (Hayes et al., 2006). These processes have been associated with difficulties in changing behaviour, even when change is necessary, beneficial and committed with one's life values. In this sense, cognitive fusion and experiential avoidance have been identified as playing a key role in the development and maintenance of a series of psychopathological conditions (Gillanders et al., 2014; Hayes, 2004; Hayes et al., 1999; Kashdan & Rottenberg, 2010; Merwin & Wilson, 2009).

Specifically, a rising number of studies have demonstrated the deleterious effect of these processes in body image and eating related psychopathology (Duarte & Pinto-Gouveia, 2014; Ferreira, Palmeira, & Trindade, 2014; Ferreira, Trindade, & Martinho, 2015; Ferreira, Trindade, Duarte, & Pinto-Gouveia, 2015; Lillis & Hayes, 2008; Merwin et al., 2011; Sandoz, Wilson, Merwin, & Kellum, 2013). In this context, specific measures have been developed to address psychological inflexibility in domains that are central in eating psychopathology, such as body image (e.g., Body Image Acceptance and Action Questionnaire — BIAAQ; Sandoz et al., 2013), weight (Acceptance and Action Questionnaire for Weight-related difficulties — AAQW; Lillis & Hayes, 2008) and eating-related attitudes and behaviours (e.g., Inflexible Eating Questionnaire — IEQ; Duarte, Ferreira, Trindade, & Pinto-Gouveia, 2015). In what regards the specific dimension of food craving, the Food Craving Acceptance and Action Questionnaire — FAAQ (Juarascio, Forman, Timko, Butryn, & Goodwin, 2011) was developed to assess psychological flexibility in relation to food-related experiences, namely cravings and urges to eat. This scale assesses two specific constructs relevant to psychological flexibility, notably acceptance of food-related distressing thoughts and feelings, and willingness to engage in healthy eating despite this aversive internal experience. Although the psychometric properties and validity of this scale in community samples warrant further investigation, the FAAQ appears to be a measure with potential applicability in research focused on eating behaviours and weight management. Nonetheless, a measure that allowed for the assessment of the specific process of fusion with cognitive events related to food, was non-existent.

Gillanders et al. (2014) developed the Cognitive Fusion Questionnaire (CFQ), a widely used and validated measure of cognitive fusion in distinct populations. Nonetheless, the authors suggested the pertinence of developing measures of cognitive fusion that addressed specific thought contents, and that the CFQ could form the basis for the development of such scales. Recently, Ferreira, Trindade, Duarte, and Pinto-Gouveia (2015) developed the Cognitive Fusion Questionnaire — Body image (CFQ-BI) in order to assess cognitive fusion in the specific domain of body image, that is, the tendency to get entangled with body image-related cognitions and to become highly regulated by them, presenting an inability to experiencing them as transient and subjective events.

Evidence has been supporting that body image-related cognitive fusion is significantly associated with eating psychopathology severity. Ferreira, Trindade, Duarte, et al. (2015), found that cognitive fusion focused on body image is a significant feature of women with higher levels of eating psychopathology. Moreover, body image-related cognitive fusion was identified as a mediator on the association between risk factors for eating disorders (namely eating and body image maladaptive attitudes and concerns, and perceptions of inferiority), and eating psychopathology in nonclinical samples (Ferreira et al., 2014; Trindade & Ferreira, 2014) and in patients with Binge Eating Disorder (BED; Duarte, Pinto-Gouveia, & Ferreira, 2015a). Although based in cross sectional data, these studies offer important suggestions as to the important role that cognitive fusion may play on eating psychopathology.

Alongside with body image, disturbing and recurrent thoughts and maladaptive behaviours about eating, are a hallmark of eating psychopathology (Fairburn, 2008; Spoor et al., 2006). In fact, there is evidence that eating psychopathology is marked by the struggle with frequent eating concerns (e.g., what to eat, how much, when to eat), with resisting food cravings, and with feelings of guilt about indulging in such cravings or losing control over eating (Duarte, Pinto-Gouveia, & Ferreira, 2014; Goss & Allan, 2009; Goss & Gilbert, 2002; Heatherton & Baumeister, 1991). In fact, food craving has been identified as an important precipitant for binge eating symptoms (Waters et al., 2001). Nonetheless, experiencing food-related thoughts and cravings is not necessarily pathological (Gendall, Joyce, Sullivan, & Bulik, 1998), which suggests the relevance of identifying potential mechanisms operating on the association between urges and desires to eat, and disordered eating. It is plausible that the extent to which individuals become trapped in disturbing thoughts, urges and cravings about eating, believing that these must be acted upon, create emotional distress and have an important impact on disordered eating

behaviours. Actually, disordered eating, either in the form of eating restraint or binge eating behaviours, may be conceptualized as emerging from maladaptive control strategies. Such strategies seem to be adopted as a means to avoid or diminish the frequency, intensity and valence of disturbing and undesirable internal experiences about food, even that if this subsequently leads to functional and psychosocial impairment, and greater suffering (Goss & Gilbert, 2002; Heatherton & Baumeister, 1991; Striegel-Moore et al., 2000; Wilfley, Wilson, & Agras, 2003). Nonetheless, research on the dimension of eating-related cognitive fusion is scant. The development of a measure that specifically captures this process is an important step to better understand the role that it may operate in eating psychopathology.

Thus, the current study aimed at developing and examining the psychometric properties of a scale that specifically assesses the tendency to get fused with disturbing mental events around food craving – the Cognitive Fusion Questionnaire -Food Craving.

2. Method

2.1. Participants

Sample 1. The scale was initially examined in 300 women (171 college students and 129 women from the general population), with ages ranging from 18 to 55. Participants presented a mean age of 27.22 ($SD = 10.04$) years old and of 12.73 ($SD = 2.81$) years of education. Regarding Body Mass Index (BMI), participants presented a mean of 22.02 ($SD = 3.02$).

Sample 2. An independent sample of 518 participants was used to conduct a Confirmatory Factor Analysis and to further examine the scale's validity. The sample included 292 women (145 college students and 147 from the general population) and 226 men (112 college students and 114 from the general population). Participants presented ages that also ranged from 18 to 55, with women presenting a mean age of 28.26 ($SD = 10.64$) and of 12.72 ($SD = 2.84$) years of education; and men a mean age of 29.11 ($SD = 12.29$) and of 12.29 ($SD = 3.13$) years of education. Results indicated no significant differences regarding these demographic variables $t_{age(516)} = .902, p = .268$; $t_{education(516)} = 1.514, p = .131$. Women presented a mean BMI of 23.21 ($SD = 3.85$), while men presented a mean BMI of 24.22 ($SD = 4.23$).

Sample 3. A sample of 54 participants (10 males and 44 females), with a mean age of 30.41 ($SD = 10.44$) and a mean of 13.09 ($SD = 3.20$) years of education was also used to analyse the temporal

stability of the scale. These participants were asked to complete the CFQ-FC twice within a 3-4 week interval. Most of these participants presented a normal BMI ($M = 22.10$; $SD = 3.19$).

In all samples, the participants BMI' distribution followed the distribution found for the Portuguese population for both men and women, and according to the age intervals considered in the current study (Poínhos et al., 2009).

2.2. Measures

BMI. Participants BMI's was calculated by dividing self-reported current weight (in kg) by height squared (in m).

Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014); Portuguese version by Pinto-Gouveia, Dinis, Gregório, and Lopes (2011). The CFQ is a brief self-report measure of cognitive fusion. Its more recent version comprises 7 items. Participants are invited to answer to the items using a 7-point Likert scale ranging from "Never true" (1) to "Always true" (7). Higher scores indicate higher levels of cognitive fusion. Gillanders et al. (2014), found that the scale presents very good psychometric properties, including a Cronbach's alpha of .90 in a community sample. The scale also presented a high internal consistency in the Portuguese version (with a Cronbach's alpha of .89).

Cognitive Fusion Questionnaire-Body Image (CFQ-BI; Ferreira, Trindade, Duarte, et al., 2015). The CFQ-BI comprises 10 items that assess body image-related cognitive fusion. Participants are asked to rate the extent to which each statement reflect their experience using the same 7-point Likert scale ranging from "Never true" (1) to "Always true" (7). Higher scores indicate that the respondent is highly fused with body image-related cognitions. The CFQ-BI was shown to present very good psychometric qualities (with a Cronbach's alpha of .96; Ferreira, Trindade, Duarte, et al., 2015).

Acceptance and Action Questionnaire II (AAQ-II; Bond et al., 2011); Portuguese version by Pinto-Gouveia, Gregório, Dinis, and Xavier (2012). The AAQ-II is a 7-item scale designed to assess psychological inflexibility. Participants are asked to rate the extent to which each statement is true to them using a 7-point Likert scale ranging from "Never true" (1) to "Always true" (7). Higher scores reflect greater psychological inflexibility. In the original study, the scale presented high internal consistency in distinct samples (with a Cronbach's alpha mean of .84). The scale presented a Cronbach's alpha value of .90 in the Portuguese population.

Eating Disorder Examination Questionnaire (EDE-Q); Fairburn & Beglin, 1994; Portuguese version by Machado et al. (2014). The EDE-Q is a self-report version of the interview Eating Disorders Examination (EDE; Fairburn & Cooper, 1993). The EDE-Q includes 36 items and allows for a comprehensive evaluation of eating psychopathology, assessed through four subscales: restraint, eating concern, weight concern and shape concern. The items are rated for frequency of occurrence on a scale ranging from “No days” (0) to “Every day” (6) or for severity on a scale ranging from “Not at all” (0) “Markedly” (6). The EDE-Q total score is obtained by calculating the mean of the four subscales’ scores. Higher scores indicate greater levels of eating psychopathology severity. This measure has consistently demonstrated good psychometric properties in both clinical and community samples.

Intuitive Eating Scale-2 (IES-2); Tylka & Kroon Van Diest, 2013); Portuguese version by Duarte et al. (2015). The IES-2 assesses a form of adaptive eating - intuitive eating - that includes the awareness of internal hunger and satiety signals, the ability to eat in response to internal physiological cues, instead of following rigid dietary or as a way to cope with emotional distress, and to choose nutritious foods according to the body's needs. The scale includes 23 items and participants are asked to rate each statement selecting the option that better describes their attitudes and behaviours, using a 5-point Likert scale ranging from “Strongly disagree” (1) to “Strongly agree” (5). Higher scores indicate higher intuitive eating. The scale presented good internal reliability in the original (Cronbach's alpha of .87; Tylka & Kroon Van Diest, 2013) and in the Portuguese version (.97; Duarte et al., 2015).

Binge Eating Scale (BES); Gormally, Black, Daston, & Rardin, 1982; Portuguese version by Duarte, Pinto-Gouveia, and Ferreira (2015b). The BES is a self-report measure that assesses the emotional, cognitive and behavioural dimensions of the severity of binge eating symptomatology. The BES comprises 16 items. Each item includes three to four statements and respondents are asked to select the statement that best describes their experience. Each statement reflects a rating of severity that ranges from 0 (no symptoms of binge eating) to 3 (severe symptoms of binge eating). Higher scores indicate more severe binge eating symptoms. The scale has good psychometric properties, presenting a Cronbach's alpha value of .85 in the original study (Gormally et al., 1982), and .88 in the Portuguese validation study (Duarte et al., 2015b).

Depression Anxiety and Stress Scales - 21 (DASS21); Lovibond & Lovibond, 1995); Portuguese version by Pais-Ribeiro, Honrado, and Leal (2004). DASS21 is a self-report measure that includes

three subscales that assess levels of depressive, anxiety and stress symptoms, with 7 items each. Respondents are invited to indicate the frequency with which they experienced each symptom over the past week, using a 4-point Likert scale ranging from “Did not apply to me at all” (0) to “Applied to me very much or most of the time” (3). Higher results indicate higher levels of psychopathology symptoms. The scale presents high internal consistency, with the depression, anxiety and stress subscales presenting Cronbach's alpha values of .88, .82, and .90, respectively, in the original version (Lovibond & Lovibond, 1995), and .85, .74, and .81, respectively, in the Portuguese version (Pais-Ribeiro et al., 2004).

2.3. Procedure

The study was approved by the Ethic Committees and Boards of the institutions involved. The students were recruited in universities and higher education institutes, whereas the participants from the general population were collected within the staff of distinct labour sectors (e.g., schools, universities and higher education institutes, hospitals). The students completed the measures at the end of a lecture; the participants from the general population completed the measures at an authorized break. The researchers presented the study to the participants, clarifying that their collaboration was voluntary and that the data collected was confidential and used only for research purposes, and administered the self-report measures. Informed consent was obtained from all participants.

2.4. Development of the measure

The CFQ-FC was based on the original CFQ (Gillanders et al., 2014) and was developed to assess the degree to which individuals are fused with specific eating-related cognitions, including disturbing and undesirable thoughts and cravings about food. Approval was obtained from the authors of the original CFQ (Gillanders et al., 2014) to develop this specific measure. We focused on the original items of the CFQ and developed a pool of items in which the original content was adapted to focus on the specific dimension of eating-related cognitions and impulses. The preliminary version of the scale comprised a pool of 20 items that were analysed by a research team with large clinical and research experience on the field of eating disorders. The items were also administered to a group of 10 patients with BED who reported higher levels of cognitive fusion with food-related content. They were asked to fill the measure and to comment on whether the statements reflected their experience. After this process, the items were further

revised and minor changes of wording were made. The final version of the scale was then submitted to a Principal Component Analysis (PCA) with the aim of reaching a shorter and psychometrically robust measure.

The instructions of the CFQ-FC also follow the structure of the original CFQ (Gillanders et al., 2014), asking participants to evaluate the extent in which each statement is true to them. The respondents use a 7-point Likert scale ranging from “Never true” (1) to “Always true” (7) to rate their responses.

2.5. Analytic strategy

A PCA was conducted (Sample 1) with the aim of developing a brief measure that comprised items designed to capture the related facets that entail the unidimensional construct of cognitive fusion (Gillanders et al., 2014; Hayes et al., 2004, 2006; Luoma & Hayes, 2003), but focused on the specific phenomenon of food craving. The analysis followed the procedures adopted in the adaptation of the CFQ (Gillanders et al., 2014) to other populations (e.g; Pinto- Gouveia et al., 2011) and dimensions (e.g., Ferreira, Trindade, Duarte, et al., 2015); and taking into consideration the assumptions to conduct the analysis (DeVellis, 2003; Field, 2004). The number of factors to extract was further confirmed through a parallel analysis (Horn, 1965).

The obtained structure was then confirmed through a Confirmatory Factor Analysis (CFA) with Maximum Likelihood estimation method (Sample 2). The plausibility of the model was examined by the Chi-Square (χ^2) and the following fit indicators: the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), and the Normed Fit Index (NFI), which indicate a very good fit with values above .95 (Bollen, 1986; Kline, 2005). The Root-Mean Square Error of Approximation (RMSEA), with 90% confidence interval, was also considered; with values below .10 indicating an acceptable fit (Byrne, 2010; Hair, Black, Babin, & Anderson, 2010; MacCallum, Browne, & Sugawara, 1996). The model invariance between sexes was also examined (Cheung & Rensvold, 2002).

Furthermore, the internal consistency of the measure was evaluated by computing Cronbach's alpha coefficients and item-total correlations. The scale's construct reliability and convergent validity was further established by the calculation of the Composite Reliability and of the Average Variance Extracted.

The scale's psychometric properties were further analysed in Sample 2. The relationship between the CFQ-FC and other self-report measures was examined by computing Pearson product-moment correlation coefficients (Cohen, Cohen, West, & Aiken, 2003). The retest reliability of the measure was analysed by comparing the values of the scale obtained in two assessment moments (with 3e4 weeks interval) through paired samples t-tests and Pearson product-moment correlations. T-tests for two independent samples were conducted to examine CFQ-FC's ability to discriminate between individuals from the general population with clinically significant levels of binge eating symptoms from individuals with no symptoms. Finally, a series of hierarchical regression analyses were conducted to examine the scale's incremental validity over a measure assessing broad cognitive fusion (CFQ) in the prediction of eating psychopathology and, in particular, binge eating symptoms (DeVellis, 2003; Field, 2004).

The PCA and the remaining psychometric analyses were conducted using IBM SPSS Statistics (v. 21 SPSS; Armonk, NY: IBM Corp.); the CFA was conducted using the software AMOS (v. 21; Analysis of Moment Structures, SPSS Inc. Chicago, IL).

3. Results

3.1. Preliminary data analyses

Preliminary data analyses were conducted and indicated that the Skewness and Kurtosis values did not represent a significant bias to normal distribution ($Sk < |3|$ and $Ku < |10|$; Kline, 2005).

3.2. Principal component analysis

A PCA was conducted to examine the CFQ-FC factorial structure (Sample 1). The adequacy of the data to conduct the analysis was confirmed given the results of the Kaiser MeyerOlkin test (.96) and the Bartlett's sphericity test ($\chi^2_{(190)} = 4806.80$; $p < .001$). All items presented communalities above .59. Results indicated three factors with eigenvalues above 1. However, the visual inspection of the scree plot suggested a one-dimensional structure (**Fig. 1**). This structure was further supported by a parallel analysis, which indicated that one factor presented an eigenvalue that exceeded the 95th percentile of the eigenvalues that emerge from a random data matrix.

Thus, the analysis was recalculated forcing the retention of one factor (**Table 1**). This solution accounted for a total of 57.14% of the variance (eigenvalue: 11.43). The items presented factor

loadings ranging from .56 to .84. To develop a briefer measure the authors selected the 15 items with the largest factor loadings (items 1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 18, 19 and 20). This approach revealed that this solution accounted for a total of 61.54% of the variance, with these items presenting factorial loadings ranging from .73 (item 2) to .86 (item 12).

With the aim of reaching a shorter but still a theoretically and psychometrically sound measure, these 15 items were further discussed and from these, 7 items were selected. The election of these items was grounded on empirical and theoretical criteria. Theoretically, this set of items was identified as covering the variability of the construct of cognitive fusion, as conceptualized by the authors of the original measure of fusion with cognition in general (CFQ; Gillanders et al., 2014), but being focused on the specific dimension of food craving and urges. This item reduction process structure, a CFA was conducted in a distinct sample (Sample 2). Results indicated a significant chi-square goodness of fitness was further corroborated by the factorial analysis. Results indicated that this fit index has been that this approach resulted in an increase of the amount of variance explained to 66.14%, with the items presenting factor loadings ranging between .73 (item 2) and .88 (item 12). Moreover, results demonstrated that the 15-item solution and the 7-item one presented a nearly perfect correlation ($r = .98$).

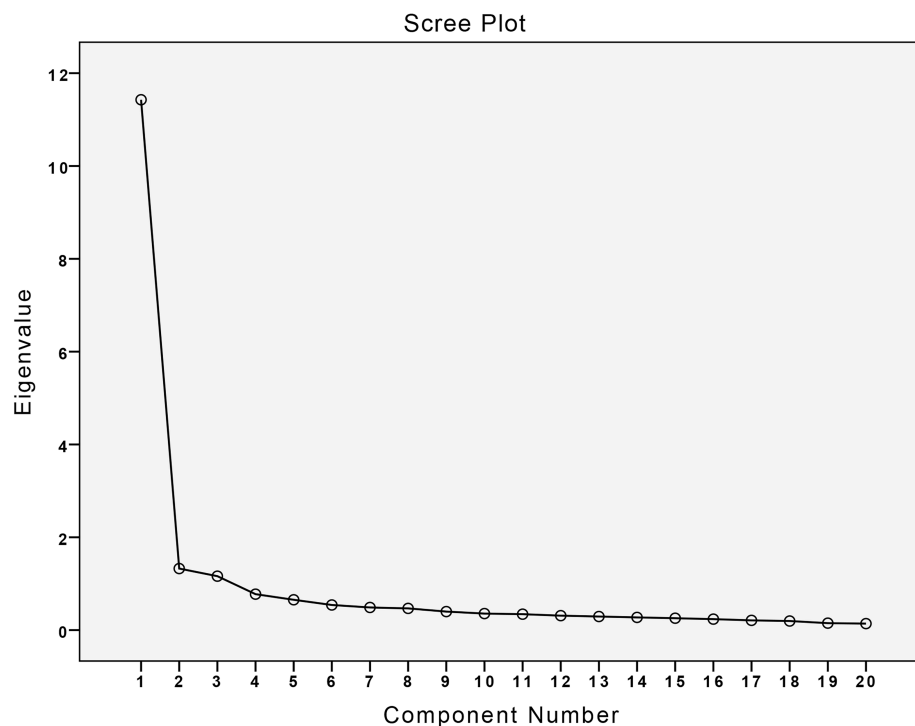


Figure 1 | Scree plot for the Principal Component Analysis for the Cognitive Fusion Questionnaire-Food Craving ($n = 300$).

Table 1

Mean (M), Standard deviation (SD), Principal Component Analysis factor loadings (λ), communalities (h^2), item-total correlation and Cronbach's alpha (α) if item deleted (Sample 1; n = 300); Standardized regression weights (SRW) and Squared Multiple Correlations (SMC) in the Confirmatory Factor Analysis (Sample 2; n = 518).

Items	M	SD	λ	h^2	Item-total correlation	α if item deleted	SRW	SMC
1. My desires to eat in excess (large amounts) disturb me or cause me emotional distress.	1.61	1.04	.74	.55	.71			
2. I tend to get very entangled in my food urges or cravings.	1.83	1.20	.74	.55	.72	.89	.74	.55
3. I feel distressed when I have urges to eat something that is not healthy.	2.00	1.33	.72	.51	.69			
4. If I have the desire to eat something that is not healthy I cannot resist it.	2.73	1.46	.56	.32	.54			
5. I focus too much on my disturbing thoughts about my eating pattern.	1.58	.095	.77	.59	.73			
6. My urges to eat 'force' me to stop whatever I am doing.	1.50	0.92	.74	.55	.70			
7. It's very difficult for me to let go of my food urges or cravings even when I know that letting go would be helpful.	1.81	1.23	.77	.59	.74	.88	.77	.59
8. My food urges or cravings distract me from what I am doing at the moment.	1.60	0.96	.77	.60	.74			
9. I feel that my food urges or cravings control my eating.	1.67	1.12	.69	.48	.66			
10. I get so caught up in my urges to eat that I am unable to do the things that I most want to do.	1.30	0.71	.80	.63	.74	.88	.80	.64
11. I overanalyse my urges or cravings to eat to the point where it's unhelpful to me.	1.42	0.82	.80	.64	.75	.87	.80	.64
12. I struggle to control my food urges or cravings.	1.45	0.96	.84	.71	.81	.89	.88	.77
13. I get upset with myself for having certain urges or cravings for unhealthy foods.	1.99	1.35	.77	.59	.75	.88	.81	.65
14. Whenever I have an impulse or desire to eat something that is not healthy (for example, candies, fries) I find it difficult to concentrate is anything else.	1.73	1.03	.76	.58	.73			
15. I need to control the food cravings that come to my mind.	1.89	1.24	.77	.60	.76			
16. I make a great effort to control or avoid my urges or cravings to eat.	1.78	1.17	.73	.54	.71			
17. If I have the craving to eat something that is not healthy I cannot 'let go' until I do it.	1.82	1.15	.69	.48	.67			
18. My food-related thoughts cause me distress or emotional pain.	1.30	0.76	.80	.63	.74	.95	.86	.75
19. My urges and cravings to eat cause me great distress and impairment in my life.	1.27	0.72	.82	.68	.77			
20. I am afraid of my urges to eat something that is unhealthy or to eat excessively.	1.46	1.08	.79	.63	.75			

3.3. Confirmatory factor analysis

To confirm the obtained shorter 7-item one-dimensional structure, a CFA was conducted in a distinct sample (Sample 2). Results indicated a significant chi-square goodness of fitness ($\chi^2_{(14)}=141.98, p < .001$), but given that this fit index has been regarded as leading to biases in results due to sample size (DeCoster, 1998), we considered the remaining goodness of fit indices to attest for the adequacy of the structure under analysis. Results suggested a poor to adequate model fit (CFI = .95; TLI = .93; NFI = .95; RMSEA = .13, $p = .000$). The analysis of the modification indices suggested the correlation of the errors of items 2 and 7 (47.03) and 10 and 11 (30.77),

which resulted in an improvement of the model to a very good fit ($\chi^2_{(12)} = 60.59$; CFI = .98; TLI = .97; NFI = .98; RMSEA = .09, $p = .002$).

The analysis of the local adjustment indices also confirmed the adequacy of the model (Table 1). In fact, the items presented standardized regression weights significantly above the recommended cut-off point of .40 (Tabachnick & Fidell, 2013), which ranged from .74 (item 2) to .88 (item 12). The individual items reliability was also corroborated through the values of the squared multiple correlations, which varied between .55 (item 2) and .77 (item 12).

The model invariance between men and women was examined through a multigroup analysis. Findings supported the model invariance between both males and females, with results showing that no differences were found in regard to factor weights ($\Delta\text{CFI} = -.01$); as well as regarding item's means ($\Delta\text{CFI} = -.04$; Chen, Sousa, & West, 2005; Cheung & Rensvold, 2002).

3.4. CFQ-FC validity and descriptives

In Sample 1, results indicated that CFQ-FC presented a very good internal reliability, with a Cronbach's alpha value of .90. Furthermore, the scale presented item-total correlations that ranged from .66 to .82, and the deletion of any item would not result in an improvement of the internal reliability of the measure.

The validity of the scale was further assessed through the calculation of the Composite Reliability (CR) and Average Variance Extracted (AVE; Fornell & Larcker, 1981) in Sample 2. Results indicated that the scale presented a CR of .96, which indicates very good construct reliability. Furthermore, an AVE value of .77 was obtained, confirming the instrument convergent validity.

In regard to the descriptive statistics (Sample 2), results indicated that women presented higher scores of food craving-related cognitive fusion ($M = 15.37$; $SD = 8.67$), in comparison to men ($M = 10.58$; $SD = 5.17$), and these differences were statistically significant ($t_{(516)} = 7.81$, $p < .001$).

3.5. Retest reliability

The retest reliability was examined in Sample 3. Results of the Pearson product-moment correlations showed strong positive correlations between the test and retest of the CFQ-FC ($r = .79$; $p < .001$). Furthermore, findings from the t-test for dependent samples showed that there were no significant differences between the two assessment moments of the CFQ-FC ($t_{(53)} = 1.05$; $p = .298$), further supporting the instruments' temporal stability.

3.6. CFQ-FC relation with other measures

Pearson product-moment correlations coefficients were calculated (Sample 2) to examine the convergent validity of CFQ-FC in association with similar constructs, as well as to the scale's association with important indicators of eating and general psychopathology (Table 2). Findings revealed, for both men and women, positive moderate associations between CFQ-FC and broad cognitive fusion (CFQ). Stronger associations were found in the association between CFQ-FC and cognitive fusion related to the specific dimension of body image (CFQ-BI). Moreover, results indicated that CFQ-FC was positively and moderately associated with psychological inflexibility (AAQ-II). Results also revealed that CFQ-FC was strongly and positively associated with a global indicator of eating psychopathology, as well as with a more specific measure of binge eating symptoms. On the contrary, CFQ-FC was negatively associated with intuitive eating (IES-2). CFQ-FC was only marginally associated with BMI in women. Finally, positive moderate associations were found between CFQ-FC and symptoms of depression, anxiety and stress. Overall, the correlations were stronger in the case of women.

Table 2

CFQ-FC correlations with other measures and their respective Cronbach's alphas (n = 518)

	CFQ	CFQ-BI	AAQ-II	EDE	BES	IES-2	DEP	ANX	STR	BMI
α	.94	.97	.94	.95	.92	.87	.90	.86	.91	
CFQ-FC										
Women	.46***	.68***	.44***	.71***	.78***	-.59**	.43***	.40***	.40***	.10
Men	.42***	.66***	.48***	.68***	.60***	-.41**	.35***	.45***	.38***	.18**

Note. *** $p < .001$; ** $p < .010$

3.7. Discriminant validity

To confirm the CFQ-FC ability to discriminate between individuals with the presence of clinically significant symptoms of binge eating from individuals with no significant symptoms, we compared two samples with similar demographic characteristics, namely age ($t_{(108)} = .111$; $p = .319$) and years of education ($t_{(108)} = .001$; $p = .999$). The group with higher levels ($n = 42$; 5 men and 37 women) was selected based on the cut point for the BES > 17 (Duarte et al., 2015b; Marcus, Wing, & Lamparski, 1985). The group with lower levels of disordered eating symptoms included 68 (11 men and 57 women) randomly selected controls. Results revealed that participants with significant scores of binge eating present significantly higher scores of cognitive

fusion with food-related thoughts ($M = 27.33$; $SD = 9.88$), in comparison to the participants with no symptoms ($M = 14.87$; $SD = 6.81$; $t_{(108)} = 7.83$; $p < .001$).

3.8. Incremental validity

To test the CFQ-FC incremental validity over a global measure of cognitive fusion, a series of hierarchical regression analyses were conducted for both sexes (Sample 2). As criterion variables we first considered the EDE-Q, and in a second set of analyses we considered the BES. In all analyses the CFQ was included as the predictor in the first step, and CFQ-FC was further added as a predictor in the second step.

In women, results revealed that cognitive fusion measured by the CFQ accounted for 17% of EDE-Q variance ($\beta = .41$; $F_{(1,266)} = 54.62$; $p < .001$). On step two, when CFQ-FC was included, findings revealed that the model was significant and accounted for 52% of EDE-Q variance ($F_{(1,266)} = 190.72$; $p < .001$). CFQ-FC emerged as the best global predictor ($\beta = .67$; $p < .001$), followed by CFQ ($\beta = .10$; $p = .034$). In men, findings indicated that CFQ accounted for 7% of EDE-Q variance ($\beta = .27$; $F_{(1,183)} = 14.35$; $p < .001$), and that when CFQ-FC was included, the model accounted for 43% of EDE-Q variance ($F_{(1,182)} = 113.20$; $p < .001$). CFQ-FC emerged as the only significant predictor ($\beta = .66$; $p < .001$), followed by CFQ ($\beta = -.00$; $p = .970$).

Regarding binge eating symptoms, the analysis conducted in women indicated that CFQ accounted for 18% of BES variance ($\beta = .43$; $F_{(1,269)} = 60.27$; $p < .001$). The inclusion of CFQ-FC in the second step resulted in an increase of the variance of the BES to 62% of BES ($F_{(1,268)} = 307.74$; $p < .001$). In this model, CFQ-FC emerged as the best global predictor ($\beta = .74$; $p < .001$), followed by CFQ ($\beta = .09$; $p = .042$). The same analysis conducted in men indicated that CFQ accounted for 14% of BES variance ($\beta = .38$; $F_{(1,183)} = 30.43$; $p < .001$). On step two, when CFQ-FC was included, the model was significant and accounted for 38% of the variance ($F_{(1,182)} = 67.89$; $p < .001$), and CFQ-FC was the best global predictor ($\beta = .53$; $p < .001$), followed by CFQ ($\beta = .16$; $p = .015$).

4. Discussion

The current study presents the development and validation of a new measure designed to assess cognitive fusion with undesirable thoughts regarding food craving and urges to eat — CFQ-FC.

This specific measure was first examined in a sample of women from the general population, with ages ranging from 18 to 55 years old. The analysis confirmed that all CFQ-FC' items presented strong factorial loadings. With the aim of reaching a shorter and psychometrically robust measure, a stringent item reduction process was conducted. Although all items presented high factorial loadings, were elected to be included in the final version of the scale 7 items that comprehensively addressed the dimensions of food craving-related cognitive fusion. In fact, these items mirrored the content of the original CFQ (Gillanders et al., 2014), but specifically focused on the domain of eating (e.g., CFQ item: "I tend to get very entangled in my thoughts"; CFQ-FC item: "I tend to get very entangled in my food urges or cravings"). Thus, the items comprising the one-dimensional structure of the CFQ-FC are also strongly theoretically supported. Moreover, this structure accounted for 66.14% of the variance and was found to have high internal consistency. Findings also supported that CFQ-FC presents strong temporal stability.

This obtained shorter structure of the CFQ-FC was further examined in a distinct sample of 518 participants comprising men and women from the general population, with the same wide age interval. The CFA findings confirmed the plausibility of the one-dimensional model (Kline, 2005; Tabachnick & Fidell, 2013). In fact, results indicated that the model presented a very good fit to the data and that all items significantly contributed to the assessment of the construct of food craving-related cognitive fusion. The items presented high factor loadings and strong individual item reliability. Results indicated the pertinence of specifying correlated measurement errors between two pair of items, which had similar content and involved the same key terms (Brown, 2006). In particular, the formulation of items 2 and 7 in their original language may be analysed by respondents in a similar way. In fact, the language in which the measure was developed and tested (Portuguese) could have had implications in these method effects, and thus these specifications should be analysed in future studies. Furthermore, an additional explanation for this question may be related to the content of the items. Specifically, item 10 and 11 were generated to address specific aspects of fusion, namely the way behaviour may come to be dominated by thoughts and the tendency to overanalyse one's food cravings even when this is unhelpful, respectively (Gillanders et al., 2014; Hayes et al., 2006). Nonetheless, it is plausible that these items both capture the dimension of how fusion with one's internal experiences may govern one's behaviours and may hinder or limit one's ability to engage in valued helpful actions towards well-being. These assumptions should be further explored in future research examining

the factorial structure of this new measure and the potential existence of constructs underlying fusion related to this specific eating-related dimension.

Studies on food craving have been conducted predominantly in women (e.g., Forman et al., 2013; Hill, 2007; Hooper et al., 2012) and thus questions remain about the experiences associated with food craving across men and women, that can potentially be addressed through the use of the CFQ-FC. In fact, results supported that the CFQ-FC has high construct reliability and convergent validity for both men and women (Hair et al., 2010). CFQ-FC also demonstrated a strong measurement invariance for both sexes (Chen et al., 2005; Cheung & Rensvold, 2002), which supports that the scale has a simple and consistent structure across distinct populations.

The current study also contributed to clarify sex differences in regard to cognitive fusion with food cravings. Results revealed that women present statistically significant higher scores on the CFQ-FC in comparison to men. Prior research showed that, in comparison to men, food cravings are more common in women (Weingarten & Elston, 1990). Moreover, prior evidence showed that there are important sex differences in regard to the subjective experience related to food cravings, with this phenomenon being experienced by women as more problematic (Lafay et al., 2001). The current study extends these findings by showing that women from the general community, in comparison to men, present a stronger tendency to become entangled with thoughts involving craving and impulses to eat, perceiving them as events that need to be acted upon, at the expense of helpful or important actions towards well-being.

The correlation's analyses conducted for both men and women confirmed that CFQ-FC was associated with other related measures in the expected directions. In fact, results revealed that CFQ-FC was positively but moderately linked to a broad measure of cognitive fusion. This result suggests that although CFQ-FC development and content closely followed the original broad measure of CFQ (Gillanders et al., 2014), the two measures assess specific and non-overlapping constructs. That is, CFQ-FC seems to cover a specific construct that is related but distinct from a global tendency to become entangled with one's internal experiences. Furthermore, cognitive fusion focused on eating-related thoughts – CFQ-FC – was found to be closely linked but distinct from cognitive fusion focused on other construct that is key to disordered eating problems – body image (CFQ-BI; Ferreira, Trindade, Duarte, et al., 2015).

Prior evidence showed that cognitive fusion is a central component of psychological inflexibility, being associated with emotional distress and suffering (Ferreira, Trindade, Duarte, et al., 2015; Gillanders et al., 2014; Hayes, 2004; Hayes et al., 1999). In line with such findings, results also

confirmed that cognitive fusion focused on eating-related thoughts is associated with higher psychological inflexibility and symptoms of depression, anxiety and stress (DASS21; Lovibond & Lovibond, 1995). This result suggest that relating with one's internal events about eating as these were permanent events that reflect reality and require a reactive response to them, may generate emotional distress and become problematic in one's life. The current findings are therefore in line with prior research that demonstrated that food craving is associated with negative mood (e.g., depressive symptoms; Lafay et al., 2001), while also supporting the assumption that more than this phenomenon itself, it is the subjective experience and relationship the individual establishes with it that may cause it to become associated with a range of deleterious psychological and behavioural consequences (Gendall et al., 1998; Lafay et al., 2001). Although these conclusions cannot be established through the current study's findings and need to be addressed through prospective experimental designs, it is plausible that the tendency to become fused with the experience of food-related cognitive contents plays a critical role in these associations.

In particular, our findings indicate that a higher tendency to become fused with disturbing thoughts involving desires to eat, and with the struggle to resist impulses to eat, is associated with a higher severity of eating psychopathology symptoms (EDEQ; Fairburn & Beglin, 1994), namely binge eating (BES; Gormally et al., 1982). On the other hand, as expected, a negative association was found between CFQ-FC and the capacity to guide one's eating behaviour by accepting, understanding and using one's internal hunger and satiety signals, instead of eating in response to emotional or external cues (IES-2; Tylka & Kroon Van Diest, 2013). Overall, the direction and strength of the examined associations were similar in both sexes, although the link between CFQ-FC and the study measures was stronger in women. These findings corroborate prior studies that show that food cravings are associated with increased maladaptive eating attitudes and behaviours, including episodes of loss of control over eating (Greeno et al., 2000; Joyner et al., 2015; Waters et al., 2001). Nonetheless, the associations examined in this study seems to support the hypothesis that it is when individuals become fused with impulses or urges to eat that they tend to present increased eating psychopathology symptoms. These findings are therefore, in line with prior evidence that suggests that more than the occurrence of urges and desires to eat, it is the cognitive and emotional processes associated with this phenomenon that may determine its maladaptive impact.

Finally, although prior research suggest that food cravings are associated with higher BMI, and overweight/obesity (e.g., Flegal et al., 2010; White et al., 2002), the results from this study revealed that the tendency to become fused with one's eating-related thoughts is marginally or nonsignificantly associated with current BMI, in men and women from a nonclinical general community sample with normative weight status. These findings need to be analysed with caution given existent evidence on the limitations of considering BMI as a reliable indicator of healthy weight (Bhurosy & Jeewon, 2013). Future studies should clarify the strength of these associations and the link between food craving-related cognitive fusion and other measures of body composition and related health risks, in community samples, in individuals struggling with managing their weight and in clinical samples with eating disorders.

Nonetheless, the current study contributed to demonstrate that the tendency to be fused with eating-related urges and impulses may be an important construct to understand binge eating symptomatology. In fact, the current study demonstrated that women from the general population who present significant symptoms of binge eating, present significantly higher levels of food craving-related cognitive fusion, in comparison to women who do not report these symptoms. This finding supports the discriminant validity of this scale and indicates that it may be a particularly useful instrument for the research of disordered eating behaviours, namely binge eating.

The incremental validity of the measure was also confirmed, with results indicating that CFQ-FC accounted for overall eating psychopathology symptoms (EDEQ; Fairburn & Beglin, 1994) and specific symptoms of binge eating (BES; Gormally et al., 1982), above a global measure of cognitive fusion (CFQ; Gillanders et al., 2014). These findings corroborate prior suggestions regarding the pertinence of developing and using measures that cover specific contents of cognitive fusion (Ferreira, Trindade, Duarte, et al., 2015; Gillanders et al., 2014). In particular, data from the current study suggest that the tendency to get entangled with the content of undesirable and disturbing thoughts about eating and cravings and impulses to eat, may be associated with maladaptive eating attitudes and behaviours. More specifically, our results suggest that a fused relationship with one's internal events about eating and seeing them as permanent and not transitory subjective experiences, is linked with an increased tendency to engage in reactive attempts to control these unwanted experiences, such as binge eating. Prior evidence demonstrated that the tendency to get entangled with thought contents focused on specific dimensions relevant in eating psychopathology is associated with eating

psychopathology severity in women from the general community (Ferreira et al., 2014; Ferreira, Trindade, Duarte, et al., 2015; Trindade & Ferreira, 2014), and emerged as an important process operating in the severity of binge eating symptomatology in women with BED (Duarte et al., 2015a). The current study constitutes an important contribution to develop this line of research by providing an instrument that allows for the examination of cognitive fusion related with the specific dimension of food craving.

These findings support that the CFQ-FC holds therefore potential interest for researchers and clinicians as it allows for the brief and reliable assessment of a specific psychological process that seems particularly relevant in disordered eating behaviours. In fact, this measure provides a means to clarify the role that fusion with eating-related cognitive content may play in the engagement in maladaptive eating behaviours, such as binge eating. Moreover, as an important direction for future research, CFQ-FC can be used to examine changes in interventions, and to test hypotheses regarding the mediating mechanisms operating in such changes throughout treatment.

This data needs to be analysed with caution given that measures of eating psychopathology inherently comprise the dimension of the excessive dominance of eating-related cognitions (e.g., concerns about eating, attempts to control eating behaviour or reactively eating in response to urges to eat), which could result in artificially large associations between constructs, such as food craving-related cognitive fusion and binge eating (e.g., as measured by the BES; Gormally et al., 1982). The CFQ-FC items were carefully developed taking this aspect into consideration. In fact, the items that comprise the final version of the CFQ-FC assess the multiple dimensions of cognitive fusion (including the tendency to overidentify with, evaluate, overanalyse and try to control thought content, and to emotionally react to it), instead of overly focussing on the impact of cognitive fusion over eating behaviour. Nonetheless, future research should clarify these associations and examine the relationship between CFQ-FC and other behavioural and experimental methods to assess cognitive fusion related to eating, and its effect on eating behaviour and psychological adjustment.

Some limitations should be considered in the current study. The CFQ-FC' factorial structure should be confirmed in different samples. In particular, future research should investigate the invariance of this model in groups at increased risk for eating struggles (e.g., adolescent girls, homosexual/bisexual males), individuals with difficulties in regulating eating behaviour, and patients with eating psychopathology, namely bulimia nervosa and BED.

The clinical sensibility and specificity of this measure should also be further investigated in these specific samples. Furthermore, given the relevance of investigating disordered eating behaviours in the community, findings from the current study should be corroborated in future investigations in other languages (e.g., English). Lastly, results from the current study suggest that CFQ-FC seems to be particularly useful to address an important dimension for the conceptualization and treatment of eating-related difficulties.

Nonetheless, future research is needed to further understand how this dimension of cognitive fusion focused on eating interacts with other dimensions of cognitive fusion (e.g., body image) and other processes (e.g., experiential avoidance) relevant for eating psychopathology. In particular, it would be pertinent to investigate how this new measure correlates with an existing food-craving measure focussing on the ACT model processes of acceptance and willingness to experience aversive internal experiences, the FAAQ. This is an important limitation of the current study (as the FAAQ is still not validated in the Portuguese population), which should be addressed by future research.

Moreover, the development of the CFQ-FC seems to be an important contribution, as this specific measure may provide clinicians and researchers a better understanding of how fusion focused on eating and food craving can have an impact on eating behaviours. In particular, this measure is of potential use for researchers in experimental studies investigating the effect of cognitive fusion on food consumption. Moreover, it can be a particularly relevant tool to track changes in this psychological process, and its mediator effect, in treatments for disordered eating.

In conclusion, the CFQ-FC is a short and psychometrically valid measure with important implications for research and clinical practice in the field of eating behaviours.

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Study V

Psychometric properties of the Intuitive Eating Scale - 2 and association with binge eating symptoms in a Portuguese community sample

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Abstract

Intuitive eating entails the ability to connect with and understand one's internal hunger and satiety signals, instead of engaging in reactive maladaptive eating behaviours. The current study aimed at examining the factorial structure and psychometric properties of the Intuitive Eating Scale-2 (IES-2) in the Portuguese population. Also, it aimed at investigating the correlates of intuitive eating and its moderator effect on the association between negative affect and binge eating symptoms.

The factorial structure and psychometric properties of the IES-2 were examined in a sample of 545 women and were further corroborated in a distinct sample comprised by men and women from the general community ($n = 642$).

Results supported the four-factor structure of the IES-2, including the subscales: eating for physical reasons rather than emotional reasons; unconditional permission to eat; reliance on hunger and satiety cues; and body-food choice congruence. The scale presented good internal consistency, construct and discriminant validity, and test-retest reliability. IES-2 presented negative correlations with BMI, eating psychopathology, especially binge eating, body shame, and depressive, anxiety and stress symptoms; and positive correlations with decentering and body image flexibility. Furthermore, intuitive eating significantly moderated the relationship between negative affect and binge eating symptomatology.

Findings support that the IES-2 is a valid and adequate measure of intuitive eating. Results further highlight the association between intuitive eating and mechanisms relevant for eating and weight regulation, and the possible buffer effect of intuitive eating against binge eating symptoms, carrying therefore important implications for the treatment and prevention of eating-related problems.

Keywords: Intuitive eating; Confirmatory Factor Analysis; psychometric properties; body image; binge eating.

Novelty and Significance

1. What is already known about the topic?

There is growing research on adaptive eating behaviour, namely intuitive eating.

The IES-2 (Tylka & Kroon Van Diest, 2013) is a validated measure of intuitive eating.

Intuitive eating has been associated with decreased eating psychopathology and elevated well-being.

2. What this paper adds?

The psychometric properties of the Portuguese version of the IES-2 in a large community sample were examined.

Intuitive eating is associated with decentering and body image flexibility, and decreased eating psychopathology, especially binge eating symptoms.

Intuitive eating buffers the effect of depressive symptoms on binge eating symptoms.

Findings suggest the relevance of intuitive eating for the prevention and treatment of disordered eating.

Introduction

Although there has been a continuous effort on the assessment and treatment of disordered eating, the interest on adaptive eating behaviours is rising. There is a growing body of research focused on intuitive eating, which entails the ability to guide eating behaviour through one's connection with and understanding of physiological hunger and satiety signals (Tribole & Resch, 1995). Intuitive eating involves an awareness of one's body's physical needs to reach optimal health, and the use of distinct internal signals to determine when, what, and how much to eat; instead of following predetermined inflexible dietary rules, or eating as a response to emotional states (Tribole & Resch, 1996).

The Intuitive Eating Scale (IES; Tylka, 2006) was developed to measure intuitive eating according to three dimensions: unconditional permission to eat (UPE), reflecting the readiness to eat in response to internal physiological hunger cues and the food that is desired at the moment; eating for physical reasons rather than emotional reasons (EPR), referring to the ability to eat when physically hungry, and not to cope with emotional distress; and reliance on hunger and satiety cues (RHSC) involving the capacity to determine when and how much to eat, based on one's internal hunger and satiety signals (Tribole & Resch, 1995; Tribole & Resch, 1996). The scale showed good internal consistency, test-retest reliability and construct validity. The IES was

further validated in other populations (e.g., middle school boys and girls; Dockendorff, Petrie, Greenleaf, & Martin, 2012) and languages (e.g., Portuguese; Duarte, Pinto-Gouveia, & Azevedo, 2015, April).

This scale was recently revised by Tylka and Kroon Van Diest (2013) in order to include mostly items designed to assess intuitive eating attitudes and behaviours (e.g., *"I allow myself to eat what food I desire at the moment"*) and not its absence, given that in the original IES, 13 out of 21 items had to be reverse scored to measure this construct (e.g., *"I use food to help me soothe my negative emotions"*). Furthermore, items were added to the scale with the aim of assessing a fourth domain of intuitive eating that refers to the tendency to select nutritious foods that promote one's health and body functioning (Tribole & Resch, 1996). The analysis of the Intuitive Eating Scale-2 (IES-2), conducted in a large sample of college students, indicated that the scale retained 23 items with a four-factor solution. The examination of this measure seems key for the consolidation of current knowledge on the role of intuitive eating on indicators relevant for the conceptualization and treatment of disordered eating symptomatology.

There is now evidence that individuals who report a higher scores of intuitive eating, present lower engagement in maladaptive eating behaviours, such as binge eating (Avalos & Tylka, 2006; Denny, Loth, Eisenberg, & Neumark-Sztainer, 2013; Tylka & Wilcox, 2006). Also, intuitive eating is associated with adaptive body image and eating attitudes and behaviours (Augustus-Horvath & Tylka, 2011; Dockendorff et al., 2012; Herbert, Blechert, Hautzinger, Matthias, & Herbert, 2013; Shouse & Nilsson, 2011; Tylka, 2006; Tylka & Kroon Van Diest, 2013), indicators of psychological adjustment (Tylka, 2006; Tylka & Kroon Van Diest, 2013; Tylka & Wilcox, 2006), and awareness and acceptance of distinct emotional states (Shouse & Nilsson, 2011).

Moreover, theoretical and empirical accounts have been emphasising the association between intuitive eating and mindfulness and acceptance-based approaches to body image and eating regulation (e.g., Mathieu, 2009), which focus on cultivating a greater awareness of hunger and satiety cues as well as on negative emotional states that may trigger pathological eating behaviour (e.g., Bacon & Aphramor, 2011; Kristeller & Wolever, 2010; Schoenefeld & Webb, 2013; Sandoz, Wilson, Merwn, & Kellum, 2013). Binge eating symptoms have been identified as a common consequence of this process, possibly serving the function of reducing or avoiding unpleasant negative affectivity, whilst being disconnected from one's internal signals (Blackburn, Johnston, Blampied, Popp, & Kallen, 2006; Heatherton & Baumeister, 1991; Masheb & Grilo,

2006; Kristeller & Wolever, 2010). The relationship between binge eating and intuitive eating remains, however, unexplored.

The current study aimed at examining the factorial structure and the psychometric properties of the IES-2 in a wide community sample of Portuguese women and men. This study further examined the associations between intuitive eating, body image and disordered eating symptomatology, namely binge eating symptoms, depression, anxiety and stress symptoms, decentering, and body image acceptance. Furthermore, given prior evidence highlighting intuitive eating as an important mechanism that may counteract difficulties in being aware and accept internal experiences (e.g., emotions and bodily sensations; Denny et al., 2013; Mathieu, 2009; Shouse & Nilsson, 2011), and its possible implications for deregulated eating behaviour, this study also aimed at testing the moderator effect of intuitive eating on the relationship between negative affect and binge eating symptoms.

Materials and methods

Participants

The IES-2 was analysed in a sample of 545 participants (sample 1; 279 female college students and 266 women from the general population), with ages ranging from 18 to 55 ($M = 28.30$; $SD = 10.20$) years and a mean of 13 ($SD = 2.66$) years of education. The participants' Body Mass Index (BMI) mean was 22.69 ($SD = 3.70$). Forty-six participants were selected from this sample to assess the temporal stability of the IES-2.

An independent sample (sample 2) was used to confirm the scale's structure and properties and to test the measurement invariance across genders. This sample comprised 468 women (225 college students and 243 participants collected from the general population) and 174 men (71 college students and 103 collected from the general population), with ages ranging from 18 to 55. Women presented a mean age of 28.47 ($SD = 10.70$), a mean of 12.78 ($SD = 2.79$) years of education, and a mean BMI of 22.70 ($SD = 3.58$); men mean age was 30.22 ($SD = 10.56$), the mean years of education was 12.39 ($SD = 3.06$), and the mean BMI was 24.22 ($SD = 4.23$). No gender differences regarding demographics were found between genders ($t_{age(640)} = 1.86$, $p = .064$; $t_{education(640)} = 1.54$, $p = .124$).

Procedures

Participants were volunteers who were informed about the procedures and aims of the research. Informed consent was obtained from all participants. Student participants were collected in higher education institutions, with the approval of the respective educational institution's board, and filled the measures at the end of a lecture. The participants from the general population were collected in distinct institutions (e.g., schools, private companies, retail services), after the institutions' boards approved the study. The subsample used to analyse the scale temporal stability comprised participants who agreed to complete the IES-2 a second time after a 3-4 week interval.

Intuitive Eating Scale-2 Portuguese adaptation

Intuitive Eating Scale-2 (Tylka & Kroon Van Diest, 2013) the IES-2 includes 23-items assessing four dimensions of intuitive eating: eating for physical reasons rather than emotional reasons (EPR); unconditional permission to eat (UPE); reliance on hunger and satiety cues (RHSC); and body-food choice congruence (B-FCC). Participants are asked to rate each item using a 5-point Likert scale (ranging from 'Strongly disagree' (1) to 'Strongly agree' (5) selecting the option that best describes their attitudes or behaviours.

With the consent of the authors of the original version of the scale (Tylka & Voon Van Kriest, 2013), the scale was translated and adapted to European Portuguese following rigorous procedures of translation and back translation. A bilingual researcher first translated and adapted the scale. The translation was then examined by researchers with a large experience in the field. To assure comparability of content, back-translation procedures were conducted by an independent bilingual researcher. An initial version of the adapted scale was again reviewed by the researchers and was then completed by 20 college students, to whom it was asked to comment about the clarity of the expressions used in the items. Some minor wording adjustments were made and a final version of the adaptation of the scale was created.

Measures

Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Portuguese version by Machado et al., 2014). The EDE-Q includes 36 items providing a comprehensive evaluation of eating psychopathology. The EDE-Q comprises four subscales – restraint, eating concern, weight concern and shape concern – which together compose the scale's total score. The items are

rated for frequency of occurrence (on a scale ranging from 'No days' (0) to 'Every day' (6) or for symptoms' severity (on a scale ranging from 'Not at all' (0) to 'Markedly' (6)). The EDE-Q has consistently demonstrated good psychometric properties in both clinical and community samples.

Binge Eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982; Portuguese version by Duarte, Pinto-Gouveia, & Ferreira, 2015). The BES comprises 16 items and assesses the emotional, cognitive and behavioural aspects of binge eating symptomatology. Each item includes three to four statements and respondents are asked to select the one that best describes their experience. Each statement reflects a rating of severity (ranging from absence of symptoms (0) to severe symptomatology (3)). The scale has shown good psychometric properties, with a Cronbach's alpha value of .85 in the original study (Gormally et al., 1982), and .88 in the Portuguese validation study (Duarte, Pinto-Gouveia, & Ferreira, 2014).

Body Image Shame Scale (BISS; Duarte, Pinto-Gouveia, Ferreira, & Batista, 2014). The BISS includes 14 items and assesses the experience and phenomenology of body image shame, that is, negative perceptions of being negatively evaluated by others, and negative self-evaluations because of one's body image, and consequent avoidance and body image concealment behaviours. Participants are invited to rate each item according to the frequency with which they experience shame about their body image, using a 5-point Likert scale (ranging from 'Never' (0) to 'Almost always' (4)). The scale presents high internal consistency (Cronbach's alpha of .92; Duarte et al., 2014).

Body Image Acceptance and Action Questionnaire (BI-AAQ; Sandoz et al., 2013; Portuguese version by Ferreira, Pinto-Gouveia, & Duarte, 2011). The BIAAQ includes 12 items and assesses body image flexibility, that is, the ability to fully experience and accept thoughts, emotions and sensations, related to one's body, while pursuing important life values. Respondents are asked to rate the extent to which each statement applies to them, using a 7-points scale (ranging from 'Never true' (1) to 'Always true' (7)). The scale presented high internal consistency in its original (i.e., with Cronbach's alpha values around .92 and .93 in distinct samples) and Portuguese versions (with a Cronbach's alpha coefficient of .95).

Experiences Questionnaire (EQ; Fresco et al., 2007; Portuguese version by Gregório, Pinto-Gouveia, Duarte, & Simões, 2015). The EQ includes 14 items assessing decentering, which entails the ability to observe one's thoughts and feelings as temporary subjective internal events, as opposed to true reflections of the self or reality. Respondents are asked to rate each item using a

5-point Likert scale (ranging from 'Never' (1) to 'All the time' (5). The original scale has shown high internal consistency (with a Cronbach's alpha coefficient of .83), as well as the Portuguese version used in the current study (with a Cronbach's alpha of .91).

Depression Anxiety and Stress Scales– 21 (DASS21; Lovibond & Lovibond, 1995; Portuguese version by Pais-Ribeiro, Honrado, & Leal, 2004). DASS21 includes three subscales, with 7 items each, assessing depressive, anxiety and stress symptoms. Respondents are asked to indicate the frequency with which they experienced each symptom over the previous week, using a 4-point Likert scale (ranging from 'Did not apply to me at all' (0) to 'Applied to me very much or most of the time' (3). The depression, anxiety and stress subscales present high internal consistency, with Cronbach's alpha values of .88, .82, and .90, respectively, in the original version (Lovibond & Lovibond, 1995), and .85, .74, and .81, respectively, in the Portuguese version (Pais-Ribeiro et al., 2004).

Body Mass Index (BMI) was calculated with self-reported data using the formula 'weight/height squared'.

Data analysis

To analyse the dimensionality of the Portuguese version of the IES-2 second-order confirmatory factor analyses (CFA), with maximum likelihood estimation method, testing the theoretical model proposed by the original authors (Tylka & Kroon Van Diest, 2013) were conducted in two separate samples. Each item was specified to load on the respective latent first-order factor, which, in turn, was specified to load on a second-order factor. We estimated correlated errors between items of the IES-2 that were similarly worded, as they were expected to share method variance (Tylka & Voon Van Kriest, 2013; Kline, 2005). The adequacy of the model fit was determined according to the following indices: chi-square goodness-of-fit index; normed chi-square (CMIN/df) with values < 5 indicating acceptable fit; the Comparative Fit Index (CFI), which values may range from 0 (no fit) to 1 (perfect fit); the Standardized Root-Mean Square Residual (SRMR), with values around .08 or lower indicating reasonably good fit; and the Root Mean Square Error of Approximation index (RMSEA), which indicate an adequate fit when values < .08 (Arbuckle, 2008; Hu & Bentler, 1999; Kline, 2005). The model invariance between genders was examined by a multigroup analysis. The construct reliability and convergent validity of the scale were examined through the calculation of the Composite Reliability (CR) and Average Variance Extracted (AVE; Fornell & Larcker, 1981). The relationship between the IES-2 and related

constructs were examined through Pearson product-moment correlation coefficients in the female participants. The test-retest reliability of the IES-2 was estimated through Intraclass Correlation Coefficients (ICC) using data from the subsample of participants who completed the measure at both administrations (3-4 weeks apart). To test the IES-2 ability to discriminate between participants with no or low scores of binge eating and participants with moderate to high scores of binge eating a Student t-Test for independent samples was conducted.

To further examine the potential beneficial role of intuitive eating in regards to the regulation of eating behaviour, we tested the moderator effect of intuitive eating on the association between depressive symptoms (independent variable) and binge eating symptoms (dependent variable). The moderation was examined through a hierarchical regression analysis considering the interaction of the centered predictors' values (Cohen, Cohen, West, & Aiken, 2003).

The software SPSS 21.0 (Statistical Package for the Social Sciences) and the software AMOS (version 21, SPSS Inc, Chicago, IL, USA) were used to conduct the analyses.

Results

Results of the CFA (sample 1; $n = 545$) indicated an adequate model fit [$\chi^2_{(209)} = 653.48$; $p < .001$; CMIN/df = 3.13; CFI = .93; SRMR = .07; RMSEA = .06, 90% CI (.06 to .07)]. Regarding local adjustment indices, results indicated that the items presented Standardized Regression Weights (SRW) that ranged from .41 (item 13) to .89 (item 11) for EPR, .60 (item 1) to .68 (item 16) for UPE, .54 (item 22) to .84 (item 6) for RHSC, and .49 (item 18) to .88 (item 19) for B-FCC. The individual items' reliability (assessed by the Squared Multiple Correlations – SMC) values ranged from .17 (item 13) to .79 (item 11) for EPR, .37 (item 1 and 4) to .46 (item 16) for UPE, .30 (item 22) to .71 (item 6) for RHSC, and .24 (item 18) to .77 (item 19) for B-FCC.

This structure was further examined in an independent sample comprising both genders (sample 2; $n = 642$). Results supported the adequacy of the examined model [$\chi^2_{(209)} = 695.94$; $p < .001$; CMIN/df = 3.36; CFI = .94; SRMR = .08; RMSEA = .06 90% CI (.06 to .07)]. Regarding local adjustment indices, SRW values ranged from .33 (item 13) to .89 (item 11) for EPR, .55 (item 4) to .73 (item 16) for UPE, .55 (item 22) to .79 (item 8) for RHSC, and .67 (item 18) to .92 (item 19) for BFCC. The SMC values ranged from .11 (item 13) to .79 (item 11) for EPR, .30 (item 4) to .54 (item 16) for UPE, .31 (item 22) to .62 (item 8) for RHSC, and .45 (item 18) to .85 (item 19) for B-FCC, supporting the items reliability. Results are reported at Table 1.

Results of the multigroup analysis supported the model invariance between genders. Results revealed no differences in regard to factor weights ($\Delta CFI = .00$) and item's means ($\Delta CFI = -.001$; Chen, Sousa, & West, 2005; Cheung & Rensvold, 2002).

Table 1

Items' means (M), standard deviations (SD), standardized regression weights (SRW) and squared Multiple Correlations (SMC) in sample 1 (n = 545) and sample 2 (n = 642)

Items	Sample 1				Sample 2			
	M	SD	SRW	SMC	M	SD	SRW	SMC
EPR								
2	3.01	1.18	.87	.76	3.30	1.20	.85	.72
5	3.24	1.11	.76	.58	3.52	1.11	.80	.64
10	3.44	1.14	.87	.75	3.59	1.11	.86	.74
11	3.25	1.18	.89	.79	3.44	1.16	.89	.79
12	3.59	1.02	.59	.34	3.80	1.01	.52	.27
13	3.40	1.05	.41	.17	3.40	1.14	.33	.11
14	3.58	1.02	.70	.48	3.69	1.05	.61	.38
15	3.93	0.79	.64	.41	4.01	0.82	.53	.29
UPE								
1	2.77	1.12	.60	.37	2.87	1.15	.56	.32
3	3.23	1.16	.62	.39	3.83	0.78	.58	.34
4	3.58	1.11	.61	.37	3.43	1.10	.55	.30
9	3.84	0.79	.62	.39	3.62	1.17	.65	.42
16	3.66	0.85	.68	.46	3.76	0.82	.73	.54
17	3.58	1.02	.67	.45	3.54	1.09	.69	.47
RHSC								
6	3.50	0.93	.84	.71	3.65	0.91	.75	.57
7	3.07	0.91	.71	.50	3.22	0.94	.61	.38
8	3.39	0.92	.81	.65	3.46	0.92	.79	.62
21	3.57	0.80	.68	.47	3.66	0.80	.70	.49
22	3.72	0.83	.54	.30	3.63	0.88	.55	.31
23	3.61	0.87	.74	.55	3.65	0.86	.76	.58
B-FCC								
18	3.54	0.79	.49	.24	3.73	0.83	.67	.45
19	3.64	0.80	.88	.77	3.78	0.78	.92	.85
20	3.61	0.72	.84	.71	3.75	0.75	.81	.65

Note. EPR = Eating for Physical Reasons Rather Than Emotional Reasons; UPE = Unconditional Permission to Eat; RHSC = Reliance on hunger and Satiety Cues; B-FCC = Body –Food Choice Congruence

In sample 1, results indicated a CR of .96 for the total scale, .93 for EPR, .86 for UPE, .91 for RHSC, and .91 for B-FCC. Also, an AVE of .60 was obtained for the total score, .65 for EPR, .51 for UPE, .63 for RHSC, and .78 for B-FCC. The measure's validity was further examined in sample 2. The total scale presented a CR of .96, and the subscales EPR, UPE, RHSC and B-FCC presented CR values of .92, .86, .90 and .91, respectively, supporting the measure's construct validity. Regarding the AVE, results indicated a value of .59 for the total scale, .60 for EPR, .51 for UPE, .61 for RHSC, and .76 for B-FCC, corroborating the items' convergent validity. The AVE values of the factors were higher than the squared correlation between each pair of variables, which provided evidence for the subscales' discriminant validity.

Women presented significantly lower scores comparing to men in the IES-2 total score ($M = 3.51$, $SD = 0.52$; $M = 3.76$, $SD = 0.46$; $t_{(640)} = 5.55$, $p < .001$), and the subscales EPR ($M = 3.46$, $SD = 0.81$; $M = 3.95$, $SD = 0.70$; $t_{(640)} = 7.00$, $p < .001$), UPE ($M = 3.45$, $SD = 0.73$; $M = 3.67$, $SD = 0.70$; $t_{(640)} = 3.41$, $p = .001$), and RHSC ($M = 3.51$, $SD = 0.68$; $M = 3.61$, $SD = 0.69$; $t_{(640)} = 2.30$, $p = .022$). No significant differences were verified in the B-FCC subscale ($M = 3.78$, $SD = 0.67$; $M = 3.68$, $SD = 0.71$; $t_{(640)} = 1.75$, $p = .082$).

The ICC between the first and second administration were .88 for the total IES-2, .89 for EPR, .87 for UPE, .88 for RHSC, and .80 for B-FCC, supporting the scale's temporal stability.

Product-moment Pearson correlation coefficients (**Table 2**) revealed positive moderate to strong correlations between IES-2 total score and subscales.

Negative associations were verified between the total IES-2 and subscales and eating psychopathology measured by the EDE-Q, with the UPE subscale presenting the stronger correlation with EDE-Q. Regarding binge eating symptoms, the total IES-2 and subscales were negatively correlated with the BES, with the EPR and RHSC subscales presenting the strongest correlations. Negative significant associations were also found between IES-2 and its subscales, especially EPR and RHSC, and body image shame as measured by the BISS. Negative associations were also found between the IES-2 total score and subscales, and BMI. Moreover, results indicated that the total IES-2 and its subscales were positively and significantly correlated with body image flexibility. Positive associations were also found between the total IES-2 score and subscales, especially the subscale EPR, and decentering measured by EQ. Regarding

psychological adjustment, the total IES-2 and subscales were negatively correlated with anxiety, depression and stress, presenting low magnitudes of correlation.

Table 2

IES-2 correlations with other measures and Cronbach's alphas (n = 1013)

	EPR	UPE	RHSC	B-FCC	EDEQ	BES	BIAAQ	EQ	DEP	ANX	STR	BMI
α	.90	.80	.88	.77	.95	.87	.96	.84	.88	.86	.91	-
IES-2	.83**	.61**	.72**	.39**	-.60**	-.63**	.55**	.35**	-.26**	-.19**	-.22**	-.35**
EPR	-	.28**	.39**	.24**	-.47**	-.59**	.42**	.32**	-.30**	-.24**	-.26**	-.25**
UPE	-	-	.29**	-.08**	-.49**	-.27**	.39**	.11**	-.07**	-.08*	-.08*	-.29**
RHSC	-	-	-	.33**	-.39**	-.45**	.38**	.22**	-.12**	-.06	-.12**	-.24**
B-FCC	.	-	.	-	-.15**	-.29**	.19**	.25**	-.14**	-.06*	-.07*	-.16**

Note. * $p < .05$; ** $p < .001$; IES-2 = Intuitive Eating Scale – 2; EPR = Eating for Physical Reasons Rather Than Emotional Reasons; UPE = Unconditional Permission to Eat; RHSC = Reliance on Hunger and Satiety Cues; B-FCC = Body-Food Choice Congruence; EDEQ = Eating Disorder Examination Questionnaire; BES = Binge Eating Scale; BISS = Body Image Shame Scale; BIAAQ = Body Image Acceptance and Action Questionnaire; EQ = Experiences Questionnaire; DEP, ANX, STR = Depression, Anxiety and Stress Scale – 21; BMI = Body Mass Index.

To examine IES-2 ability to discriminate between participants with significant symptoms of binge eating – according to the cut-off score of 17 the BES (Duarte, Pinto-Gouveia, & Ferreira, 2015; Marcus, Wing, & Lamparski, 1985) – two groups with similar demographic characteristics ($t_{(180)age} = .59, p = .557$; $t_{(180)education} = .40, p = .689$; $t_{(180)BMI} = 1.876, p = .062$) were selected from the total sample. One group included 77 participants identified as having moderate to high scores of binge eating; the second group comprised 105 participants with no or low symptoms of binge eating. Statistically significant differences were found between the groups, with participants with higher scores of binge eating symptoms presenting lower scores on the IES-2 total score ($M = 2.76, SD = 0.50$; $M = 3.17, SD = 0.41$; $t_{(180)} = , p < .001$) and in the subscales EPR ($M = 2.39, SD = 0.74$; $M = 2.99, SD = 0.72$; $t_{(180)} = 5.48, p < .001$), RHSC ($M = 2.69, SD = 0.77$; $M = 3.24, SD = 0.60$; $t_{(180)} = 5.48, p < .001$) and B-FCC ($M = 3.16, SD = 0.83$; $M = 3.57, SD = 0.62$; $t_{(180)} = 3.77, p < .001$). There was also a trend for the group with higher levels of binge eating to present lower levels on the subscale UPE, in comparison to the group with no to lower levels of binge eating, but this difference was not statistically significant ($t_{(180)} = 0.19, p = .851$; $M = 3.14, SD = 0.70$; $M = 3.16, SD = 0.63$).

The moderator analysis was conducted in women given the identified gender differences regarding intuitive eating scores. Depressive symptoms were entered in the regression model in the first step, producing a statistically significant model [$R^2 = .13$; $F_{(1, 1004)} = 153.83$, $p < .001$; $\beta_{\text{depression}} = .36$]. Intuitive eating was added on the second step and the model was also significant [$R^2 = .44$, $F_{(1, 1003)} = 545.47$, $p < .001$; $\beta_{\text{depression}} = .22$; $\beta_{\text{intuitive eating}} = -.57$]. In the third step there was a significant increase in R^2 to .46 [$F_{(1, 1002)} = 42.11$, $p < .001$], with a β of .18 for depressive symptoms ($p < .001$), a β of -.56 for intuitive eating ($p < .001$), and results indicated that the interaction between the two predictors was also significant with a β of -.16 ($p < .001$).

A graphic was plotted to clarify these associations. Three curves were considered taking into account the following levels of intuitive eating: one *SD* below the mean, the mean, and one *SD* above the mean (Cohen et al., 2003). The graphical representation of the findings (see **Figure 1**) shows that in participants with low levels of intuitive eating the relationship between depressive symptoms and binge eating symptoms is higher; participants with higher levels of intuitive eating present lower levels of binge eating symptoms regardless of the degree of negative affect.

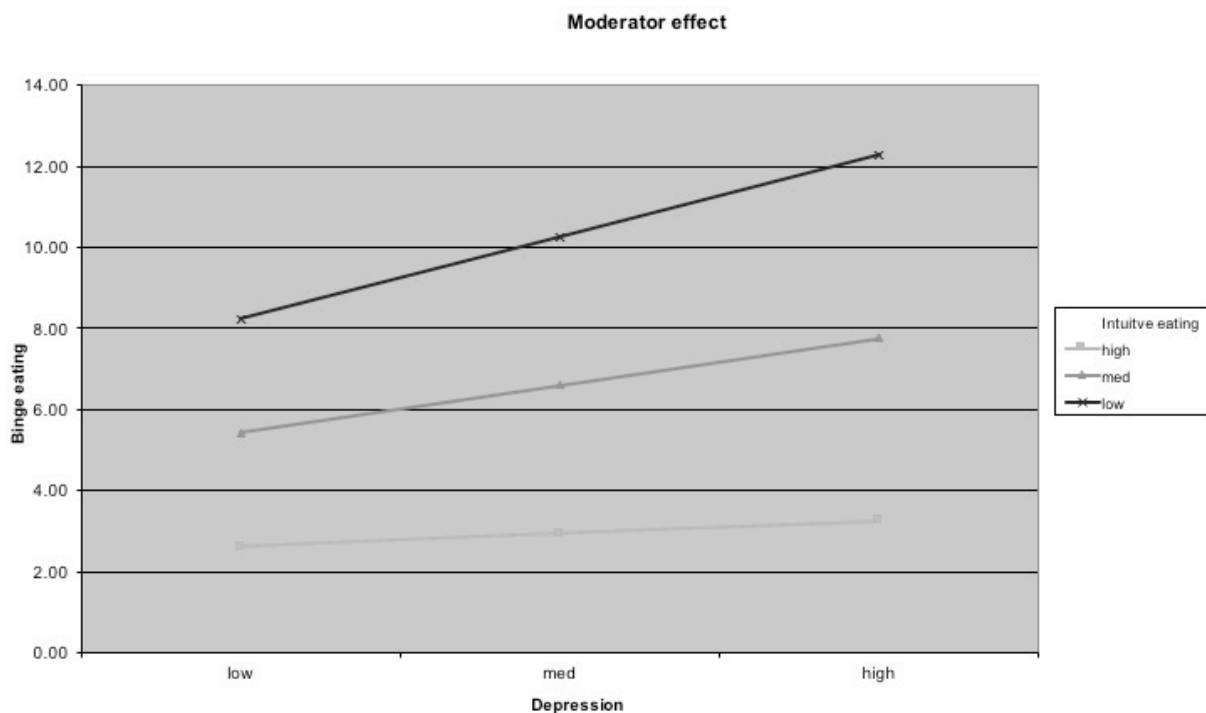


Figure 1 | Moderator effect of intuitive eating (IES-2 total score) on the association between depressive symptoms (Depression subscale of DASS21) and binge eating symptoms (as measured by the BES).

Discussion

The current study aimed at examining the psychometric properties of the IES-2 in a community sample of the Portuguese population comprising college students and participants from the general population. This study further investigated the associations between intuitive eating and body image and eating related dimensions, such as body image shame, body image flexibility and disordered eating, namely binge eating symptoms.

The current study corroborated the four-factor structure proposed by Tylka and Kroon Van Diest (2013). Moreover, results supported the measurement invariance between genders (Chen et al., 2005; Cheung & Rensvold, 2002). The analysis of individual parameters indicated the items' robustness. Item 13 ('When I am bored, I do NOT eat just for something to do') presented the lowest factor loadings and individual reliability, which may be due to the fact that the item is negatively worded, imposing understanding difficulties in its Portuguese language translation. Furthermore, results indicated that the measure presents good construct reliability and convergent validity, and its subscales also present good discriminant validity (Hair, Black, Babin, & Anderson, 2010). Findings supported that IES-2 total score and subscales present high test-retest reliability.

Results also indicated that, in the Portuguese population, women present lower scores of intuitive eating than men, which corroborates prior evidence suggesting that women present increased difficulties in being aware of internal experiences (e.g., thoughts, emotions and sensations) and connect with physiological hunger and satiety cues, with this having deleterious consequences for the regulation of eating behaviour (Denny et al., 2013; Duarte, Pinto-Gouveia, Ferreira, et al., 2014; Kessler et al., 2013; Tylka & Kroon Van Diest, 2013).

Findings supported the strong and negative association between intuitive eating and BMI and measures of disordered eating behaviour, namely binge eating symptoms (e.g., Augustus-Horvath & Tylka, 2011; Avalos & Tylka, 2006; Tylka, 2006; Tylka & Kroon Van Diest, 2013). Moreover, intuitive eating was negatively related to body image shame. These findings are in line with prior evidence that this ability to be aware of one's body's needs and signals and to use these signals to guide one's eating behaviour is associated with lower levels of difficulties related with body image and of thin-ideal internalization (Dockendorff et al., 2012; Tylka, 2006). Moreover, results indicated that intuitive eating abilities are associated with decreased symptoms of depression, anxiety and stress.

The current study also followed on prior research demonstrating the association between intuitive eating and self-regulatory processes (Schoenefeld & Webb, 2013). Results suggested that intuitive eaters present higher levels of decentering and body image flexibility, which may be translated into a higher ability to observe their difficult thoughts and feelings (e.g., about their body image), without engaging in reactive behaviours in their response (e.g., binge eating; Kristeller & Wolever, 2010).

In the current study, participants with lower intuitive eating presented more binge eating symptoms. There is consistent evidence on how impairments in regulating eating behaviour, especially binge eating symptoms, may emerge as a consequence of maladaptive self-regulatory and emotion regulation processes (Blackburn et al., 2006; Heatherton & Baumeister, 1991; Masheb & Grilo, 2006; Stice, 2002) including the difficulty of being aware and accept negative thoughts, emotions and sensations (Duarte & Pinto-Gouveia, 2015; Katterman, Kleinman, Hood, Nackers, & Corsica, 2014; Kristeller & Wolever, 2010; Lillis & Kendra, 2014; Sandoz, Wilson, & DuFrene, 2010). As intuitive eating involves the ability to mindfully discriminate cues leading to food consumption and a more aware individual choice (Mathieu, 2009; Tribole & Resch, 1995), it is hypothesized that the promotion of this ability may have important implications for the prevention and treatment of eating and weight-related difficulties.

These assumptions were supported by the moderator analysis' findings. In fact, results corroborated the moderator effect of intuitive eating on the association between depressive symptoms and binge eating, with the tested model accounting for 46% of the variance of binge eating symptoms. Although based on cross-sectional data and thus limiting our conclusions regarding causality, findings suggested that women with a higher awareness of and respect for their internal body's signals present a lower tendency to engage in binge eating symptoms even when presenting higher levels of negative affect. These findings suggest that intuitive eating may have an important protective effect against a reactive form of eating in face of negative emotional experiences. The cultivation of intuitive eating may promote the awareness of the initiation and cessation of eating based on internal hunger and satiety signals, instead of on emotional cues (Tribole & Resch, 1995; Tribole & Resch, 1996).

This study presents other limitations that should be considered by future studies. Although the Portuguese version of the scale was analysed in a large community sample, the sample is not fully representative of the general population. Future studies should include a wider sample of men, and the scale's structure and psychometric properties should be analysed in other samples

with marked difficulties in regulating eating behaviour and manage weight. Future research should investigate the scale's sensitivity to changes throughout psychological intervention programmes addressing the development of a more aware and accepting attitude towards eating behaviour and body image.

Nevertheless, the current study provides an examination of the dimensionality and psychometric properties of the Portuguese version of the IES-2, in a large sample including students and participants from the general population and extends prior evidence on intuitive eating and its correlates. Data from the current study corroborated the adequacy and validity of the IES-2 to assess intuitive eating and offers important suggestions regarding the potential importance of this construct in the prevention and treatment of difficulties in regulating eating behaviour in the general community.

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Study VI

Returning to emotional eating: The emotional eating scale psychometric properties and associations with body image flexibility and binge eating

Adapted from:

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Abstract

Purpose This study tests the Emotional Eating Scale (EES) psychometric properties and correlates, and the moderator effect of body image flexibility on the association between emotional eating and binge eating.

Methods The EES factorial structure was examined in female college students and women from the general population, through a principal component analysis and a confirmatory factor analysis. EES psychometric properties and moderation analyses were further conducted.

Results The EES presented a three-factor structure — Depression, Anxiety and Anger — a good model fit, internal consistency, construct validity and temporal stability. EES was positively associated with general and eating psychopathology, binge eating, and negatively associated with mindfulness and body image flexibility. Body image flexibility moderated the association between emotional eating and binge eating.

Conclusions Findings showed that EES is a valid measure of emotional eating, and clarified the association between emotional eating and binge eating moderated by body image flexibility.

Keywords: Emotional eating; Binge eating; Body image flexibility; Psychometrics; Moderation

Introduction

There is growing research on how emotions impact individuals eating behaviour. Emotional eating refers to the tendency to overeat in response to a range of negative emotions, such as anxiety, depression or anger [1, 2]. Emotional eating was initially described in Bruch's psychosomatic theory [3], according to which it derives from the inability to distinguish hunger sensations from physiological cues linked to emotional states. Furthermore, affect regulation models state that eating may be an attempt to escape, distract oneself from or avoid aversive affective states [4, 5].

Emotional eating is associated with mental health problems and plays an important role in body image, weight and eating-related disorders [6–9]. In particular, studies suggest that negative mood states, combined with disturbing eating and body image-related thoughts, are precipitants of binge eating [10, 11]. In fact, binge eating may serve to avoid such negative

internal events [4, 12], being however a futile strategy in the long term that creates greater distress, fueling a self-perpetuating cycle [13], with serious health and psychosocial consequences [14]. Thus, emotional eating has been highlighted as an important target of psychotherapeutic interventions for eating psychopathology, namely binge eating.

There is growing research showing the efficacy of mindfulness and acceptance-based interventions in reducing emotional eating and binge eating. Such interventions target the willingness to adaptively cope with emotions and undesirable thoughts to promote adaptive living [15–18]. A particularly important process of change in the treatment of binge eating is body image flexibility, the capacity to fully and openly experience body image-related negative thoughts and feelings, whilst engaging in value-consistent behaviours, instead of in reactive attempts to avoid them, such as emotional eating [19–22].

The development and refinement of assessment tools to address emotional eating and examine its interaction with processes relevant for body image and eating behaviours are therefore particularly relevant. Distinct self-report measures have been used to assess emotional eating [10,23]. The Emotional Eating Scale (EES) [1], first developed in obese women, includes 25 items comprising three subscales reflecting the desire to eat in response to Anger/ Frustration, Anxiety, and Depression. The scale presented good psychometric properties, and scores were sensitive to changes in binge eating treatment. Waller and Osman [8] further examined EES in non-eating-disordered female undergraduates and confirmed the scale's internal reliability and that emotional eating was significantly associated with disordered eating behaviours, namely bulimic symptoms, and increased weight status. Nevertheless, this study used a small sample and did not confirm whether the scale structure replicated the original EES. A recent study investigated the scale's factor structure in a larger sample of treatment-seeking overweight and obese participants [24]. Although results confirmed the utility of the EES with this population, they did not replicate the original EES factor structure. The EES was also examined in specific samples (e.g., children and adolescents [25]) with results revealing a loading pattern distinct of what was originally found. Other adaptations of the scale added items comprising positive emotions [26, 27], but the specificity of the samples used (undergraduate students) precluded conclusions regarding the measure's structure. Nonetheless, findings corroborated that negative affect was significantly associated with disordered eating behaviours (whilst positive affect failed to present significant associations).

To sum up, EES has been regarded as useful to evaluate emotional eating across distinct populations. This measure's factor structure reveals however some disparities, which suggests that the EES may be sensitive to the characteristics of the sample it is being applied to [24]. Also, negative emotions seem to co-occur within and across individuals and thus, the overlap between certain emotional states should be considered when analysing negative affect scales [28].

The current study aimed at conducting a more comprehensive evaluation of the EES dimensionality and psychometric properties in a wide nonclinical Portuguese sample of women. This study also intended to further examine the associations between emotional eating, psychopathology and body image and eating-related psychopathology, and treatment-relevant constructs. In particular, it was examined whether body image flexibility significantly moderated the association between emotional eating and binge eating.

Materials and methods

Participants

A principal component analysis (PCA) was conducted in 506 participants presenting a mean age of 24.71 ($SD = 9.13$) and 14.09 years of education ($SD = 1.80$). Most participants were students (81.5 %). Body mass index (BMI) mean was 22.45 ($SD = 3.41$), 6.4 % were underweight, 74.9 % presented normal weight, 14.9 % were overweight, and 3.8 % obese.

A confirmatory factor analysis (CFA) and subsequent analyses were conducted in an additional sample ($n = 512$). Participants' mean age was 21.81 ($SD = 4.17$) and years of education' mean was 13.98 ($SD = 1.98$); most were students (81.3 %). BMI mean was 21.72 ($SD = 3.00$); 10.4 % were underweight, 75.5 % had normal weight, 12.3 % were overweight and 1.8 % obese. Fifty-one participants were randomly selected to fill the retest of the EES after a 1-month period.

Measures

BMI was calculated by dividing current weight (in kg) by height squared (in m).

Eating Disorder Examination Questionnaire (EDE-Q [29, 30]) provides a comprehensive assessment of eating psychopathology. It includes four subscales (restraint, eating concern, weight concern and shape concern) and presents good psychometric properties.

Binge Eating Scale (BES [31, 32]) assesses behavioural manifestations and emotional/cognitive factors linked to binge eating. It comprises 16 items with each item including three/four statements representing a rating of severity ranging from 0 (no difficulties with binge eating) to 3 (severe problems with binge eating). Participants are asked to choose the statement that best describes their experience. The scale has good internal consistency [31,32].

Mindful Attention Awareness Scale (MAAS [33, 34]) is a self-report instrument that assesses dispositional mindfulness. MAAS includes 15 items related to everyday experiences, regarding which participants are asked to select an option using a 6-point scale (ranging from 1 “Almost always” to 6 “Almost never”). MAAS presents a high internal consistency [33, 34].

Body Image Acceptance and Action Questionnaire (BI-AAQ [19, 21]) was designed to measure body image flexibility [21]. It includes 12 items, rated in a 7-point scale (1 “Never true” to 7 “Always true”), regarding which participants are asked to rate the subjective truth of each statement. BIAAQ presents good psychometric properties [19, 21].

Depression Anxiety and Stress Scales—21 (DASS21 [35, 36]) assesses levels of Depression, Anxiety and Stress symptoms. Participants are asked to indicate the frequency they experienced each symptom over the past week using a 4-point scale (0 “Did not apply to me at all” to 3 “Applied to me very much or most of the time”). The scale reveals adequate internal consistency [35].

Procedure

With the consent from the authors of the original EES, the scale was translated into Portuguese by a bilingual researcher and analysed by a research group with a large experience with eating psychopathology. The comparability of content was verified through stringent back-translation procedures.

Participants were female college students recruited from various higher education courses, and women from the general population collected within different public and private institutions. The boards of all involved institutions approved the study and participants provided their informed consent.

Data analyses

The EES factor structure was examined through a PCA, following the analytical procedures of the original study of the scale and previous research [1, 24]. The internal consistency of the scale was examined by McDonald's Omega coefficients (using the statistical software R).

The obtained structure was confirmed through a CFA, with Maximum Likelihood as the estimation method. The items were specified to load on the respective latent first-order factor, and these were specified to load on a second-order factor of emotional eating. The following indices were selected to examine model fit [37, 38]: Chi square (χ^2); normed Chi square (χ^2/df), with 2–5 indicating good fit; goodness of fit index (GFI) and comparative fit index (CFI), with 0.90 suggesting good fit; parsimony goodness of fit index (PGFI); and root mean square error of approximation (RMSEA), with 0.05–0.08 indicating reasonable error and acceptable fit [37, 38]. Construct validity was further established through the calculation of the composite reliability (CR; indicator of construct reliability), the average variance extracted (AVE; indicator of convergent validity), and the discriminant validity. The association between the EES and the study variables was examined through Product-moment Pearson correlations [39].

The moderator effect of body image flexibility on the association between emotional eating (independent variable) and binge eating (dependent variable) was examined through a hierarchical regression analysis. A standardized procedure was adopted, centering the values of the two predictors. The interaction product of the predictors was obtained by multiplying the two centred variables [40].

Analyses were conducted using IBM SPSS Statistics 20 (Statistical Package for the Social Sciences, Chicago, IL, USA) and the software AMOS (Analysis of Moment Structure, software version 18, SPSS Inc. Chicago, IL).

Results

EES factorial structure and initial psychometric properties

The suitability of the data for the analysis was confirmed through the Kaiser–Meyer–Olkin test (.93) and the Bartlett's sphericity test ($\chi^2_{(351)} = 6031.64, p < .001$). All items presented high communalities (item 4 presented the lowest value; $h^2 = 0.35$). The Kaiser–Guttman criteria

suggested four factors. However, the parallel analysis indicated that three components had eigenvalues exceeding the 95th percentile of the eigenvalues obtained in a random matrix.

The analysis was then recalculated with a Direct Oblimin rotation with a three-factor solution, which explained 52.39 % of the variance. To achieve a parsimonious solution, a conservative approach was followed which indicated the progressive deletion of items 1, 13, 20,5, 11, 19 and 3, for presenting factorial loadings bellow 0.45. This resulted in an increase of the variance explained to 58.88 %, with the first factor explaining 38.68 % of the variance, the second 12.78 %, and the third 7.43 %.

Results indicated a good reliability for the first factor [coefficient omega = 0.89, 95 % CI (0.87, 0.91)] and the third factor also presented good reliability [coefficient omega = 0.88, 95 % CI (0.86, 0.90)]. The second factor revealed a lower coefficient [coefficient omega = 0.71, 95 % CI (0.66, 0.75)] and results indicated that the removal of item 4 would increase the internal consistency to 0.76 [95 % CI (0.70, 0.80)]. The total scale internal consistency was 0.90 [95 % CI (0.89, 0.92)].

A final PCA without item 4 was conducted and this structure explained 61.39 % of the variance (Table 1). Factor 1 explained 40.64 % and comprised items reflecting depression; factor 2 explained 13.51 % and involved items regarding anxiety and somatic activation; and factor 3 explained 7.24 % and its items tapped into anger states.

Confirmatory factor analysis

EES items showed acceptable values of skewness and univariate and multivariate kurtosis [37]. The first model had a mediocre fit ($\chi^2 = 580.94$, $p = .000$; $\chi^2/df = 5.01$; GFI = 0.88; PGFI = 0.67; CFI = 0.87; RMSEA = 0.09, 90% CI = 0.08–0.10). The analysis of the modification indices (MI) and standardized residuals (SR) suggested the correlation of the errors of items 8 and 10 (MI = 109.013, SR = 4.506). The content analysis of these items supported this decision given their similarity (with “blue” being a more prosaic term for expressing sadness). This resulted in an improvement of the model adjustment ($\chi^2 = 459.61$, $p = .000$; $\chi^2/df = 4.00$; GFI = 0.90; PGFI = 0.68; CFI = 0.91; RMSEA = 0.08, 90% CI = 0.07–0.08).

Table 1

Principal Component Analysis factor loadings (λ) communalities (h^2), mean (M), standard deviation (SD ; $n = 506$); Standardized regression weights (SRW) and Squared Multiple Correlations (SMC) in the Confirmatory Factor Analysis ($n = 512$)

Items	Factors			h^2	M	SD	SRW	SMC
	λ Depression	λ Anxiety	λ Anger					
<i>Factor 1 - Depression</i>					19.03	7.79		
8 – blue	.87	.10	.11	.67	2.45	1.31	.63	.39
10 – sad	.83	.15	.03	.65	2.29	1.31	.61	.37
16 – lonely	.72	.24	.11	.55	2.60	1.26	.64	.41
24 – helpless	.71	.03	.14	.61	1.94	1.14	.72	.52
23 – bored	.69	.20	.06	.51	2.23	1.18	.61	.38
2 – discouraged	.65	.11	.05	.50	1.91	1.10	.64	.40
15 – frustrated	.59	-.11	.30	.57	2.06	1.21	.70	.49
14 – worried	.57	-.09	.20	.45	1.90	1.14	.61	.37
22 – guilty	.56	.02	.22	.49	1.67	1.07	.57	.32
<i>Factor 2 - Anxiety</i>					5.91	2.67		
6 – excited	.01	.82	.00	.67	2.06	1.12	.73	.53
7 – rebellious	.08	.80	.15	.73	1.83	1.02	.80	.64
9 – jittery	.13	.72	.07	.61	2.03	1.12	.65	.43
<i>Factor 3 - Anger</i>					9.05	4.62		
17 – furious	.15	.10	.91	.78	1.72	1.10	.82	.67
21 – angry	.05	.07	.79	.71	1.74	1.11	.80	.64
18 – on edge	.03	.04	.78	.66	1.76	1.15	.67	.45
12 – irritated	.09	.02	.77	.68	1.92	1.15	.77	.60
25 – upset	.30	.02	.59	.61	1.90	1.09	.66	.44

Results indicated that the three first-order factors — Depression, Anxiety and Anger — significantly loaded on the second-order factor (0.64, 0.59, and 0.96, respectively). All items revealed adequate standardized regression weights [38], ranging from 0.57 (item 22) to 0.72 (item 24) in the first subscale, 0.65 (item 9) and 0.80 (item 7) in the second, and 0.66 (item 25) and 0.82 (item 17) in the third subscale. Squared multiple correlations' results confirmed the instrument reliability; items presented values ranging from 0.32 (item 22) to 0.67 (item 17).

Validity analyses

The first factor revealed a CR of 0.91, the second 0.85, and the third 0.92. Also, the total score showed a CR of 0.96. Regarding the AVE, results indicated a value of 0.53 for the first factor,

0.66 for the second, and 0.69 for the third factor. Given that the AVE of the three factors is higher than r^2 of the correlation between them ($r^2 = .14$, $r^2 = .32$, and $r^2 = .37$), the factors also showed adequate discriminant validity.

Retest reliability

Results revealed significant positive correlations between the test and retest versions of the EES subscales ($r_{\text{Depression}} = .70$, $r_{\text{Anxiety}} = .40$, $r_{\text{Anger}} = .36$) and global score ($r = 0.57$). Furthermore, no significant differences were found between the two assessment moments ($t_{\text{Depression (50)}} = 1.10$, $p = 0.278$; $t_{\text{Anxiety(50)}} = 0.91$; $p = 0.366$; $t_{\text{Anger(50)}} = 0.58$, $p = 0.563$; $t_{\text{Total (50)}} = 1.06$, $p = 0.293$).

EES correlations with other measures

The EES subscales presented moderate to large significant associations between them and are strongly associated with the total EES score (Table 2). Also the EES subscales Depression and Anger, and total score, were positively associated with EDE-Q. There were no significant associations between the EES subscale Anxiety and EDE-Q. Furthermore, the EES Depression and Anger subscales and total score were significantly and strongly associated with binge eating. The subscale Anxiety was moderately linked to binge eating. There were no significant associations between the three emotional eating subscales and participants' BMI.

Positive lower correlations were found between the EES subscales and general psychopathology.

Results indicated a significant and negative association between EES and mindfulness and psychological flexibility regarding body image, with the EES Depression subscale revealing the strongest negative association with these variables.

Table 2*EES's subscales correlations and correlations with other measures (n = 512)*

		EES			
		Depression	Anxiety	Anger	Total
EES	Depression	1	.30***	.54***	.89***
	Anxiety	.30***	1	.48***	.61***
	Anger	.54***	.48***	1	.83***
	Total	.89***	.61***	.83***	1
EDEQ	Restriction	.19***	-.03	.10*	.15***
	Eating Concern	.34***	.08	.22***	.31***
	Shape Concern	.27***	.02	.13**	.22***
	Weight Concern	.25***	.03	.15**	.22***
	Total	.29***	.03	.16***	.25***
DASS21	BES	.53***	.20**	.49***	.56***
	Depression	.23***	.12**	.20***	.24***
	Anxiety	.17***	.21***	.15**	.21***
	Stress	.28***	.25***	.22**	.31***
MAAS	MAAS	-.29***	-.19***	-.19***	-.30***
	BIAAQ	-.31***	-.11*	-.19***	-.29***
	BMI	.07	-.07	.04	.04

Note. EES = Emotional Eating Scale; EDEQ = Eating Disorders Examination-Questionnaire; DASS21 = Depression Anxiety and Stress Scales-21; MAAS = Mindful Attention Awareness Scale; BIAAQ = Body Image Acceptance and Action Questionnaire; BMI = Body Mass Index. *** $p < .001$; ** $p < .01$; * $p < .05$

The predictive effect of emotional eating on binge eating having body image flexibility as a moderator

EES was entered as a predictor in the first step of the regression model. Body image flexibility was entered on step two. The predictors produced statistically significant models [Step 1: $R^2 = .36$, $F_{(1,214)} = 121.59$, $p < .001$; Step 2: $R^2 = .54$, $F_{(1,213)} = 82.53$, $p < .001$]. The third step produced a significant increase in R^2 to 0.60 [$F_{(1,212)} = 32.88$, $p < .001$]. Results revealed a β of 0.27 for EES ($t_{(212)} = 5.17$, $p < .001$), a β of -0.38 for body image flexibility ($t_{(212)} = -7.24$, $p < .001$), and that the interaction between the two was significant [$\beta = -0.30$, $t_{(212)} = -5.83$, $p < .001$].

A graphic representation of the moderation analysis (**Figure 1**) considered three levels of body image flexibility: low (one *SD* below the mean), medium (mean) and high (one *SD* above the mean [40]). The visual inspection of the graphic indicated that in women with the same tendency to eat in response to negative emotions, those with higher body image flexibility present lower levels of binge eating.

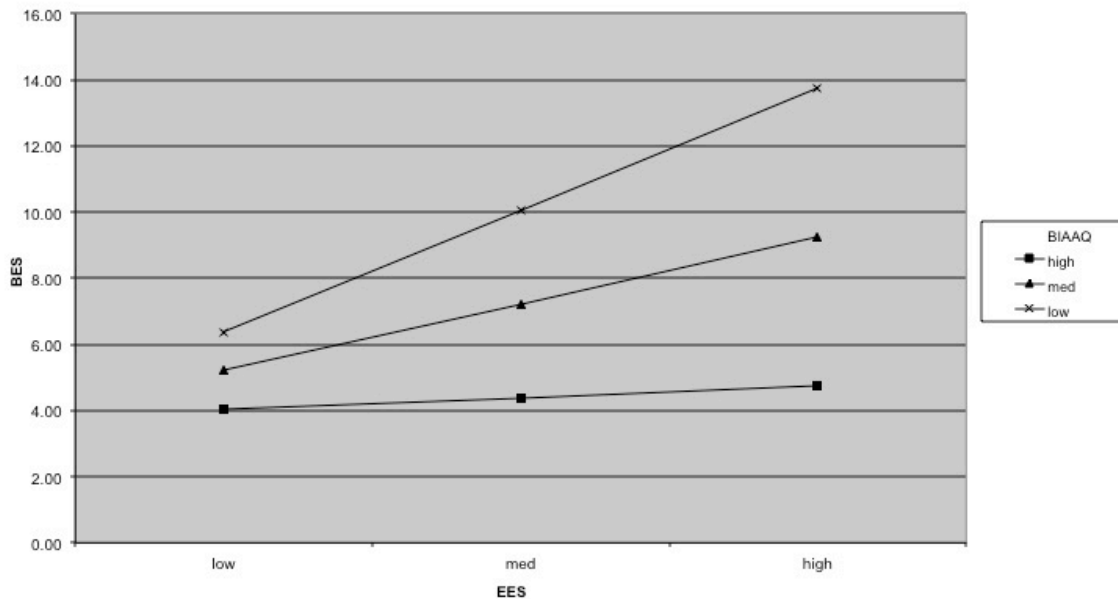


Figure 1 | Moderator effect of body image flexibility (BIAAQ) on the association between emotional eating (EES) and binge eating (BES)

Discussion

Emotional eating plays an important role in mental health problems, namely body image and eating-related difficulties [6, 11]. Also, research emphasizes that these difficulties should be considered from a dimensional perspective, supporting therefore the relevance of assessing emotional eating both in clinical and nonclinical samples. The EES is one of the most cited measures in the literature used to assess the tendency to eat when emotional [1]. Nevertheless, its psychometric properties have only been partially examined in specific samples, with studies revealing mixed findings regarding its structure.

Therefore, the current study aimed at conducting a more extensive study of the EES structure and psychometric properties in a large and heterogeneous nonclinical sample. Furthermore, we

intended to further investigate the association between emotional eating and variables that are increasingly being pointed out as relevant for clinical interventions targeting disordered eating behaviours (e.g., binge eating), such as mindfulness and psychological flexibility (e.g., [15, 17]).

Findings indicated a similar three-factor structure identified in the original scale [1]. Nevertheless, we opted to follow a more stringent approach to the data. Rigorous criteria for item retention were adopted to reach a brief but reliable measure, and a CFA was conducted to attest the adequacy of the obtained structure. A preliminary reliability assessment revealed that the scale presented high internal consistency. The first subscale included items reflecting the original Depression subscale (e.g., eating when feeling blue, lonely or bored), and also included items that, even though were originally included in the Anger/Frustration subscale and in the Anxiety subscale, can be considered as being part of the pattern of affects co-occurring in a depressive state (i.e., feelings of helplessness, discouragement, guilt, failure and rumination [28]). The second subscale included items referring to the tendency to eat when feeling in a state of physiological activation and anxiety. The third subscale included items reflecting anger states and an additional item (“upset”), originally belonging to the Anxiety subscale, but that may be conceptually understood as integrating the constellation of affects co-occurring when one is angry. CFA results confirmed that this EES model was plausible and that all items significantly contributed to the assessment of the construct of emotional eating and its respective dimensions. The scale and respective subscales also presented good construct reliability, convergent and discriminant validities. The test–retest analysis EES indicated an adequate temporal stability, and also suggested that the anger and anxiety subscales may be particularly suitable to measure eating triggered by emotional states in laboratory studies.

Furthermore, findings indicated that the EES subscales are related but distinct constructs. As in prior research, emotional eating, namely the subscales Depression and Anger, was significantly associated with eating psychopathology and in particular with binge eating [1, 27]. Furthermore, the emotional eating subscales were associated with general psychopathology. These findings are in line with prior evidence and highlight that this variable merits attention in the context of mental well-being [27]. Additionally, results revealed significant associations between increased emotional eating, especially eating in response to depressive affect, and a lower ability to being receptive to and aware of what is happening in the present moment [33] as well as with lower body image flexibility [20, 21].

Last, the moderator effect of body image flexibility on the association between eating in response negative emotions and binge eating was tested. The model explained a total of 60% of the variance of the severity of binge eating behaviours and findings suggest that in women who may present the tendency to eat in response to negative emotions, those with higher psychological flexibility regarding body image tend to present lower engagement in binge eating. Even though the cross-sectional design of the study does not allow to establish a causal ordering for the observed relationships between these variables, the current findings show that their covariation is in accordance with theoretical suggestions and research demonstrating the association between emotional eating, binge eating and self-regulatory processes. In fact, this model seems to extend the evidence on the association between emotional eating and constructs that have been clinically explored as relevant to address emotional eating and eating psychopathology in clinical populations, namely mindfulness and acceptance-based approaches, and further suggest the importance of body image flexibility [19, 20].

Other limitations should be considered when interpreting this study's findings. Even though the EES was examined in a large population of women comprising both students and women from other occupational contexts, this sample is not representative of the general population and future research should be conducted to confirm the plausibility of the scale's structure in other samples (e.g., explore invariance across genders). Furthermore, even though weight and eating-related difficulties are common in the community, the sample used in the current study also impairs the generalization of results to samples with varying degrees of overweight, and clinical populations (e.g., patients with binge eating disorder).

Nonetheless, this study extends prior research on the assessment of emotional eating by offering evidence that this more stringent examination of the scale resulted in a plausible structure with adequate psychometric properties and seems to be a reliable and useful instrument to assess emotional eating and its correlates. Furthermore, this study's findings offer preliminary evidence that suggests that emotional eating and the ability to tolerate and accept painful or disturbing emotional states, without engaging in reactive attempts to avoid them, are relevant aspects to consider in binge eating prevention and treatment.

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Conflict of interest Cristiana Duarte declares that she has no conflict of interest. José Pinto-Gouveia declares that he has no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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Chapter 4

Adolescence:
Processes involved in the vulnerability to
disordered eating symptoms

Adolescence: Processes involved in the vulnerability to disordered eating symptoms

Chapter overview

- Study VII** Normative body dissatisfaction and eating psychopathology in teenage girls: The impact of inflexible eating rules
- Study VIII** Being bullied and feeling ashamed: Implications for eating psychopathology and depression in adolescent girls
- Study IX** Can self-reassurance buffer against the impact of bullying? Effects on body shame and disordered eating symptoms in adolescence
- Study X** The prospective associations between bullying experiences, body image shame and disordered eating in a sample of adolescent girls

Study VII

Normative body dissatisfaction and eating psychopathology in teenage girls: The impact of inflexible eating rules

Adapted from:

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Abstract

Purpose Adolescence has been considered a critical time for the development of body image-related difficulties and disordered eating behaviours, especially in females. Although adherence to eating rules has been linked to disordered eating, literature has not yet explored how the inflexible subscription to those rules impacts on eating psychopathology. Therefore, the aim of the current study was to explore whether inflexible eating impacts on the relationships between weight and body image-related variables, and disordered eating.

Methods Participated in this study are 497 female adolescents from the community, aged between 14 and 18 years old, who completed self-report measures.

Results Results revealed that the majority of the participants were dissatisfied with their weight and body shape. Moreover, 6.64% of the participants demonstrated severe eating psychopathology. A path analysis revealed that BMI, body dissatisfaction and social comparisons based on physical appearance impact on disordered eating behaviours, through the mechanism of inflexible adherence to eating rules. This model explained 52% of eating psychopathology's variance.

Conclusions Findings highlight the relevance of body image-related difficulties in adolescence and additionally they emphasise the importance of promoting more flexible attitudes towards eating in prevention and intervention programmes with female adolescents.

Keywords: Body dissatisfaction; Social comparison; Eating psychopathology; Inflexible eating rules; Adolescence; Community sample; Disordered eating

Introduction

The prevalence of disordered eating behaviours amongst female adolescents has been described as reaching epidemic proportions [1, 2]. Indeed, research has long been reporting a significant number of disordered eating behaviours on this population (e.g. [2]) and adolescence has been recognised as a period when several risk factors for eating psychopathology are established (e.g. [3, 4]).

Approximately 41–66 % of female adolescents from the community engage in excessive or unhealthy dieting behaviours [5]. In addition, dietary behaviours are commonly associated with

other maladaptive weight control strategies, such as excessive exercise, self-induced vomiting, and the use of diet pills, diuretics or laxatives. Although most of these cases are subclinical [6], these behaviours in adolescence are not benign and are associated with emotional and physical health consequences (e.g. [7]). In fact, dietary restraint may reflect the initial phase of a diagnosable eating disorder, and weight control behaviours have been linked to later eating disorders (e.g. binge eating; [8] and overweight-related problems (e.g. [9, 10]). This consistent body of evidence reinforces the relevance of identifying risk factors and how they interact to predict disordered eating behaviours in community samples and especially in the critical vulnerable period of adolescence.

Body dissatisfaction is considered the main risk factor for maladaptive dietary behaviours (e.g. [8, 11]). Dissatisfaction with one's body is so prevalent amongst teenage girls that it has been considered a "normative discontent" [12]. It is consensual that this dissatisfaction arises from the perception of having a bodily figure significantly different from the socially ideal thin body often portrayed by media unrealistic images of models and other celebrities [13]. Furthermore, several studies have shown that body dissatisfaction is not confined to overweight females, and is prevalent amongst girls who are normal weight or underweight (e.g. [14]).

Recently, research showed that body dissatisfaction and the over-evaluation of thinness are linked to unfavourable social comparisons, that is, to feelings of inferiority in comparison to others (e.g. [15, 16]). Physical appearance is indeed considered a main domain of social comparison and self-evaluation, especially for females [15]. This may be explained by the emphasis given to thinness as an attribute valued by the social group, being associated with success, status and happiness (e.g. [17]). Hence, in women who experience feelings of inferiority derived from social comparisons based on physical appearance, drive for thinness might be conceptualised as a strategy adopted to be more accepted by others [15, 18].

Although in certain cases (e.g. obesity, diabetes), the existence of restrictive eating patterns may be advisable, the adherence to restrictive personal food rules has been found to be associated with eating psychopathology [19,20]. Indeed, eating rules tend to increase levels of excessive preoccupation with eating and the adoption of maladaptive eating behaviours [9, 21], and may become a problem instead of a solution. This may occur when the individual blindly follows rigid eating rules, without meeting internal and external cues, and consequently engages in disordered eating behaviours with possible damaging consequences [11]. A large

number of studies using neuropsychological tasks have been gathering support that eating disorders patients, especially with restrictive eating patterns, present an inflexible cognitive style [22–24]. This pattern of poor flexibility of thinking has been identified as a vulnerability trait, as being associated with the maintenance of the disorder, and with poorer treatment outcomes [25].

In fact, body image and eating-related difficulties have been conceptualised as problems marked by inflexibility [25–28]. In particular, according to Acceptance and Commitment Therapy (ACT; [29]), psychological inflexibility is defined as the inability of behaving flexibly whilst dealing with negative sensations, thoughts and feelings. In this sense, psychological inflexibility involves the dominance of cognitions and emotions over one's values and situational cues in guiding behaviours [27]. Psychological inflexibility has been identified as a key process underlying a range of psychopathological conditions and behavioural ineffectiveness [29–31]. Specifically, psychological inflexibility focused on body image has been recognised as a core dimension implicated in body image difficulties and disordered eating behaviours [26, 32–36].

Nevertheless, the impact of psychological inflexibility associated with eating rules on eating psychopathology remains unexplored. As adolescence is a phase of life of increased vulnerability for emotional difficulties, especially body image problems and disordered eating behaviours [1,10, 11], it seems particularly relevant to examine the processes underlying the association between body shape and weight difficulties and eating psychopathology in this specific population. In fact, the globally rising levels of subclinical disordered eating behaviours in adolescent girls [1] and how this serious phenomenon is related with emotional difficulties and physical health impairments [7], stress the importance of investigating and addressing maladaptive body image and eating-related attitudes and behaviours in community samples. Thus, the current study aimed at investigating the associations between eating rules inflexibility and body image and eating-related dimensions, amongst adolescent girls from the community. These associations were examined in a path analysis in which it was hypothesised that eating-related inflexibility would mediate the association between well-known risk factors — body mass index, body dissatisfaction and social comparisons based on physical appearance — and eating psychopathology.

Methods

Participants

The study's sample comprised 497 female adolescents aged between 14 and 18 ($M = 16.03$; $SD = 1.43$) years old, attending classes from 8th to 12th grade ($M = 9.96$; $SD = 1.37$). Three hundred and thirty-five (67.40 %) participants lived in the north and 162 (32.60 %) in the centre of Portugal. Three hundred and nineteen (64.19 %) lived in an urban and 178 (35.81 %) in a rural zone. The participants' mean body mass index (BMI) was 21.12 ($SD = 2.76$). Five participants (1 %) presented a BMI indicating thinness, 411 (82.7 %) presented normal weight, 72 (14.5 %) were overweight, and 9 (1.8 %) were obese, according to the WHO reference for adolescent girls [37].

Procedures

The sample of this study is part of a wider research investigating the role of emotional regulation processes in eating psychopathology. The sample was collected in Portuguese high schools during scheduled class periods, after the respective Direction's Boards approval. Participants and their parents were fully informed about the study, as well as the voluntary and anonymous character of their participation, and provided their written informed consent. One of the researchers gave standardised instructions to the participants. To encourage honest responding, prior to the questionnaires completion, it was reinforced that the data collection was confidential and used only for the research. The participants completed the self-report measures at a class designated by the teacher in charge, during approximately 20 min. The researcher was present during the questionnaires completion and assisted the participants whenever necessary.

Measures

Demographic data: participants reported their age, educational level, area of residence, height, and current and desired weight.

BMI was calculated using the Quetelet Index (Wt/Ht^2), and weight dissatisfaction was calculated as the subtraction between participants' current weight and desired weight.

Figure Rating Scale (FRS [38, 39]; Portuguese version by [39]): the FRS consists of nine figures of different body sizes (1: the thinnest to 9: the largest). The respondent chooses the silhouettes that best illustrate her real and ideal body shape. The discrepancy between these two figures represents the participant's body dissatisfaction. The FRS presents good temporal, convergent and divergent validities.

Social Comparison through Physical Appearance Scale (SCPAS; [15]): the SCPAS measures one's subjective perception of social ranking based on physical appearance. Participants are presented with bipolar constructs (e.g. inferior/superior; left out/accepted) and asked to choose the number, on a 10-point Likert Scale, that best translates how they feel when physically comparing themselves with others (with peers friends and colleagues; and with models and celebrities). Higher scores represent more favourable comparisons. The SCPAS presented a high internal reliability (Peers: .94; Models: .96) in its original study.

Inflexible Eating Questionnaire (IEQ; [40]): this 11-item scale assesses eating-related inflexibility (e.g. "I rather follow my eating rules than to eat without any guidance or according to my appetite or will"; "I get worried when I do not follow my eating rules, even if it only happens occasionally"). One is asked to evaluate the scale's items on a 5-point Likert scale (1: totally disagree; 5: totally agree), with higher scores revealing a heightened inflexible adhesion to verbal eating rules. The IEQ showed good psychometric characteristics ($\alpha = .95$) in its original study.

Eating Disorder Examination Questionnaire (EDE-Q [41, 42]): the EDE-Q is a 36-item self-report inventory of disordered eating based on the Eating Disorder Examination interview. This questionnaire comprises four subscales: Restraint, Shape Concern, Weight Concern, and Eating Concern, which combined offer a global measure of disordered eating. The EDE-Q presents good reliability and may be useful to screen for eating disorders [43].

The participants completed the Portuguese versions of the described measures, which are validated for the current sample's age interval, and showed adequate to very good internal reliability in the current study (see **Table 1**).

Data analysis

Data analyses were performed using IBM SPSS Statistics 20 (IBM Corp, Armonk, NY, 2011). Path analyses were performed using the software AMOS (Analysis of Moment Structure, Version 21; IBM Corp, Armonk, NY, 2011).

Descriptive analyses were conducted to explore the sample's levels of weight and shape dissatisfaction. In addition, the incidence of eating psychopathology cases in this sample was explored. This analysis was based on the EDE-Q's cut-off value of 4, which has been considered a good guide for screening eating disorders [44].

The associations between rigid eating (IEQ), body dissatisfaction (BD) and social comparisons based on physical appearance (SCPAS) and the severity of eating disorders' symptomatology [45] were examined through Pearson correlations.

Path analyses were conducted to estimate the presumed relations amongst variables in a proposed theoretical model (Fig. 1). Path analyses are a type of structural equation modelling (SEM) that allows the simultaneous examination of structural relationships and direct and indirect paths (e.g. [46]). The Maximum Likelihood method was used to estimate the model path coefficients and to compute fit statistics. The plausibility of the overall model was examined through the following recommended goodness-of-fit indices: Chi-square (χ^2), Normed Chi-square (χ^2/df), Tucker Lewis Index (TLI), Comparative Fit Index (CFI), Normed Fit Index (NFI), and Root-Mean Square Error of Approximation (RMSEA) with 90% confidence interval. The bootstrap procedure (with 2000 samples) was used to create 95% bias-corrected confidence intervals around the standardised estimates of total, direct and indirect effects. The effect is statistically significant ($p < .50$) if the interval between the lower and the upper bound of the 95 % bias-corrected confidence interval does not contain zero [47].

Table 1*Means (M), Standard Deviations (SD), Cronbach's alphas and correlations between the study measures (N = 497)*

Measure	M	SD	α	1	2	3	4	5	6	7	8	9
1. BMI	21.12	2.76	-	-								
2. FRS	.69	.98	-	.54***	-							
3. SCPAS_Peers	58.52	15.39	.94	-.06	-.20***	-						
4. SCPAS_Models	48.84	18.59	.97	-.02	-.30***	.63***	-					
5. IEQ	30.13	10.06	.95	.29***	.38***	-.12**	-.21***	-				
6. Dietary Restraint	1.05	1.30	.84	.25***	.38***	-.10**	-.15**	.50***	-			
7. Eating Concern	.96	1.13	.77	.26***	.47***	-.30***	-.34***	.55***	.63***	-		
8. Weight Concern	2.14	1.63	.85	.34***	.52***	-.31***	-.38***	.54***	.57***	.75***	-	
9. Shape Concern	2.29	1.70	.90	.30***	.54***	-.34***	-.42***	.56***	.59***	.77***	.90***	-
10. Global EDE-Q	1.70	1.32	.94	.33***	.55***	-.31***	-.38***	.60***	.75***	.87***	.93***	.96***

Note. BMI = Body Mass Index; FRS = Figure Rating Scale (measuring Body Dissatisfaction); SCPAS = Social Comparison through Physical Appearance Scale, Peers and Models subscales; IEQ = Inflexible eating Questionnaire; Dietary Restraint = subscale of the EDE-Q; Eating Concern = subscale of the EDE-Q; Weight Concern = subscale of the EDE-Q; Shape Concern = subscale of the EDE-Q; Global EDE-Q = global score of the Eating Disorder Examination-Questionnaire. * $p < .050$. ** $p < .010$. *** $p < .001$.

Results

Descriptive analyses

Results revealed that 71.23 % of the sample desired to lose weight, and 61.37 % desired a thinner figure. Besides, 6.64 % of the adolescents scored 4 or higher on the EDE-Q, which translates the presence of severe eating psychopathology. Means and standard deviations of the measures in the current study are reported in **Table 1**.

Correlations

Results (**Table 1**) showed that BMI and body dissatisfaction (BD) presented moderate to high positive correlations with each other, with inflexible adherence to eating rules (IEQ) and with EDE-Q's subscales and global score.

Furthermore, results showed that both domains of social comparisons based on physical appearance (SCPAS peers and SCPAS models) were associated with increased BD, IEQ, and

with higher scores on EDE-Q's subscales and global scale. In turn, inflexible eating presented positive and strong correlations with all EDE-Q's dimensions and global score.

Finally, a partial correlation analysis was conducted controlling for age. Results indicated that the strength and direction of the associations between the study variables remained the same. Thus, age was not considered in the following analyses.

Path analyses

Mahalanobis distance statistic was used to analyse multivariate outliers and results indicated the absence of extreme values. Moreover, Skewness and Kurtosis values did not show a bias to normal distribution ($SK < |3|$ and $Ku < |8-10|$; [47]), and there was no evidence for multicollinearity ($VIF < 5$).

The hypothesised model (**Fig. 1**) tested the associations between increased BMI, body dissatisfaction (BD), and negative social comparisons based on physical appearance with others, such as models or celebrities (SCPAS) and eating psychopathology (**Fig. 1**), considering the mediator effect of increased inflexible eating (IEQ). This model was first examined through a fully saturated model (i.e. zero degrees of freedom), consisting of 22 parameters.

In the first saturated model, one path coefficient was not statistically significant, the direct effect between BMI and EDE-Q ($b_{BMI} = .01$; $SE = .02$; $Z = .72$; $p = .472$). This nonsignificant relation was removed, and the respecified model was then tested.

The final adjusted model (**Fig. 1**) explained 52 % of EDE-Q and 17 % of IEQ, and its evaluation revealed an excellent model fit, with a nonsignificant Chi-square of $\chi^2_{(1)} = .517$, $p = .472$. Furthermore, the goodness-of-fit indices indicated a very good model fit ($\chi^2/df = .517$; $TLI = 1.00$; $CFI = 1.00$; $NFI = 1.00$; $RMSEA = .000$, $p = .687$ [47]).

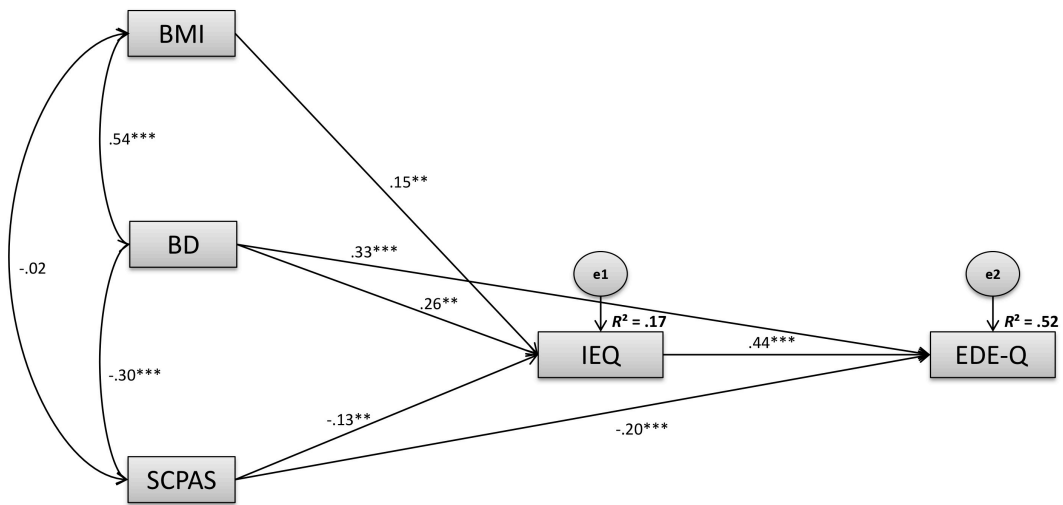


Figure 1 | Final path model. Standardized path coefficients among variables are presented. All path coefficients are significant at the .05 level. * $p < .05$; ** $p < .01$; *** $p < .001$; BMI = Body Mass Index; SCPAS = Social Comparison Based on Physical Appearance; SCPAS_models = Social Comparison through Physical Appearance Scale (Models); BD = Body Dissatisfaction; IEQ = Inflexible Eating Questionnaire; EDE-Q = Eating Disorder Examination Questionnaire.

Furthermore, all individual path coefficients were statistically significant and represented the expected directions. Namely, BMI and BD presented a direct effect on IEQ, with an effect of .15 ($b_{\text{BMI}} = .54$; $SE = .18$; $Z = 3.00$; $p = .003$) and .26 ($b_{\text{BD}} = 2.69$; $SE = .53$; $Z = 5.08$; $p < .001$), respectively. Furthermore, more favourable social comparisons based on physical appearance were associated with lower IEQ ($\beta = -.13$; $b_{\text{SCPAS}} = -.07$; $SE = .02$; $Z = -3.06$; $p = .002$). In turn, IEQ presented a positive association with eating psychopathology, with an effect of .44 ($b_{\text{IEQ}} = .06$; $SE = .00$; $Z = 13.01$; $p < .001$).

Moreover, favourable social comparisons based on physical appearance (SCPAS) presented a total effect of $-.25$ on eating psychopathology (EDE-Q), with a negative direct effect of $-.20$ ($b_{\text{SCPAS}} = -.01$; $SE = .00$; $Z = -5.94$; $p < .001$), and an indirect effect partially mediated by IEQ of $-.06$ (95 % CI = $-.10$ to $-.09$; $p = .004$).

Regarding the effects of body dissatisfaction on EDE-Q, BD presented a total effect of .44, with a direct effect of .33 ($b_{\text{BD}} = .44$; $SE = .05$; $Z = 9.38$; $p < .001$) and an indirect effect of .12 (95% CI = $.07$ to $.16$; $p = .001$), partially explained through increased IEQ.

Results also revealed that BMI did not present a significant direct effect on EDE-Q. BMI showed, however, an indirect effect on EDE-Q of .07 (95 % CI = .02 to .11; $p = .004$), which was fully mediated by increased levels of IEQ.

Discussion

It is increasingly recognised that adolescence is a critical developmental stage in which pathological attitudes and behaviours about body image and eating tend to develop and may have a negative impact in psychosocial functioning and mental health [1, 7, 48]. Thus, it is particularly pertinent to investigate disordered eating behaviours and implicated risk factors in nonclinical community samples of adolescents. Recent research shows that body dissatisfaction and drive for thinness, recognised risk factors for eating disorders, have become the norm amongst adolescent girls (e.g. [5, 12, 49]). Our results corroborate this phenomenon, showing that the majority of the participants desired to lose weight and to present a thinner body shape.

Findings also revealed that body dissatisfaction was associated with perceptions of inferiority based on social comparisons through physical appearance, and both of these factors were linked to disordered eating attitudes and behaviours, which is in accordance with previous research (e.g. [18]). In fact, these results support prior theoretical and empirical accounts that suggest that for women physical appearance is a key domain for self and social evaluation [15]. Adolescence is characterised by physical maturation and by psychosocial transformations, according to which concerns about how one stands in relation to peers in valued domains (e.g. physical appearance) become particularly important [4]. In this way, many adolescents may believe that by reaching a thinner body (e.g. by controlling their eating behaviours) they will become closer to ideal body image patterns and thus more accepted and valued by others [11, 15]. In fact, our results indicated that adolescent girls present more unfavourable social comparisons with peers based on physical appearance in comparison to other samples of adult women [15], and similar levels of eating psychopathology scores to those found in young women [42]. It is important to note that 6.64 % of the current female adolescent sample's scores revealed severe eating psychopathology (EDE-Q > 4; [43,44]).

In addition, the present study aimed at exploring whether the impact of body-related variables (BMI, body dissatisfaction, and social comparisons based on physical appearance) on

the severity of eating psychopathology, is influenced by the inflexible adherence to eating rules. The tested model explained 52 % of eating psychopathology's variance and clarified the pervasive effect of this adherence to rigid eating rules. Findings suggested that, in teenage girls, the inflexible and rigid subscription to eating rules was a significant mediator on the relationships between BMI, body dissatisfaction, and social comparisons based on physical appearance, and eating psychopathology. More specifically, the inflexible adherence to eating rules fully mediated the association between higher BMI values and eating psychopathology. Furthermore, increased body dissatisfaction and unfavourable social comparisons based on physical appearance were associated with higher scores of eating psychopathology, as found in prior studies [15], but these relationships were partially explained by eating-related inflexibility. Taken together, these findings suggest that, in teenage girls, disordered eating attitudes and behaviours may be amplified by the inflexible adherence and implementation of eating rules. These inflexible eating patterns may be adopted with the purpose of controlling body weight and shape in the context of overall dissatisfaction and perceptions of inferiority based on physical appearance. These findings can be understood in light of ACT psychological inflexibility model [29, 33], in the sense that inflexible eating may be understood as a strategy which aims at diminishing, neutralising or avoiding unwanted internal body image-related experiences. However, due to its rigid features and decontextualisation from internal and external cues (e.g. hunger, social situations), this strategy tends to become a source of greater difficulties.

These findings should not be considered without acknowledging some limitations. The cross-sectional nature of the study design does not allow analysing the associations' directionality. Further studies are needed to longitudinally explore the development of eating psychopathology, its risk factors, and the inflexible adherence to eating rules. Given the large body of evidence derived from neuropsychological studies on inflexible thinking style in disordered eating patients [22–24], the findings from the current study should also be corroborated through experimental designs using neuropsychological tasks, which overcome the limitation of using self-report measures. Besides, more work is needed to confirm this study's findings on patients with eating disorders. Finally, this model was purposely restrained to specifically examine the impact of inflexible subscription to eating rules on disordered eating; however, given the multidetermined nature of eating psychopathology, other processes may be involved in the examined associations.

Nonetheless, this study offers important insights for research on body image and eating-related difficulties in adolescent females. In fact, this study corroborates the link between “normative” body dissatisfaction and eating psychopathology in teenage girls, and also explores the role of inflexible subscription to eating rules on the engagement in disordered eating attitudes and behaviours. The findings highlight that the extent to which BMI, body dissatisfaction and social comparisons based on physical appearance are associated with eating psychopathology severity is partially influenced by how one follows inflexible personal eating rules. These findings may have important implications for the clinical work with adolescent girls with eating disorders, since they emphasise the relevance of addressing the negative impact of an excessive focus on social comparison and the adherence to inflexible eating rules. Furthermore, as normative body image and eating difficulties have per se important negative biopsychosocial consequences (e.g. [7]), the current study offers important directions for the development of preventive programmes focused on body image and eating behaviours directed at adolescent girls. In fact, this study seems to support the relevance of therapeutic approaches that target cognitive rigidity and promote flexibility [50, 51]. In particular, the development of higher psychological flexibility may be beneficial to attenuate the impact of body and weight dimensions on eating difficulties, and to help adolescent girls to focus on and engage with valued life domains [33, 52]. The early targeting of these difficulties at a community level could also have an important effect on preventing the progress of disordered eating behaviours to cases of clinical significance.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964

Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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Study VIII

Being bullied and feeling ashamed: Implications for eating psychopathology and depression in adolescent girls

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Abstract

The current study examined the associations between peer victimization, body image shame, self-criticism, self-reassurance, depressive symptoms and eating psychopathology in 609 female adolescents.

Correlational analyses showed that being the victim of bullying was positively associated with body image shame, self-criticism, with low self-reassurance, depressive symptoms and eating psychopathology. A path analysis indicated that victimization experiences were associated with increased depressive symptoms partially through increased levels of body image shame, and a severe form of self-criticism e hated self. Body image shame and hated-self self-criticism fully mediated the association between victimization experiences eating psychopathology. The tested model accounted for a total of 51% of depressive symptoms variance and for 52% of eating psychopathology variance.

These findings may have important intervention and prevention implications, by suggesting that bullying experiences fuel body image shame and consequent self-directed hostility and anger, which, in turn, predict increased depressive symptomatology and eating psychopathology in female adolescents.

Keywords: Peer victimization; Body shame; Self-criticism; Depressive symptoms; Eating psychopathology

Introduction

Adolescence represents a critical developmental stage characterized by biological and physical maturation, and also by psychosocial transformations. These changes may contribute for a significant increase of the prevalence of mental health problems in this transitional period, namely depression (Cole et al., 2002; Kashani & Orvaschel, 1990). In particular, adolescent girls are a risk population for the development of eating disorders (Striegel-Moore & Bulik, 2007).

Adolescence is a time of a series of psychological, social and environmental challenges, including a movement of emancipation from parents, and enhancement of peer-group relationships (Allen & Land, 1999). This reliance on peers as new sources of social support

occurs simultaneously with growing pressures to achieve social status and with the structuring of self-identity (Gilbert & Irons, 2009). Thus, adolescents become more aware of self-other evaluations and perceptive of the emotions and images they are triggering in their peers' minds (Gilbert & Irons, 2009; Wolfe, Lennox, & Cutler, 1986; Wolfe & Mash, 2006). In fact, during adolescence peer groups become stratified and issues of acceptance, popularity, competing for a secure place in the group and subsequent recognized social status, become increasingly important (Gilbert & Irons, 2009; Irons & Gilbert, 2005; Wolfe et al., 1986). This perceived pressure to be accepted, valued and approved by others increases adolescents' concerns with what is valued by the group, with self-presentation and with whether one is failing or not to display valued features (e.g., toughness and aggressiveness among adolescent boys, and appearance among girls; Eder, 1995).

These concerns can be understood in light of the dynamics of humans' innate need for group belonging and the social competition to be seen as attractive by others, as outlined by Gilbert (1998, 2002, 2007) evolutionary biopsychosocial model of shame. According to this model, humans' survival and prospering deeply depend on being able to stimulate positive affect in the mind of the others about the self and engage them to co-create advantage social roles (e.g., as an ally, friend, team member). Thus, beginning in childhood, humans develop a series of cognitive competencies for self-evaluation and to estimate how others see the self, that become particularly strengthened during adolescence. Shame emerges in this context of the competition for social attractiveness and is founded in social interactions (Gilbert, 2000, 2002; Tangney & Fischer, 1995), being related to how one believes to be viewed by others. Shame acts therefore as an internal warning signal that one is failing to create positive affect in the mind of the others, and rather that one has certain personal characteristics, attributes or behaviors that are seen by others as unattractive and are potential factors for being victimized by them (Gilbert, 2000; Pinto-Gouveia, Ferreira, & Duarte, 2014; Tangney & Fischer, 1995).

Retrospective research conducted with adults (e.g., Matos, Pinto-Gouveia, & Duarte, 2012; Matos, Ferreira, Duarte, & Pinto-Gouveia, 2015) suggests that shame experiences, namely occurred within peer relationships, may become the basis for negative self-evaluation and self-devaluation, being associated with depressive symptoms. This negative view of the self may become internalized in an internal shaming process defined as self-criticism (Gilbert & Irons, 2009). Self-criticism refers to a maladaptive defensive strategy adopted to correct one's perceived inadequacies and flaws, but that can also be characterized by desires to persecute or

harm the self as others might (Gilbert, Clarke, Hempel, Miles, & Irons, 2004; Gilbert & Irons, 2005, 2009). Research has consistently shown that self-criticism, especially in its more severe form, is linked to poorer mental health indicators, namely depressive symptoms (Gilbert et al., 2004), as well as eating psychopathology (Pinto-Gouveia et al., 2014). Shahar, Blatt, Zuroff, Kuperminc, and Leadbeater (2004), prospectively examined the pathogenic effect of self-criticism in adolescence and found that in adolescent girls self-criticism and depressive symptoms fueled each other in a vicious cycle.

Bullying can be a particularly harmful shaming experience. Bullying has been described as a negative interaction in which the perpetrator adopts an aggressive behavior towards the victim, with the intent to inflict injury or discomfort (Smith & Thompson, 1991). Bullying can involve physical or verbal aggressiveness (e.g., acts that inflict physical harm, name-calling), but also other nonphysical, nonverbal forms of aggression, such as relational aggression (e.g., including telling rumors, excluding, rejecting; Smith & Thompson, 1991). Such bullying experiences can activate shame as they may indicate to the adolescent that the self is regarded as unattractive and thus creates in others desires to reject, persecute or harm the self (Gilbert & Irons, 2009), and studies suggest that such experiences play a crucial role in adolescents psychopathology indicators (e.g., depression; Cunha, Matos, Faria, & Zagalo, 2012; Rubeis & Hollenstein, 2009).

A number of studies have demonstrated that peer rejection and bullying are associated with mental health problems (Cunha et al., 2012; Gilbert & Irons, 2009; Hawker & Boulton, 2000; Kaltiala-Heino, Rimpelä, Rantanen, & Rimpelä, 2000; Smokowski & Kopasz, 2005), including lowered self-esteem (O'Moore & Kirkham, 2001; Olweus, 1993), emotional well-being (Nansel et al., 2001), and other indicators of maladjustment (e.g., deficiencies in academic success, associations with deviant peers and violence; Nansel, Overpeck, Haynie, Ruan, & Scheidt, 2003). In fact, two meta-analyses provided evidence that internalizing problems (e.g., depressive and anxiety symptoms, withdrawal, loneliness; Reijntjes, Kamphuis, Prinzie, & Telch, 2010; Reijntjes, Kamphuis, Prinzie, Boelen, et al., 2011) and externalizing problems (e.g., hostile and aggressive behaviors) constitute a consequence but also a risk factor for peer victimization.

In particular, studies have shown that being a victim of bullying is linked to severe depressive symptomatology among adolescents (Craig, 1998; Hawker & Boulton, 2000; Yena, Liua, Koa, Wud, & Chenge, 2014). There is also evidence that adolescents who are more victimized seem to be more prone to depression and suicidal ideation (Turner, Exum, Brame, & Holt, 2013). Bauman, Toomey, and Walker (2013) conducted a cross-sectional study that suggested that

depression mediated the association between bullying and suicidal behavior in both genders, and specifically in adolescent girls bullying, including cyber victimization, affected suicidal attempts. Another study demonstrated the association between being victimized and a higher risk for depression and suicidal ideation and attempts, and suggested that among females this risk was increased even if the victimization was infrequent (Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2008).

There is also some evidence suggesting that in adolescent girls bullying experiences are related to a higher risk for developing eating disorders (Engström & Norring, 2002). In particular, a number of cross-sectional and longitudinal studies have demonstrated the relationship between being the target of negative interactions focused on physical appearance (e.g., weight and appearance-related teasing) and body image and eating problems (for a review see Menzel et al., 2010). Nonetheless, there is evidence that peer victimization can have a harmful effect on eating behavior even when it is not specifically focused on physical appearance (Kaltiala-Heino, Rissanen, Rimpela, & Rantanen, 1999). In fact, Lunde, Frisénand and Hwang (2006) demonstrated that experiences of victimization such as being rejected by the social group were associated with low body esteem and to young girls' perceptions that their physical appearance is the target of critical evaluations from their peers. Furthermore, research has shown that these early negative experiences may have an enduring adverse impact on body image and eating-related problems. Actually, patients with eating disorders often report experiences of having been bullied by peers in childhood and adolescence (Fosse & Holen, 2006; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002).

Given the pervasive effect of being bullied in adolescence, it is pertinent to formulate an insight relatively to possible mechanisms underlying the associations between bullying and mental health indicators. Self-other representations and the internalization of what is socially valued, seem to play an important role in this process (Cunha et al., 2012; Sweetingham & Waller, 2008). In particular, among the female gender physical appearance is regarded as a key dimension for self-evaluation and to estimate social rank in the social group (e.g., whether one is valued and accepted or, on the contrary, rejected or even attacked by others; Ferreira, Pinto-Gouveia, & Duarte, 2013; Gilbert, 2002; Pinto-Gouveia et al., 2014). In this sense, the physical appearance domain may be in the basis of shame feelings. Specifically, when individuals perceive that their physical appearance fails to fit within what the social group perceives as attractive, and that it may be in the root of rejection or attack behaviors by others, they are

likely to experience body image shame. In this sense, individuals may engage in defensive body image concealment or avoidance of social exposure to avoid possible negative social outcomes (e.g., being made fun of, verbally/physically abused or ostracized; Gilbert, 2002; Gilbert & Thompson, 2002). There is evidence that, in adult women, evaluations that one's body image make the individual unattractive in the eyes of others and thus vulnerable to social harm, exclusion or ridicule, are significantly associated with disordered eating symptomology (Duarte, Pinto-Gouveia, Ferreira, & Batista, 2014; Gilbert, 2002) and that self-criticism is an important mediator in this association (Duarte, Pinto-Gouveia, & Ferreira, 2014).

However, the associations between bullying, shame and self-criticism, and their association with psychological adjustment in adolescent girls, remain less documented. Also, even though research has demonstrated the link between bullying and poorer mental health in adolescents, namely eating psychopathology among adolescent girls, research on the underlying mechanisms of these associations remains scarce. Based on a theoretical model and on research review, the current study tests a model in which it is explored whether, in adolescent girls, the associations between being a victim of bullying and negative outcomes – depressive symptoms and eating psychopathology – are mediated by body image shame and self-criticism. We hypothesized that, as adolescence is a phase of life in which concerns about fitting in and be accepted and regarded as attractive by others become heightened, being a victim of peer bullying may be associated with perceptions that one is failing on creating a positive image of the self and exists negatively in the mind of others, as undesirable and unattractive, which characterize the experience of shame. As body image is often a source of self-evaluation in females (Ferreira et al., 2013; Gilbert, 2002; Pinto-Gouveia et al., 2014), this dimension may become the focus of shame in adolescent girls and be associated with the internal shaming process of self-criticism. We hypothesize that the extent in which adolescents engage in this type of harsh self-to-self relationship will, in turn, mediate the associations between bullying experiences and body image-focused shame and both depressive symptoms and eating psychopathology symptoms.

Methods

Participants

Participated in the study 609 Portuguese adolescent girls attending schools from the central region of Portugal: 112 (18.4%) were attending 3 public middle/high schools situated in urban areas of Viseu (inland central region of the country); 35 (5.7%) attended a public middle/high school from a semi-urban area of Covilhã (inland central region); 43 (7.1%) were recruited in 2 public middle schools from urban areas of Coimbra (central region); 51 (8.4%) attended 2 public middle/high schools situated in semi-urban areas of Coimbra; 53 (8.7%) attended a private middle/high school in an urban area of Coimbra; 59 (9.7%) attended a public middle school in a rural area of Coimbra; and 256 (42%) were recruited in 2 public middle/high schools from semi-urban areas of Coimbra. Regarding socioeconomic status, 47.7% of the participants belonged to a low, 29.9% to a medium and 22.4% to a high socioeconomic status. The participants' age ranged from 12 to 18 years old, with a mean of 14.10 ($SD = 1.16$), and the years of education ranged from 8 to 12 ($M = 8.89$; $SD = 1.05$); 99.18% of the participants were Caucasian. Participants' Body Mass Index varied from 13.12 to 35.14, with a mean of 20.90 ($SD = 3.29$). Two participants (.3%) presented severe thinness, 12(2%) presented thinness, 427(70.2%) presented a normal weight, 139 (22.8%) were overweight, and 29 (4.7%) were obese (De Onis et al., 2007).

Procedure

The study was presented to and approved by the relevant local authorities (General Direction of Innovation and Curricular Development; Portuguese Data Protection Authority). The study's aims and procedures were then presented to the boards of the schools, which approved the study and invited the students to participate. The study was presented as a research about the protective or vulnerability effect of relational experiences and emotion regulation processes in eating-related difficulties. Written informed consent was then obtained from the participants and from their parents/legal tutors. Each school subsequently scheduled the day and the class period for the questionnaires completion. The teacher in charge introduced the researchers to the students and left the classroom. The researchers administered the set of self-report questionnaires to groups of 5-36 participants. The researchers gave standardized instructions to all participants and prior to the completion of the questionnaires reiterated that the

participation in the study was voluntary and that the data collected was confidential and only used for research purposes, to encourage honest and serious responding. The researchers were present during the questionnaires completion and answered participants' questions whenever necessary. The self-report questionnaires used in the study are adapted to Portuguese and validated for adolescents, and included demographic data, weight and height, bullying experiences, body image shame, forms of self-relating (criticism and self-reassurance), eating psychopathology and general psychopathology symptoms. The measures were completed within 45 min during one class period, and after the questionnaires completion, participants were given the opportunity to clarify any subject related to the study.

Measures

Body Mass Index. Participants' BMI was calculated by dividing reported weight (in Kg) by height squared (in m).

Peers Relations Questionnaire for children (PRQ; Rigby & Slee, 1993; Portuguese version by Silva & Pinheiro, 2010) is a 20- item self-report measure that assesses peers relationships, comprising three subscales: Victim, which expresses the tendency to be the victimized by peers (e.g., "Others make fun of me"; "Others leave me out of things on purpose"); Bully, which characterizes the tendency to act aggressively toward peers (e.g., "I enjoy upsetting wimps"); Pro-social, which assesses the propensity to relate to others in a pro-social way (e.g., "I enjoy helping others"). Items are rated in a 4-point scale (1 = never to 4 = very often). PRQ is a widely used and reliable measure of bullying (Rigby & Slee, 1993). The scale was adapted and validated in the Portuguese population and presented good psychometric properties (Silva & Pinheiro, 2010). For the purpose of the current study we used only the subscale Victim as a measure of bullying victimization, which presented a Cronbach's alpha of .79.

Body Image Shame Scale — Adolescents Version (BISS; Duarte, Pinto-Gouveia, & Ferreira, 2014; Duarte, Pinto-Gouveia, Ferreira, et al., 2014; Adolescents version by Duarte & Pinto-Gouveia, 2014) includes 9 items and assesses body image shame considering an externalized (distress felt in and avoidance of social situations in which others may criticize one's body image; e.g., "I feel uncomfortable in social situations because I feel that people may criticize me because of my body shape") and an internalized dimension (negative self-evaluations and consequent behaviors to control the exposure of one's body image; e.g., "I choose clothes that hide parts of my body that I consider ugly or disproportional") of body image shame. Participants are

asked to rate each item through a 5-point scale (0 = never to 4 = almost always). Both the original adult version of the scale (Duarte, Pinto-Gouveia, & Ferreira, 2014; Duarte, Pinto-Gouveia, Ferreira, et al., 2014) as well as the adapted version for adolescents (Duarte & Pinto-Gouveia, 2014) present good psychometric properties ($\alpha = .90$ and $\alpha = .97$, respectively). The scale presented a Cronbach's alpha of .93 in the current study.

Forms of Self-Criticism/Attacking and Self-Reassurance Scale — Adolescents version (FSCRS-A; Gilbert et al., 2004; Portuguese adolescents version by Salvador & Tavares, 2011) includes 22 items and assesses two forms of self-criticism: Inadequate self (related with feelings of inadequacy and inferiority; e.g., “There is a part of me that feels I am not good enough”), and Hated self (characterized by desires of self-punishment and feelings of disgust and hatred for the self; e.g., “I have become so angry with myself that I want to hurt or injure myself”); and the ability to self-soothe (Reassured self; e.g., “I am able to remind myself of positive things about myself”). Items are rated on a 5-point Likert scale (0 = not at all like me to 4 = extremely like me). This scale presents good psychometric properties (Gilbert et al., 2004). The Portuguese version adapted for adolescents used in this study also presents good reliability (Salvador & Tavares, 2011). In the current study the subscales also presented good Cronbach's values: .89 for Inadequate self; .83 for Hated self and .86 for Reassured self.

Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Machado et al., 2014) provides a comprehensive evaluation of the specific psychopathology of disordered eating behaviours and attitudes. This self-report questionnaire includes 36 items divided in four subscales: Restraint, Eating Concern, Weight Concern and Shape Concern. A global EDE-Q score can also be obtained by calculating a mean of the four subscale scores. Research supports that this scale holds good psychometric properties in the original (Fairburn & Beglin, 1994) and on the Portuguese version (Fairburn & Beglin, 1994; Machado et al., 2014). In the current study, the scale presented a Cronbach's alpha of .95.

Depression Anxiety and Stress Scales — 21 (DASS21; Lovibond & Lovibond, 1995; Portuguese version by Pais-Ribeiro, Honrado, & Leal, 2004). The DASS21 is a 21-item self-report measure scale that measures levels of Depression (e.g., “I couldn't seem to experience any positive feeling at all”), Anxiety (“I experienced trembling (e.g., in the hands)”) and Stress symptoms (“I found it difficult to relax”). Items are rated in a 4-point Likert scale (0 = *Did not apply to me at all* to 4 = *Applied to me very much, or most of the time*). For the purpose of this study only the Depression subscale was considered. The original version (Lovibond & Lovibond, 1995) and the

Portuguese version (Pais-Ribeiro et al., 2004) of this scale revealed that it has good psychometric properties. The subscale Depression used in this study presented high internal consistency, with a Cronbach's alpha of .91.

The descriptive statistics of the measures used in the current study are presented in **Table 1**.

Data analysis

The software SPSS (v.21 SPSS; Armonk, NY: IBM Corp.) was used to calculate descriptives and correlational analyses.

Product-moment Pearson Correlation analyses were conducted to examine the associations between bullying, body image shame, self-criticism, depressive symptoms, eating psychopathology and BMI (Cohen, Cohen, West, & Aiken, 2003).

The software AMOS (Analysis of Moment Structure, software version 18, SPSS Inc. Chicago, IL) was used to estimate the hypothesized associations through a path analysis (**Fig. 1**). Path analysis is a specific type of Structural Equation Modelling (SEM) that allows for the assessment of hypothesized causal relations between previously defined variables, namely the simultaneous examination of structural relationships, and direct and indirect effects between multiple independent, mediator and dependent variables, while controlling for error (Byrne, 2010; Kline, 2005). Even though the cross-sectional design of the current study does not allow the establishment of causal influences between variables, it may contribute for the understanding of the possible pathways between the variables under examination and whether these pathways are consistent with the underlying hypothesized theoretical model (e.g., Hayes, 2013; Mueller & Hancock, 2008) of whether bullying (exogenous, independent variable) has a significant effect on depressive symptoms and eating psychopathology (endogenous, dependent variables), through the mechanisms of body image shame and self-criticism (endogenous, mediator variables). To account for the effect of depressive symptoms on bullying experiences and their associations with self-criticism and eating psychopathology, a model examining depressive symptoms as an exogenous variable was also tested. The Maximum Likelihood estimation method was selected to test for the significance of the regression coefficients and fit statistics. The adequacy of the model was examined considering the Chi-square (χ^2), and the following goodness of fit indicators: the Normed Chi—Square (CMIN/DF), regarding which values ranging from 2 to 5 show a good global adjustment of the model (Arbuckle, 2008; Tabachnick & Fidell, 2013); the Tucker Lewis Index (TLI) and the

Comparative Fit Index (CFI), which provide evidence for a good fit when values range from [.90-.95], and a very good fit with values above .95 (Kline, 2005); and the Relative Fit Index (RFI), with values close to 1 indicating a very good fit (Bollen,1986). Finally, we also used the Root-Mean Square Error of Approximation (RMSEA), with 90% confidence interval, with values below .05 ($p > .05$; Arbuckle, 2008) indicating a very good fit, values $\leq .08$ representing reasonable errors of approximation (Browne & Cudeck, 1992), and values ranging from .08 to .10 indicating mediocre fit (Byrne, 2010; MacCallum, Browne, & Sugawara, 1996).

The significance of the direct, indirect and total effects was assessed by Chi — Square tests and by the Bootstrap resampling method, with 2000 Bootstrap samples. Also, 95% bias-corrected confidence intervals (CI) were considered to test for the significance of the mediational paths. Effects were regarded as significantly different from zero ($p < .050$) if zero was not included in the interval between the lower and the upper bound of the 95% bias-corrected confidence interval (Kline, 2005).

Results

Preliminary data analysis

Results regarding uni and multivariate analysis indicated that there were no severe violations of normal distribution as confirmed by the coefficients of Skewness, which varied between .90 (EDEQ) and 1.96 (PRQ), and Kurtosis, which presented valued ranging from -.12 (EDEQ) and 4.77 (PRQ; Kline, 2005).

Correlations

Table 1 displays product-moment Pearson correlations coefficients and significance levels. Results indicated that being victim of bullying was positively and moderately associated with body image shame as well as with self-criticism, especially with the hated self-form of self-criticism. Furthermore, victimization was positively and moderately correlated with depressive symptomatology and eating psychopathology. A high positive correlation was also found between body image shame and the self-criticism forms of inadequate and hated self, depressive symptoms and eating psychopathology. Inadequate self and hated self forms of self-criticism were positively and highly associated with depressive symptoms and eating psychopathology, which, in turn, were also strongly associated with each other. On the contrary,

negative small to moderate associations were verified between the ability to self-reassure and being victim of bullying, body image shame, depressive symptoms, eating psychopathology, as well as with the inadequate self and hated self forms of self-criticism. BMI was only significantly correlated with body image shame and eating psychopathology, and revealed a small positive association with hated self and a negative association with reassured self. Partial correlations between the study variables controlling for the effect of BMI revealed that the correlations kept the same magnitudes.

Table 1

Cronbach's alphas, descriptive statistics and correlations between the study measures (N = 609)

	α	<i>M</i>	<i>SD</i>	PRQ	BISS	FSCRS Inad. Self	FSCRS Hated Self	FSCRS Reass. Self	DASS21 Depress.	EDE
PRQ	.79	6.61	2.20	1						
BISS	.93	0.90	0.98	.39***	1					
FSCRS	.89	13.78	8.33	.35***	.59***	1				
Inadeq. Self										
FSCRS	.83	4.14	4.65	.38***	.52***	.70***	.1			
Hated Self										
FSCRS	.86	18.37	7.10	-.23***	-.34***	-.24***	-.35***	1		
Reass. Self										
DASS21	.91	4.80	5.17	.42***	.58***	.65***	.65***	-.39***	1	
Depress.										
EDE	.95	1.43	1.26	.36***	.70***	.53***	.52***	-.35***	.53***	1
BMI		20.90	3.29	.05	.29***	.05	.09**	-.10**	.05	.33***

Note. *** $p < .001$; ** $p < .050$. Inad. Self = Inadequate self subscale; Reass. Self = Reassured self subscale; Depress = Depression subscale

Path analysis

The model initially examined presented 24 parameters. All path coefficients were statistically significant at the level of $p < .001$. An exception was verified regarding the path coefficient between PRQ and EDE ($p = .034$). Results indicated that PRQ accounted for a total of 15% of body image shame. Also, the model explained 31% of the hated self form of self-criticism, and 52% for both depressive symptoms and eating psychopathology.

A second model was then conducted in which the direct path between PRQ and EDE was eliminated. Results indicated that the amount of variance explained by the model was similar.

Regarding the model fit, the χ^2 value was significant ($\chi^2_{(1)} = 4.473$; $p = .034$), but since this index is very sensitive to sample size (Hair, Black, Babin, & Anderson, 2010; Kline, 2005), we selected other model fit indices to attest the adequacy of the model (Kline, 2005). Results indicated an adequate normed χ^2 (CMIN/DF = 4.473). The RMSEA (RMSEA = .076 [.017- .152], $p = .189$) provided evidence for close-fit, but the value obtained for the upper bound also suggested that the poor-fit hypothesis could not be rejected (Kline, 2005). Nonetheless, it has been suggested that this statistic's performance is influenced by model specifications and degrees of freedom, and may bias model fit interpretation (Chen, Curran, Bollen, Kirby, & Paxton, 2008; Kline, 2005). Thus, to analyze the adequacy of the model we also considered the other selected fit indices. The obtained values were above the cut offs indicating a very good model fit (TLI = .973, CFI = .995; RFI = .965; Bollen, 1986; Kline, 2005; Tabachnick & Fidell, 2013).

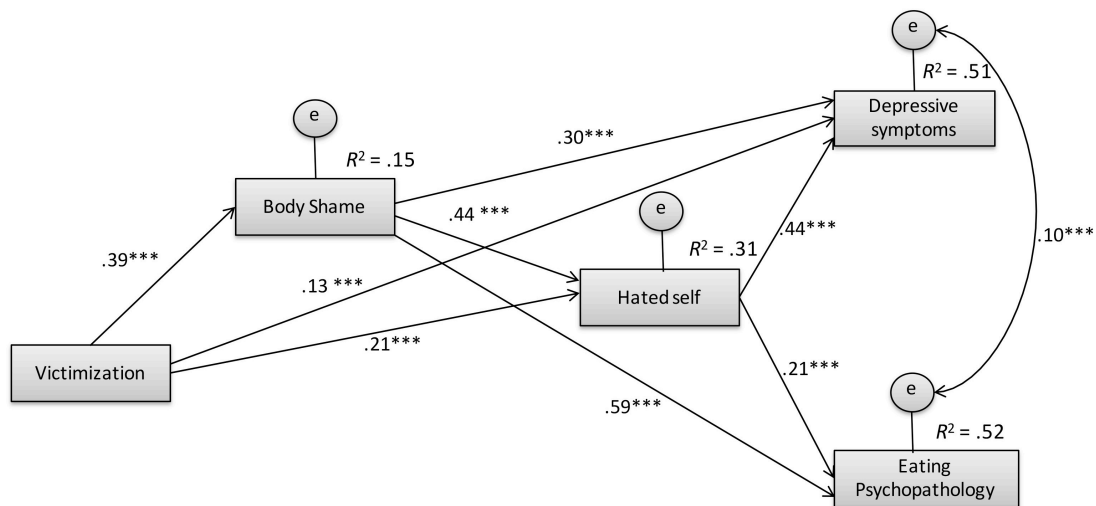


Figure 1 | Path model showing the association between peer victimization and depressive symptoms and eating psychopathology, mediated by body image shame and hated self form of self-criticism, with standardized estimates and square multiple correlations (R^2 ; $N = 609$). Note: *** $p < .001$

Findings showed that PRQ had a direct effect of .39 on body image shame ($b_{PRQ} = .17$; $SEb = .02$; $Z = 10.39$; $p < .001$). Body image shame, in turn, had a direct effect on the hated self form of self-criticism of .44 ($b_{BISS} = 2.10$; $SEb = .17$; $Z = 12.10$; $p < .001$). Also, PRQ had a total effect

of .38 on the hated self form of self-criticism ($b_{PRQ} = .44$; $SEb = .08$; $Z = 5.72$; $p < .001$), with a direct effect of .21 and an indirect effect of .36, mediated by body image shame. This mediation effect was significant according to the Bootstrap resampling method, with the estimate of the indirect effect of PRQ on self-criticism revealing an effect significantly different from zero ($CI = .16, .19$; $p = .002$).

The hated self-form of self-criticism presented, in turn, a direct effect of .44 on depressive symptoms ($b_{HatedSelf} = .49$; $SEb = .04$; $Z = 12.91$; $p < .001$). Body image shame presented a total effect of .50 on depressive symptoms, also presenting a significant direct effect of .30 ($b_{BISS} = 1.61$; $SEb = .18$; $Z = 8.90$; $p < .001$). However, this effect was partially mediated by the hated self-form of self-criticism, with an indirect effect .19, which was significantly different from zero ($CI = .14, .25$; $p = .002$).

Regarding the association between PRQ and depressive symptoms, the model indicated that PRQ had a total effect of .41 on depressive symptoms, with a direct effect of .13 ($b_{PRQ} = .30$; $SEb = .07$; $Z = 4.11$; $p < .001$) and an indirect effect of .67, through the mediators of body image shame and the hated self form of self criticism. This mediational effect was significant according to the Bootstrap resampling method. In fact, the estimate of the indirect effect of bullying on depressive symptoms, revealed an effect significantly different from zero ($CI = .23, .35$; $p = .001$).

In relation to eating psychopathology the model indicated that self-criticism presented a direct effect of .21 on eating psychopathology ($b_{HatedSelf} = .06$; $SEb = .01$; $Z = 6.23$; $p < .001$). Moreover, body image shame presented a total effect of .68 on eating psychopathology, with a direct effect of .59 ($b_{BISS} = .76$; $SEb = .04$; $Z = 17.90$; $p < .001$), and an indirect effect of .09 mediated by the hated self form of self-criticism ($CI = .06, .13$; $p < .001$).

Finally, the effect of PRQ on EDE was totally mediated by body image shame and the hated self form of self-criticism, presenting an indirect effect of .18. Again, the Bootstrap resampling method confirmed that this mediational effect of body image shame and self-criticism on the association between bullying experiences and eating psychopathology was significant ($CI = .24, .37$; $p = .002$).

A final model was tested accounting for the effect of depressive symptoms on bullying experiences, and on the associations between body image shame, self-criticism and eating psychopathology. Overall, results confirmed the adequacy of the model ($\chi^2_{(1)} = 2.930$; $CMIN/DF$

= 2.930; TLI = .984, CFI = .998; RFI = .976; RMSEA = .056 [.000, .136], $p = .317$). The tested direct and indirect effects remained significant and the model accounted for a total of 18% of bullying experiences, 37% of body image shame, 46% of self-criticism and again 52% of eating psychopathology.

Discussion

Several studies have highlighted the association between bullying and psychopathology among adolescents. Nonetheless, research on the effect of bullying on female adolescents' psychopathology, namely body image difficulties and eating behaviors problems, remains less developed. Also, studies exploring the mechanisms underlying these relationships remain scarce. The present study aimed at examining the associations between peer victimization, body image shame, self-criticism, depressive symptoms and eating psychopathology, in a wide sample of female adolescents.

Consistent with other studies examining the relationship between early negative experiences and psychopathology (Bauman et al., 2013; Cunha et al., 2012; Gilbert & Irons, 2009; Klomek et al., 2008; Turner et al., 2013; Yena et al., 2014), this study's findings corroborated the association between being victim of bullying by peers and increased levels of both depressive symptomatology and eating psychopathology. Furthermore, the current study demonstrated that, in adolescent girls, going through bullying experiences is strongly associated with experiencing shame in relation to one's body, that is, with negative evaluations that one's physical appearance is seen negatively by others (Duarte, Pinto-Gouveia, & Ferreira, 2014; Duarte, Pinto-Gouveia, Ferreira, et al., 2014). Moreover, results showed that these associations were independent of weight status, which is in accordance with prior evidence suggesting that, in women, negative body image-related perceptions are associated with negative psychological outcomes and that actual indicators of body image size or weight have a small effect on these associations (Duarte, Pinto-Gouveia, & Ferreira, 2014; Ferreira et al., 2013; Pinto-Gouveia et al., 2014). Also, results are in line with prior suggestions by indicating that being victimized by peers is associated with critical and hostile forms of self-relating, especially with a more severe form of self-criticism characterized by self-directed anger and contempt towards the self, and desires to persecute and hurt the self as an external source might (Cunha et al., 2012; Gilbert & Irons, 2009). This study also extends prior evidence (Duarte, Pinto-Gouveia, & Ferreira, 2014; Duarte, Pinto-Gouveia, Ferreira, et al., 2014) on the association between body image shame, self-

criticism, and depressive symptoms and eating psychopathology, by corroborating that these associations are also evident in adolescent girls going through challenging physiological and psychosocial transformations.

To further understand the dynamics of such complex interactions, the current study aimed at clarifying the indirect effect of early negative interactions of being the victim of bullying by peers on depressive symptoms and eating psychopathology. Thus, a path model was tested in which it was examined whether body image shame and self-criticism would have a significant mediating effect on the relationship between bullying and such negative psychological outcomes. Moreover, we further analyzed whether increased levels of self-criticism would mediate the effect of body image shame on depressive symptoms and eating psychopathology. Results indicated that the theoretical model is plausible, with the path model accounting for 51% and 52% of the variance of depressive symptomatology and eating psychopathology, respectively, in female adolescents.

Consistent with prior evidence (Hawker & Boulton, 2000; Kaltiala-Heino et al., 1999; Lunde et al., 2006), results confirmed that bullying has an indirect effect on depressive symptoms and eating psychopathology. This study further revealed that this effect is mediated by body image shame and self-criticism. Furthermore, the effect of body image shame on both depressive symptoms and eating psychopathology was partially influenced by the hated self form of self-criticism. This result suggests that bullying is associated with body image shame and self-criticism, and it could be hypothesized that when body image shame is related to higher levels self-criticism, more severe mental health outcomes may be expected.

These findings are in line with prior evidence that physical appearance is a particularly relevant domain for females to estimate their social attractiveness (e.g., Ferreira et al., 2013). Also, results are consistent with theoretical accounts suggesting that as adolescents' social life evolves to adapt to new relationships in which peers gain an increased importance to ascertain their sense of security in the social arena, becoming the target of negative interactions inflicted by them is particularly threatening and may be linked to the defensive affective response of shame (Gilbert, 2000, 2002). In particular, this data suggests that in adolescent girls this process is likely to result in feelings of shame regarding their body image. Also, our findings confirmed that this deleterious emotion is associated with increased depressive symptoms and eating psychopathology (e.g., Burney & Irwin, 2000; Duarte, Pinto-Gouveia, & Ferreira, 2014; Duarte, Pinto-Gouveia, Ferreira, et al., 2014; Noll & Fredrickson, 1998).

Results further suggest that such perceptions that one's physical appearance is at the root of ostracism and harassment by others, is associated with self-criticism, namely a more severe form characterized by self-hatred, self-loathing and desires to hurt or persecute the self (Gilbert et al., 2004). Also, it seems that in adolescent girls this type of self-relating is also a mechanism through which body image shame, associated with bullying experiences, is linked with depressive symptoms, as well the severity of eating psychopathology. That is, findings seem to suggest that, in adolescence, as the social group becomes a source of threat, instead of support, these negative external interactions may become internalized. The self may then start to bully the self in regard to possible reasons (such as body image) for existing in the outside world as a rejectable and persecuted peer. According to previous theoretical and empirical contributions, a threat-based submissive depressive response may occur as a response to these threatening external and internal environments (Gilbert, 2000; Gilbert & Irons, 2005; Gilbert & Procter, 2006; Irons & Gilbert, 2005). Furthermore, attitudinal and behavioral manifestations of eating psychopathology (e.g., overevaluation of thinness, pathological dieting, excessive exercise, purging), may emerge as attempts to correct the self into what may be socially valued, and thus to avoid the threat of existing negatively in the mind of others and of being rejected, excluded, persecuted, and harmed by them (Gilbert, 2000; Gilbert & Thompson, 2002; Goss & Gilbert, 2002). The current study also tested for the significance of the effect of depressive symptoms on the aforementioned associations, and results confirmed the plausibility of reciprocal associations between depressive symptomatology and both bullying experiences and self-criticism (Reijntjes et al., 2010, 2011; Shahar et al., 2004).

Limitations

These findings are based on cross-sectional data and therefore conclusions cannot be drawn regarding the causal relationship between the study variables. In fact, the current study contributes for the understanding of the possible pathways through which negative interaction experiences with peers exert their effect on adolescents' mental health, namely depressive symptoms and eating psychopathology. Nonetheless, prior evidence suggested that bullying experiences may be an antecedent but also a consequence of depressive symptoms (Reijntjes et al., 2010, 2011), which, in turn, fuel self-criticism in a vicious cycle (Shahar et al., 2004). Thus, future research should use longitudinal designs to better understand these mechanisms and their effect on the vulnerability to and maintenance of mental health difficulties of adolescent girls. Also, the current study examined a parsimonious model that addresses the role of

specific variables (e.g., body image shame, self-criticism) in depressive symptomatology and eating psychopathology, and therefore other relevant psychosocial and physiological (e.g., puberty) variables were not considered. Future studies should complement this model considering such variables.

Also, this study focused specifically on female adolescents since this is a particularly vulnerable population for body image and eating problems (Striegel-Moore & Bulik, 2007), but future studies should explore whether the variables and mechanisms explored in the current study operate or have distinct outcomes in male adolescents. Moreover, results were based on self-report data, which may suffer from some bias (e.g., due to social desirability). Future studies should consider the use of other assessment methods, such as structured interviews, and other sources of information, including peers and teachers, to better determine the accuracy of the relational experiences reported, as well the possibly related negative outcomes (e.g., major depression, suicidal ideation, eating disorders).

Nonetheless, these findings, by being supported by robust statistical analyses, may contribute for a higher understanding of the associations between victimization experiences, depressive symptoms and eating psychopathology in female adolescents and how shame and self-criticism may operate on these associations. Thus, this study may have important implications for future research as well as for prevention and intervention efforts. Our data highlights the important role of shame and self-criticism in mental health in a sample of adolescents and supports therefore the relevance of addressing these constructs in bullying prevention programs, as well as at a clinical level when working with adolescent girls reporting bullying experiences. Professionals working with youth, including educators and clinicians, should be aware of the effect of such negative interpersonal interactions on the development of body image and eating-related symptoms and of the maladaptive function of such symptoms. From this perspective, they should work towards promoting an attentive, deshaming and safe context to prevent damaging peer interactions and promote positive ones (e.g., in schools). At an individual level, a comprehensive and non-shaming attitude towards adolescents' difficulties should be adopted to develop a collaborative work against the deleterious consequences of the problem. This would involve the rigorous assessment of the adolescent's social network and interactions, and the provision of specific social skills to manage interpersonal violence and rejection, while promoting self-acceptance and inner compassion as antidotes to shame and self-criticism, to facilitate emotional and behavioral regulation. In conclusion, this study

stresses the importance of providing programs (e.g., Compassion-focused approaches; Gilbert, 2002; Gilbert & Irons, 2005, 2009) that focus on developing skills to identify and engage with self and others' distress and adopt adaptive behaviors that aim at promoting genuine self and others well-being and safeness.

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Study IX

Can self-reassurance buffer against the impact of bullying? Effects on body shame and disordered eating symptoms in adolescence

Adapted from:

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Abstract

Bullying experiences are associated with body image and eating-related problems. Nonetheless, research on possible resilience factors is scant. The current study tested a path model examining the association between emotional memories of experiences of warmth and safeness, and self-reassuring abilities, and whether these abilities moderate the impact of bullying experiences on body image shame and eating psychopathology. We tested this model in a nonclinical sample of 609 adolescent girls aged 12–18 years. The examined model accounted for 22 % of body image shame variance and 51 % of eating psychopathology variance. Memories of warmth and safeness were significantly associated with self-reassurance, and negatively linked to body image shame and eating psychopathology. Self-reassurance significantly moderated the association between bullying experiences and both body image shame and eating psychopathology. The present findings suggest the relevance of assessing the quality of interpersonal experiences reported by adolescents and their potential association with self-reassuring abilities. Moreover, these results suggest that the ability to reassure and soothe the self may have a buffering effect against the negative impact of bullying experiences on adolescents' body image and eating behaviors.

Keywords: Warmth and safeness memories; Bullying; Self-reassurance; Body image shame; Eating psychopathology

Introduction

The quality of early interactions can have important physiological and psychological effects (Gilbert and Procter 2006; Mikulincer and Shaver 2004; Schore 1994). Affiliative interactions in childhood that promote safeness, warmth, connectedness and soothing, create the basis of a sense of self as loveable and valued (Baumeister and Leary 1995). Positive early experiences have been associated with well-being and reduced vulnerability to psychopathology (Cheng and Furnham 2004; DeHart et al. 2006; Irons and Gilbert 2005; Mikulincer and Shaver 2004). In particular, experiences of safeness and soothing may play an important role in emotion regulation (Baldwin and Dandeneau 2005; Gillbert et al. 2006). In fact, research suggests that memories of early parental interactions characterized by warmth, care and safeness, are associated with self-reassurance abilities (Richter et al. 2009; Mikulincer and Shaver 2004), and

may protect against the effects of adverse life events (Cacioppo et al. 2000; Gilbert et al. 2009; Masten 2001; Matos et al. 2015). Self-reassurance involves a positive, compassionate and warm disposition to the self, with a sense of concern, acceptance, understanding and encouragement when the self faces difficulties, setbacks or failures (Gilbert et al. 2004). In fact, this adaptive form of self-to-self relating promotes reassurance and resilience when facing vulnerability or threat (Irons et al. 2006; Gilbert et al. 2004; Leary et al. 2007).

Adolescence is a challenging developmental period during which a series of physiological, relational and environmental changes occur. The circle of interpersonal relationships broadens and adolescents become more oriented towards joining groups of peers. During this period, peers become a particularly important source of self-evaluation, support and validation (Allen and Land 1999). With these changing dynamics in social relationships, issues of acceptance, approval, of fitting in and of being attractive to others become intensified. Perceptions of failing in achieving these social goals, can have important deleterious effects, being associated with feelings of inferiority, shame and self-criticism (Gilbert 1989, 1997, 2005; Gilbert and Irons 2009). Gilbert's evolutionary biopsychosocial model of shame (Gilbert 1992, 1997, 1998, 2002) proposes that shame is both a self-focused and socially focused emotion. Shame involves therefore both negative self-evaluations that the self is flawed or inadequate in some way, and evaluations that others see the individual in the same negative manner, and may criticize, exclude or even attack the individual. Perceptions that one's physical appearance fails to fit within what others find attractive and may be the cause of such social threats, have been identified as important determinants of shame (Duarte et al. 2015; Ferreira et al. 2013; Goss and Allan 2009; Goss and Gilbert 2002; Pinto-Gouveia et al. 2014). In particular, body image shame comprises negative evaluations that because of one's physical attributes (i.e., body shape, size or weight), others view the self as unattractive, inferior, or defective as a person (Gilbert 2002; Gilbert and Thompson 2002). Research suggests that pathological attempts to control physical appearance and eating behavior may be understood as maladaptive defensive strategies in face of these shame feelings (Ferreira et al. 2013; Goss and Allan 2009; Goss and Gilbert 2002; Pinto-Gouveia et al. 2014).

Shame can emerge from negative peer interactions, namely bullying experiences. Bullying involves negative interactions in which the perpetrator has an aggressive behavior towards the victim (including ridiculing, name-calling or rejection), in order to inflict injury or discomfort (Smith and Thompson 1991). Growing research demonstrates that bullying experiences may

have a pathogenic impact on several psychological indicators (Gilbert and Irons 2009; Hawker and Boulton 2000; Kaltiala-Heino et al. 2000; Smokowski and Kopasz 2005; Yena et al. 2014). In particular, studies indicate that bullying experiences are associated with disordered eating, namely among adolescent girls (Engström and Norring 2002; Gilbert 2002; Gilbert and Thompson 2002; Kaltiala-Heino et al. 1999; Menzel et al. 2010). Also, there is evidence suggesting that bullying is associated with adolescents' negative perceptions that their body is the target of criticism from others (Lunde et al. 2006). A recent study conducted with adolescent girls revealed that the extent to which bullying is associated with eating psychopathology symptoms is influenced by how bullying becomes linked to body image shame and self-criticism (Duarte et al. 2015). Moreover, bullying experiences may have lasting effects on body image and eating-related difficulties. In fact, these types of negative experiences with peers in childhood and adolescence were found to be commonly recalled by patients with eating disorders (Ferreira et al. 2014; Fosse and Holen 2006; Striegel-Moore et al. 2002; Matos et al. 2014).

To sum up, mounting evidence suggests that bullying experiences may contribute to eating psychopathology, which is a serious public health problem within the adolescent population (Croll et al. 2002; French et al. 1995; Gilbert and Thompson 2002). Nonetheless, not all adolescents who go through bullying experiences develop psychopathology symptoms and disordered eating. Therefore, it is important to identify the factors that may promote resilience against the negative impact of bullying experiences on adolescents' body image and eating behavior. It is plausible that growing up in caring, supportive and safe environments promotes positive internal self-regulation linked to compassionate self-reassuring abilities. Self-reassurance, in turn, may deter the engagement in maladaptive defensive strategies (e.g., pathological dieting) to cope with bullying and shame feelings (Baumeister and Leary 1995; Baldwin and Dandeneau 2005; Gilbert et al. 2009; Matos et al. 2015; Richter et al. 2009). In fact, a recent study demonstrated that adolescents with higher levels of self-compassion present higher emotional well-being and lower stress in response to social stressors (Bluth et al. 2016). Nonetheless, to our knowledge, there are no studies on the role that early interpersonal experiences play on positive self-regulation through self-reassurance and body image and eating behavior in adolescence.

The goal of the current study was to examine a path model testing the associations between memories of positive, soothing and safe interactions during childhood, bullying experiences with peers during adolescence, abilities to self-soothe and reassure, and body image shame and

eating psychopathology in a sample of adolescent girls. It was hypothesized that adolescents who reported memories of growing up in a warm, supportive and safe childhood environment would have higher self-reassuring and self-soothing abilities. Moreover, it was hypothesized that those self-reassuring abilities would moderate the impact of bullying during adolescence on body image shame and eating psychopathology symptoms.

Method

Participants

Six-hundred and nine adolescent girls were recruited from middle and high schools from urban (34.15 %), semi-urban (56.16 %) and rural (9.69 %) areas of the central region of Portugal. The mean age was 14.10 ($SD = 1.16$) years old, ranging from 12 and 18 years. The years of education mean was 8.89 ($SD = 1.05$), ranging from 8 to 12. The majority (99.18 %) of the participants were Caucasian; 47.7 % were from low, 29.9 % from medium and 22.4 % from high socioeconomic status. Participants' Body Mass Index (BMI) ranged from 13.12 to 35.14, with a mean of 20.90 ($SD = 3.29$). Two participants (0.3 %) presented severe thinness, 12 (2 %) thinness, 427 (70.2 %) had normal weight, 139 (22.8 %) were overweight, and 29 (4.7 %) presented obesity (De Onis et al. 2007).

Procedure

This study is part of a wider research investigating the role of interpersonal experiences on body image and eating-related difficulties in adolescence. The relevant local authorities (General Direction of Innovation and Curricular Development; Portuguese Data Protection Authority) approved the study, which was then presented to and approved by the Boards of the schools involved. Written informed consent was obtained from the participants and from their parents/legal tutors. Each school scheduled the day and the class period for the questionnaires completion. The teacher in charge introduced the researchers to the participants and then left the classroom. The researchers gave standardized instructions to the participants, reiterated that their participation was voluntary, that the data collected was confidential and used only for research purposes, and administered the set of self-report questionnaires (in groups of 5–36 participants).

Measures

Body mass index. Participants' BMI was calculated by dividing reported weight (in Kg) by height squared (in m).

Early Memories of Warmth and Safeness Scale (EMWSS; Richter et al. 2009) is a self-report instrument of personal emotional memories of feeling safe, warm and being cared for in childhood. The scale includes 21 items that are rated in a 5-point scale (ranging from 0 = no, never to 4 = yes, most of the time). The scale presented good psychometric properties in its original study (Richter et al. 2009), as well as in the Portuguese version of the scale validated for adolescents (Cunha et al. 2014).

Peers Relations Questionnaire (PRQ; Rigby and Slee 1993) is a 20-item self-report measure that includes a sub- scale used to assess victimization experiences inflicted by peers—Victim. Items are rated in a 4-point scale (ranging from 1 = never to 4 = very often). The scale presents good psychometric properties in both the original (Rigby and Slee 1993) and Portuguese study (Silva and Pinheiro 2010). In this study the subscale Victim was used to assess bullying experiences.

Body Image Shame Scale—Adolescents Version (BISS- A; Duarte and Pinto-Gouveia 2014) is a 9-item scale that assesses body image shame, including perceptions that others negatively evaluate and criticize the self because of one's body image, and body image-focused negative self- evaluations. Participants are asked to rate the items using a 5-point scale (ranging from 0 = never to 4 = almost always). The original scale (Duarte et al. 2014) and the adapted version for adolescents (Duarte and Pinto-Gouveia 2014) presents good psychometric properties.

Forms of Self-Criticizing/Attacking and Self-Reassuring Scale—Adolescents Version (FSCRS-A; Gilbert et al. 2004) comprises 22 items and assesses self-critical and self- reassuring abilities in response to personal setbacks or failures. Items are rated on a 5-point scale (ranging from 0 = not at all like me to 4 = extremely like me). This scale presented good psychometric properties in both the original version (Gilbert et al. 2004) and in the Portuguese version adapted for adolescents (Salvador and Tavares 2011). In the current study we considered the Reassured self- subscale.

Eating Disorder Examination Questionnaire (EDE-Q; Fairburn and Beglin 1994) includes 36 items assessing disordered eating behaviors and attitudes. The EDE-Q presented good psychometric properties in the original (Fairburn and Beglin 1994) and in its Portuguese version (Machado et al. 2014). We used the global score of the questionnaire in the current study.

The means, standard deviations and Cronbach’s alphas of the measures used in the current study are reported in **Table 1**.

Data Analyses

Descriptives and correlational analyses were conducted using the software SPSS (v.21 SPSS; Armonk, NY: IBM Corp.). The AMOS software (version 21, SPSS; Armonk, NY: IBM Corp.) was used to examine the path model (**Fig. 1**; Hayes 2013; Kline 2005), which tested the hypothesis that early memories of warmth and safeness (exogenous, independent variable) present a significant positive effect on self-reassurance, and a negative effect on bullying experiences (endogenous, mediator variables), body image shame (endogenous, mediator variable) and eating psychopathology symptoms (endogenous, dependent variable). Moreover, the model examined whether self- reassurance would moderate the association between bullying experiences and both body image shame and eating psychopathology symptoms.

Table 1

Cronbach’s alphas, descriptive statistics and correlations between the study measures (N = 609)

	α	<i>M</i>	<i>SD</i>	EMWSS	FSCRS	PRQ	BISS	EDEQ
					Reass. Self	Victim		
EMWSS	.97	61.44	18.58	1				
FSCRS	.86	18.37	7.10	.52***	1			
Reass. Self								
PRQ Victim	.80	6.61	2.20	-.41***	-.23***	1		
BISS	.96	0.90	0.98	-.32***	-.33***	.39***	1	
EDEQ	.95	1.43	1.26	-.31***	-.34***	.36***	.70***	1
BMI		20.90	3.29	-.14***	-.10**	.02	.30***	.33***

Note. EMWSS: Early Memories of Warmth and Safeness Scale; FSCRS Reass. Self: Reassured Self subscale of the Forms of Self-criticizing/attacking and Self-reassuring Scale; PRQ Victim: Victim subscale of the Peers Relations Questionnaire; BISS: Body Image Shame Scale; EDEQ: Eating Disorder Examination Questionnaire global score. *** $p < .001$

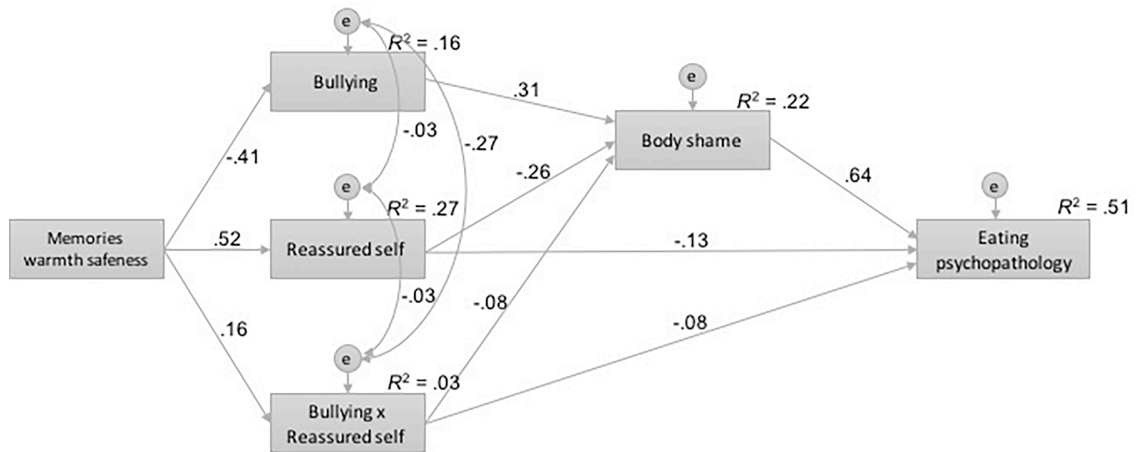


Figure 1 | Path model showing the association between early memories of warmth and safeness, bullying victimization experiences, self-reassurance, body image shame and eating psychopathology, with standardized estimates and square multiple correlations (R^2 ; $N = 609$).

The Maximum Likelihood estimation method was used. The adequacy of the model was examined considering the following model fit indices: Chi-square (χ^2); Normed Chi-Square (CMIN/DF), with values ranging from 2 to 5 revealing a good global model adjustment; Comparative Fit Index (CFI) and Tucker Lewis Index (TLI), which indicate a very good fit with values above .95; and the Root-Mean Square Error of Approximation (RMSEA) with values ≤ 0.05 indicating a very good fit and values ≤ 0.08 representing reasonable errors of approximation (Kline 2005; Tabachnick and Fidell 2013).

To illustrate the association between bullying experiences and both body image shame and eating psychopathology symptoms, considering distinct levels of the moderator—self-reassurance—a graphical representation was created with a curve for each level of the moderator (low, one SD below the mean; medium, mean; high, one SD above the mean; Cohen et al. 2003).

Results

The correlations between the study variables are reported in **Table 1**. Memories of warmth and safeness in childhood were strongly positively associated with self-reassurance, and negatively associated with bullying, body image shame and eating psychopathology symptoms. Memories of warmth and safeness were negatively but weakly associated with BMI. Bullying was positively and moderately associated with body image shame and eating psychopathology symptoms.

Body image shame and eating psychopathology presented a positive strong association (but that did not indicate multicollinearity).

Furthermore, self-reassurance was negatively correlated with body image shame and eating psychopathology symptoms, with bullying experiences, and (with a weaker association) with BMI. Moreover, BMI presented positive moderate associations with body image shame and eating psychopathology symptoms.

Partial correlations between the study variables accounting for the effect of BMI were conducted and findings confirmed the direction and strength of the examined associations even when controlling for BMI.

The model examined through a path analysis accounted for a total of 16 % of the variance of bullying experiences, 27 % of the variance of self-reassurance, 22 % of the variance of body image shame and 51 % of the variance of eating psychopathology (Fig. 1). The model fit indices provided strong evidence for the adequacy of the model ($\chi^2_{(3)} = 8.871, p = .031$; CMIN/df = 2.957; CFI = .994; TLI = .968; RMSEA = .057 [.015, .102]; $p = .326$).

Early memories of warmth and safeness presented a significant direct effect of .52 on self-reassurance ($b_{EMWSS} = .20$; $SEb = .01$; $Z = 14.91$; $p < .001$) and of $-.41$ on bullying ($b_{EMWSS} = -.05$; $SEb = .00$; $Z = -10.86$; $p < .001$). Moreover, early memories of warmth and safeness presented an indirect effect of $-.27$ on body image shame ($CI = -.33, -.21$; $p < .001$), and $-.25$ on eating psychopathology ($CI = -.31, -.20$; $p < .001$). Bullying presented a direct effect of .31 on body image shame ($b_{PRQ} = .14$; $SEb = .02$; $Z = 7.83$; $p < .001$), which in turn presented a direct effect of .64 on eating psychopathology ($b_{BISS} = .82$; $SEb = .04$; $Z = 20.74$; $p < .001$). Bullying experiences presented an indirect effect of .20 on eating psychopathology mediated by body image shame ($CI = .14, .25$; $p < .001$). In a negative direction, self-reassurance presented a direct effect of $-.26$ on body image shame ($b_{Reassured\ self} = -.04$; $SEb = .01$; $Z = -6.91$; $p < .001$). Moreover, self-reassurance presented a total effect of $-.29$ on eating psychopathology, with a direct effect of $-.13$ ($b_{Reassured\ self} = -.02$; $SEb = .01$; $Z = -4.20$; $p < .001$), and an indirect effect of $-.16$, mediated by body image shame ($CI = -.22, -.12$; $p < .001$).

The interaction term between bullying and self-reassurance presented significant direct effects of $-.08$ on both body image shame ($b_{Reassured\ self} = -.01$; $SEb = .00$; $Z = -2.02$; $p = .044$) and eating psychopathology ($b_{Reassured\ self} = -.01$; $SEb = .00$; $Z = -2.64$; $p = .008$). These effects suggest the moderator effect of self-reassurance on the association between bullying

experiences and body image shame, as well on the association between bullying and eating psychopathology.

The visual inspection of the moderator effect of self-reassurance on the association between bullying experiences and body image shame (Fig. 2) demonstrates that adolescents who go through bullying experiences more frequently report higher body image shame. Nonetheless, those with a higher ability to self-reassure present lower levels of body image shame, even when frequently experiencing bullying; in comparison to those with medium and especially those with lower levels of self-reassurance.

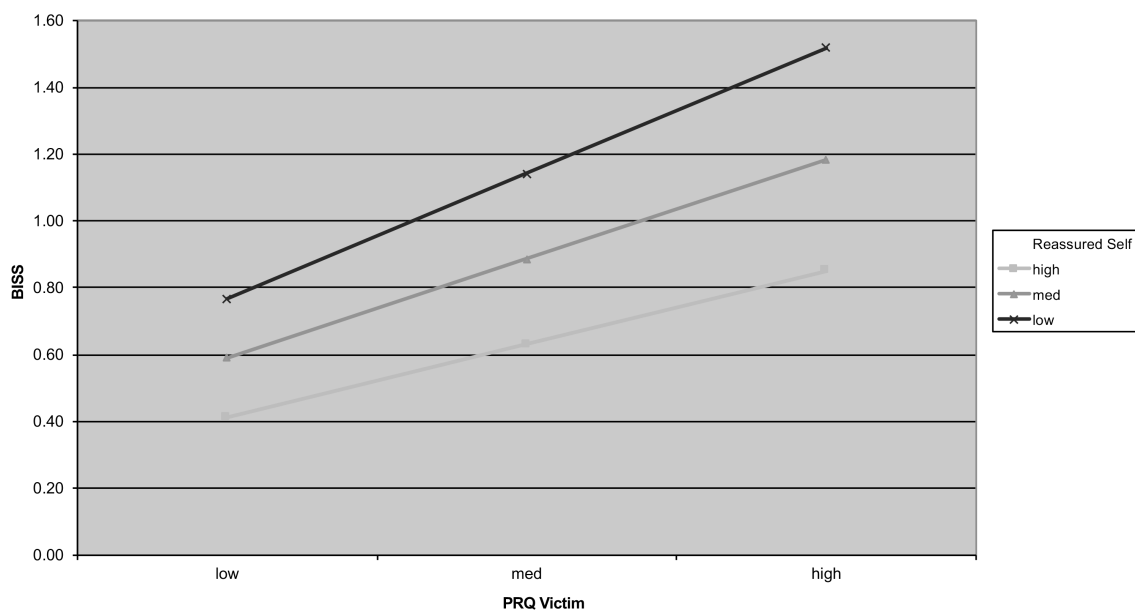


Figure 2 | Graphic representation of the moderator effect of self-reassurance (FSCRS) on the association between bullying victimization experiences (PRQ Victim) and body image shame (BISS).

The moderator effect of self-reassurance on the association between bullying and eating psychopathology (Fig. 3) also suggested that adolescents with a higher ability to self-reassure present lower levels of eating psychopathology even when frequently experiencing bullying.

A final path model was conducted to understand whether self-reassurance would moderate the association between body image shame and eating psychopathology. Results indicated that the interaction term between body image shame and self-reassurance and eating psychopathology was not significant ($p > .050$), which suggests the absence of a moderator effect.

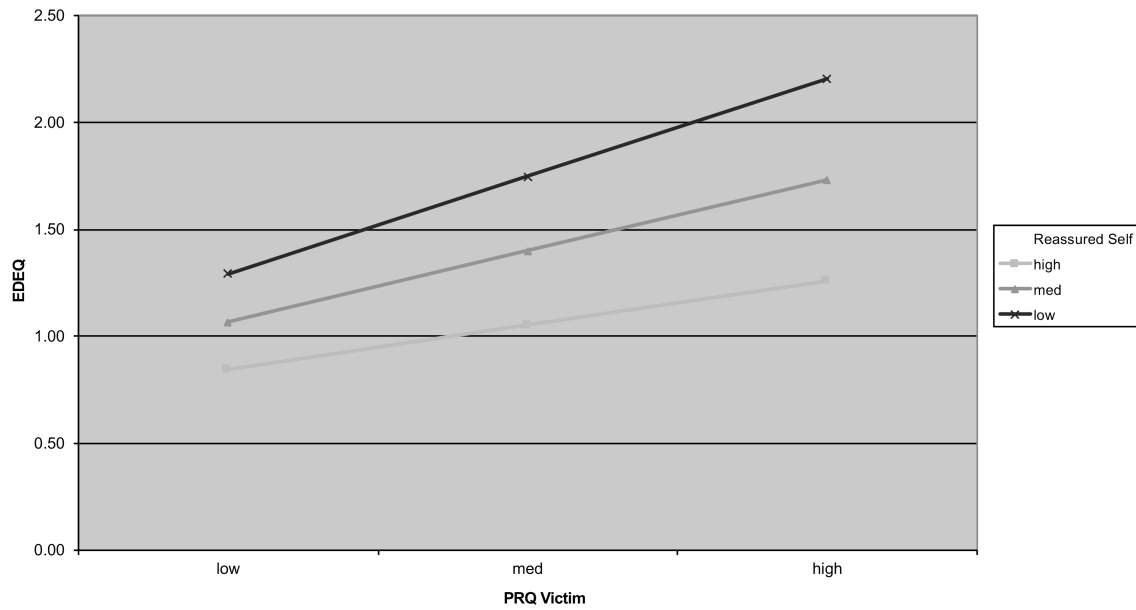


Figure 3 | Graphic representation of the moderator effect of self-reassurance (FSCRS) on the association between bullying victimization experiences (PRQ Victim) and eating psychopathology (EDEQ).

Discussion

This study examined whether memories of feeling cared for, valued and soothed as a child, were associated with current compassionate abilities to soothe and reassure the self when in challenging situations. Also, we aimed at examining whether self-reassurance might operate as a buffer against the impact of bullying experiences on body image shame and eating psychopathology. These associations were examined in a sample of relatively young adolescent girls, which comprises a population identified in the literature as being at a higher risk for the development of a range of psychopathological conditions, namely eating disorders (Croll et al. 2002; Duarte et al. 2015; French et al. 1995; Gilbert and Irons 2009; Gilbert and Thompson 2002; Irons and Gilbert 2005). A number of important findings can be noted. Results revealed that personal emotional memories of nurturing and soothing experiences were positively linked to self-reassurance and negatively associated with bullying experiences. Moreover, these emotional memories were associated with decreased body image shame and eating psychopathology. Thus, the present findings support previous research conducted with adolescent (Cunha et al.

2014) and adult populations (Richter et al. 2009; Matos et al. 2015) that demonstrated that memories of feeling soothed, safe and connected with significant others, are associated with self-reassurance and soothing abilities and with lower levels of psychopathology symptoms.

Furthermore, the present findings indicate that bullying experiences were negatively associated with self-nurturing abilities of soothing and reassurance in face of setbacks or difficult situations, and positively linked to body image shame and eating psychopathology. This data are also in accordance with prior research that revealed that memories of shame experiences, including bullying, are associated with poorer emotional regulation and negative psychological outcomes in adolescence (Cunha et al. 2012; Duarte et al. 2015) and also later in life (Matos and Pinto-Gouveia 2010; Matos et al. 2013). Moreover, the current findings are in line with research about the role that early negative social experiences, especially those occurring with peers, plays on the severity of eating disorders (Ferreira et al. 2014; Matos et al. 2014).

The examined model offers important directions to understand the role of experiences of care and warmth on self-soothing and reassuring abilities, and how these may moderate the effect of bullying experiences on body image shame and eating psychopathology. Research conducted in adult populations suggests that the recall of positive emotional memories characterized by safeness, soothing and warmth, promote the capacity to be self-reassuring and caring as a way to cope with setbacks and failures (Gilbert and Procter 2006; Matos et al. 2015). In keeping with what has been reported in the literature, the current data suggest that adolescent girls who recall being loved, cared for, safe and valued as a child, present higher self-reassurance abilities and less body image shame and disordered eating. Our findings further suggest that self-reassuring abilities may protect against the impact of negative interpersonal experiences, which is also in line with prior research demonstrating the beneficial effect of self-compassion abilities in adolescents' mental health (Bluth et al. 2016). There is consistent evidence that bullying experiences are a common hazard among adolescents, and are associated with mental health problems, especially body image and eating related problems in adolescent girls (Engström and Norring 2002; Kaltiala-Heino et al. 2000; Menzel et al. 2010). The results of this study indicate however that this association is not linear and most notably, self-reassurance may have a buffer effect in it. In fact, our results suggest that adolescent girls who are able to offer themselves the comfort, warmth and support to cope with bullying situations, present a lower tendency to evaluate their body image as a source of shame and to engage in disordered eating.

These findings have important preventive and therapeutic implications. Results indicate that the perceived quality of early developmental environments should be carefully assessed as these may have an important impact on adolescents' ability to be self-soothing and reassuring. Also, findings support the relevance of therapeutic interventions that target the development of

compassionate abilities that involve a genuine concern and commitment to foster others' and one's well-being and the cultivation of feelings of self-directed warmth, safeness and contentment (e.g., Compassion-Focused Therapy; Gilbert 2002; Gilbert and Irons 2005, 2009). There is now evidence that these therapeutic approaches may be especially effective in individuals with eating disorders with high levels of shame and self-criticism (e.g., Goss and Allan 2010; Gale et al. 2014). Together with this evidence, the current study's findings offer tantalizing suggestions that helping adolescents build self-soothing compassionate abilities may counteract the effect of negative interpersonal interactions and prevent the development of body image disturbances and disordered eating.

However, the current findings are derived from a cross-sectional design and thus these suggestions should be investigated in future research using longitudinal and experimental designs. The model tested in this study is also inherently limited as it excludes other important social and contextual variables and processes operating in the development and protection against body image difficulties and eating psychopathology. Also, although self-report data may facilitate honest responding, it may suffer from biases, and thus future studies should include data obtained from other assessment methods (e.g., structured interviews) and other sources (e.g., parents and teachers). Moreover, although adolescent girls are a particularly vulnerable population for body image and eating-related difficulties, future research should examine the current model in male adolescents and consider possible distinct outcomes considering intra and inter-individual differences. Future research should also consider the role that cultural/racial differences may play in the examined associations.

This is the first study investigating memories of warmth and safeness, and self-reassurance abilities, as resilience factors to social threat and its impact on body image shame and disordered eating. The current data support the relevance of addressing relational experiences within the family and with peers, and of cultivating emotion regulation through compassion, when working with adolescents at both prevention and intervention levels.

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Compliance with ethical standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964

Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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Study X

The prospective associations between bullying experiences, body image shame and disordered eating in a sample of adolescent girls.

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Highlights

The prospective effect of bullying on body shame and disordered eating was tested.

The study was conducted in adolescent girls and involved 3 waves of data collection.

Bullying had a significant effect on baseline body shame and disordered eating.

Body image shame and disordered eating symptomatology growth was stable over time.

Body shame mediated the link between bullying experiences and disordered eating.

Abstract

Objective The current analysed the prospective effect of bullying on body image shame and disordered eating symptomatology in adolescent girls.

Method The study was conducted with 290 adolescent girls, and involved three waves of data collection assessing over time victimization experiences, body image shame and disordered eating symptomatology. At the beginning of the study, the participants average age was 13.73 years ($SD = 0.78$). Latent growth models were used to fit the data to identify the effect of bullying on the outcomes. Path analysis examined the mediator effect of body image shame on the association between bullying and disordered eating.

Results Bullying had a significant effect on the initial status of both body image shame and disordered eating. Body image shame and disordered eating growth was stable over time. Body image shame significantly mediated the relationship between bullying and disordered eating symptomatology.

Conclusions Findings suggest that programmes aimed at preventing bullying and associated shame could decrease the risk of initially developing body image issues and disordered eating.

Keywords: Bullying; body image shame; disordered eating symptomatology; adolescence; longitudinal

1. Introduction

Negative body image has received empirical support as a risk factor for disordered eating (Stice, Marti, & Durant, 2011). Body image dissatisfaction increases with the onset of adolescence

(Cusumano & Thompson, 2001) and is considered a widespread phenomenon among women (Thompson, Heinberg, Altabe, & Tanleff-Dunn, 1999). Physical maturation associated with the onset of puberty, characterized by the development of curves and by an increased regional deposition of body fat is not always consistent with the socially valued physical appearance. This inconsistency may help explain why many adolescent girls become increasingly dissatisfied with their physical appearance (Ricciardelli, McCabe, Holt, & Finemore, 2003) and may engage in efforts to alter their physical appearance to become closer to the social representation of the ideal female appearance (Allen & Land, 1999; Gilbert & Irons, 2009). This valued ideal is represented by excessive thinness and often equated with attractiveness, power and success (Ferreira, Pinto-Gouveia, & Duarte, 2013; Pinto-Gouveia, Ferreira, & Duarte, 2014).

It has been suggested that having traits believed to be valued by others, within a certain social and cultural context, is associated with positive social outcomes (e.g., beneficial social relationships) and is important for one's sense of safeness and self-worth (Gilbert, 1989, 1997; Kurzban & Leary, 2001). Concerns that one has certain traits or attributes that others might disapprove or do not value can be perceived as threatening, which may give rise to perceptions of inferiority and inadequacy in some people. In *extremis* these perceptions characterize the painful emotion of shame. Shame is a complex self-focused social emotion that involves evaluations that the self is inferior or flawed, negatively viewed by others, criticized or judged, and thus vulnerable to social exclusion, rejection or even attacks (Gilbert, 1998; Lewis, 2003; Tangney & Dearing, 2002; Tracy & Robins, 2004). Several studies have demonstrated that shame can have negative effects on psychological adjustment (e.g., Kim, Thibodeau, & Jorgensen, 2011; Matos & Pinto-Gouveia, 2010).

One's body image is a domain of self in the context of self and others' evaluation. One's body image can stimulate either a positive image of the self through being valued, included and accepted by others or be perceived as a source of ostracism, devaluation or rejection by one's social context. Body image shame has been conceptualized as involving negative self-evaluations that one is seen as an unattractive, undesirable social agent because of one's physical appearance (Gilbert, 1998, 2002). Body image shame has been linked to a range of psychopathologies, especially eating disorders (Bessenoff & Snow, 2006; Castonguay, Brunet, Ferguson, & Sabiston, 2012; Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015; Duarte, Pinto-Gouveia, & Rodrigues, 2015; McKinley, 1998). It has been suggested that disordered eating behaviours may operate as a proximal maladaptive mechanism of attempted coping with the

distressing affective experience of shame (Ferreira et al., 2013). Ultimately, however this attempt at coping may lead to a further sense of being devalued, flawed and be associated with poor psychological adjustment (Pinto-Gouveia et al., 2014).

Adolescence is characterized by key psychosocial transformations that make the adolescent particularly sensitive to social messages and signals that indicate what is attractive and acceptable to the social group (Gilbert & Irons, 2009; Irons & Gilbert, 2005; Wolfe & Mash, 2006). During this critical period there is a tendency to rely less on attachment figures (e.g., parents) and more on the peer group as a source of support and as a reference to estimate one's self-worth (Allen & Land, 1999). At this developmental phase, social competition related to attractiveness in the context of relationships with the peer group can become more pronounced, which tends to intensify concerns with self-presentation, self-evaluation of attributes or characteristics that are socially valued, and with also fears of rejection, disapproval, or potential attacks by the peer group (Gilbert & Irons, 2009).

Peer bullying can therefore be a potentially shame provoking experience. Bullying, including being excluded, ridiculed, name-called or even physically abused is a common experience (Nansel et al., 2001; Smith & Brain, 2000), with its peak occurring in early adolescence (Smith, Madsen, & Moody, 1999). There is consistent evidence that persistent victimization by peers is related to mental health problems in adolescence (Cunha, Matos, Faria, & Zagalo, 2012; Gilbert & Irons, 2009; Hawker & Boulton, 2000; Kaltiala-Heino, Rimpelä, Rantanen, & Rimpelä, 2000; Rubeis & Hollenstein, 2009; Smokowski & Kopasz, 2005) and can have deleterious enduring effects into adulthood (Matos & Pinto-Gouveia, 2010; Pinto-Gouveia & Matos, 2011; Rigby, 2001). Physical appearance is often the cause of peer victimization (Frisén, Holmqvist, & Orcarsson, 2008; Menzel et al., 2010). Nonetheless, there is cross-sectional and retrospective evidence to suggest that even when the victimization is not specifically focused on the domain of physical appearance, the experience of victimization itself may become associated with perceptions of unattractiveness and inferiority and also with eating psychopathology (Kaltiala-Heino, Rissanen, Rimpela, & Rantanen, 1999; Matos, Ferreira, Duarte, & Pinto-Gouveia, 2014; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002). A recent cross-sectional study of a large sample of adolescent girls suggested that the association between peer bullying experiences and disordered eating was influenced by the extent to which these experiences were associated with body image shame and self-criticism (Duarte, Pinto-Gouveia, & Rodrigues, 2015). Associations in this study highlighted possible pathways (shame and self-criticism) by which bullying experiences

may influence eating psychopathology in adolescence. This suggests that susceptibility to shame and self-criticism may interact with the environmental trigger of peer victimisation to promote eating disordered symptomology.

Longitudinal studies have investigated the directional nature of the relationship between victimization experiences within the peer group context and changes in subsequent body image and eating difficulties (Engström & Norring, 2002). These studies suggest that i) early peer victimization is prospectively related to increased appearance monitoring and body image shame in adolescent girls in comparison to adolescent boys (Lunde, Frisén, & Hwang, 2006); ii) adolescents who experienced bullying were at increased risk for eating psychopathology symptoms (Copeland et al., 2015; Mamun, O'Callaghan, Williams, & Najman, 2013). Nonetheless, no study to date has investigated the prospective associations between victimization experiences and disordered eating symptoms, mediated by body image shame. It should be emphasised that victimization experiences are a pervasive phenomenon in adolescence (Nansel et al., 2001) but their impact on adolescents' mental health is not ubiquitous. Thus, it is important to understand the mechanisms through which victimization experiences may become associated with body image and eating psychopathology. As in adolescence concerns about whether one is stimulating positive affect and a positive image of oneself in others increase, it is plausible that negative interpersonal experiences (e.g., criticism, rejection, or attacks) become associated with shame feelings (Gilbert & Irons, 2009). Disordered eating symptoms and attempts to change the body may then become a means to cope with shame and to be accepted by others, and avoid such social threats (Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015; Duarte, Pinto-Gouveia, & Rodrigues, 2015; Ferreira et al., 2013; Pinto-Gouveia et al., 2014).

The current study prospectively examined the longitudinal relationship between victimization experiences, body image shame and disordered eating symptomology. We examined individual differences in the longitudinal trajectories of these outcomes over three years in a sample of 290 adolescent girls using latent growth curve models. Taken together theoretical and empirical contributions (Gilbert, 2002; Duarte, Pinto-Gouveia, & Rodrigues, 2015; Gilbert & Irons, 2005; Ferreira et al., 2014), we hypothesized that (i) victimization experiences would be predictive of earlier levels of body image shame, (ii) that body image shame would in turn predict later developmental trajectories in disordered eating symptomatology and (iii) that body image shame mediated the longitudinal effect of bullying experiences on disordered eating symptomatology.

2. Method

2.1. Participants

This study is part of a wider project examining the effect of interaction experiences on self-evaluation, emotion regulation, body image and eating-related difficulties in adolescence. The sample of this study was collected in private and public schools of the central region of Portugal, over three years. Participants attended schools located in urban (38.67%), semi-urban (46.15%) and rural (15.8%) areas; 99.18% of the participants were Caucasian. Equidistant measurement was assured at every 12 months. A total of 481 adolescent girls ($M_{Age} = 13.73$, $SD = 0.78$), completed the assessment at year 1 when attending the 8th and 9th grades ($M_{YearsEducation} = 8.51$, $SD = 0.51$); 395 participants ($M_{Age} = 14.50$, $SD = 0.75$; $M_{YearsEducation} = 9.46$, $SD = 0.54$) completed the assessment at year 2; and 290 ($M_{Age} = 15.63$, $SD = 0.68$; $M_{YearsEducation} = 10.43$, $SD = 0.54$) completed the assessment at year 3. The attrition rate (17.88% at year 2 and 26.58% at year 3) was primarily due to students transferring out of the schools in the study catchment during the 9th grade transition from middle to secondary school. Thus 191 students were lost to follow-up. No differences were found between the participants that completed the study and those who did not regarding the study variables at the start of the study ($t_{(479)BMI} = 0.29$, $p = .774$; $t_{(479)Bullying} = 1.16$, $p = .249$; $t_{(479)BodyShame} = 0.40$, $p = .690$; $t_{(479)DisorderedEating} = 0.19$, $p = .985$).

2.2. Measures

Body Mass Index. Participants' BMI was calculated by dividing self-reported weight (in Kg) by self-reported height squared (in m).

Peers Relations Questionnaire (PRQ; Rigby & Slee, 1993) is a 20-item self-report measure that includes a subscale (Victim - 5 items) used to assess victimization experiences inflicted by peers. Items are rated on a 4-point scale (ranging from 1 = *never* to 4 = *very often*). The scale presents good psychometric properties in two previous studies (Rigby & Slee, 1993; Silva & Pinheiro, 2010). In this study the subscale Victim was used to assess bullying experiences.

Body Image Shame Scale – Adolescents Version (BISS-A; Duarte & Pinto-Gouveia, 2014; Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015) is a 9-item scale that assesses body image shame, including perceptions that others negatively evaluate and criticize the self because of one's body image, and body image-focused negative self-evaluations. Participants are asked to rate the items using a 5-point scale (ranging from 0 = *never* to 4 = *almost always*). The original scale

(Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015) and the adapted version for adolescents (Duarte & Pinto-Gouveia, 2014) present good psychometric properties.

Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) includes 36 items assessing disordered eating behaviours and attitudes over the past 28 days (score ranges between 0 and 6). The EDE-Q presented good psychometric properties in the original (Fairburn & Beglin, 1994) and in its Portuguese version (Machado et al., 2014). The global score of the questionnaire was used the current study.

2.3. Procedures

The required local authorities and ethics committees (General Direction of Innovation and Curricular Development; Portuguese Data Protection Authority) and the boards of the schools participating in the study approved the study. Participants and their parents/legal tutors provided their written informed consent to participate at the three yearly assessment points. Each school scheduled the day and the class period completion of the questionnaires at each assessment point. The researchers gave standardized instructions to the participants, emphasised that their participation was voluntary and that all data collected would be confidential, anonymised and used only for research purposes. The self-report questionnaires were administered in groups of 5 to 36 participants and took approximately 45 minutes to complete.

2.4. Analytic strategy

Descriptive statistics and correlation analyses were calculated using SPSS (v.21 SPSS; Armonk, NY: IBM Corp.).

Longitudinal relationships between the study variables were analysed through Latent Growth Curve Modelling. This technique incorporates initial levels of study variables (intercept mean), the inter-variability in these levels (intercept variance), the average rate at which individuals change (slope mean), and the inter-individual variability in that rate (slope variance (Selig & Preacher, 2009). Unconditioned latent growth curve models were calculated to examine the growth of bullying experiences, body image shame and disordered eating. To examine the effect of bullying experiences on the longitudinal relationships between body image shame and eating psychopathology a conditioned latent growth curve model was tested using baseline assessment

(year 1) of self-reported bullying experiences (independent variable). To assess the change (slope) in the outcome variables (body image shame and eating psychopathology) from baseline we used the observations from year 1, 2 and 3.

BMI at baseline was controlled for in the models as a covariate to account for its effect on outcomes.

Analyses were conducted using the Maximum Likelihood estimation method. The plausibility of the examined models was assessed using the following model fit indices: the Chi-square (χ^2), which indicates a very good model fit when nonsignificant; the Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI), with higher levels (above .95) indicating very good fit; the Root Mean Square Error of Approximation (RMSEA), with 90% confidence intervals, with values below .08 indicating reasonably good fit (Kline, 2005; Tabachnick & Fidell, 2013).

3. Results

3.1. Descriptives and correlations

Preliminary analyses indicated no extreme outliers, no severe violation normality and no evidence of multicollinearity (Kline, 2005).

Means and standard deviations of the study variables (reported in **Table 1**) were similar to those obtained in previous studies with community samples (Duarte, Pinto-Gouveia, & Rodrigues, 2015; Luce, Crowther, & Pole, 2008; Rigby & Slee, 1993). Considering a cut-off score of ≥ 4.0 on the EDE-Q score to indicate clinical significance, 3.8% of the sample in year 1, 4.8% in year 2 and 4.8% in year 3, scored in the clinical significant range (Carter, Stewart, & Fairburn, 2001). Participants' mean BMI was within the normal weight range and the BMI distribution was similar to prior studies (De Onis et al., 2007).

There were moderate positive correlations between bullying experiences and both body image shame and disordered eating symptomology in year 1, 2 and 3 (**Table 1**). There were strong positive correlations between body image shame and disordered eating symptomology at the three assessment points. BMI was not significantly associated with bullying experiences, but revealed small-to-moderate positive associations with body image shame and disordered eating symptomology.

Table 1

Means (*M*), Standard Deviation (*SD*), Cronbach's alpha estimates (α), and product-moment Pearson correlation coefficients between the three assessment moments of the study variables (*N* = 290). Partial correlations controlling for the effect of BMI presented in subscript.

	<i>M</i>	<i>SD</i>	α	1	2	3	4	5	6	7	8	9	10	12
1. Bullying_Y1	6.56	2.20	.79	1										
2. Bullying_Y2	6.41	2.22	.78	.67***	1									
3. Bullying_Y3	6.26	1.96	.75	.65***	.75***	1								
4. BISS_Y1	.83	.91	.93	.39***	.29***	.28***	1							
5. BISS_Y2	.86	.94	.93	.40***	.33***	.30***	.77***	1						
6. BISS_Y3	.80	.93	.93	.40***	.33***	.38***	.61***	.76***	1					
7. EDE_Y1	1.35	1.23	.95	.44***	.28***	.29***	.68***	.60***	.54***	1				
8. EDE_Y2	1.33	1.28	.96	.43***	.34***	.31***	.60***	.70***	.67***	.84***	1			
9. EDE_Y3	1.29	1.26	.96	.41***	.32***	.35***	.56***	.65***	.71***	.79***	.91**	1		
10. BMI_Y1	20.48	3.29		.03	-.01	-.01	.32***	.19**	.18**	.37***	.34**	.28***	1	
11. BMI_Y2	20.81	3.03		-.01	-.05	-.03	.25***	.21***	.23***	.36***	.34**	.31***	.81***	1
12. BMI_Y3	20.89	2.90		.04	-.03	-.04	.20***	.19**	.16**	.29**	.30**	.30***	.66***	.78***

Note. *** $p < .001$; ** $p < .010$.

Bullying= Victimization subscale of the Peer Relationships Questionnaire; BISS = Body Image Shame Scale; EDE = Eating Disorder Examination Questionnaire

3.2. Unconditional latent growth curve modeling

Three unconditional latent growth models were first conducted for bullying experiences, body image shame and eating psychopathology. Plausibility estimates for bullying experiences revealed a very good model fit ($\chi^2_{(1)} = .007, p = .935$; CFI = 1.00; TLI = 1.00; RMSEA = .00 [.00, .00], $p = .989$). The means for the intercept and slope factors were estimated to be 6.56 ($p < .001$) and $-.15$ ($p = .003$). Moreover, there were significant variance estimates for both the intercept (3.69, $p < .001$) and slope (.46, $p = .006$), indicating that there was substantial individual variability around both the mean starting point and the mean rate of change over time. Also, there was a

significant correlation between the intercept and slope factors (-0.35 ; $p = .019$). These results indicated that although the pattern for the sample as a whole suggested that scores on this variable declined over time, this rate of decline was less steep for individuals with high levels of bullying at baseline.

For body image shame the model also showed a very good model fit ($\chi^2_{(1)} = 2.20$, $p = .138$; CFI = 1.00; TLI = .99; RMSEA = .06 [.00, .18], $p = .273$). The mean of the intercept was .84 ($p < .001$), while the mean slope was nonsignificant (-0.02 ; $p = .437$). There were significant variance estimates for the intercept (.79, $p < .001$) and for the slope (.14, $p < .001$), suggesting significant individual variability for the mean starting point and progression over time. The correlation between the intercept and slope factors was significant (-0.42 , $p < .001$) indicating less steep increases of body image shame.

The unconditioned model for disordered eating symptomology revealed a very good model fit ($\chi^2_{(1)} = .181$, $p = .670$; CFI = 1.00; TLI = 1.00; RMSEA = .00 [.00, .12], $p = .765$). The mean of the intercept was significant (1.35, $p < .001$), there was a nonsignificant mean estimate for the slope (-0.04 ; $p = .105$). Variance estimates were significant for the intercept (1.39, $p < .001$) and for the slope (.16, $p < .001$), indicating that for disordered eating symptomology the growth is not homogeneous between individuals. The correlation between the intercept and slope factors was -0.18 ($p < .033$), indicating less steep increases over time.

3.3. Conditional latent growth curve modeling

A conditional latent growth model was conducted to analyse the relationships between body image shame and disordered eating symptomology and whether bullying experiences were associated with those relationships (Figure 1). The model revealed a very good fit ($\chi^2_{(10)} = 18.163$, $p = .111$; CFI = 1.00; TLI = .99; RMSEA = .04 [.00, .08], $p = .589$). Bullying experiences had a significant effect on the initial levels of both body image shame ($\beta = .42$, $p < .001$) and disordered eating symptomology ($\beta = .47$, $p < .001$), but it did not significantly impact the slope of these variables ($\beta = .09$, $p = .148$; and $\beta = .06$, $p = .314$, respectively). The correlation between body image shame and disordered eating symptomology intercept factors was .66, and the correlation between the two variables slope factors was .59, indicating that the initial status of body image shame was similar to the initial status of disordered eating symptomology and that the change over time of these variables was also similar. Initial levels of body image shame had a significant effect of -0.22 ($p < .001$) on the growth of disordered eating symptomology over time, and the

initial levels of disordered eating symptomology also had a significant effect on the growth of body image shame over time ($\beta = -.14, p = .021$), which indicates that higher initial levels of body image shame and disordered eating symptomatology are associated with less steep growth (i.e., smaller magnitude of change) of the other construct. Results also revealed a significant indirect effect of bullying experiences on the slope factors of disordered eating symptomology ($-.09$; CI $-.02, -.01$; $p < .001$) and body image shame ($-.07$; CI $-.02, -.001$; $p = .032$) and, mediated by the intercept factors of body image shame and disordered eating symptomology, respectively. The tested relationships were preserved after controlling for the effect of BMI at baseline ($\chi^2_{(16)} = 45.34, p < .000$; CFI = .98; TLI = .97; RMSEA = .08 [.05, .11], $p = .038$).

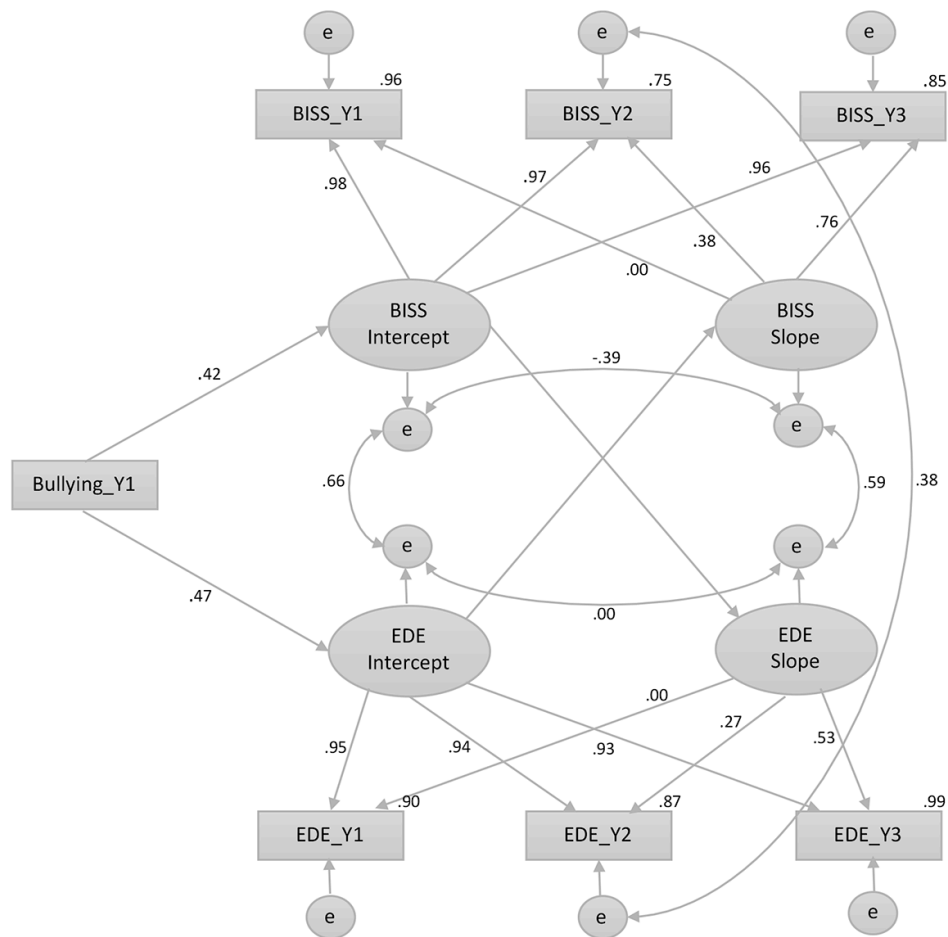


Figure 1 | Standardized parameter estimates of the multivariate conditional latent growth model between body image shame and disordered eating symptomatology regressed on victimization experiences ($N = 290$).

4. Discussion

The current study examined the longitudinal trajectories of self-reported victimization experiences, body image shame and disordered eating symptomology in a sample of adolescent girls over a 3-year period. Results of the correlation analyses were in agreement with previous findings that victimization experiences are associated with body image difficulties and disordered eating symptomatology (Engström & Norring, 2002; Kaltiala-Heino et al., 2000; Lunde et al., 2006) and that body image-focused perceptions of inferiority and inadequacy are linked to symptoms of disordered eating, both cross-sectionally and longitudinally. This raised hypothetical questions about the prospective relationships between the study variables and whether the association between victimization experiences and disordered eating symptomology was mediated by body image shame.

A series of unconditional latent growth curve models allowed us to clarify the patterns of change in victimization experiences, body image shame and disordered eating symptomology, as well as the individual variability in both the starting point and the change in these variables. The significant decrease in the mean of victimization experiences from the first assessment (year 1) to the last assessment (year 3), is consistent with the peer victimization literature, which notes that the peak in peer victimization occurs in early adolescence (Smith et al., 1999). Prior evidence has demonstrated significant increases in disordered eating symptoms from late childhood to young adulthood (Slane, Klump, McGue, & Iacono, 2014). This change in overall levels of body image shame and disordered eating symptomology was not evident in the 3-year time window of the current study. But, when looking at the potential heterogeneity within the sample, results indicated that there was significant individual variability in the starting point and in the longitudinal change of body image shame and disordered eating symptomology over time. Given this variability in the growth trajectories of body image shame and disordered eating symptomatology we then examined whether the addition of bullying experiences to an explanatory model would contribute to understand this variance and the relationship between these constructs.

To test our first hypothesis, we modelled this observed variability in a conditioned latent growth model to explore the predictive effect of victimization experiences on body image shame and disordered eating symptomology and how these two phenomena interact over time. According to our first hypothesis, adolescents who reported going through more frequent victimization experiences presented both higher initial levels of body image shame and disordered eating

symptomology. Moreover, results supported our second hypothesis by indicated that body image shame was a significant predictor of disordered eating symptomatology, with higher initial levels of body image shame being associated with less steep growth trajectories in disordered eating symptomology. The effect of disordered eating symptomology on body image shame was smaller but revealed the same trend. These findings suggest that the initial status of body image shame and, to a lesser extent, disordered eating symptomatology, is predictive of later changes in the other construct, but that changes in these outcomes are small, i.e., tend to be stable over time. Also, results suggested that victimization experiences have a significant indirect effect on later disordered eating symptomatology via body image shame. Victimization experiences also had a significant effect on body image shame via disordered eating, but the effect was smaller.

Previous studies have found that victimization experiences are associated with indicators of poorer mental health in adolescence (e.g., Cunha et al., 2012; Gilbert & Irons, 2009; Hawker & Boulton, 2000; Irons & Gilbert, 2005; Kaltiala-Heino et al., 2000), including difficulties related to body image and disordered eating symptoms (e.g., Copeland et al., 2015; Duarte, Pinto-Gouveia, & Rodrigues, 2015; Kaltiala-Heino et al., 1999; Menzel et al., 2010). The current study extended these findings by highlighting the potential effect of victimization as a trigger of negative self-evaluations and disordered eating symptomology. In fact, results indicated that even though the reported frequency of victimization experiences decreased over time, at their peak these experiences seem to significantly impact adolescents' levels of body image shame and indirectly affect disordered eating symptomology. The data from this study suggest that once these relationships are established, they appear relatively stable fuelling a potential cycle of shame feelings about the self-focused on the body which activate the engagement in maladaptive attitudes towards body image and eating behaviour. Results supported our third hypothesis and extended results obtained in prior cross-sectional research, suggesting that negative peer interactions, such as bullying experiences may become associated with shame feelings related to perceptions that one's body image may create self-perceptions of inadequacy and inferiority in the eyes of others (Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015; Duarte, Pinto-Gouveia, & Rodrigues, 2015; Gilbert & Irons, 2009). These results contribute to research that empirically supports the theoretical suggestion that shame can play a role in the development and maintenance of the disordered eating continuum (Duarte, Pinto-Gouveia, & Rodrigues, 2015; Gilbert, 2002; Goss & Allan, 2009; Pinto-Gouveia et al., 2014). In this conceptual model cognitive and behavioural symptoms of eating psychopathology possibly serve as a defensive albeit maladaptive function of attempting to mould the self to fit into socially prescribed patterns (e.g.,

thinness; Gilbert, 2002; Gilbert & Thompson, 2002; McKinley, 1998). The current study highlights the potential links between bullying, body image shame and tendencies towards disordered eating patterns and suggests that prevention of bullying early in adolescence may be most beneficial for the development of subsequent self-evaluation and eating behaviour patterns.

The current study has implications for the development of etiological models and possible preventive strategies regarding body image problems and eating psychopathology. Strengths include the longitudinal design and the focus on a critical developmental time period and population to assess the study variables. Nonetheless, there are important limitations that need to be considered. Firstly, these results should be replicated in a larger sample as the sample size of this study may have influenced the strength of the associations detected. Secondly, the study time-window of 3 years may have limited the detection of changes over larger time periods. Future research with extended assessments (i.e., beginning at an earlier age and extending the study to young adulthood) is important to confirm the suggestions derived from the current data. Thirdly, the parsimonious models examined in the current study were incomplete as they excluded other emotional, cognitive, social and physiological variables that have been implicated in the development and maintenance of body image difficulties and eating psychopathology (Slane et al., 2014; Stice et al., 2011). Future studies should attempt to consider how these variables interact to influence the development of body image and eating-related problems in adolescents. Finally, the current study focused solely on girls. Additional research that explores gender differences and cause-effect relationships between victimisation experiences, body image shame and emotional and behavioural indicators of degree of psychological adjustment are required.

4.1. Conclusions

The current study suggests that (i) victimization experiences predict initial levels of body image shame and disordered eating symptoms, (ii) body image shame predicts disordered eating symptoms (the opposite is also true but the effect is smaller) and (iii) the prospective effect of bullying experiences on disordered eating symptoms is not direct, but indirect, mediated by body image shame. These results have implications for prevention strategies that may ameliorate the development of eating psychopathology during the critical developmental stage of adolescence.

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Chapter 5

Emotion regulation processes and eating behavior
in the adult general community

Emotion regulation processes and eating behavior in the adult general community

Chapter overview

- Study XI** Escaping from body image shame and harsh self-criticism: Exploration of underlying mechanisms of binge eating
- Study XII** Body image flexibility mediates the effect of body image related victimization experiences and shame on binge eating and weight.
- Study XIII** Self-Defining Memories of Body Image Shame and Binge Eating in Men and Women: Body Image Shame and Self-Criticism in Adulthood as Mediating Mechanisms

Study XI

Escaping from body image shame and harsh self-criticism: Exploration of underlying mechanisms of binge eating

Adapted from:

Duarte, C., Pinto-Gouveia, J., & Ferreira, C. (2014). Escaping from body image shame and harsh self-criticism: Exploration of underlying mechanisms of binge eating. *Eating Behaviors, 15*(4), 638-643. doi: 10.1016/j.eatbeh.2014.08.025

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Abstract

Shame has been highlighted as a key component of eating psychopathology. However, the specific impact of body image shame on binge eating and the mechanisms through which it operates remained unexplored.

The current study tests a model examining the role that body image shame plays in binge eating and the mediator effect of self-criticism on this association, while controlling for the effect of depressive symptoms, in 329 women from the general population and college students.

Correlation analyses showed that binge eating is positively associated with depressive symptoms, body image shame, and self-criticism, namely with a more severe form of self-criticism characterized by self-disgust, hating and wanting to hurt the self – hated self. Furthermore, results indicated that the path model explained 32% of binge eating behaviours and confirmed that body image shame has a significant direct effect on binge eating, and that this effect is partially mediated by increased hated self.

These findings suggest that binge eating may emerge as a maladaptive way to cope with the threat of being negatively viewed by others because of one's physical appearance and the consequent engagement in a severe critical self-relating style marked by hatred, disgust and contempt towards the self. This study contributes therefore for the understanding of the processes underlying binge eating. Also, these findings have important research and clinical implications, supporting the relevance of developing eating disorder treatments that specifically target shame and self-criticism, through the development of self-compassionate skills.

Keywords: Binge eating; Body image shame; Self-criticism; Mediator effect; Path analysis

1. Introduction

There is increased recognition that binge eating is a serious condition with significant implications for physical and mental health, being linked to the development and maintenance of overweight/obesity and psychiatric comorbidities (e.g., Kessler et al., 2013). Binge eating behaviours are a key feature of Binge Eating Disorder (BED) and also of the other eating disorders diagnoses, but evidence shows that they are also significantly prevalent among individuals without eating disorders (Johnson, Rohan, & Kirk, 2002; Kinzl, Trawegger, Trefalt, Mangweth, & Biebl, 1999). Binge eating involves the occurrence of episodes of overly excessive

and rapid eating in a discrete period of time accompanied by a sense of lack of control that causes great distress. During these episodes one may eat until feeling uncomfortably full; gorging in the absence of hunger, engage in these behaviours in secrecy due to the embarrassment they generate, and feel disgusted with oneself, depressed or very guilty after eating (American Psychiatric Association, 2013).

Extant evidence converge on the notion that negative affect is the most common antecedent of binge eating (e.g., Haedt-Matt & Keel, 2011; Stice, 2001; Stice, Akutagawa, Gaggan, & Agras, 2000). In particular, several studies suggest that depressive symptoms are important risk factors for binge eating (Meno, Hannum, Espelage, & Douglas, 2008; Saules et al., 2009; Spoor et al., 2006). Moreover, it has been suggested that binge eating may result from maladaptive emotional regulation processes, aiming at the avoidance or escape from disturbing thoughts or unstable and undesirable emotional states (Arnou, Kenardy, & Agras, 1992; Goldfield, Adamo, Rutherford, & Legg, 2008; Heatherton & Baumeister, 1991). This attempt to control the internal experience may be effective in the short term, and may even be related to pleasant feelings (Del Parigi, Chen, Salbe, Reiman, & Tataranni, 2003). However, it subsequently increases negative affect and, simultaneously, more difficulties in controlling later eating behaviour. This process may be accompanied by greater shame and self-criticism, which, in turn, seem to further fuel the occurrence of these episodes, generating a self-sustained cycle (Goss & Gilbert, 2002; Jambekar, Masheb, & Grilo, 2003).

Several studies have shown that shame is a major component in several psychological difficulties, namely depressive symptoms (for a review see Kim, Thibodeau, & Jorgensen, 2011). There is also growing evidence showing the relevant role that shame plays in body image and eating related psychopathology (e.g., Ferreira, Pinto-Gouveia, & Duarte, 2013; Gee & Troop, 2003; Goss & Allan, 2009; Murray, Waller, & Legg, 2000; Pinto-Gouveia, Ferreira, & Duarte, 2014). However, the specific role of this emotion in binge eating remains less investigated. Shame is a multifaceted, self-conscious and socially focused emotion, acting as a warning signal that others see and judge the self negatively, and may reject, exclude, or even harm the self (Gilbert, 1998, 2002, 2007). These evaluations can be internalized, in the sense that one may start to view the self in the same negative manner (Gilbert, 1998, 2002). According to an evolutionary biopsychosocial approach to shame (Gilbert, 1997, 1998, 2002, 2007) humans are a highly social species, whose survival and prospering depends on the relationship they establish with others and how others relate to them. Hence, throughout evolution we developed

a set of social motivational systems to create in others a positive image of the self to form advantageous social relationships (e.g., to be chosen as a friend, lover, team member; Gilbert, 1997, 2005; Mikulincer & Shaver, 2005). Shame emerges therefore when an individual believes he/she is failing on creating such image or lacks qualities others value, and is, on the contrary, perceived as a defective, flawed, inadequate, unattractive social agent.

Physical appearance has always been a central domain to define how socially attractive one is to others. In this sense, the sociocultural context clearly defines what others will praise and what others will find negative or rejectable in terms of body weight and shape (Gilbert, 2002). In Modern western societies portraying a slender body shape became a synonym of positive and desirable personality features such as will power and determination (Strahan, Wilson, Cressman, & Buote, 2006), while not fitting into this thin ideal became a highly stigmatized condition (e.g., Puhl & Heuer, 2009) with relevant pathogenic consequences, namely among women (Bessenoff & Snow, 2006; Castonguay, Brunet, Ferguson, & Sabiston, 2012). Actually, perceiving that one's body may somehow differ or be distant to what the social group considers to represent a socially attractive individual, may be linked to the emotion of shame and to the further engagement in disordered eating behaviours as a mean to avoid social inferiority (Ferreira et al., 2013; Pinto-Gouveia et al., 2014).

In this sense, one's physical appearance may be experienced as shaming. When feeling shame about one's body image one may perceive oneself as having unattractive, defective and rejectable physical attributes and thus that one may stand at risk of being put down, excluded, passed by, or even harmed by others (Gilbert, 1997, 1998). Body image concealment or avoidance of situations of possible negative scrutiny by others may then be adopted as defensive outputs to protect the self of such presumed social threats, leading however to increased distress and invalidation in one's life (Gilbert, 2002).

In the face of such perceived shortcomings of the self, due to one's physical appearance, one may engage in critical and punitive responses towards the self. Self-criticism has been conceptualized as a form of self-to-self relating marked by negative judgements and evaluations that may be activated as a safety response in face of setbacks, failures or other threats to the self (e.g., Gilbert, Clarke, Kempel, Miles, & Irons, 2004). In this sense, self-criticism may be understood as a maladaptive defensive strategy, driven by shame (Gilbert & Irons, 2005; Gilbert & Procter, 2006), that aims at correcting and improving personal features or behaviours to

protect the self (Gilbert & Irons, 2005). However, when one fails to defend against one's self-attacks this may often lead to states of defeat. In fact, research has shown that when individuals feel controlled and discouraged by their own harsh self-attacks they may develop submissive and defensive behavioural and emotional outputs, such as depressive symptoms (e.g., Gilbert & Irons, 2005). A more harsh self-attacking relationship characterized by self-hatred, disgust and contempt, has been particularly linked to severe psychological suffering (e.g., Castilho, Pinto-Gouveia, & Duarte, 2013; Gilbert et al., 2010).

There is also evidence showing that self-criticism may play an important mediator role on the association between shame and eating psychopathology (Pinto-Gouveia et al., 2014). The link between self-criticism, depressive symptoms and body image evaluation in BED patients has also been demonstrated (Dunkley & Grilo, 2007; Dunkley, Masheb, & Grilo, 2010). Although these studies suggest the relevance of shame and self-criticism in the vulnerability to and maintenance of disordered eating symptoms, little is known about the extent to which body image shame and self-criticism contribute for the engagement in binge eating. Thus, the current paper aimed to examine whether experiencing shame regarding one's physical appearance is a significant predictor of binge eating and whether this association is mediated by increased levels of self-criticism, while controlling for the effect of depressive symptoms as overall negative affect.

2. Material and methods

2.1. Participants

Participants in this study were 329 women, 221 college students attending different courses and grades, and 108 women from the general population working in private and public corporations. The participants' age ranged from 18 to 57 years old, with a mean of 23.30 ($SD = 10.41$), and their years of education ranged from 6 to 22, presenting a mean of 13.81 ($SD = 2.40$). Participants' Body Mass Index (BMI) mean was 22.85 ($SD = 3.78$). In regard to binge eating, 92.7% ($n = 305$) of the participants presented mild to no binge eating; 5.2% ($n = 17$) moderate binge eating; and 2.1% ($n = 7$) severe binge eating, which is in accordance to recent studies (Kessler et al., 2013).

2.2. Measures

2.2.1. *Body Mass Index*

Participants' BMI was calculated by dividing the weight (in kg) by height squared (in m).

2.2.2. *Binge Eating Scale*

The Binge Eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982; Duarte, Pinto-Gouveia, & Ferreira, submitted for publication) is a 16-item scale designed to measure the behavioural manifestations and emotional and cognitive factors associated with binge eating. Each item comprises three or four statements regarding which participants are asked to choose the one that best describes their eating behaviour. Each option reflects a rating of severity ranging from 0 (reflecting no difficulties with binge eating) to 3 (severe problems with binge eating). Higher scores denote more severe binge eating. The scale yields good internal consistency in both clinical samples (e.g., Gormally et al., 1982; Tapadinhas & Pais-Ribeiro, 2012) and nonclinical samples (Anton, Perri, & Riley, 2000; Duarte et al., submitted for publication). The Cronbach's alpha of the scale in the current study was .88.

2.2.3. *Body Image Shame Scale*

The Body Image Shame Scale (BISS; Duarte, Pinto-Gouveia, Ferreira, & Batista, in press) assesses the experience and phenomenology of body image shame. It comprises 14 items measuring an externalized dimension of body image shame involving the avoidance of social situations in which others may criticize the self because of one's body image; and an internalized dimension, comprising negative self-evaluations and consequent behaviours to control the exposure of one's body image (i.e., concealment). Respondents are asked to rate each item according to the frequency they experience body image shame, using a 5-point Likert scale (ranging from 0 = *Never* to 4 = *Almost always*). Higher scores indicate higher levels of body image shame. In the original study the scale revealed high internal consistency with a Cronbach's alpha of .92. In the current study the scale also revealed a very good internal consistency with a Cronbach's alpha of .94.

2.2.4. *Forms of Self-Criticizing/Attacking & Self-Reassuring Scale*

Forms of Self-Criticizing/Attacking & Self-Reassuring Scale (FSCRS; Gilbert et al., 2004; Castilho & Pinto-Gouveia, 2011) includes 22 items and assesses how respondents typically think and react when they face setbacks or failures. The scale assesses two forms of self-criticism: inadequate-self, which refers to feelings of inadequacy and inferiority, and hated-self, characterized by self-punishment and feelings of disgust, hatred and contempt for the self. This scale also measures the ability to self-soothe (reassured self), but for the purpose of this study only self-criticism subscales were considered. In regard to the probe statement “When things go wrong for me...” participants respond on a 5-point scale (ranging from 0 = *Not at all like me*, to 4 = *Extremely like me*), according to how much each statement applies to their experience. Gilbert et al. (2004) found that the scale yielded good internal consistency (Cronbach's alphas were .86 for hated self and .90 for inadequate self). The scale's Portuguese version also revealed good internal consistency (Castilho & Pinto-Gouveia, 2011). The Cronbach's alphas for the subscales in the current study were .90 for inadequate self, and .75 for hated self.

2.2.5. *Depression Anxiety and Stress Scales*

Depression Anxiety and Stress Scales (DASS21; Lovibond & Lovibond, 1995; Apóstolo, Mendes, & Azeredo, 2006) is a short form of the Lovibond and Lovibond's (1995) 42-item self-report measure scale that includes 21 items measuring levels of depression, anxiety and stress symptoms. Respondents are asked to indicate the frequency in which they experienced each symptom over the past week using a 5-point Likert scale (0 = *Did not apply to me at all* to 4 = *Applied to me very much, or most of the time*). Higher results indicate higher levels of emotional distress. In the current study, depressive symptomatology was assessed through the depression subscale. The original as well as the Portuguese versions of DASS21 reveal adequate internal consistency (with the subscale depression presenting Cronbach's alpha values of .88 and .85, respectively). The Cronbach's alpha for the depression subscale in this study was .88.

2.3. Procedure

To conduct the current study all ethical requirements were met. Participants gave their informed consent after being fully informed about the voluntary nature of their cooperation and the confidentiality of the data collected. The author CD administered the set of self-report

measures described above. Students completed the assessment protocol at the end of a lecture. The remainder participants comprised a convenience sample collected within the staff of distinct institutions (e.g., schools, private companies, retail services). Prior to data collection authorization was obtained from the Boards of the institutions involved.

2.3.1. Calculation

Product-moment Pearson Correlation analyses were conducted to examine the associations between binge eating, body image shame, self-criticism, depressive symptoms, and BMI (Cohen, Cohen, West, & Aiken, 2003). Descriptives and correlational analyses were conducted using the software SPSS (v.21 SPSS; Armonk, NY: IBM Corp.).

A path analysis was conducted to estimate the associations between the study variables hypothesized in the model (Fig. 1). Path analysis is a particular type of Structural Equation Modelling (SEM) used to assess hypothesised causal relations between previously defined variables. It allows for the simultaneous analysis of structural relationships and direct and indirect effects between multiple exogenous and endogenous variables, while controlling for error (Byrne, 2010; Kline, 2005). The current study examined whether the association between body image shame (exogenous variable) and binge eating (endogenous variable) would be mediated by both self-criticism and depressive symptoms (endogenous mediator variables). The Maximum Likelihood estimation method was used to test for the significance of the regression coefficients and to compute fit statistics. The plausibility of the model was ascertained by the following goodness of fit indicators: Chi-square (χ^2), Tucker Lewis Index (TLI), Comparative Fit Index (CFI), Relative Fit Index (RFI) and Root-Mean Square Error of Approximation (RMSEA), with 95% confidence interval.

The significance of the direct, indirect and total effects was assessed by Chi-Square tests and the Bootstrap resampling method, with 2000 Bootstrap samples and 95% bias-corrected confidence intervals (CI) around the standardized estimates of total, direct and indirect effects, was further used to test the significance of the mediational paths. The effects were considered as significantly different from zero ($p < .050$) if zero was not included in the interval between the lower and the upper bound of the 95% bias-corrected confidence interval (Kline, 2005).

The path analysis was examined through the software AMOS (Analysis of Moment Structures, software version 18, SPSS Inc. Chicago, IL).

3. Results

3.1. Preliminary data analyses

Univariate and multivariate normality was assessed by the coefficients of skewness and kurtosis, which indicated that there was no severe violation of normal distribution ($|Sk| < 3$ and $|Ku| < 8-10$; Kline, 2005), with skewness values ranging from 1.13 (BISS) to 2.06 (hated self – FSCRS), and with kurtosis values ranging from 1.15 (BISS) to 5.09 (hated self – FSCRS).

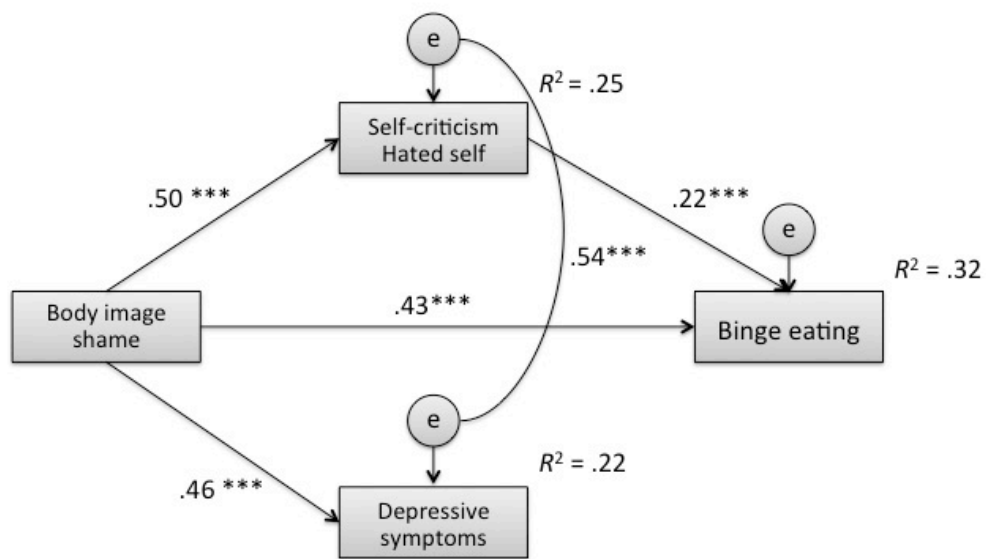


Figure 1 | Path model showing the association between body image shame and binge eating, mediated by hated self form of self-criticism and depressive symptoms, with standardized estimates and square multiple correlations (R^2 ; $N = 329$). **Note.** $*** < .001$

3.2. Descriptives

The means and standard deviations of the study variables (Table 1) were similar to those obtained in previous studies with nonclinical samples (Anton et al., 2000; Castilho et al., 2013; Duarte et al., submitted for publication, in press; Henry & Crawford, 2005). Furthermore, participants' BMI mean was within the normal weight range.

3.3. Correlations

Pearson product-moment correlations for the study variables are presented in Table 1. Binge eating is positively and highly correlated with body image shame. Also, binge eating is

positively associated with the inadequate self form of self-criticism and, with a higher magnitude, with the hated self form of self-criticism. There was also a positive moderate association between binge eating and depressive symptoms.

Body image shame was also positively associated, with moderate correlations, with the inadequate and hated-self forms of self-criticism. Also, body image shame was positively and moderately associated with depressive symptoms. Positive and large significant correlations were also found between depressive symptoms and inadequate and, even higher, with hated self forms of self-criticism. BMI was positively and moderately associated with binge eating symptoms and body image shame. A positive but small correlation was also found between BMI and hated self form of self-criticism. No significant correlations were found between BMI and inadequate self and depressive symptoms.

Even though the two forms of self-criticism present the same correlational pattern with the study variables, results showed that the hated self form emerged as the one presenting the strongest associations with binge eating and depressive symptoms. Taking this into account, hated self was selected as the self-criticism mediator variable in the tested path model.

3.4. Path analysis

The initial model comprised 17 parameters. Initially, the path regarding the direct effect of depressive symptoms and binge eating exceeded the critical value for two-tailed statistical significance at the .05 level ($b_{\text{depression}} = -.02$; $SEb = .10$; $Z = -.21$; $p = .837$; $\beta = -.01$) and was therefore eliminated.

The model was then recalculated and results indicated that all path coefficients were statistically significant ($p < .001$), accounting for 32% of binge eating variance. This parsimonious model revealed an excellent model fit, with a nonsignificant chi-square [$\chi^2_{(1)} = .042$; $p = .837$], and as supported by other recommended goodness-of-fit indices: TLI = 1.014; CFI = 1.000; RFI = .999; RMSEA = .000 ($p = .891$).

Table 1
Descriptives and Pearson product-moment correlations between study variables ($N = 329$)

	<i>M</i>	<i>SD</i>	BES	BISS	InadequateS	HatedS	Depression
BES	7.45	6.81	1				
BISS	0.90	.76	.54***	1			
InadequateS	1.45	0.84	.40***	.50***	1		
HatedS	0.45	0.59	.44***	.50***	.67***	1	
Depression	3.77	4.10	.33***	.46***	.60***	.65***	1
BMI	22.85	3.78	.37***	.42***	.10	.18**	.04

Note. ** $p < .01$; *** $p < .001$

BES = Binge Eating Scale; BISS = Body Image Shame Scale; InadequateS = inadequate self FSCRS subscale; HatedS = hated self FSCRS subscale; Depression = DASS21 depression subscale; BMI = Body Mass Index

Results indicated that body image shame accounted for 25% of hated self form of self-criticism, with a direct effect of .50 ($b_{\text{body image shame}} = .39$; $SEb = .04$; $Z = 10.55$; $p < .001$); and 22% of depression variance, with a direct effect of .46 ($b_{\text{body image shame}} = 2.51$; $SEb = .27$; $Z = 9.48$; $p < .001$). Also, hated self directly predicted binge eating, with a direct effect of .22 ($b_{\text{hated self}} = 2.55$; $SEb = .61$; $Z = 4.20$; $p < .001$), and was highly correlated with depression ($r = .54$).

Furthermore, body image shame presented a total effect of .54 over binge eating, with a direct effect of .43 ($b_{\text{body image shame}} = 3.82$; $SEb = .47$; $Z = 8.08$; $p < .001$) and an indirect effect, mediated by hated self, of .11. All the examined effects were significant ($p < .001$) according to the Bootstrap resampling method. Specifically, the estimate of the indirect effect of body image shame on binge eating framed by a CI of .95% revealed an effect significantly different from zero (CI = .05, .19).

Fig. 1 presents the nested model with the standardized estimates of the regression coefficients and the R^2 of the variables.

4. Discussion and conclusions

Substantial evidence highlights the impact of shame and self-criticism in eating psychopathology (e.g., Ferreira et al., 2013; Gee & Troop, 2003; Murray et al., 2000; Pinto-Gouveia et al., 2014). Nevertheless, the role of body image shame and the aforementioned associations in binge eating remained to be explored. The current study aimed at testing a

model of binge eating, in women from the general population, conceptualized as resulting from a deleterious self-conscious emotion regarding one's physical appearance – body image shame – and a maladaptive way to cope with such perceived defective features of the self – self-criticism –, controlling for overall negative affect – depressive symptoms.

Findings corroborated that body image shame, self-criticism and depressive symptoms are significantly linked to binge eating symptoms. In particular, results confirmed that feelings of shame regarding one's physical appearance, with the inherent engagement in defensive outputs such as body image concealment and avoidance of social interactions (as assessed by the BISS), are highly associated with binge eating. Moreover, these data also suggested that perceiving that one's body image makes the self defective and thus that others will criticize and reject the self, seems to be, in women, highly associated with inner critical evaluations, namely with a more toxic form of self-criticism characterized by self-hatred and self-contempt (i.e., hated self; Gilbert et al., 2004). Furthermore, there was a significant association between body image shame and self-criticism and depressive symptomatology. Results also showed that it is the more destructive form of self-criticism of hated self that presented a stronger association with binge eating and depressive symptoms, in comparison to the inadequate self form of self-criticism.

Overall, these findings suggest the relevant linkages between these variables and how they may be related to the engagement in episodes of uncontrolled overeating.

The path model further examined these associations and clarified the specific role of body image shame and harsh self-criticism in binge eating, while simultaneously considering depressive symptomatology. Findings revealed an excellent model fit, with the model explaining 32% of binge eating's variance. When the model was first tested results indicated that in the presence of body image shame and self-criticism, depressive symptomatology did not directly predict binge eating. These findings are interesting in the sense that they add to current knowledge regarding the role of self-criticism and negative affect on binge eating (Dunkley & Grilo, 2007; Stice et al., 2000). In fact, even though it is well-established that negative affect is an important predictor of binge eating symptoms (Meno et al., 2008; Saules et al., 2009; Spoor et al., 2006; Stice, 2001), the path model tested in the current study suggests that more than a general negative affectivity, it is the specific negative and painful emotion of shame related to one's body image that has a strong direct association with binge eating. Moreover, body image shame was shown to have a direct effect on depressive

symptoms and the hated self form of self-criticism. This type of self-criticism emerged, in turn, as the mechanism partially through which body image shame impacted on binge eating, and was significantly associated with depressive symptoms. Actually, these results seem to support the hypothesis that the impact of depressive symptoms on binge eating is carried by the effect of hated self, a punitive and harsh self-to-self relationship, when one is dealing with perceived inferiority and feared rejection because of one's body image.

To sum up, this model revealed therefore that body image shame is strongly associated with binge eating and that the more pathogenic form of self-criticism of hated self partially mediates this association. This seems to suggest that binge eating may arise in the context of an increased sense that one's physical appearance is a source of social threat (e.g., of being criticized, excluded, or rejected by others (Gilbert, 1998, 2002, 2007). Furthermore, the engagement in a severe form of self-criticism in which the self criticizes and attacks the self as one believes others might, may emerge in this context as a maladaptive way to deal with body image shame, further increasing the pervasive impact of this emotion in binge eating. Thus, these findings corroborate that binge eating may be seen as a maladaptive avoidance or escape strategy in face of emotional distress (e.g., Arnow et al., 1992; Goldfield et al., 2008; Heatherton & Baumeister, 1991), but highlight the specific role of body image shame and self-criticism that extend beyond above overall negative affect.

Even though this study contributes for a greater understanding of binge eating symptoms in women from the general population, supported by rigorous and sophisticated statistical analyses, these findings cannot be understood without considering some limitations. One important limitation is that the cross-sectional design precludes causal conclusions to be drawn. Indeed, the processes examined in the current study contribute for the conceptualization of binge eating as a mean to deal with painful internal experiences, but binge eating, in turn, is associated with increased emotional distress (Haedt-Matt & Keel, 2011) and may be associated with increases in shame and self-criticism (Gilbert, 2002; Goss & Gilbert, 2002), with these processes contributing therefore for a perpetuating cycle. Thus, studies with prospective and experimental designs are warranted to clarify these mechanisms and how they operate in the vulnerability to and maintenance of binge eating symptoms.

Also, since the main aim of the current study was to specifically address the role of body image shame and its association with self-criticism in binge eating symptoms, other relevant variables (e.g., developmental, interpersonal, physiological) that may contribute

to the multidetermined phenomenon of binge eating were beyond this study' scope and were not examined. Future research should then expand on this model considering such variables.

Furthermore, even though binge eating is more prevalent in females, men also experience these symptoms (for instance, there is evidence showing that in BED there is a higher proportion of men in relation to women, in comparison to other eating disorders diagnosis; e.g., Kessler et al., 2013). So, upcoming studies should investigate this model in male samples and explore gender differences in how body image shame impacts binge eating symptoms. Future research should also investigate these associations in large-scale samples and, in particular, in clinical samples to further support the adequacy of this model.

Nevertheless, these findings seem to have important research and clinical implications at both prevention and intervention levels. In fact, even though the existent treatments for eating disorders, especially binge eating (with CBT being the most supported one), are effective in the remission and reduction of symptoms, results regarding the maintenance of improvements are variable (Brownley, Berkman, Sedway, Lohr, & Bulik, 2007; Wilson, Grilo, & Vitousek, 2007). This suggests the importance of considering the processes contributing to the aetiology and maintenance of these problems in order to prevent and target them more effectively to achieve sustained change. The current study seems therefore to be an important contribution by highlighting the relevance of considering body image shame and self-criticism in the conceptualization and intervention with BED and bulimic-type eating disorders. In this sense, this data supports the adequacy of treatment approaches (e.g., Compassion Focused Therapy for Eating Disorders – CFT-E; Goss & Allan, 2010) that focus on overcoming shame and self-criticism by helping individuals to develop abilities for warmth, kindness and compassion (Gilbert, 2005; Gilbert & Irons, 2005). Such competencies enable individuals to tone down emotional distress through self-reassurance and self-soothing, thus promoting effective emotion regulation and disrupting the binge cycle.

In conclusion, the current study offers pertinent suggestions by demonstrating the effect of body image shame and the mechanisms, namely self-criticism, through which it operates on binge eating.

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Contributors

Authors Cristiana Duarte and José Pinto-Gouveia designed the study and wrote the protocol. Author Cristiana Duarte recruited and assessed participants. Authors Cristiana Duarte and Cláudia Ferreira conducted literature research and provided summaries of previous research studies, conducted the statistical analysis and wrote the manuscript throughout its development stages. José Pinto-Gouveia supervised and contributed for these tasks and approved the final manuscript.

Conflict of interest

The authors declare no conflicts of interest.

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Study XII

Body image flexibility mediates the effect of body image-related victimization experiences and shame on binge eating and weight

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Abstract

Objectives: The current study examined a path model testing the indirect effect of negative body-image related memories of being teased and bullied in childhood and adolescence on binge eating severity symptoms, via its effect on current body image shame and body image flexibility.

Methods: Participants were 853 Portuguese women from the general community who completed a set of self-report measures of body image-related bullying and teasing experiences in childhood and adolescence, current body image shame, body image flexibility, binge eating symptoms, body mass index (BMI) and depressive symptoms.

Results: The path model accounted for 40% of the variance of binge eating symptoms and 14% of the variance of BMI, and revealed a very good fit. Findings corroborated the plausibility of the hypothesized associations suggesting that negative body image-related memories and emotional experiences are significantly associated with binge eating symptoms and BMI, and that body image flexibility is a significant mediator of these associations. The examined relationships were preserved after controlling for the effect of depressive symptoms.

Conclusions: The current study's findings contribute to clarify the role that body image-related memories and emotional experiences may play on individuals' difficulties in regulating eating behaviour and weight, and provides preliminary support for the potential effect of body image flexibility as a self-regulatory process that operates in these associations.

Keywords: Body image victimization; Body image shame; Psychological flexibility; Binge eating; Body Mass Index

1. Introduction

Binge eating is characterized by the intake of large amounts of food, in a discrete period of time, with a sense of lack of control. During binge eating episodes, food consumption may be faster than usual, one may eat until feeling uncomfortably full, in the absence of hunger and in secrecy because of feelings of shame about the behaviour. After eating, individuals may feel disgusted with themselves, depressed or very guilty (American Psychiatric Association, 2013). Binge eating behaviours are a hallmark feature of the currently established eating disorders diagnoses of

Bulimia Nervosa and Binge Eating Disorder (American Psychiatric Association, 2013), but are also a prevalent problem in the general population. These behaviours are currently recognized as a public health concern with important deleterious health consequences, having a high comorbidity with overweight and obesity and poor psychological adjustment (Bulik & Reichborn-Kjennerud, 2003; Hudson, Hiripi, Pope, & Kessler, 2007; Kessler et al., 2013; Ribeiro, Conceição, Vaz, & Machado, 2014). The scientific literature supports that binge eating is associated with maladaptive emotion regulation capacities (Whiteside et al., 2007). In fact, existing conceptualizations suggest that eating binges are developed and maintained as a means of temporarily reducing or escaping the experience of negative emotions (Heatherton & Baumeister, 1991), particularly emotions associated with negative self-evaluations, criticism from others and other complex interpersonal difficulties (Rieger et al., 2010).

Actually, negative interpersonal interactions that posit a threat to the self have been identified as an important risk factor for binge eating (Menzel et al., 2010; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002). In particular, weight-based negative interactions of bullying, teasing, negative verbal commentary or other non-verbal forms of victimization, perpetrated by peers and by parents, have been identified as significant predictors of difficulties to regulate eating behaviour and weight (Fairburn et al., 1998; Field et al., 2008; Jackson, Beeken, & Wardle, 2014; Sweetingham & Waller, 2008). In a large 5-year prospective study, Haines, Neumark-Sztainer, Eisenberg, and Hannan (2006) demonstrated that adolescents who were teased about their weight were more likely than their peers to develop disordered eating behaviours, namely binge eating symptoms. Nonetheless, the factors contributing for the development of binge eating symptoms are complex, and other variables have been identified as potential risk factors, namely the exposure to media images representative of the 'thin ideal', and the pressure to achieve this socially-valued physical appearance and avoid weight-related stigmatization (e.g., Field et al., 2008; Stice, Presnell, & Spangler, 2002). Moreover, evidence suggests that the extent to which one's body image comes to be perceived as the possible cause for negative social evaluations and interactions, seems to play a key role in the development and maintenance of eating-related difficulties (Duarte, Pinto-Gouveia & Rodrigues, 2015d; Ferreira, Pinto-Gouveia, & Duarte, 2011; Gilbert, 2002; Goss & Allan, 2010). Thus, the link between weight-focused negative interpersonal interactions and binge eating symptoms is not necessarily direct and may be influenced by important mechanisms.

These threatening interpersonal experiences have been found to contribute to the development of shame feelings about the self (Matos, Pinto-Gouveia, & Duarte, 2013; Pinto-Gouveia & Matos, 2011), which involve negative evaluations of being a defective, inferior, faulty social agent in the eyes of others. Body image has been identified as a particular source of shame that is significantly associated with indicators of poor psychological adjustment (Castonguay, Brunet, Ferguson, & Sabiston, 2012; Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015c; Gilbert, 2002; Noll & Fredrickson, 1998). In particular, a study conducted in a sample of women from the general community revealed that body image shame significantly accounted for the severity of binge eating symptoms, above the effect of overall negative affect (Duarte, Pinto-Gouveia, & Ferreira, 2014). A recent study also demonstrated that shame is strongly associated with the severity of the symptomatology presented by women with Binge Eating Disorder (Duarte, Pinto-Gouveia, & Ferreira, 2015a). Moreover, this study clarified that the dimension of body image plays a significant role on this association. In fact, results suggested that shame had an impact on the severity of binge eating symptoms via the extent to which shame was associated with the tendency to become overly focused and disturbed by body image-related cognitions.

These findings are consistent with the accruing research substantiating the hypothesis that important self-regulatory processes mediate the impact of negative internal experiences, particularly those related with body image, on the continuum of disordered eating. A process that has been recognized as a particularly relevant mechanism is body image flexibility (Ferreira et al., 2011; Hill, Masuda, & Latzman, 2013; Moore, Hill, & Goodnight, 2014). Body image flexibility refers to the ability to accept difficult emotions, thoughts and memories about one's body while remaining committed to engage in helpful actions consistent with one's chosen values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Sandoz, Wilson, Merwin, & Kellum, 2013). There is evidence that individuals with a higher ability to accept these internal experiences related to body image tend to present a decreased tendency to engage in pathological dieting (e.g., Ferreira et al., 2011), less binge eating symptoms (Duarte & Pinto-Gouveia, 2014), more adaptive eating styles (Schoenefeld & Webb, 2013), a healthier BMI (Wendell, Masuda, & Le, 2012), and more adaptive emotion regulation skills (Kelly, Vimalakanthan, & Miller, 2014).

The current study aimed at investigating a path model that tested, on a large sample of women from the general population, the indirect effect of negative body image-related memories of being teased and bullied in early life on binge eating symptoms and BMI, via its effect on

current body image shame, and on body image flexibility. According to prior evidence that demonstrated the negative impact of victimization experiences on body image shame (Duarte et al., 2015d), we hypothesized that memories of being bullied or teased about one's body image by important reference figures throughout one's development was associated with current body image shame. Body image shame, in turn, was hypothesized to be significantly associated with binge eating symptoms and increased BMI. Moreover, in view of prior evidence (e.g., Ferreira et al., 2011; Duarte & Pinto-Gouveia, 2014; Wendell et al., 2012) we hypothesized observing negative associations between body image flexibility, memories of body image-related victimization experiences, body image shame, binge eating symptoms and BMI. Finally, we surmised that body image flexibility would mediate the effect of body image-related victimization and body image shame on binge eating symptoms and BMI. These associations were expected to persist when accounting for the effect of depressive symptoms.

2. Method

2.1. Participants

Participants were 853 female participants (including students and women from the general community), whose ages ranged from 18 to 55, with a mean of 28.74 ($SD = 10.94$). The participants' years of education ranged from 5 to 24, with a mean of 13.21 ($SD = 2.60$). The participants' body mass index (BMI) mean was 22.69 ($SD = 3.59$). Sixty-four (7.5%) participants were underweight ($BMI < 18.5$), 591 (69.3%) had a normal weight ($18.5 \geq BMI \leq 25.0$), 160 (18.7%) were overweight ($25 \geq BMI \leq 29.9$), and 38 (4.5%) were obese ($BMI \geq 30$), which corresponded to the BMI distribution in the female Portuguese population (Poínhos et al., 2009). Regarding binge eating symptoms, 800 (93.8%) participants presented mild to no binge eating; 44 (5.1%) moderate binge eating; and 9 (1.1%) presented severe binge eating, which is in accordance with values found in other community samples with similar characteristics to those of the current study (Duarte, Pinto-Gouveia, & Ferreira, 2015b; Kessler et al., 2013).

3. Measures

3.1. *Body mass index*

The participants' BMI was calculated by dividing self-reported weight (in Kg) by height squared (in m).

3.2. *Binge Eating Scale*

BES (Gormally, Black, Daston, & Rardin, 1982) is a 16-item self-report instrument that assesses the behavioural, emotional and cognitive dimensions of binge eating. Each item comprises three to four statements that represent a rating of severity, which ranges from 0 (no difficulties with binge eating) to 3 (severe problems with binge eating). Respondents are asked to select the statement that best applies to them. The score range is from 0 to 46. The scale presents good psychometric properties, with a Cronbach's alpha of 0.85 in the original validation study conducted with people with obesity (Gormally et al., 1982). In a sample of women from the general population the scale was found to be a reliable measure of binge eating symptoms, with a test-retest (over 4 weeks) estimate of 0.84, good construct reliability and discriminant validity, and good internal consistency (with a composite reliability value of 0.88; Duarte et al., 2015b).

3.3. *Body Image Victimization Experiences Scale*

BIVES (Duarte & Pinto-Gouveia, 2016) measures childhood or adolescence experiences of bullying and teasing related to physical appearance perpetrated by peers (friends or colleagues; BIVES_Peers) or by parents (or other significant carers; BIVES_Parents). The BIVES comprises 12 items regarding which respondents are invited to rate, using a 5-point Likert Scale, the frequency to which they experienced each situation described (ranging from 1 = *Never* to 5 = *Very frequently*) and the emotional impact the experience had for them (ranging from 1 = *Nothing* to 5 = *A lot*). The mean score of the two subscales range from 1 to 5. In the validation study of the BIVES, conducted in a nonclinical sample of women from the general population, the two subscales presented very good psychometric properties, including construct validity, test-retest reliability (ranging from 0.80 to 0.89), and internal consistency (with both subscales presenting a composite reliability value of 0.95; Duarte & Pinto-Gouveia, 2015, September).

3.4. *Body Image Shame Scale*

BISS (Duarte et al., 2015c) is a measure of body image shame, that is, perceptions of being negatively evaluated or criticized by others because of one's physical appearance, and negative self-evaluations due to one's physical appearance. Participants are asked to rate each item according to the frequency with which they experience body image shame, using a 5-point Likert scale (ranging from 0 = *Never* to 4 = *Almost always*). The scale's mean score range from 0 to 4. The scale was validated in a large nonclinical sample of women from the general population and the scale revealed very good construct and discriminant validities, temporal stability (with an estimate of 0.75 in a 4-week period) and high internal consistency with a composite reliability estimate of 0.96 (Duarte et al., 2015c).

3.5. *Body Image Acceptance and Action Questionnaire*

BI-AAQ (Sandoz et al., 2013) is a 12-item scale that measures body image-related psychological flexibility, which entails the capacity to accept thoughts, memories, emotions and sensations related to body image, along with the capacity to adopt adaptive actions committed with one's values. Respondents are asked to rate the extent to which each item applies to them, using a 7-point scale (ranging from 1 = *Never true* to 7 = *Always true*). The score range is from 7 to 84. The scale presented good construct validity, test-retest reliability and internal consistency in the original validation study (with Cronbach's alpha values of 0.92 and 0.93; Sandoz et al., 2013) and in the Portuguese validation study conducted in a nonclinical sample of women from the general population (with a Cronbach's alpha of 0.95; Ferreira et al., 2011).

3.6. *Depression anxiety and stress scales*

DASS21 (Lovibond & Lovibond, 1995) assesses levels of depression, anxiety and stress symptoms. Respondents are asked to indicate how frequently they experienced such symptoms over the previous week on a 5-point scale (ranging from 0 = *Did not apply to me at all* to 4 = *Applied to me very much, or most of the time*). In the current study, depressive symptoms were assessed through the depression subscale. This subscale score range is from 0 to 21. This subscale was found to have adequate convergent and discriminant validity, and internal consistency in both the original validation study (with a Cronbach's alpha of 0.88; Lovibond & Lovibond, 1995) and in the Portuguese validation study (with a Cronbach's alpha of 0.85; Pais-Ribeiro, Honrado, & Leal, 2004), both conducted in nonclinical samples of the general population.

The internal reliability coefficients of each measure used in the current study are reported in **Table 1**.

3.7. Procedures

All ethical requirements were met to conduct the current study. Students completed the measures at the end of a designated lecture authorized by the respective institution Board. The participants from the general population comprised staff members of different institutions (e.g., schools, hospitals, private companies, retail services) and completed the measures during an authorized break approved by the institution Board. The participants were informed about the voluntary and confidential nature of their cooperation, received standardized instructions, and provided their written informed consent. A total of 895 participants initially completed the questionnaire; 4.7% were excluded because they did not provide data regarding height or weight or >15% of the answers were missing from a questionnaire.

3.8. Data analysis

Pearson product-moment correlation coefficients were calculated to examine the correlations between the study variables (Cohen, Cohen, West, & Aiken, 2003). Descriptives and correlational analyses were conducted using the SPSS software (v.21 SPSS; Armonk, NY: IBM Corp.).

A path analysis (**Fig. 1**) was conducted to examine the association between early experiences of body image-related bullying and teasing by parents and peers (exogenous variables) and both binge eating symptoms and BMI (endogenous variables), and potential mediator mechanisms – body image shame and body image flexibility – influencing this association. Path analysis is a particular technique within Structural Equation Modelling that allows for the simultaneous examination of direct and indirect effects considering multiple mediators (Kline, 2005). Therefore, the model tested the hypothesis that body image shame is a significant mechanism (first endogenous mediator variable) through which body image-related bullying and teasing experiences influence binge eating and weight, directly and partially through its effect on body image flexibility (second endogenous mediator variable).

The Maximum Likelihood estimation method was used to examine the significance of the regression coefficients and to calculate fit statistics. The following model fit indicators were used to test model fit: Chi-square test (χ^2), Tucker Lewis Index (TLI), Comparative Fit Index (CFI),

and the Root-Mean Square Error of Approximation (RMSEA), with 90% confidence intervals (CI). The significance of the mediation effects were analysed through the Bootstrap resampling method, with 5000 Bootstrap samples and 95% bias-corrected confidence intervals around the standardized estimates of total, direct and indirect effects (Kline, 2005; Tabachnick & Fidell, 2013). The path model was examined using the AMOS software (Analysis of Moment Structures, software version 21, SPSS; Armonk, NY: IBM Corp.).

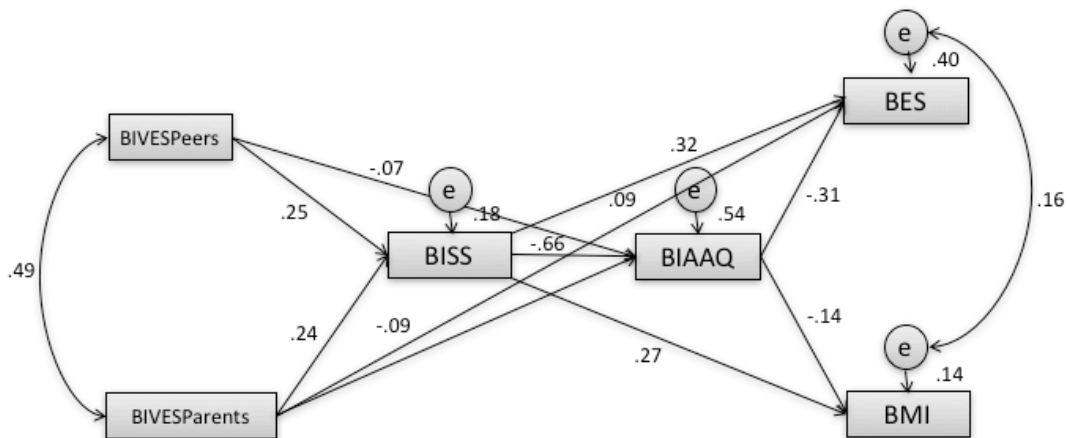


Figure 1 | Path model representing the association between body image-related victimization experiences and binge eating symptoms and BMI, mediated by current body image shame and body image flexibility, with standardized estimates and square multiple correlations ($N = 853$).

4. Results

4.1. Descriptives and correlations

Preliminary analysis indicated that there was no serious violation of normal distribution: Skewness values ranged from 0.86 (BIVES_Parents) to 1.53 (BES), and Kurtosis values ranged from - 0.67 (BIVES_Parents) to 2.80 (BES). The means and standard deviations of the study variables are reported in **Table 1**.

Table 1

Means (*M*), Standard Deviations (*SD*), Cronbach's alpha (α) and correlation coefficients between the study's variables

	<i>M</i>	<i>SD</i>	α	BIVES Peers	BIVES Parents	BISS	BIAAQ	BES	BMI
BIVES Peers	1.45	0.77	.92	1					
BIVES Parents	1.26	0.59	.91	.49**	1				
BISS	0.88	0.77	.94	.37**	.36**	1			
BIAAQ	27.28	15.03	.96	-.36**	-.37**	-.72**	1		
BES	6.48	6.05	.86	.25**	.33**	.58**	-.58**	1	
BMI	22.69	3.59	-	.15**	.17**	.36**	-.33**	.35**	1
DEP	3.52	3.90	.87	.23**	.19**	.38**	-.36**	.28**	.07*

Note. BIVES = Body Image Victimization Experiences Scale; BISS = Body Image Shame Scale; BIAAQ = Body Image Acceptance and Action Questionnaire; BES = Binge Eating Scale; DEP = DASS21 depression subscale; BMI = Body Mass Index

* $p < .05$; ** $p < .001$

Pearson product-moment correlation coefficients are also reported in **Table 1**. Results indicated a positive moderate association between body image-related bullying and teasing experiences perpetrated by peers and by parents. These experiences were also positively associated with body image shame and binge eating symptoms, and negatively associated with body image flexibility. Smaller associations were found with depressive symptoms and BMI. Body image shame was strongly associated with binge eating symptoms, and moderately associated with BMI and depressive symptoms. Body image flexibility was negatively and strongly associated with body image shame, binge eating symptoms and moderately associated with BMI and depressive symptoms. Binge eating presented a positive moderate association with BMI and a positive but smaller association with depressive symptoms.

4.2. Path analysis

The initial model comprised 31 parameters. The paths regarding the direct effect of body image-related victimization experiences with peers on binge eating symptoms ($b_{\text{BIVES_Peers}} = -0.16$; $SEb = 0.12$; $Z = -1.39$; $p = 0.165$; $\beta = -0.04$) and on BMI ($b_{\text{BIVES_Peers}} = -0.03$; 0.03 ; $SEb = 0.08$; $Z = -0.30$; $p = 0.766$; $\beta = -0.01$), and the direct effect of body image-related victimization experiences with parents on BMI ($b_{\text{BIVES_Parents}} = 0.09$; $SEb = 0.11$; $Z = 0.82$; $p = 0.414$; $\beta = 0.03$) were nonsignificant. After the removal of these nonsignificant paths, results indicated that the model accounted for 40% of binge eating symptoms and 14% of BMI variance and presented a

very good model fit: $\chi^2_{(3)} = 2.52$, $p = 0.472$; TLI = 1.00; CFI = 1.00; RMSEA = 0.00 (CI = 0.00 to 0.05; $p = 0.928$).

Results indicated that body image-related victimization experiences with peers and parents presented respectively a direct effect of 0.25 ($b_{\text{BIVES_Peers}} = 0.12$; $SEb = 0.02$; $Z = 7.13$; $p < 0.001$) and 0.24 ($b_{\text{BIVES_Parents}} = 0.14$; $SEb = 0.02$; $Z = 6.69$; $p < 0.001$) on body image shame; a direct effect of -0.07 ($b_{\text{BIVES_Peers}} = -0.67$; $SEb = 0.26$; $Z = 2.63$; $p = 0.009$) and -0.09 ($b_{\text{BIVES_Parents}} = -1.09$; $SEb = 0.32$; $Z = 3.41$; $p < 0.001$) on body image flexibility, and an indirect effect of -0.17 and -0.16 on body image flexibility mediated by body image shame (CI = -0.22 to -0.12 , $p < 0.001$; CI = -0.22 to -0.10 , $p < 0.001$, respectively). Body image-related victimization experiences with peers and parents presented a direct effect of 0.09 ($b_{\text{BIVES_Peers}} = 0.43$; $SEb = 0.13$; $Z = 3.20$; $p < 0.001$) on BES. Moreover, body image-related victimization experiences with peers and parents presented a total effect of 0.16 and 0.25 on binge eating symptoms, respectively. Also, the indirect effects of body image-related victimization experiences with peers and parents on binge eating symptoms (0.16 for both), were significantly mediated by body image shame and body image flexibility (CI = 0.11 to 0.21, $p < 0.001$ for both). Regarding BMI, results indicated that body image-related victimization experiences with peers and parents presented an indirect effect on BMI (0.10 for both), again significantly mediated by body image shame and body image flexibility (CI = 0.07 to 0.14, $p < 0.001$; and CI = 0.06 to 0.14, $p < 0.001$, respectively). The path model was recalculated controlling for the effect of depressive symptoms ($\chi^2_{(3)} = 24.11$, $p < 0.001$; TLI = 0.97; CFI = 0.99; RMSEA = 0.06 (CI = 0.04 to 0.08; $p = 0.231$) and the results confirmed the stability of the significance, strength and direction of the examined structural relationships.

5. Discussion

Clarifying the mechanisms that contribute to body image disturbance, disordered eating and weight regulation is currently a main focus of interest for researchers and clinicians. The current study uniquely adds to existing research by testing a model that examines the role of early experiences of body image-related bullying and teasing about body image, current body image shame, and body image flexibility on binge eating severity and weight in a community sample.

Results of the bivariate associations were aligned with prior research demonstrating the association between body image related teasing and bullying perpetrated by peers and parents and binge eating (e.g., Fairburn et al., 1998; Haines et al., 2006), and the significant link between body image shame and the severity of binge eating symptoms (Duarte et al., 2014). In fact, findings supported our initial predictions in that body image-related teasing perpetrated by peers and parents was associated with both body image shame and binge eating symptoms. Moreover, body image flexibility was shown to negatively correlate with these negative memories and emotions related to body image, and with binge eating severity and BMI. Although weaker in strength, results also revealed that memories of negative body image-focused interactions, body image shame, binge eating symptoms, and decreased body image flexibility were associated with increased BMI.

Moreover, the path model, which examined the effect of early body image-related bullying and teasing experiences on binge eating symptoms and BMI, mediated by body image shame and body image flexibility, was found to account for a total of 40% of the variance of binge eating severity variance and for 14% of the variance of BMI and provided evidence in support for the hypothesized indirect effects. In fact, the results revealed that recollections of being teased, picked on, name-called or rejected because of one's body image by one's peers or parents, was indirectly associated with binge eating symptoms and BMI, with this effect operating via the hypothesized mediating mechanisms. In particular, these findings provided evidence supporting the hypothesis that these negative interaction experiences may become associated with shame feelings about the self because of one's physical appearance. In addition, our data suggests that it is through an increase in this specific negative emotional experience that such negative memories impact binge eating symptoms, even when accounting for the effect of depressive symptoms. The findings also provided preliminary evidence to support the hypothesis that body image flexibility is a particularly important self-regulatory mechanism operating on the relationship between negative internal experiences and difficulties with eating behaviour and weight. In fact, the examined model suggested that decreased body image flexibility significantly mediated the effect of recollections of body image-related victimization experiences and current body image shame on binge eating severity scores and increased BMI.

The present findings are consistent with prior research and contribute to accumulating evidence on the factors and mechanisms underlying deregulated eating behaviour (e.g., Ferreira et al., 2011; Duarte & Pinto-Gouveia, 2014; Duarte et al., 2015a; Moore et al., 2014). In particular, this

study corroborates mounting empirical data demonstrating that body image-related self-evaluation and emotional processes play a determinant role in the understanding of binge eating symptoms and weight regulation (Duarte et al., 2014; Duarte et al., 2015a; Lillis & Kendra, 2014; Webb & Forman, 2013). Therefore, our results support the idea that the dimension of body image should be considered in assessment and intervention protocols for full syndrome and subthreshold binge eating. Moreover, the evidence provided by the current study aligns with scholarship postulating that negative internal experiences do not necessarily lead to psychological maladjustment and suffering, and that the ability to flexibly accept such negative experiences while engaging in adaptive actions committed with one's optimal well-being, plays a determinant role in this link (Hayes, 2004). In fact, the findings suggest that the extent to which individuals binge eat as a means to momentarily alleviate or escape negative internal experiences may be influenced by their ability to mindfully accept them without engaging in such reactive damaging behaviours. These associations were less expressive in relation to BMI, but point out to the significant relationship between higher body image flexibility and healthy weight status (Kelly et al., 2014; Wendell et al., 2012) and merits therefore further empirical scrutiny in future research that includes participants with greater weight diversity.

Clinically, our results suggest the relevance of assessing body image-related negative experiences, and the defensive maladaptive function of disordered eating symptoms (e.g., Goss & Allan, 2010), and highlight that body image flexibility is a potential process of change that should be therapeutically addressed. In particular, the current study seems to support the potential beneficial effect of compassion and acceptance-based approaches that focus on building psychological flexibility regarding difficult or unwanted emotions, memories, or negative self-evaluations. These treatment approaches aim at changing individuals' relationship with such internal experiences rather than attempting to control, diminish or avoid them, and at helping them to engage in adaptive actions with self-kindness (e.g., Baer, Fischer, & Huss, 2005; Juarascio, Forman, & Herbert, 2010; Lillis & Kendra, 2014; Sandoz, Wilson, & DuFrene, 2010; Tirch, Schoendorff, Silberstein, Gilbert, & Hayes, 2014).

The current study has several limitations, including its cross-sectional design, which precludes conclusions regarding causality. Also, the use of self-report data on retrospective experiences does not permit ruling out response bias. In addition, although this study was conducted in a large sample of women from the general community, which corresponds to a population of interest to examine the continuum of disordered eating behaviours, the current findings cannot

be extended to male participants. Moreover, the number of people reporting moderate or severe binge eating in the current study was small and thus results should not be generalized to samples of individuals struggling with weight management difficulties or eating disorders. Nonetheless, our findings point out to important research directions to be examined in longitudinal studies examining the effect of childhood and adolescence experiences of body image-related bullying and teasing in individuals' disordered eating and body weight over time. Moreover, forthcoming studies should explore the current findings in experimental studies examining the beneficial effect of therapeutic approaches that cultivate a mindful accepting and compassionate attitude in face of difficult experiences and challenges related to body image (Goss & Allan, 2010; Juarascio et al., 2010; Lillis & Kendra, 2014; Sandoz et al., 2010; Tirch et al., 2014). Thus, although further research is necessary, the current study contributes for a greater understanding of the potential factors operating on the emergence of binge eating behaviours, and for the identification of the mechanisms that can be therapeutically addressed in the early prevention of disordered and in the promotion of healthy eating behaviours and body image attitudes.

Authors disclosure

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Contributors

Authors Cristiana Duarte and José Pinto-Gouveia designed the study and wrote the protocol. Author Cristiana Duarte recruited and assessed participants. Author Cristiana Duarte conducted literature research and provided summaries of previous research studies, conducted the statistical analysis and wrote the manuscript throughout its development stages. José Pinto-Gouveia supervised and contributed for these tasks and approved the final manuscript.

Conflict of interest

The authors declare no conflicts of interest.

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Study XIII

Self-defining memories of body image shame and binge eating in men and women: Body image shame and self-criticism in adulthood as mediating mechanisms

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Abstract

Despite the growing evidence of the association between shame experiences and eating psychopathology, the specific effect of body image-focused shame memories on binge eating remains largely unexplored. The current study examined this association and considered current body image shame and self-criticism as mediators. A multi-group path analysis was conducted to examine gender differences in these relationships. The sample included 222 women and 109 men from the Portuguese general and college student populations who recalled an early body image-focused shame experience and completed measures of the centrality of the shame memory, current body image shame, binge eating symptoms, depressive symptoms, and self-criticism. For both men and women, the effect of the centrality of shame memories related to body image on binge eating symptoms was fully mediated by body image shame and self-criticism. In women, these effects were further mediated by self-criticism focused on a sense of inadequacy and also on self-hatred. In men, only the form of self-criticism focused on a sense of inadequacy mediated these associations. The present study has important implications for the conceptualization and treatment of binge eating symptoms. Findings suggest that, in both genders, body image-focused shame experiences are associated with binge eating symptoms via their effect on current body image shame and self-criticism.

Keywords: Binge eating; Body image shame; Centrality of shame memories; Self-criticism; Mediator effect; Gender differences

Introduction

Binge eating involves episodes marked by the intake of large amounts of food, along with a sense of lack of control and accompanied by marked distress. These episodes are characterized by rapid consumption, by eating until uncomfortably full in the absence of hunger and in secrecy due to shame about the behaviour, or by feelings of disgust, depression, or guilt felt after eating (American Psychiatric Association, 2013). Binge eating behaviours are currently recognized as a serious concern by virtue of their association with a host of physical and psychological problems, including overweight and obesity, and psychiatric symptoms and comorbidities (Bulik & Reichborn-Kjennerud, 2003; Hudson, Hiripi, Pope, & Kessler, 2007; Kessler et al., 2013). Binge eating behaviours are prevalent in the general population (Johnson, Rohan, & Kirk, 2002; Kinzl,

Traweger, Trefalt, Mangweth, & Biebl, 1999; Ribeiro, Conceição, Vaz, & Machado, 2014) and are not restricted to clinically established eating disorders (e.g., Bulimia Nervosa [BN] and Binge Eating Disorder [BED]; American Psychiatric Association, 2013). Data from the World Health Organization World Mental Health Survey initiative, obtained in 14 countries, indicate that on average the lifetime prevalence for BED is 2% for men and 3% for women, and approximately 4% of men and 5% of women experience any binge eating symptoms throughout their lifetime (Kessler et al., 2013). Despite the growing research on binge eating, the scientific examination of the factors underlying these behaviours is still warranted to better understand and address this problematic behaviour.

Existent conceptualizations describe binge eating symptoms as a short-term attempt to escape, avoid or alleviate aversive negative emotional states and self-evaluations (Dakanalis, Carrà, Calogero, et al., 2015; Goldfield, Adamo, Rutherford, & Legg, 2008; Goss & Gilbert, 2002; Heatherton & Baumeister, 1991). The role of negative affect on the development of binge eating symptoms is well documented (Dakanalis, Timko, et al., 2014; Goldschmidt, Wall, Loth, Bucchianeri, & Neumark-Sztainer, 2014; Spoor et al., 2006). Goldschmidt, Wonderlich, et al. (2014) found that stressful events, namely interpersonal stressors, predicted binge eating symptoms in women with BN and that this association was mediated by increases in negative affect. Other studies conducted with clinical samples support that greater negative affect precedes binge eating episodes (for a review, see Haedt-Matt & Keel, 2011). Research conducted in non-clinical samples also supports the association between negative affect and binge eating. A study conducted with female college students indicated that negative familial experiences (e.g., weight and eating related criticism) were indirectly associated with binge eating symptoms—mediated by depressive symptoms, an externalized sense of control, and negative body esteem. These findings suggested that problematic eating behaviour may be adopted as a means to cope with negative internal states (Meno, Hannum, Espelage, & Low, 2008). Also, Saules and colleagues (2009) found that negative self-evaluations of being overweight and negative affect were associated with binge eating symptoms among college students. Moreover, a recent study conducted with women from the general community showed that the specific negative emotion of shame related to body image had a significant effect on binge eating symptoms, above the effect of overall negative affect (e.g., depressive symptoms; Duarte, Pinto-Gouveia & Ferreira, 2014).

Nonetheless, theoretical considerations and empirical accounts indicate that even though binge eating may alleviate these negative emotions and cognitions in the short term, after engaging in these behaviours negative affect increases (Haedt-Matt & Keel, 2011), and people may find themselves feeling ashamed and becoming self-critical (Goss & Gilbert, 2002; Jambekar, Masheb & Grilo, 2003). These negative emotions and self-evaluations seem, in turn, to be associated with the severity of binge eating symptoms, possibly fuelling a self-sustained cycle (Duarte et al., 2014; Duarte, Pinto-Gouveia, & Ferreira, 2015a; Duarte, Pinto-Gouveia, Ferreira & Batista, 2015c).

Shame Experiences and Binge Eating

The aetiology of binge eating is complex and multidetermined (Fairburn et al., 1998; Striegel-Moore, Dohm, Pike, Wilfley, & Fairburn, 2002). Retrospective studies suggest that adverse experiences in childhood and adolescence—including bullying experiences by peers, sexual and physical abuse, parental criticism and low affection, and negative comments about body weight and shape—are risk factors for BED (Fairburn et al., 1998; Striegel-Moore et al., 2002; Striegel-Moore et al., 2005). Nonetheless, the mechanisms underlying the associations between such negative experiences and binge eating symptoms remain less explored.

Difficulties in emotion regulation have been identified as resulting from early negative social experiences (e.g., abuse, neglect, rejection criticism; Blatt & Zuroff, 1992; Gilbert, Clarke, Hempel, Miles, & Irons, 2004; Perris & Gilbert, 2000; Schore, 1994). Among such negative early interactions, shame experiences are particularly pathogenic and are associated with several psychopathological indicators (Blatt & Zuroff, 1992; Gilbert, 1998, 2007; Matos & Pinto-Gouveia, 2010; Matos, Pinto-Gouveia, & Gilbert, 2013; Pinto-Gouveia, Castilho, Matos, & Xavier, 2013).

The effect of such experiences can be understood in light of the evolutionary biopsychosocial model of shame (Gilbert, 1992, 1998, 2002, 2007). According to this model, humans are innately prone to be highly influenced by the quality of social relationships (Baumeister & Leary, 1995; Cozolino, 2007; Gerhardt, 2004; Gilbert, 1992, 2000; Schore, 1994). Moreover, being able to stimulate positive affect and being regarded as attractive by one's social group are key to engaging others to form advantageous social relationships and to feeling safe within the social arena. On the contrary, perceiving or experiencing failures in these domains is perceived as highly threatening and sets the basis for the activation of shame and self-critical/attacking feelings and cognitions (Gilbert, 1992, 1997, 1998, 2002, 2003, 2007; Tangney & Dearing, 2002).

Researchers found that shame experiences occurring in childhood and adolescence can become central to self-identity and one's life story, becoming a key component of one's sense of self and a reference point for everyday inferences and expectations, as well as greatly influencing one's social interactions (Bernsten & Rubin, 2006; Pinto-Gouveia & Matos, 2011). These experiences can have enduring pathogenic effects. In fact, there is consistent evidence showing that the centrality of early shame memories is associated with depressive symptomatology later in life (Matos & Pinto-Gouveia, 2010; Matos, Pinto-Gouveia, & Duarte, 2012; Matos et al., 2013; Pinto-Gouveia et al., 2013; Pinto-Gouveia & Matos, 2011). Moreover, studies conducted with patients with eating disorders showed that shame memories significantly predicted the severity of the disorder and that this effect was mediated by perceptions of being inferior in the social world (Ferreira, Matos, Duarte, & Pinto-Gouveia, 2014; Matos, Ferreira, Duarte, & Pinto-Gouveia, 2015). Nonetheless, little is known about the effect of shame memories on specific symptoms of eating psychopathology, namely binge eating, and the mechanisms involved in this association.

Body image has been identified as a particularly important source of shame because it represents a dimension of the self that can be easily assessed and scrutinised by others (Duarte et al., 2015c; Gilbert, 2002; Goss & Gilbert, 2002; Tangney, Miller, Flicker, & Barlow, 1996). In fact, the display of a body image with valued features has always played an important role in the interplay of others' and self evaluations (Strahan, Wilson, Cressman, & Buote, 2006). In particular for women, physical appearance has been a fundamental dimension for self-evaluation and for determining whether one is accepted and valued by others (Burkle, Ryckman, Gold, Thornton, & Audesse, 1999; Fredrickson & Roberts, 1997; Gatward, 2007; Gilbert, 2002; Gilbert, Price, & Allan, 1995). There is growing evidence demonstrating that body image-related shame plays a significant role in the development and persistence of binge eating symptomatology among women composing clinical (Dakanalis, Carrà, Calogero, et al., 2015; Duarte et al., 2015a; Fitzsimmons-Craft et al., 2011) and nonclinical samples (Dakanalis, Clerici, et al., 2014; Duarte et al., 2014; Duarte & Pinto-Gouveia, 2016).

Shame and Self-criticism

Theoretical conceptualizations of shame (Gilbert, 2002, 2007) suggest that shame can focus on two types of evaluation: external shame, which is externally focused on how others evaluate the self, and internal shame, which is focused inwardly. These two dimensions are closely related, with internal shame involving an identification with others' negative evaluations such that the

individual self-devalues and self-criticizes. Thus, self-criticism involves the internalization of shame. Evidence suggests that self-criticism can take two forms with distinct functions: one involving perceptions of inadequacy and inferiority, as well as desires to correct one's flaws (inadequate-self), and a more severe form of self-criticism involving feelings of self-hate and contempt, as well as desires to punish and harm the self (hated-self; Gilbert et al., 2004; Gilbert & Irons, 2005).

Self-criticism has been consistently associated with poorer psychological adjustment, namely depressive symptoms (Gilbert et al., 2004). In particular, a study demonstrated that self-criticism mediated the relationship between the centrality of early shame memories and depressive symptomatology in a general community sample (Pinto-Gouveia et al., 2013). Self-criticism also seems to play an important role in body image and eating-related problems. In a study conducted with a nonclinical sample of women from the community and in a clinical sample of female patients with eating disorders, Pinto-Gouveia, Ferreira and Duarte (2014) found that self-criticism significantly mediated the link between shame and perceptions of inferiority and disordered eating symptoms. Research conducted with clinical samples of women with BED also identified self-criticism as a significant predictor of symptoms' severity (Duarte, Ferreira, & Pinto-Gouveia, 2016; Dunkley & Grilo, 2007). Another study conducted with a nonclinical female sample found that the hated-self form of self-criticism significantly mediated the relationship between body image shame and binge eating symptoms (Duarte et al., 2014). Moreover, recent research conducted with adolescent girls suggested that the association between negative social experiences (e.g., bullying) and disordered eating symptoms was mediated by body image shame. The effect of body image shame on these symptoms was, in turn, mediated by this more severe form of self-criticism (Duarte, Pinto-Gouveia, & Rodrigues, 2015d). Nonetheless, the specific effect of memories of body image-related shame experiences and feelings on binge eating symptoms and the potential mediator effect of self-criticism on these associations were not explored.

The Effect of Gender

The study of body image in men is limited in comparison to research conducted with women (Pila, Brunet, Crocker, Kowalski, Sabiston, 2016; Striegel-Moore et al., 2009). Nonetheless, akin to what has been suggested for women, maladaptive attitudes toward body image in men seem to be influenced by what is valued by the social group (Adams, Turner, & Bucks, 2005). There is

evidence that, for both men and women, the internalization of the ideal body image — that is, drive for thinness in women and drive for muscularity in men in current Western society (Yean et al., 2013) — and of the values associated with it (e.g., confidence and power; Grogan & Richards, 2002; McCabe & Ricciardelli, 2003) is linked to body dissatisfaction, poorer self-esteem, and disordered eating symptomatology (Dakanalis & Riva, 2013; Fitzsimmons-Craft, Bardone-Cone, & Kelly, 2011; McCreary & Sasse, 2002).

Thus, it stands to reason that both genders are similarly affected by evaluations that one's physical appearance lacks qualities to create a positive image of oneself in the eyes of others and that instead potentially promotes their desire to criticize, reject or attack the self. In fact, research conducted with male college students suggests that social experiences focused on physical appearance (e.g., comments) are associated with increased negative affect and a decreased sense of self-worth (Calogero, 2009; Dakanalis et al., 2012). A recent prospective study conducted with college men suggested that body dissatisfaction, negative affect, self-objectification, and lower self-esteem were significant predictors of binge eating symptoms (Dakanalis et al., 2016).

Nonetheless, in modern western societies women still face greater pressures than men do to approximate the images of idealized bodies as a means to reach social approval and acceptance (Buote, Wilson, Strahan, Gazzola, & Papps, 2011; Gatward, 2007; Gilbert, 2002). In fact, whereas conceptions of traditional masculinity convey the notion that men's worth is related to their abilities to be powerful, socially dominant, and physically effective (Kilmartin, 2007), women constantly face messages that their worth depends on how their physical appearance is perceived by others (Fredrickson & Roberts, 1997), which negatively affects their self-evaluation, body image, and eating behaviour (Fitzsimmons-Craft et al., 2011; Dakanalis, Carrà, Calogero, et al., 2015; Dakanalis, Clerici, et al., 2014; Duarte et al., 2014, 2015c). Women's perceptions that their body image may be at the root of social diminishment or attacks may give rise to shame perceptions of being seen by others as flawed, unattractive or inferior, as well as to the internal shaming process that includes severe self-criticism (Goss & Allan, 2009; Goss & Gilbert, 2002; Pinto-Gouveia, Ferreira, & Duarte, 2014). Binge eating symptoms may be adopted in this context as a means to cope with such negative evaluations and emotions (Duarte et al., 2014; Duarte et al., 2015a).

The Current Study

To sum up, there is evidence for the interconnection between shame experiences and feelings, body image perceptions, and binge eating symptoms. Nonetheless, little is known about the specific effect of the centrality of early shame memories related to body image and binge eating symptoms as well as the mechanisms operating on this association. Also, no known study to date has investigated the effect of body image-related experiences and self-criticism on binge eating symptoms in men.

The current study aimed to test a model, in women and men from the general community, that examined the extent to which early memories of body image shame experiences recalled as central to one's identity predict current feelings of body image shame and binge eating symptoms, as well as whether self-criticism is a mediating process underlying these associations. We surmise that these are processes, common to both genders, may operate in the occurrence of binge eating symptoms. However, given the role that body image plays in women's self and others' evaluations, it is plausible that memories of experiences of shame related to body image have a stronger effect on women's current levels of body image shame, self-criticism, and binge eating symptoms than they do in men.

We hypothesized that for both men and women: (a) current body image shame would mediate the effect of the centrality of shame memories related to body image experiences on inadequate-self and hated-self forms of self-criticism, as well as on depressive symptoms; (b) current body image shame would mediate the effect of the centrality of shame memories related to body image shame experiences on binge eating symptoms; and (c) body image shame would have a direct effect on binge eating symptoms, and an indirect effect mediated by self-criticism. Moreover, we hypothesize that, for women, body image shame would have an effect on binge eating symptoms directly and indirectly via the more severe self-hating form of self-criticism. Finally, we expected these associations to persist when accounting for the effect of body mass index (BMI) and depressive symptoms and that the strength of these associations would be stronger for women than for men.

Method

Participants

Participants in our study were Portuguese college students (102 men; 205 women) and participants recruited from the community (7 men; 17 women), with ages ranging from 18 to 60 years-old ($M = 22.83$, $SD = 6.98$, $mdn = 20$). The overall sample comprised 331 participants (109 men and 222 women). Most participants were either or had completed higher education (309; 93.6%), 5 (1.3%) participants completed secondary education, 1 (0.3%) completed basic education; 16 (4.8%) student participants did not report their completed years of education. Regarding relationship status, 308 (93.1%) were single, 18 (5.4%) were married or partnered, 3 (0.9%) were divorced, and 2 (0.6%) did not provide information on relationship status. Fully 327 (98.79%) of the participants were Caucasian; 4(1.21%) participants were Black. No gender differences were found in regard to demographic variables: $t_{age(329)} = .99$, $p = .324$; $t_{education(329)} = .16$, $p = .873$; $\chi^2_{relationship(3)} = 3.01$, $p = .390$.

Participants' mean Body Mass Index (BMI), calculated as the quotient of participants' self-reported weight (in Kg) divided by height squared (in m), was 22.09 ($SD = 2.87$, range = 15.81–32.81). Of the men in this study 2.7% ($n = 3$) presented low weight, 76.2% ($n = 83$) presented normal weight, 18.3% ($n = 20$) were overweight, and 2.7% ($n = 3$) were obese; In women 8.1% ($n = 18$) of the participants presented low weight, 81.1% ($n = 180$) normal weight, 9.4% ($n = 21$) were overweight, and 1.4% ($n = 3$) were obese. The BMI's distribution of the sample was similar to the distribution found in the general population (Poínhos et al., 2009). In regard to binge eating symptoms, 92.7% ($n = 307$) of the participants presented mild to no binge eating; 5.2% ($n = 17$) moderate binge eating; and 2.1% ($n = 7$) severe binge eating, according to the cut scores for binge eating severity (Marcus, Wing, & Lamparski, 1985). This distribution of binge eating symptoms in this study's sample is in accordance with recent evidence (Kessler et al., 2013). There were no differences in binge eating symptomatology between the students and the community sample participants ($t_{(329)} = 1.216$; $p = .239$).

Procedure and Measures

Participants were recruited from different courses of Higher Education institutions and from the staff of distinct labour institutions (e.g., schools, health services, retail, private companies). The present study is part of a wider research project advertised as: "The aim of this research is to

investigate how people eating behaviour may be influenced by the experiences people go through and by how they feel (such as shame experiences) [O objetivo desta investigação é estudar de que forma o comportamento alimentar das pessoas pode ser influenciado pelas experiências pelas quais passam e pela forma como se sentem (tais como experiências de vergonha)]. Approval was obtained by the institutions' Boards to conduct the study, which required that participants completed a set of self-report measures. The authors presented the aims of the research, clarified that participation was voluntary and confidential, and administered the pencil-and-paper questionnaires, which were counterbalanced to avoid order effects. All participants provided their written informed consent to voluntarily participate. The students completed the measures at the end of a designated lecture, and the remaining participants filled in the instruments at an authorized break during work.

Centrality of Event Scale – Body Image

The CES-BI was adapted from the Centrality of Event Scale (CES; Berntsen & Rubin, 2006; Portuguese version by Matos, Pinto-Gouveia, and Gomes, 2010). The CES measures the extent to which a memory of a stressful event forms a reference point for personal identity, is viewed as a landmark in one's life story, and is a key reference point to attribute meaning to other experiences in one's life (e.g., "I feel that this event has become part of my identity"). This self-report questionnaire comprises 20 items, rated on 5-point scale ranging from 1 (*Totally disagree*) to 5 (*Totally agree*). The total score is obtained by calculating the mean of the items' scores, with higher scores indicating that the event is viewed as being more central to one's identity. In its original study (Bernsten & Rubin, 2006) this measure revealed good psychometric properties with a high internal consistency ($\alpha = .94$). In the Portuguese version of the scale, the instructions for the measure were adapted to focus on shame experiences and presented high internal consistency ($\alpha = .96$) as well as sound convergent and divergent validity (Matos et al., 2010). In the current study, the instructions of the measure were adapted to measure the centrality of shame memories involving an experience related to body image that occurred in childhood or adolescence, that is, a situation in which one has negatively evaluated oneself or felt that others were criticizing, judging or devaluing the self because of one's physical appearance:

Shame is a frequent emotion in humans. Almost everyone go through, throughout their lives, experiences of shame. In this study, we are interested in your experiences of shame related to the body (for example, weight, body size or body shape).

By shame we mean the negative emotion associated with a sense of personal inferiority and devaluation. We feel ashamed when, in a situation, we evaluate ourselves (due to an action or characteristic) as awkward, different, inadequate, inferior, weak, disgusting or bad, but also when we have the idea that others see us as inferior, defective, inadequate, weak or disgusting. When we feel ashamed, we often have other feelings simultaneously, such as anxiety, anger, disgust, and we experience an overwhelming desire to disappear, to hide or to flee.

Next, try to remember a (significant) situation or experience in your childhood or adolescence where you think you have felt shame about your body. That is, a situation in which you have judged yourself negatively, or you have thought or felt that others were judging you, criticizing you or devaluing you, because of your physical appearance.

[A experiência da emoção de vergonha é frequente nos humanos. Quase toda a gente vivencia, ao longo da sua vida, experiências de vergonha. Neste estudo estamos interessados nas suas experiências de vergonha relacionadas com o corpo (por exemplo, peso, tamanho do corpo ou forma corporal).

Por vergonha entende-se a emoção negativa associada a um sentido de diminuição e desvalorização pessoal. Sentimos vergonha quando, numa situação, nos avaliamos (devido a uma ação ou característica) de forma global como desajeitados, diferentes, inadequados, inferiores, fracos, repugnantes ou maus, mas também quando temos ideia de que os outros nos veem como inferiores, defeituosos, inaptos, fracos ou repugnantes. Quando sentimos vergonha, temos muitas vezes outros sentimentos em simultâneo, como ansiedade, raiva, repugnância e somos assaltados por uma enorme vontade de desaparecer dali, nos escondermos ou fugirmos.

De seguida tente recordar-se de uma situação ou experiência (marcante) pela qual passou em que acha ter sentido vergonha em relação ao seu corpo, durante a sua infância ou adolescência. Ou seja, uma situação na qual se tenha avaliado negativamente a si mesmo(a), ou tenha pensado ou sentido que os outros a(o) estavam a julgar, a criticar ou a desvalorizar, devido à sua aparência física].

Within the present study, the scale demonstrated excellent internal consistency ($\alpha = .96$ for women and $.96$ for men).

Binge Eating Scale

The BES (Gormally, Black, Daston, & Rardin, 1982; Portuguese version by Duarte, Pinto-Gouveia, and Ferreira, 2015b) is a 16-item scale designed to measure the behavioural emotional and cognitive dimensions of binge eating. Each item presents three to four statements, and participants are asked to choose the one that best describes their eating behaviour (e.g., “I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily”). Each response option reflects a rating of severity ranging from 0 (reflecting no difficulties with binge eating) to 3 (severe problems with binge eating). The responses are totalled to obtain a total score that may range from 0 to 46. Higher scores indicate higher binge eating symptomatology severity. The scale revealed good internal consistency in the original study ($\alpha = .85$; Gormally et al., 1982). In the Portuguese validation study conducted in the general community, the scale presented good construct validity, test-retest reliability, discriminant validity, and high internal consistency ($\alpha = .88$; Duarte et al., 2015b). BES revealed a very good internal consistency ($\alpha = .89$ for women and $.85$ for men) in the current study.

Body Image Shame Scale

The BISS (Duarte et al., 2015c) measures the experience and phenomenology of body image shame, that is, perceptions that one is negatively evaluated or judged by others because one’s physical appearance (external dimension of body image shame) and negative self-evaluations due to one’s physical appearance (internal dimension). It includes 14 items (e.g., “My physical appearance makes me feel inferior in relation to others”), and a composite score of body image shame is derived as the mean of the items. Respondents rated each item according to the frequency they experience body image shame, using a 5-point rating scale from 0 (*Never*) to 4 (*Almost always*). The scale’s mean score ranges from 0 to 4. with higher scores representing greater body image shame. The BISS has good construct validity, test-retest reliability, and high internal consistency with a Cronbach’s alpha of $.92$ (Duarte et al., 2015c). In the current study we used the overall score of the measure, which also revealed very good internal consistency ($\alpha = .94$ for women and $.95$ for men).

Forms of Self-Criticizing and Self-Reassuring Scale

The FSCRS (Gilbert et al., 2004; Portuguese version by Castilho, Pinto-Gouveia, and Duarte, 2015) includes 22 items and measures how individuals typically think and react when facing setbacks or

failures. The scale assesses two forms of self-criticism: inadequate-self, which involves feelings of inadequacy and inferiority (9 items; e.g., “There is a part of me that feels I am not good enough”), and hated-self, which entails feelings of self-disgust, hatred, and contempt with desires to hurt and persecute the self (5 items; e.g., “I have a sense of disgust with myself”). The FSCRS also measures the ability to self-soothe (reassured self). Respondents answer the items on a 5-point rating scale from 0 (*Not at all like me*) to 4 (*Extremely like me*). The subscales scores correspond to the mean items' scores. Higher scores indicate greater self-criticism (for the inadequate and hated-self subscale) or greater self-reassurance (for the reassured-self subscale). The scale has good construct validity and was found to present good internal consistency (α s = .86 for hated-self and .90 for inadequate-self; Gilbert et al., 2004). The Portuguese version of the scale also revealed good construct validity and presented high internal consistency in the general population (α s = .72 for hated-self and .89 for inadequate-self; Castilho et al., 2015). In the current study we focused on the two forms of self-criticism assessed through the FSCRS, which yielded good internal consistency (α = .93 for women and .92 for men for inadequate-self, .80 for women and .84 for men for hated-self).

Depression Anxiety and Stress Scales

The DASS21 (Lovibond & Lovibond, 1995; Portuguese version by Pais-Ribeiro, Honrado, and Leal, 2004) includes 21 items measuring levels of depression, anxiety, and stress symptoms. Respondents are asked to indicate the frequency at which they experienced each symptom over the past week using a 5-point rating scale ranging from 0 (*Did not apply to me at all*) to 4 (*Applied to me very much, or most of the time*). In the current study, we used the depression subscale of 7 items to measure depressive symptoms (e.g., “I couldn't seem to experience any positive feeling at all”). Items are summed to obtain the subscale score, which range from 0 to 21. Higher scores indicate more depressive symptoms. The original and the Portuguese versions of the scale reveal good internal consistency (with the subscale depression presenting α s = .88 and .85, respectively). In the current study, this subscale also presented good internal consistency (α s = .89 for women and .88 for men).

Data Analysis

Data analyses were conducted using the SPSS software (v.21 SPSS; Armonk, NY: IBM Corp.), and the path analysis was performed using the AMOS software (v.21 SPSS; Armonk, NY: IBM Corp.).

Descriptive statistics were tested and gender differences were examined through a MANOVA. Product-moment Pearson correlation coefficients were calculated to examine the relationships among centrality of shame memories related to body image, body image shame, depressive symptoms, self-criticism, binge eating symptoms, BMI, and age (Cohen, Cohen, West, & Aiken, 2003).

A multigroup path analysis was conducted to estimate whether body image shame and self-criticism (mediator variables), would mediate the relationship between the centrality of shame memories related to body image and BMI (independent, exogenous variables) and binge eating symptoms (dependent, endogenous variable). Depressive symptoms were considered as a covariate to account for the effect of overall negative affectivity, given their known association with binge eating symptoms (Duarte et al., 2014; Stice, Presnell, & Spangler, 2002) as well as shame and self-criticism (Pinto-Gouveia et al., 2013; Pinto-Gouveia & Matos, 2011). Path analysis is a specific case of Structural Equation Modelling (SEM) that allows for the simultaneous examination of hypothesised direct and indirect effects between multiple exogenous and endogenous variables, while controlling for error (Kline, 2005). The Maximum Likelihood estimation method was used to calculate the significance of the regression coefficients and the model fit statistics. The following goodness of fit indices were considered to assess model fit: Chi-square (χ^2) with a nonsignificant value indicating a very good model fit; the Tucker Lewis Index (TLI) and the Comparative Fit Index (CFI), with values above .95 suggesting very good fit; the Root-Mean Square Error of Approximation (RMSEA; with 90% confidence intervals), with values below .05, and $p > .05$ indicating reasonable error and very good fit; and the Standardised Root Mean Square Residual (SRMR), with values as high as .08 suggesting acceptable model fit (Hu & Bentler, 1999; Kline, 2005).

We followed the following steps to examine the model invariance between men and women. First, the hypothesised model was tested in both groups combined to determine whether the model was viable. Next, the model fit was examined for both groups separately. Then, we examined the model fit of the unconstrained model (i.e., the model in which the paths were free to vary between groups) and assessed the differences in significant/nonsignificant pathways between the groups. Then, we assessed the model fit for the constrained model (i.e., the model in which the paths were constrained to be equal across the groups). The unconstrained and constrained model were compared through the Chi-square difference test. The critical ratio differences were calculated to examine the statistical significance of the differences between

both groups. Finally, we compared the constrained model and a partially constrained model in which all paths were constrained to be equal, except for the ones that were significantly different across groups (Byrne, 2010; Kline, 2005; Tabachnick & Fidell, 2013).

The significance of the mediational paths was examined through the Bootstrap resampling method, with 5000 Bootstrap samples and 95% bias-corrected confidence intervals (CI). The effects were considered significant ($p < .050$) when zero was not included between the lower and the upper limits of the CI range (Kline, 2005).

Results

Preliminary Analyses

Prior to conducting the analyses, data were screened for missing data, univariate and multivariate normality, and multicollinearity. Preliminary analysis indicated that of the 331 participants, no more than 3.3% presented missing data, which was found to be missing completely at random (Little's MCAR test $p > .050$). The regression imputation method was used to impute missing data. The Mahalanobis distance analysis indicated two multivariate outliers. Nonetheless, these were not extreme outliers and were kept in the analysis because they represent the variability of the constructs under examination. Moreover, the analysis of the coefficients of skewness and kurtosis indicated that there was no severe violation of uni- and multi-variate normality, with skewness values ranging from 0.48 (inadequate-self form of self-criticism) to 1.50 (binge eating) and with kurtosis values ranging from -0.51 (inadequate-self form of self-criticism) to 2.29 (binge eating; Kline, 2005). There was no evidence of multicollinearity.

The means and standard deviations of the study variables are reported in **Table 1**. The means and standard deviations for the variables are similar to those obtained in previous studies with community samples (Duarte et al., 2014; Matos et al., 2012; Pinto-Gouveia et al., 2013). The results of the MANOVA indicated significant overall effects: $F_{(7, 323)} = 9.95$, $p < .001$, Pillai's trace = .18; $\eta p^2 = .18$. Results indicated no significant gender differences regarding the centrality of shame memories related to body image, $F_{(1, 329)} = 2.91$, $p = .089$, $\eta p^2 = .01$; inadequate-self form of self-criticism, $F_{(1, 329)} = 2.20$, $p = .139$, $\eta p^2 = .01$; the hated-self form of self-criticism, $F_{(1, 329)} = 0.28$, $p = .595$, $\eta p^2 = .00$; and depressive symptoms, $F_{(1, 329)} = 0.10$, $p = .751$, $\eta p^2 = .00$. Women presented significantly higher body image shame, $F_{(1, 329)} = 23.29$, $p < .001$, $\eta p^2 = .07$, and binge

eating symptoms, $F_{(1, 329)} = 6.48$, $p = .011$, $\eta p^2 = .02$, as well as lower BMI, $F_{(1, 329)} = 17.05$, $p < .001$, $\eta p^2 = .05$, than men did.

Table 1
Descriptive Statistics and Correlations for All Study Variables

Variables	Men <i>M (SD)</i>	Women <i>M (SD)</i>	Correlations							
			CESBI	BISS	Depression	Hated- self	Inadequate- self	BES	BMI	Age
CESBI	1.98 (0.79) _a	2.15 (0.88) _a	--	.47***	.34***	.44***	.46***	.34***	.17*	.03
BISS	0.57 (0.76) _a	1.03 (0.83) _b	.46***	--	.49**	.49***	.57***	.47***	.32**	-.06
Depression	3.77 (4.10) _a	3.92 (4.11) _a	.21*	.36***	--	.39***	.56***	.31***	.41***	-.02
Hated-self	0.55 (0.72) _a	0.51 (0.66) _a	.28***	.43***	.66***	--	.55***	.55***	.18**	.01
Inadequate- self	1.39 (0.93) _a	1.56 (1.00) _a	.20*	.36***	.72***	.64***	--	.43***	.04	-.12
BES	5.63 (5.68) _a	7.59 (6.99) _b	.33***	.52***	.34***	.29**	.47***	--	.41***	.02
BMI	23.00 (2.94) _b	21.64 (2.73) _a	.02	.14	-.04	.00	-.06	.14	--	.26**
Age	22.83 (6.98) _a	22.10 (5.80) _a	.00	.04	.06	.10	.08	.06	.33**	--

Note. Means for women and men with different subscripts indicate a significant difference ($p < .05$). Correlations for men ($n = 109$) are reported below the diagonal; for women ($n = 222$), above. CESBI = Centrality of Event Scale - Body Image, BISS = Body Image Shame Scale, Depression = Depression subscale of the Depression Anxiety and Stress Scales, Hated-self and Inadequate-Self = subscales of the Forms of Self-Criticizing and Self-Reassuring Scale, BES = Binge Eating Scale, BMI = Body Mass Index.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Product moment Pearson correlation coefficients (see **Table 1**) indicated that significant correlations between the centrality of body image-related shame memories and current body image shame, the forms of self-criticism, depressive symptoms and binge eating symptoms were in the expected directions for both men and women. In women, the correlation between inadequate self and centrality of shame memory ($z = -2.49$; $p = .013$) and body image shame ($z = -2.29$; $p = .022$), and the correlation between hated self and binge eating symptoms ($z = -2.7$; $p = .007$), were stronger than in men. In men, the correlation between hated self and depressive symptoms were stronger than in women ($z = -2.7$; $p = .007$). In women, BMI was positively associated with centrality of shame memories related to body image, body image shame, hated-

self, depressive symptoms, and binge eating symptoms. In men, the associations between BMI and the study variables were nonsignificant. In both women and men no significant associations were found among age and the study variables and thus this variable was not considered in the path model examined.

Path Analysis

Results of the model examined for both genders combined indicated that the model accounted for a total of 43% of the variance in binge eating symptoms. The following path coefficients were nonsignificant: the paths from BMI to depressive symptoms and to hated self, the path from centrality of shame memories related to body image to binge eating symptoms, and the path from depressive symptoms to binge eating symptoms. The nested model, examined without these nonsignificant paths, indicated an excellent fit to the data: $\chi^2_{(4)} = 2.54$, $p = .640$; CFI = 1.00; TLI = 1.01; RMSEA = .00, 90% CI [.00, .07], $p = .877$; SRMR = .01.

Then, the model was tested for women and men separately. The model tested for women accounted for 50% of variance in binge eating symptoms and presented an excellent model fit: $\chi^2_{(4)} = 1.88$, $p = .759$; CFI = 1.00; TLI = 1.02; RMSEA = .00, 90% CI [.00, .07], $p = .891$; SRMR = .01. The model tested for men accounted for 33% of variance in binge eating symptoms and also presented an excellent model fit: $\chi^2_{(4)} = 2.80$, $p = .592$; CFI = 1.00; TLI = 1.03; RMSEA = .00, 90% CI [.00, .12], $p = .705$; SRMR = .03.

Next, we tested an unconstrained model in which all paths were allowed to vary between the two groups. Results showed that the data presented an excellent model fit: $\chi^2_{(8)} = 4.76$, $p = .783$; CFI = 1.00; TLI = 1.02; RMSEA = .00, 90% CI [.00, .04], $p = .970$; SRMR = .01. For men, the following paths were nonsignificant: the paths from BMI to body image shame, to inadequate-self, to hated-self, and to binge eating symptoms; the paths from centrality of shame memories related to body image to hated-self, to inadequate-self, and to depressive symptoms; and the path from hated-self to binge eating symptoms. For women, the path from inadequate-self to binge eating symptoms was nonsignificant.

We then tested a constrained model (i.e., a model in which the direct path coefficients was constrained to be equal across both groups) and results indicated a very good model fit: $\chi^2_{(21)} = 35.00$, $p = .028$; CFI = .98; TLI = .96; RMSEA = .05, 90% CI [.02, .07], $p = .592$; SRMR = .03. The unconstrained and constrained models were then compared, and results indicated that there were significant differences across the groups: $\Delta\chi^2_{(13)} = 30.25$, $p = .004$. Next, we analysed critical

ratio differences to test for the significance of the differences between both groups among the parameter estimates. Results showed that the parameters coefficients in the path between hated-self and binge eating symptoms had a statistically significant difference ($Z = -3.70, p < .001$); for women this was a significant path ($b = 3.23, p < .001$), whereas for men it was not ($b = -.54, p = .504$). The path from BMI to binge eating symptoms also revealed a statistically significant difference ($Z = -2.14, p < .001$); for women this was a significant path ($b = 0.63, p < .001$), whereas for men it was not ($b = 0.19, p = .209$).

Finally, we compared the fit of the constrained model to a model where all paths were constrained to be equal except for the paths that were significantly different between the groups: the path from hated-self to binge eating symptoms as well as the path from BMI to binge eating symptoms. The partially constrained model presented an excellent model fit $\chi^2_{(21)} = 35.00, p = .028$; CFI = .98; TLI = .96; RMSEA = .05, 90% CI [.02, .07], $p = .592$; SRMR = .03, and was also significantly different from the constrained model, $\Delta\chi^2(2) = 16.601, p < .001$. Thus, the partially constrained model was the one that was retained.

The indirect effects were also examined for both groups. The parameter estimates for each group are presented in **Figure 1**. Results revealed that, for women (**Figure 1a**), the centrality of shame memories related to body image revealed an indirect effect on binge eating symptoms of .30, fully mediated by body image shame and the two forms of self-criticism, 95% CI [.22, .38], $p < .001$. BMI had an indirect effect on binge eating symptoms of .11, partially mediated by body image shame and by self-criticism, 95% CI [.04, .20], $p = .003$. Body image shame had a significant indirect effect of .14 on binge eating symptoms, indirectly mediated by self-criticism (CI = .06 to .23, $p = .001$). For men (**Figure 1b**), results revealed that the centrality of shame memories related to body image had an indirect effect on binge eating symptoms of .24, mediated by body image shame and the inadequate-self form of self-criticism, 95% CI [.10, .40], $p = .001$. Also, body image shame had an indirect effect of .15 on binge eating symptoms, mediated by the inadequate-self form of self-criticism 95% CI [.06, .29], $p = .005$.

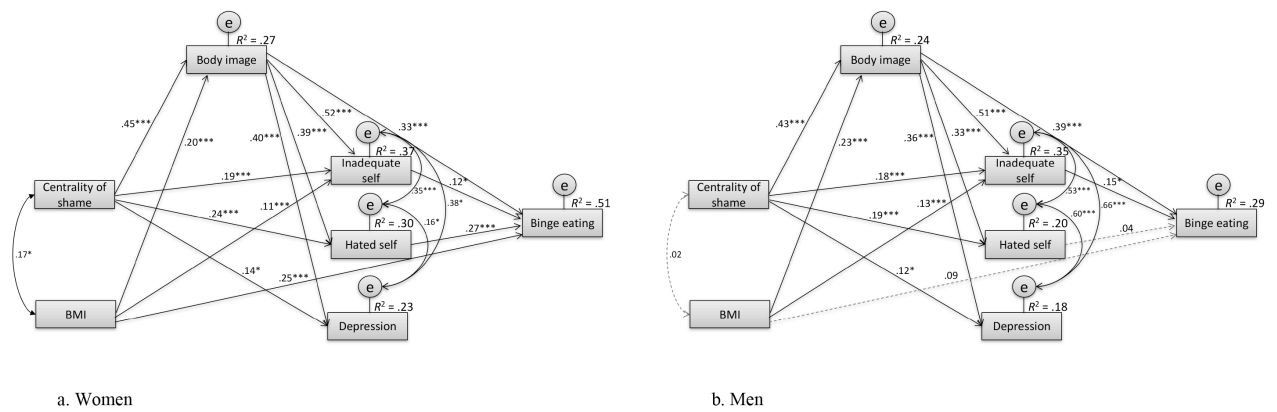


Figure 1 | Parameter estimates for the multi-group path analysis, with direct paths constrained to be equal except for the paths from hated-self to binge eating symptoms and BMI to binge eating symptoms. Standardized regression weights and squared multiple correlations for female participants are represented in Figure 1a ($n = 222$); and for male participants are represented in Figure 1b ($n = 109$). * $p < .05$. *** $p < .001$.

Results supported the hypothesis that, for both men and women, the centrality of shame memories related to body image experiences on binge eating symptoms is mediated by current body image shame. The effect of current body image shame on binge eating symptoms, in turn, was confirmed to be mediated by self-criticism. Results also supported the hypothesis that in women the more severe self-hating form of self-criticism is a significant mediator on the association between body image shame and binge eating symptoms. In men this association is mediated by the inadequate self form of self-criticism.

Discussion

The current study aimed at understanding the role of early body image shame-related experiences on binge eating symptoms and the pathways influencing this association. A mediational model was tested and suggested that the centrality of shame memories related to body image is associated with current levels of body image shame and elevated self-criticism, which, in turn, is associated with the severity of binge eating symptoms. Because prior evidence was limited to women, these associations were tested in both men and women from the general and college communities through a multi-group path analysis.

Consistent with other studies, which show that women present significantly higher levels of body image difficulties and disordered eating behaviours compared to men (Kessler et al., 2013; Pila et

al., 2016; Striegel-Moore et al., 2009), the results of the current study showed that women reported increased levels of body image shame and binge eating symptoms. Nonetheless, men and women included in the present study did not present differences regarding depressive symptoms and forms of self-criticism. No gender differences were found regarding the centrality of memories of body image-related shame experiences.

Moreover, results suggested that early negative experiences specifically related to the physical appearance dimension may play an important role in how one comes to evaluate the self based on this dimension (e.g., as an inferior, defective or flawed person) and that this association is relevant for binge eating symptoms in both genders. In fact, our results build and expand prior studies that identified that memories of shame that become central to identity are associated with increased shame feelings in adulthood, difficulties in emotion regulation, and several psychopathological indicators—namely elevated severity of eating psychopathology (Ferreira et al., 2014; Matos et al., 2015; Matos & Pinto-Gouveia, 2010; Matos et al., 2012; Pinto-Gouveia & Matos, 2011). Moreover, our results supported the assumption that body image is an important dimension associated with binge eating symptoms (Dakanalis et al., 2016; Duarte et al., 2014; Duarte et al., 2015a; Duarte et al., 2016). Indeed, our findings revealed that memories related with the experience of perceiving that one's physical appearance is at the root of criticism, belittlement, rejection or attacks from others were linked with increased current levels of body image shame. Body image shame, in turn, was found to be associated with an internalization of these negative evaluations of the self in the form of self-criticism, which was found to be an important contributor to binge eating symptoms. As previously noted (Dakanalis, Timko, et al., 2014; Duarte et al., 2014; Duarte et al., 2015a; Goss & Gilbert, 2002; Heatherton & Baumeister, 1991; Stice et al., 2002; Striegel-Moore et al., 2009), binge eating symptoms can be understood as a maladaptive strategy to momentarily avoid undesirable thoughts and emotional states. Noteworthy, results from the current study corroborated that shame feelings related to body image have a distinctive association with binge eating symptoms (beyond the effect of overall negative affect) in both men and women.

Nonetheless, important gender differences were identified in the structural relationships among the examined variables. Whereas in women the associations between the centrality of shame memories related to body image experiences and current body image shame on binge eating symptoms were further mediated by the inadequate-self and the hated-self forms of self-criticism, in men only the inadequate-self form was a significant mediator. In fact, results

suggested that women whose shame memories focused on body image function as key components of their identity tend to present higher levels of binge eating symptoms. This link seems to be strengthened by the association that these shame memories have with current levels of shame about one's body and, consequently, on the tendency to engage in self-criticism, namely in its more severe self-hating form. These associations persisted while accounting for the effect of BMI, which, for women only, also presented a significant association with binge eating symptoms, mediated by body image shame and self-criticism. Although issues of self-objectification are rising among men (Dakanalis et al., 2014), women may be more vulnerable to the deleterious impact of the sociocultural messages that equate physical attractiveness with social attractiveness and acceptance (Buote et al., 2011). In fact, our study suggests that for women, experiences where they felt that due to their physical appearance they were negatively seen by others (e.g., as unattractive, inferior or defective as a social agent) may become associated with their self-evaluation and with a sense of self-inadequacy, as well as with self-directed anger and contempt and with desires to persecute or harm the self when facing setbacks or failures.

In the case of men, our findings suggested that memories of being shamed about body image may become related to current body image shame, which, in turn, can become associated with perceptions of inadequacy and binge eating symptoms. These findings extend prior studies conducted with men which identified that the potential pathogenic effect of negative body image-related experiences depends on the extent to which these experiences relate to the sense of one's value within the social group (Adams et al., 2005; Calogero, 2009; Dakanalis et al., 2012; Dakanalis & Riva, 2013; Fitzsimmons-Craft, 2011; Grogan & Richards, 2002; McCabe & Ricciardelli, 2003; McCreary & Sasse, 2002). These findings also add to recent evidence that highlighted the roles that body image dissatisfaction and shame play in binge eating symptoms in men (Dakanalis et al., 2016). Our findings corroborated that these negative memories related to body image may also have negative consequences for men. Nonetheless, their association with binge eating symptomatology was not mediated by the self-hating form of relating with the self when facing difficulties as was the case for women, but by a less severe form of self-criticism focused on feelings of inadequacy and inferiority, and in specific aspects of the self that need to be corrected (Gilbert et al., 2004)

Overall, the current study suggests that, in women, negative experiences related to body image seem to be internalized in a form of self-relating characterized by a sense of inadequacy and also

by an overall sense of self-hatred and self-disgust, which seems to further fuel binge eating. This finding may be understood by considering the great sociocultural pressures that women face regarding the need to display an attractive physical appearance, which can become associated with disordered eating (Pinto-Gouveia et al., 2014). These pressures are less pronounced for men, but results suggest that when boys and male adolescents are the target of shame experiences related to their physical appearance, this too may come to have an impact on the way they relate with themselves. These experiences may become associated with feelings of inadequacy and inferiority, which in turn may influence binge eating symptoms.

Limitations and Future Research Directions

The present study has some important limitations that we should note. The cross-sectional design of our study hinders the possibility of determining temporal causality between the examined variables (Maxwell & Cole, 2007). Our study aim was to examine the plausibility and significance of a hypothesized theoretical model testing the structural links among our variables of interest. Nonetheless, a longitudinal examination of these associations would be necessary to determine the temporal association between body image-related shame experiences in childhood or adolescence, negative affective and self-evaluative experiences, and disordered eating behaviours in adult life. Moreover, the assessment of the shame memory was based on a self-report measure and relied on retrospective memories, which may raise some concerns regarding the reliability of such recollections. Even though it has been suggested that retrospective data is generally accurate, stable over time, and not distorted by current emotional states (Brewin, Andrews & Gotlib, 1993; Matos & Pinto-Gouveia, 2010), future research should expand the current findings using other assessment methodologies (e.g., structured interviews). However, the accuracies of memories may not be what is driving our findings but rather it is how experiences are remembered that is important.

Also, the model examined in the current study is inherently limited because other variables (e.g., interpersonal, social, biological) may play a determinant role on binge eating symptoms. In fact, in the current study we proposed a parsimonious model and thus the role of other potentially relevant variables on the examined associations should be explored further in future studies. In particular, future research may expand the current model by considering that the multifaceted nature of shame and the externalized and internalized dimensions that this emotion entails (Duarte et al., 2015c; Gilbert, 1997, 2002; Goss & Gilbert, 2002) may have a differential impact

on disordered eating symptomatology. Also, in our study the sexual identity of participants was not assessed. Given the current evidence on the significant role that sexual orientation plays in body dissatisfaction and disordered eating, namely in men (Dakanalis et al., 2012; Yean et al., 2013), it is important that future research replicate our study and examine these relationships considering potential differences regarding these aspects. Another limitation is that the study's sample is not representative of the general population, and thus future research is needed before the current findings can be generalized. Moreover, although a dimensional perspective on disordered eating is currently advocated, the replication of our results with a sample of patients with BED would be informative to further clarify the potential unique impact that body image-related early and current shame experiences have on this problem and the mechanisms that operate in this association that can be targeted in treatment.

Practice Implications

These findings have potential implications for researchers and clinicians working with individuals presenting binge eating symptomatology. Our results support that body image is, for both men and women, a shame-eliciting dimension that is strongly associated with binge eating symptoms, which indicates that this dimension should be considered in the conceptualization and treatment of these disordered eating behaviours. Moreover, our results support the relevance of therapeutically evaluating and addressing shame memories and current experiences of shame, self-criticism, and binge eating, considering their evolved defensive functions against interpersonal and emotional stressors (Gilbert, 2006; Gilbert & Irons, 2005). In light of the current findings, it is important that clinicians consider the gender differences suggested by the current study. In fact, for women these early negative experiences may influence their overall sense of self-worth and fuel a negative pathogenic form of coping with setbacks or failures (Fredrickson & Roberts, 1997; Gilbert et al., 2004). In the case of men, clinicians should be aware of how these experiences may also negatively influence men's eating behaviour by being associated with feelings of inadequacy and desires to correct specific aspects of the self seen as flawed (Dakanalis et al., 2016; Gilbert et al., 2004).

Early assessment and targeting of these aspects may also have important prevention implications. Treatment and preventive approaches should focus on helping individuals understand these functions, re-evaluate the centrality of body image-focused experiences for their self-identity, and develop more adaptive means to regulate negative internal experiences.

Recent studies suggested that having the capacity to relate with the self in a compassionate and balanced way may protect against body image shame in the context of negative early eating-related experiences (Daye, Webb, & Jafari, 2014) and weight bias (Webb, Fiery, & Jafari, 2016). Thus, interventions that involve the practice and development of this more compassionate and flexible self-to-self relationship may promote a healthier relationship with one's body image, enable effective emotion regulation, and deter engagement in reactive binge eating behaviours (Gilbert, 2005; Goss & Allan, 2010).

Conclusion

To our knowledge, ours is the first study examining the association between body image-related shame memories and disordered eating in both genders. The current study offers preliminary evidence suggesting that early negative experiences related to body image play a significant role on the severity of binge eating symptoms, through its association with heightened current body image shame and self-criticism, in both men and women from the general and college communities. These findings contribute therefore to the understanding of this problematic eating behaviour and have potential treatment and prevention implications.

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Compliance with Ethical Standards

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Conflict of Interest The authors declare that they have no conflict of interest.

Research Involving Human Participants and/or Animals All procedures were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

This article does not contain any studies with animals performed by any of the authors.

Informed Consent All participants provided their written informed consent to participate in the study.

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Chapter 6

Emotion regulation processes and eating behavior
in obesity and eating disorders

Chapter overview

- Study XIV** The impact of shame, self-criticism and social rank on eating behaviours in overweight and obese women participating in a weight management programme
- Study XV** At the core of eating disorders: Overvaluation, social rank, self-criticism and shame in anorexia, bulimia and binge eating disorder
- Study XVI** The impact of shame memories traumatic and central to identity on current shame, body image cognitive fusion and binge eating symptoms in a clinical sample
- Study XVII** Ashamed and fused with body image and eating: Binge eating as an avoidance strategy

Study XIV

The impact of shame, self-criticism and social rank on eating behaviours in overweight and obese women participating in a weight management programme

Adapted from:

Duarte, C. Matos, M., Stubbs, R. J., Gale, C., Morris, L., Pinto-Gouveia, J., & Gilbert, P. (in press). The impact of shame, self-criticism and social rank on eating behaviours in overweight and obese women participating in a weight management programme. *Plos One*.

Abstract

Recent research has suggested that obesity is a stigmatised condition. Concerns with personal inferiority (social rank), shame and self-criticism may impact on weight management behaviours. The current study examined associations between social comparison (shame, self-criticism), negative affect and eating behaviours in women attending a community based weight management programme focused on behaviour change.

2,236 participants of the programme completed an online survey using measures of shame, self-criticism, social comparison, and weight-related affect, which were adapted to specifically address eating behaviour, weight and body shape perceptions.

Correlation analyses showed that shame, self-criticism and social comparison were associated with negative affect. All of these variables were related to eating regulation and weight control ($p < 0.001$). Path analysis revealed that the association of shame, hated-self, and low self-reassurance on disinhibition and susceptibility to hunger was fully mediated by weight-related negative affect, even when controlling for the effect of depressive symptoms ($p < 0.050$ to $p < 0.010$). In addition, feelings of inadequacy and unfavourable social comparisons were associated with higher disinhibition and susceptibility to hunger, partially mediated through weight-related negative affect ($p = 0.001$). These variables were negatively associated with extent of weight loss during programme attendance prior to the survey, while self-reassurance and positive social comparisons were positively associated with the extent of weight loss prior to the survey ($p < .050$).

Shame, self-criticism, and perceptions of inferiority may play a significant role in self-regulation of eating behaviour in overweight people trying to manage their weight.

Keywords: obesity; shame; self-criticism; social rank; self-regulation of eating behaviour

Introduction

Projected obesity trends are well documented [1-4], escalating [5] and account for a significant proportion of health costs in Europe [6] and the US [7]. While prevention is preferable to cure, the majority of Western adults are already overweight or obese [8], which emphasises the need to provide self-management solutions to prevent further weight gain and promote sustained

weight loss [2, 9]. Governments are calling for consumers to focus on the proactive prevention of avoidable disease by taking more responsibility for their own health through the adoption of healthier lifestyles, improved diets, increased physical activity and managing their own weight [10, 11]. However, many people are enmeshed in an “obesogenic” environment that facilitates excess energy intake and low levels of energy expenditure [12-15]. Self-management of behaviour may also be influenced by emotion regulation, i.e., the processes whereby individuals seek to manage emotional states [16, 17]. It is not clear if emotion regulation helps or hinders self-management of weight. Part of the reason for this is that food can have both positive and negative effects on emotive and reasoned thoughts and actions and weight management can also have a large emotional dimension. Food is a powerful source of pleasure and reward [18-21]. Also, eating may serve the function of temporarily reducing negative affect and thus regulating aversive emotions [22, 23]. This may have consequences for the enactment of planned, reasoned behavioural pathways to manage weight. Overweight and obese people commonly experience stigma, which enhances psychosocial stress and negatively impacts on physical and mental well-being [24-26]. Stigma can impact on shame, self-criticism and unfavourable social comparisons, creating feelings of inferiority and inadequacy in relation to others [27].

The process of stigmatisation of body shapes means that physical appearance can affect the way people feel. Weight stigma can become associated with feelings of inferiority, shame and self-criticism [27-29]. Shame and self-criticism are associated with depression [30], body image dissatisfaction [28, 31-35], binge eating [36-39] and obesity [40]. Shame-based self-criticism may undermine self-regulation of eating behaviour.

This study explored, through an online survey, the associations between self-evaluative processes (shame, self-criticism, social comparison), weight-related affect and depressive symptoms in people attending a community-based weight management programme. Further analysis controlled for depressive symptoms and then examined the relationship between self-evaluative processes and (i) control of eating behaviour (measured by disinhibition and susceptibility to hunger) and (ii) historical weight change during programme attendance prior to the time of the survey.

Materials and Methods

Subjects

Participants were 2,236 women attending a community based weight management programme focused on behaviour change. **Table 1** gives participants' age, height, weight and BMI when they started with the programme, along with their weight and BMI at the time they completed the survey, weight change ($p < 0.001$) and BMI change ($p < 0.001$) between starting with the programme and the point of survey. Time taken to reach survey weight was the number of days from joining the programme until the date of the survey. Nineteen point one percent had a BMI between 25-30 kg/m², 33.5% between 30-35 kg/m², 23% between 35-40 kg/m² and 24.4% > 40 kg/m². Compared to average participants in the programme these women lost more weight and attended for longer. Start height, weight and age were similar to average participants of the programme [41].

Table 1

Characteristics of study participants

	<i>N</i> ¹	<i>M</i>	<i>SD</i>
Age	2236	41.71	12.34
Height (m)	2236	1.65	0.07
Start Weight (kg)	2236	95.61	18.73
Start BMI (kg/m ²)	2236	35.28	6.49
Weight at survey (kg)	2089	85.65	17.46
BMI at Survey (kg/m ²)	2089	31.62	6.10
Weight change (kg)	2089	-9.98**	8.80
BMI Change (kg/m ²)	2089	-3.68**	3.22
Weight change (%)	2089	-10.19%**	8.07%
Time taken to reach survey weight (days)	2236	274.44	388.76
	<i>N</i>	%	
Lost weight	2055	91.4	
Gained weight	27	1.3	
Maintained weight	7	0.3	

Note.¹ For 147 participants (7%) weight data was not provided at the beginning of the survey.

** Denotes statistical significance at $p < 0.001$.

Procedure

The commercial weight management organisation, Slimming World (www.slimmingworld.com), meets the NICE best practice criteria [3] to help adults adopt lifestyle behaviour changes to reduce weight, prevent weight gain and support long-term weight maintenance. The programme and approach to behaviour change and weight management are described elsewhere [9, 42, 43].

After being approved by the University of Derby Ethics Committee, this study was advertised on the Slimming World members' website. The advertorial directed potential participants to a website designed specifically for this project, which provided detailed information about the study and contact details for the research team at the University of Derby to answer any specific questions relating to the study. Those wishing to take part were asked to indicate their consent by clicking the appropriate button on the website. Once consent had been obtained participants were directed to a link to the questionnaires, which were completed online.

The questionnaire (available as online supplementary material) consisted of questions regarding age, height, level of activity, date of birth, duration of membership, time taken to reach current weight and time at current weight. Duration of membership, time taken to reach current weight and time at current weight, were computed by assuming linearity and taking the mid-point of each time category (i.e., 6 months or less as 3 months, 6-12 months as 9 months, 12-18 months as 15 months, 18 months-2 years as 21 months, 2-3 years as 30 months, more than 3 years as 48 months). The remainder of the questionnaire took the form of Likert scales asking questions about shame, self-criticism and social comparison, negative and positive affect related to body weight and shape, and eating, depressive symptoms, and eating behaviours, as described below. The questionnaire was constructed and administered using Checkbox v4.4-Web Survey Software- 2007, Prezza Technologies, Inc. The specific scales used in the current study are described in the supplementary material (S1 docx file).

Materials

Weight-focused External shame Scale (WFES)

This scale was adapted from the Other as Shamer Scale [44, 45]. The scale consists of 18 items, which participants are asked to rate in terms of the frequency with which they make certain evaluations about how others judge them based on their weight, body shape and eating (0 =

'Never' to 4 = 'Almost always'). In the original study the scale showed high internal consistency with a Cronbach's alpha of 0.92.

Weight-focused Self-Criticising/Self-Reassuring Scale (WFSCRS)

This 22-item scale is derived from the Forms of Self-Criticising/Attacking and Self-Reassuring Scale [46]. Participants rate each statement on a five-point scale (0 = 'Not at all like me' to 4 = 'Extremely like me'). Subscales include inadequate self, which regards a sense of feeling internally put-down and inadequate; hated self, which involves a sense of self-dislike and aggressive/persecutory desires to hurt the self; and reassured self, which refers to an ability to be encouraging and concerned for self when things go wrong. The original scale has good reliability with Cronbach's alphas of 0.90 for inadequate self, 0.86 for hated self, and 0.86 for reassured self [46].

Weight-focused Social Comparison Scale (WFSCS)

This 11-item scale measures judgements of how a person compares him/herself with others in terms of general competencies (inferior-superior), attractiveness (undesirable - more desirable) and how well the person thinks he/she 'fits in' (outsider-insider). This scale uses a semantic differential methodology with bipolar constructs on a 1-10 scale. Lower scores point to feelings of inferiority and general low rank self-perceptions. The scale has been found to have good reliability, with Cronbach's alphas of 0.88 and 0.96 in clinical populations and 0.91 and 0.90 with student populations [47]. For this study the instructions were changed to focus on weight, body shape or eating.

Weight-focused Feelings Scale (WFFS)

This is an 11-item scale measuring positive and negative feelings in relation to body weight, body shape and eating. Participants were asked to rate on a 4-point scale ('Not like me' to 'Extremely like me') their responses to a series of statements about their current feelings linked to body weight. Exploratory and confirmatory factor analyses of this measure showed that this scale shows good psychometric properties with a robust two-factor structure: negative weight-focused feelings (8 items; e.g., 'I feel depressed and down'); and positive weight-focused feelings (3 items; e.g., 'I am quite happy in myself').

Depression, Anxiety and Stress Scale (DASS-21)

This 21-item scale measures depressive, anxiety and stress symptoms [48]. Participants were asked to rate how much each statement applied to them over the past week, on a 4-point scale ('Did not apply to me at all' to 'Applied to me very much, or most of the time'). The subscales presented Cronbach's alphas of 0.94 for depression, 0.87 for anxiety and 0.91 for stress [49].

The Three Factor Eating Questionnaire (TFEQ)

The TFEQ is a 51-item questionnaire designed to measure three cognitive and behavioural dimensions of eating [50]. The TFEQ includes three subscales: restraint, which measures the tendency to restrict food intake to control body weight and shape; disinhibition, which assesses episodes of loss of control over eating; and susceptibility to hunger, which measures subjective perceptions of hunger and food cravings [51]. In the original study the scale revealed Cronbach's values of 0.93 for the subscale Restraint, 0.91 for the subscale Disinhibition, and 0.85 for the subscale Hunger.

Height and weight

The weight management programme support groups are located in a variety of local venues at different times and days of the week, making the groups widely accessible for members of the community. The majority of participants access the groups through self-referral and pay weekly (£4.95) to attend their chosen group. It is an open programme with no fixed duration of membership. Participants can join, leave and re-join as they wish for any length of time and support groups are available week-by-week through the year. As part of the weight management programme height is recorded at the point of joining and weight is recorded weekly during programme attendance. Height was self-reported to the nearest 0.5 cm. Participants were weighed in light clothing on scales with a precision of ± 0.23 kg (SECA bespoke model). Accuracy is ensured by calibration against standard weights, during routine service and scales are checked for notable drift weekly in use. The same calibrated scales were used each week at a given group to record weight and weight change. Weights reported for the time of survey were < 10 days of the survey date.

Statistical analysis

Data analyses were conducted using PASW (version 18 SPSS, Chicago Inc.) and AMOS (version 18, SPSS Inc, Chicago, IL).

Pearson correlation coefficients were calculated to explore the correlations between the study variables. Multiple regression analyses were conducted to explore the contribution of study variables to the prediction of depressive symptoms and weight-related negative affect [52].

A mediation analysis was then performed, to test the impact of weight focused external shame (WFES), weight focused self-criticism (WFFSCRS) and weight focused social comparison (WFSCS); [independent, exogenous variables] on disinhibition and susceptibility to hunger (TFEQ); [dependent, endogenous variables] with weight-related negative affect (WFFS) as a mediator, controlling for the effect of depressive symptoms (DASS-21). A final path analysis was conducted examining the direct and indirect effect of these variables on the extent of weight loss during participation in the programme prior to the point of survey (BMI change; dependent, endogenous variable).

A path analysis using the Maximum Likelihood method was carried out to test for the relationships described above. This technique is a special case of structural equation modelling (SEM) and considers hypothetical causal relations between variables, controlling for error [53, 54]. There was no severe violation of normal distribution (with skewness values ranging from -0.37 (disinhibition) to 1.19 (DASS-21 depression), and with kurtosis values ranging from -0.95 (susceptibility to hunger) to 0.83 (DASS-21 depression). The significance of direct, indirect and total effects was assessed using χ^2 tests. Bootstrap re-sampling was further used to test the significance of the mediation paths, using 1000 bootstrap samples and 95% confidence intervals (CIs; [54]). The data set used for analysis in the present study can be found in the supplementary materials S2 sav file.

Results

Mean (*SD*) weight change, since joining the programme, was -9.98 (8.80) kg, BMI change was -3.68 (3.22) kg/m² and per cent weight change was -10.2 (8.1)% (all $p < 0.001$) indicating that this group of participants lost a significant amount of weight during programme attendance up to the point of survey. Mean BMI was 31.6 kg/m² at the time of survey.

The scales, which were adapted to focus dimensions of weight and eating relevant to this population (WFES, WFFSCRS, WFSCS), presented higher mean values than those found with the original versions in the general population [44, 46, 47] and similar to those found in clinical samples with eating disorders [27, 28, 35]. Participants showed higher levels of negative affect related to weight and eating than of positive affect. Depressive symptoms scores were similar to those found in the general population [48]. Mean values for disinhibition and susceptibility to hunger TFEQ subscales were comparable to those found in other studies conducted in similar samples [55, 56]. All scales revealed good to very good internal consistency (**Table 2**).

Table 2

Descriptive statistics and Cronbach' alphas for study variables (N = 2 236)

	Cronbach'α	M	SD
WFES	.95	24.50	14.42
WFFSCRS_Inadequate Self	.86	19.16	8.15
WFFSCRS_Reassured Self	.84	16.38	6.31
WFFSCRS_Hated Self	.70	4.66	4.43
WFSCS	.95	53.53	18.40
WFFS_Negative Affect	.88	12.64	8.37
WFFS_Positive Affect	.79	5.13	3.45
TFEQ_Disinhibition	.79	9.94	3.55
TFEQ_Susceptibility to hunger	.82	6.51	3.70
TFEQ_Dietary Restraint	.70	11.50	3.43
DASS21_Depression	.91	5.08	4.98

Note. WFES = Weight-focused External shame Scale; WFFSCRS = Weight-focused Self-Criticising/Self-Reassuring Scale; WFSCS = Weight-focused Social Comparison Scale; WFFS = Weight-focused Feelings Scale; TFEQ = Three Factor Eating Questionnaire; DASS21 = Depression, Anxiety and Stress Scale-21.

Correlations

Table 3 gives the correlation matrix for the study variables. Results showed positive associations between depressive symptoms, external shame, self-criticism, and weight-related negative affect. Negative correlations were found between these variables and weight-related positive affect, favourable social comparisons and reassured self.

Disinhibition and susceptibility to hunger were positively associated with external shame, self-criticism, negative social comparison, weight-related negative affect and depressive symptoms, and negatively linked to reassured self and weight-related positive affect. Dietary restraint

showed weak positive correlations with reassured self, positive social comparison and weight-related positive affect.

Women with higher BMIs had higher external shame, self-criticism (especially self-hatred), were less self-reassuring, felt more inferior to others, had higher weight-related negative and lower positive affect. Weight loss was positively associated with favourable social comparisons, self-reassurance, and weight-related positive affect, and negatively related to self-criticism, weight-related negative affect, disinhibition, susceptibility to hunger and depressive symptoms.

Table 3

Pearson's correlations between the study measures (N = 2 236)

	1	2	3	4	5	6	7	8	9	10	11	12
1. BMI												
2. BMI_Change	-0.36**											
3. WFES	0.19**	-0.06*										
4. WFFSCRS_Inadequate Self	0.15**	-0.13**	0.64**									
5. WFFSCRS_Reassured Self	-0.14**	0.07*	-0.50**	-0.49**								
6. WFFSCRS_Hated Self	0.19**	-0.14**	0.62**	0.71**	-0.54**							
7. WFSCS	-0.22**	0.15**	-0.65**	-0.57**	0.59**	-0.56**						
8. WFFS_Negative Affect	-0.19**	-0.20**	0.63**	0.73**	-0.55**	0.70**	-0.62**					
9. WFFS_Positive Affect	-0.11**	0.28**	-0.49**	-0.55**	0.68**	-0.53**	0.63**	-0.63**				
10. TEFQ_Disinhibition	0.10**	-0.16**	0.31**	0.39**	-0.30**	0.33**	-0.38**	0.42**	-0.43**			
11. TEFQ_Susceptibility to Hunger	0.04**	-0.14**	0.28**	0.32**	-0.22**	0.29**	-0.29**	0.35**	-0.34**	0.62**		
12. TEFQ_Dietary Restraint	-0.10**	0.12**	-0.07**	-0.03	0.11**	-0.06**	0.17**	-0.09**	0.13**	-0.22**	-0.20**	
13. DASS21_Depression	0.13**	-0.10**	.61**	.57**	-0.50**	0.61**	-0.54**	0.67**	-0.51**	0.31**	0.27**	-0.07**

Note. Correlations for BMI_Change considered participants with BMI data ($n = 2\ 089$), ** $p < .001$, * $p < .05$; BMI = Body Mass Index; WFES = Weight-focused External shame Scale; WFFSCRS = Weight-focused Self-Criticising/Self-Reassuring Scale; WFSCS = Weight-focused Social Comparison Scale; WFFS = Weight-focused Feelings Scale; TEFQ = Three Factor Eating Questionnaire; DASS21 = Depression, Anxiety and Stress Scale-21

Multiple regression with social rank variables predicting depressive symptoms and weight-related affect

Two multiple regressions were conducted using external shame, self-criticism and social comparison to predict depressive symptoms and weight-related affect.

For depressive symptoms, the regression model explained 49% of the variance [$F = 432.28$, $p < 0.001$]. External shame ($\beta = 0.25$) and hated self ($\beta = 0.25$) emerged as the best global predictors, followed by inadequate self ($\beta = 0.12$), reassured self ($\beta = -0.12$) and social comparison ($\beta = -0.10$).

Regarding weight-related negative affect, the model explained 65% of the variance [$F = 825.61$, $p < 0.001$], and inadequate self ($\beta = 0.35$) emerged as the best global predictor, followed by hated self ($\beta = 0.24$), social comparison ($\beta = -0.16$), reassured self ($\beta = -0.11$) and external shame ($\beta = 0.10$).

The same model was tested to predict weight-related positive affect and explained 57% of the variance [$F = 593.26$, $p < 0.001$], with reassured self ($\beta = 0.43$) emerging as the best global predictor, followed by social comparison ($\beta = 0.29$), and in a negative direction inadequate self ($\beta = -0.16$). All coefficients were significant at $p < 0.001$.

Weight-related negative affect as a mediator between social rank variables and eating behaviours

The hypothesized model was first tested through a fully saturated model with 54 parameters. The direct effects of depressive symptoms, external shame, hated self and reassured self on disinhibition and susceptibility to hunger were not significant. These non-significant paths were removed and the model recalculated. Results indicated an excellent model fit: [$\chi^2_{(8)} = 15.134$, $p = 0.057$; CMIN/DF = 1.892; CFI = 0.999; TLI = 0.997; NFI = 0.999; RMSEA = 0.020 [0.000 to 0.035], $p = 1.000$), according to recommended model fit indices [54].

The model accounted for 68%, 21% and 13% of the variance in weight-related negative affect, disinhibition and susceptibility to hunger, respectively. Results showed that, when controlling for the effect of depressive symptoms, inadequate self had a direct effect on disinhibition ($b = 0.063$; $SE_b = 0.012$; $Z = 5.147$; $p < 0.001$) and susceptibility to hunger ($b = 0.051$; $SE_b = 0.013$; $Z = 3.825$; $p < 0.001$). Social comparison also had a negative direct effect on disinhibition ($b = -0.031$; $SE_b = 0.005$; $Z = -6.464$; $p < 0.001$) and susceptibility to hunger ($b = -0.020$; $SE_b = 0.005$; $Z = -3.917$; $p < 0.001$). Furthermore, mediation analyses suggested that external shame and hated self indirectly predicted greater disinhibition (respectively: $\beta = 0.010$, CI = 0.001 to 0.021, $p = 0.029$; $\beta = 0.040$, CI = 0.027 to 0.056, $p = 0.001$) and susceptibility to hunger ($\beta = 0.009$, CI = 0.001 to 0.019, $p = 0.024$; $\beta = 0.037$, CI = 0.024 to 0.053, $p = 0.001$), fully mediated through weight-related negative affect. Higher levels of reassured self predicted lower levels of disinhibition ($\beta = -0.017$, CI = -

0.027 to -0.009, $p = 0.002$) and susceptibility to hunger ($\beta = -0.016$, CI = -0.025 to -0.008, $p = 0.001$) fully mediated through lower levels of weight-related negative affect. Inadequate self and social comparison also had an indirect effect on disinhibition (respectively: $\beta = 0.071$, CI = 0.052 to 0.094, $p = 0.001$; $\beta = -0.029$, CI = -0.042 to -0.019, $p = 0.001$) and susceptibility to hunger ($\beta = 0.065$, CI = 0.046 to 0.086, $p = 0.001$; $b = -0.027$, CI = -0.038 to -0.017, $p = 0.001$). **Fig 1** presents the mediation model with regression coefficients standardized estimates and R^2 for disinhibition, susceptibility to hunger and weight-related negative affect.

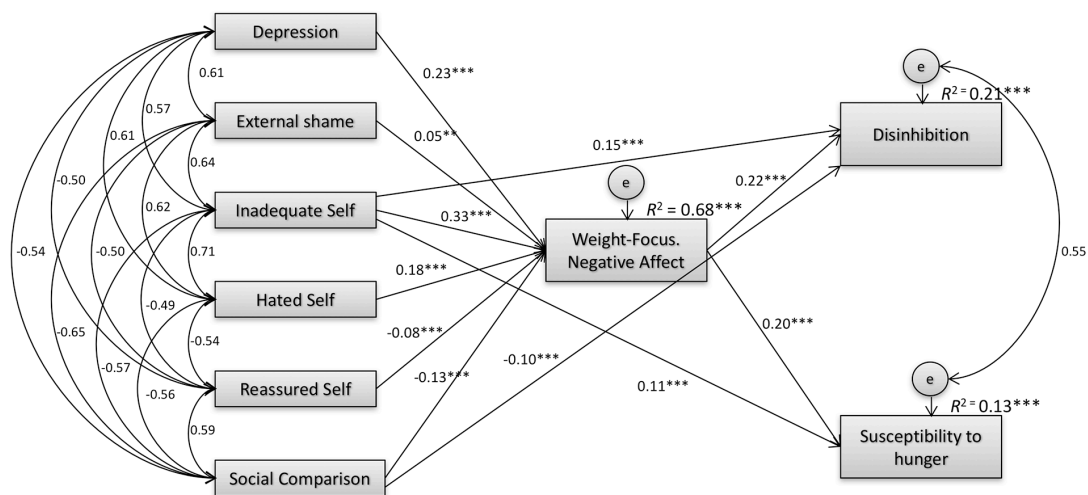


Figure 1 | Path analysis for eating disinhibition and susceptibility to hunger. Mediation model with standardized estimates and R^2 for weight-related negative affect, disinhibition and susceptibility to hunger. Model fit: $\chi^2_{(8)} = 15.134$ ($p = 0.057$); CMIN/DF = 1.892; CFI = 0.999; TLI = 0.997; NFI = 0.999; RMSEA = 0.020, CI = 0.000 to 0.035, $p = 1.000$). Inadequate self and negative social comparison predict higher disinhibition and susceptibility to hunger directly and partially through increased weight-related negative affect. When the effect of depressive symptoms was controlled for, the impact of shame, hated self and reassured self on disinhibition and susceptibility to hunger was fully mediated by their effect on weight-related negative affect.

Note. Depressive symptoms = Depression, Anxiety and Stress Scale-21 Depression subscale; External Shame = Weight-focused External shame Scale; Inadequate Self, Hated Self, Reassured Self = Weight-focused Self-Criticising/Self-Reassuring Scale subscales; Social Comparison = Weight-focused Social Comparison Scale; Weight-Focus. Negative Affect = Weight-focused Feelings Scale Negative Affect subscale; Disinhibition, Susceptibility to hunger = Three Factor Eating Questionnaire subscales.

Finally, we examined whether the proposed variables and mediators would have a significant effect on changes on BMI since starting the programme ($n = 2\ 089$), which was added in the model as the final outcome (**Fig 2**). Results indicated that the path between susceptibility to hunger and BMI change was nonsignificant ($p = 0.165$). This nonsignificant path was removed and results confirmed the adequacy of the model ($\chi^2_{(16)} = 75.970$ ($p = 0.000$); CMIN/DF = 4.748;

CFI = 0.994; TLI = 0.984; NFI = 0.993; RMSEA = 0.042 [0.033 to 0.052], $p = 0.897$). Results indicated that, while controlling for the effect of depressive symptoms, shame ($\beta = -0.009$, CI = -0.018 to -0.001, $p = 0.029$), hated self ($\beta = -0.034$, CI = -0.047 to -0.023, $p = 0.002$) and inadequate self ($\beta = -0.074$, CI = -0.090 to -0.060, $p = 0.002$), had a negative indirect effect on BMI changes (i.e. weight loss), fully mediated by increased weight-related negative affect and higher eating disinhibition. Moreover, self-reassurance ($\beta = 0.013$, CI = 0.007 to 0.021, $p = 0.002$) and positive social comparisons ($\beta = 0.035$, CI = 0.026 to 0.046, $p = 0.001$) were positively associated with BMI changes (i.e. weight loss), and again their effects were fully mediated by lower negative affect and disinhibition. Negative affect presented a significant negative direct effect on BMI change (weight loss) ($b = -0.059$; $SE_b = 0.009$; $Z = -6.889$; $p < 0.001$), as well as a significant indirect effect, with eating disinhibition emerging as a significant mediator of the negative association between weight-focused negative affect and changes (decreases) in BMI ($\beta = -0.022$, 95% CI = -0.037 to -0.010, $p = 0.002$).

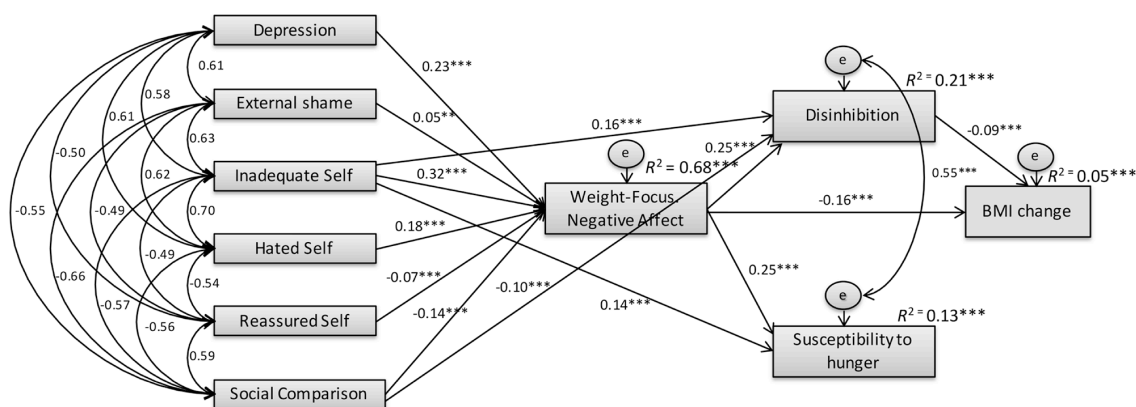


Figure 2 | Path analysis for BMI changes. Mediation model with standardized estimates and R^2 for weight-related negative affect, disinhibition, susceptibility to hunger and BMI changes. Model fit: $\chi^2_{(16)} = 75.970$ ($p < 0.001$); CMIN/DF = 4.748; CFI = 0.994; TLI = 0.984; NFI = 0.993; RMSEA = 0.042, CI = 0.033 to 0.052, $p = 0.897$).

Discussion

Current evidence suggests that core features of effective weight management interventions include self-regulatory behaviour change techniques such as self-monitoring (of weight and behaviour), relapse prevention, goal setting, and action plans for diet and physical activity [57-60]. However, for some there is also an emotional dimension to weight management. There is increasing evidence of the central role of shame, self-criticism, and negative social comparison in

a wide range of psychopathological conditions [31, 32, 36, 46]. Self-evaluation and emotion regulation may also influence self-regulatory behaviours associated with weight management in some people. The current study examined associations between external shame, self-criticism, unfavourable social comparison, negative emotions about weight and dietary restraint, disinhibition and perceived hunger, in participating members of a weight management organisation that focuses on behaviour change.

In line with previous studies [31, 32, 36, 46], external shame, perceptions of social inferiority and self-criticism derived from weight-focused evaluations, a diminished ability to self-reassure and experience positive feelings in relation to weight and eating, were associated with depressive symptoms. Weight-related negative emotions were related to feelings of inferiority, external shame and self-criticism and a lack of self-reassurance, which is of interest in relation to potential mechanisms that may undermine control of eating behaviour. The relationships between negative self-evaluation and disinhibition and perceived hunger, suggest that shame, perceptions of inferiority in comparison to others and self-criticism may predispose people to poor self-regulation of eating behaviour within our current "obesogenic" and stigmatising environment [13-15, 25, 27].

Regression analysis confirmed the relationship between social rank variables, depressive symptoms and weight-related negative affect and identified salient predictors of weight-related negative and positive affect. Results suggested that negative self-evaluations (inferiority, perceived criticism or devaluation associated with weight status, along with self-criticism, have a significant effect on increased negative affectivity, which in turn, has been identified as an important predictor of difficulties in regulating eating behaviour [16, 22, 23].

Path analysis suggested that negative affect about weight is a mediator between external shame, social comparison, self-criticism, low self-reassurance, and indicators of difficulty in controlling eating behaviour (disinhibition and perceived hunger). These cross sectional data suggest that negative self-evaluation (shame, self-criticism including self-hatred, and low self reassurance) may be associated with negative feelings around one's body weight and these emotions may translate into higher disinhibited eating behaviours and elevated predisposition to hunger. It would be important to confirm these associations in prospective intervention studies. These findings are consistent with previous studies indicating that perceptions of inferiority, shame and self-criticism play a significant role in the aetiology and persistence of disordered eating symptomatology [27, 28, 31, 35, 36, 38, 39]. The present study extends these findings by

suggesting that these variables are also relevant to understand difficulties with self-regulation of eating behaviour in a large community sample overweight and obesity women.

Inclusion of weight change during participation of the programme prior to the survey confirmed that shame and self-criticism were negatively associated with extent of weight loss prior to the survey, while self-reassurance and positive social comparisons were positively linked with extent of weight loss prior to the survey. In the path analysis these effects appeared to be related to their effect on increased or decreased weight-focused negative affect and disinhibition/perceived hunger. In particular negative affect was negatively associated with degree of weight loss prior to the survey and was associated with higher eating disinhibition, which, in turn, was strongly linked with susceptibility to hunger.

It is important to emphasize the cross-sectional nature of these analyses. It is not possible from the current data to state whether weight loss led to changes in weight-related affect or whether weight-related affect is causally involved in the control of subsequent eating behaviour and weight outcomes. Nonetheless, this cluster of variables has not been explored in relation to weight management before, and these relationships raise important hypotheses that should be tested prospectively. The current findings suggest that in overweight populations negative feelings about physical appearance and perceptions of social inferiority and self-criticism could potentially undermine some aspects of self-regulation of eating behaviour [22, 23, 38]. On the other hand, the ability to reassure and soothe oneself may potentially protect against weight-related negative affectivity and difficulties in regulating eating behaviour [28]. We hypothesise that if this is the case helping participants cope with the emotional stress of weight related shame and self-criticism may be a useful resource for participants engaged in weight management programmes. There is evidence that developing acceptance skills and learning to manage emotional responses has beneficial impacts in behavioural self-regulation and weight management [61, 62]. The current study suggests that addressing the role of shame and self-criticism and targeting emotion regulation through the cultivation of self-reassuring skills could enhance self-regulation of eating behaviours and improve the effectiveness of weight management programmes. However, we stress that these relationships have yet to be tested in prospective intervention studies.

Strengths and limitations of the current study

Although these findings were supported by robust statistical analysis, namely path analyses, the cross sectional and correlational design of the study does not allow causal conclusions to be drawn. The current study tested whether a hypothesized model that links weight-focused shame, self-criticism and negative social comparisons, with difficulties with regulating eating and weight, would be consistent with the theoretically and empirically supported associations between these variables. There is growing research on the negative effect of shame and self-criticism on self-regulation of eating behaviour, but it has been mostly limited to normal weight nonclinical samples (e.g., [28, 29, 31]) or clinical samples with eating disorders (e.g., [35, 36, 39]). To our knowledge, this is the first study that tested the plausibility of this specific hypothetical model in overweight and obese participants of a community-based weight management programme. Even though cross-sectional data does not invalidate our approach (e.g., [63, 64]), future prospective studies are necessary to ascribe causality to these associations.

Another important limitation of this study was that data was collected online. Although online surveys enable the access to a large number of participants and offer a sense of privacy that facilitates the honest disclosure of sensitive data (e.g., aspects related to shame), this methodology has a number of limitations, including sampling bias (see below), self-selection issues, or under-representation of the population, and thus limits the possibility to make generalizations about the study's findings [65]. The current study used a large sample that represents individuals attending weight management programmes, but participants were predominately middle-aged, Caucasian women. Only 1.8% of the respondents were men, while about 5% of the regular membership of commercial weight management organisations comprise men and so they appear to have been under-represented in this sample. For this reason, the study was conducted only in the female participants' sample, but future research should investigate this model considering also men. As with most surveys of this type, only a small percentage of participants in the programme who had accessed the website, actually took part in the survey. The site is accessed by >100, 000 participants per week (although the number accessing the survey description was not recorded). In a separate online study where participant access was recorded from the same population of participants of a commercial weight management programme, we have found that 10,483 participants accessed a survey, of whom 2492 completed it. There was evidence that these were relatively successful participants as on average, they had lost 10.19% of their initial weight in approximately 9 months prior to the

survey. By definition of taking part in the study they were prepared to discuss their emotions in relation to their weight control. It may well be that the variables of interest present differently in those who are less successful participants in weight management programmes. This study also suggests that issues related to external shame, self-criticism, unfavourable social comparison, and low self-reassurance are important in the lives of the general public struggling with weight management and not just clinical samples with eating disorders (e.g., [35, 36, 39]). Future studies should investigate whether the pattern of associations found in the current study is stable in other samples of participants who show more difficulties in losing weight and/or maintaining weight loss.

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Study XV

At the core of eating disorders: Overvaluation, social rank, self-criticism and shame in anorexia, bulimia and binge eating disorder

Adapted from:

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Abstract

This study examined the similarities and differences in eating psychopathology symptoms, overvaluation of body shape, weight and eating, general psychopathology, social comparison, self-criticism and shame, between AN, BN and BED patients. Also, the mediator effect of self-criticism and social comparison on the association between overvaluation and shame, was tested.

Participants were 119 patients (34 AN, 34 BN and 51 BED) diagnosed through the Eating Disorder Examination.

Results indicated that BED patients are older and present higher BMI. The groups differed regarding eating disorders' symptomatology, but no significant differences were observed in overvaluation, self-criticism, shame and overall psychopathology symptoms. The path model confirmed that overvaluation has a significant indirect association with shame, which is mediated by severe self-criticism and negative social comparisons. The model was found to be invariant between the clinical groups.

These findings contribute for the understanding of the common processes that feed the perpetual cycle of eating psychopathology. Thus, these data have potential implications for transdiagnostic approaches to treatment.

1. Introduction

The differences and similarities between anorexia nervosa (AN) and bulimia nervosa (BN) have been an important issue for both clinicians and researchers [1]. Furthermore, there has been a research focus on to what extent BN patients differ from BED patients [2–5]. However, the comparison between these three main eating disorders' conditions has received less attention. According to the fifth version of the DSM, although these three diagnostic categories involve persistent eating-related difficulties linked with significant physical or psychosocial impairments, they are conceptualized as substantially distinct and autonomous conditions, with specific clinical courses, characteristics and treatment needs [6]. Transdiagnostic approaches for eating psychopathology [1,7] suggest that these disorders present distinct clinical manifestations (e.g., severe restraint or attempts to restraint one's eating; binge eating episodes; compensatory behaviors). However, such manifestations derive from a common

psychopathological core characterized by the overvaluation of eating, body shape and weight and their control in the judgment of one's self-worth [1,8]. This overvaluation has been identified as playing a key role in maintaining the disorder [7,9].

Even though the overvaluation of shape and weight is a necessary diagnostic criterion for the diagnosis of BN and AN [6], the importance of this dimension in one's self-evaluation is still not recognized in BED current diagnostic criteria. This has been highlighted as a caveat in current conceptualizations of BED as there is growing research on body image difficulties in BED that suggests that this feature should also be included in BED diagnostic criteria. In fact, studies have shown that BED patients present similar levels of overimportance of shape and weight in comparison to BN and AN, and higher levels in comparison to non-disordered eating controls [2–5,10–12].

Moreover, recent studies reveal that eating disorders share important mechanisms operating in the onset and maintenance of the disorder. A sense of inferiority and defectiveness, and the adoption of maladaptive emotion regulation strategies have been highlighted as key in eating disorders [13–16]. In fact, there is evidence that eating disorders' patients tend to engage in an excessive focus on social rank and especially on how they stand in relation to others, based on body image [17–20]. These patients often reveal a tendency to compare themselves negatively with others and to engage in harsh self-criticism, which have been associated with the severity of eating disorders symptoms [13,16].

These processes of social comparison and self-criticism may be understood as defensive self-monitoring strategies used as a maladaptive way to become closer to what is socially valued (e.g., a thin body shape) and thus to enhance one's social status and sense of being praised and accepted by the social group [19,21]. Nonetheless, research has consistently shown that perceptions of low social rank and self-criticism are important contributors for emotional distress [22,23] and are associated with feelings of inferiority and defectiveness [24,25], which are part of the phenomenon of shame. Indeed, shame is conceptualized as a self-conscious and socially-focused emotion derived from perceptions of being perceived as flawed, inadequate or defective [18,26–28]. Shame is associated with a range of psychopathological conditions (e.g., depression; [29]), and research converges on the idea that shame plays a crucial and distinctive role in the understanding of eating disorder pathology, operating both as a risk and as a maintenance factor [14–16,30–34]. In fact, research seems to support the claim that shame fuels the maintenance cycle of eating psychopathology by stimulating pathological

eating behaviors, which may further increase the obsessive focus on the control over body image and weight, and a sense of failing to reach standards to feel valued [16,18,19]. Nonetheless, there is no research on the relationship between overvaluation and shame in patients with eating disorders. Theoretical accounts suggest that there is a complex and cyclical association in which shame predicts the development of the overimportance of body weight, shape and eating, and the engagement in disordered eating behaviors to manage such shame feelings [16,18]. Moreover, it is plausible that overvaluation leads to more shame by predicting the engagement in defensive processes of social comparison and self-criticism.

In fact, as the overvaluation of body weight, shape and eating stems from a sense of self-inefficacy and defect, it is hypothesized that this system to evaluate self-worth involves the tendency to constantly monitor how one stands in relation to others regarding the physical appearance domain, which, in patients with eating disorders, mirrors how much personal value one has in comparison to others [17,18,21]. This overvaluation can also be associated with a critical relation with oneself, a maladaptive strategy adopted to correct the self, avoid mistakes or even punish or attack the self for its flaws [24]. These strategies of internally tracking one's value may, in turn, paradoxically intensify negative perceptions that one is failing in creating positive feelings in others, but rather that others see the self negatively (e.g., as inferior, flawed, worthless; [26,27]), which then may promote the engagement in the defensive attitudinal and behavioral outputs that characterize eating disorders. Understanding these associations and the mechanisms underlying these self-other experiences may be particularly important for the development of specific eating disorders' evaluation protocols and interventions. The inclusion of a detailed assessment and a clinical focus on these maladaptive processes, may improve the effectiveness of such treatment approaches, allowing the break of the pathological cycle between the overvaluation of body image, weight and eating, and shame feelings in patients with eating disorders. In this sense, it seems crucial to clarify the characteristics that distinct eating disorders' diagnoses share and to understand the relational pathways between the overvaluation of weight, shape and eating, and self-criticism, social comparison and shame. To our knowledge, no previous study has compared patients with AN, BN and BED (DSM-5; [6]), on these variables, and how these relate and interact in such clinical conditions.

The current study aimed at contributing for a better understanding of the distinctive and common features across patients with AN, BN and BED. This study analyzed whether patients with AN, BN and BED differed significantly in regard to clinical features of eating

psychopathology, especially the eating psychopathology core – overvaluation of body shape, weight and eating – and indicators of mental health distress (i.e., symptoms of anxiety, stress and depression). Furthermore, we aimed at clarifying the characterization of patients with eating disorders in relation to external shame and emotional regulation processes operating in the disorder, namely self-criticism and social comparison. Finally, this study aimed at examining a model investigating the role of self-evaluation and emotion regulation processes that these patients share. The tested model suggests that in patients with eating disorders, regardless of the specific clinical condition, the relationship between the compulsive focus on weight, body shape and eating, and higher levels of shame, would be influenced by negative social comparisons based on physical appearance and self-criticism. To make this model more robust, we controlled for the effect of depressive symptoms as a simultaneous mediator, given the high association between self-criticism, negative social comparisons and shame, and depression (e.g., [24]). We hypothesize that the impact of the core eating psychopathology of overvaluation in patients with eating disorders on increased levels of the painful experience of existing negatively in the social arena – external shame – would be fully mediated by its effect on maladaptive self-monitoring strategies – social comparison and self-criticism. It is expected that instead of allowing for self-correction and self-enhancement, these mechanisms paradoxically feed a flawed sense of self in the eyes of others. (See Fig. 1.)

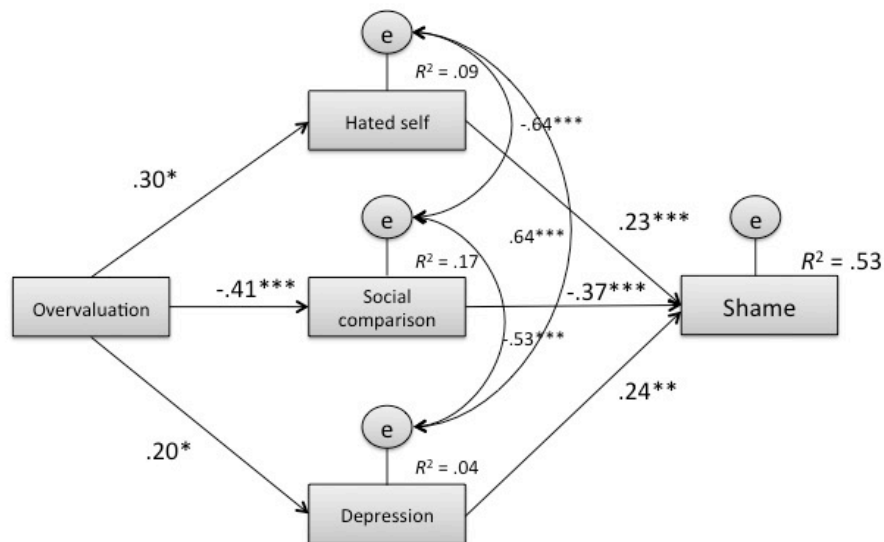


Figure 1 | Path model representing the association between overvaluation of body shape, weight and eating, and external shame, mediated by the hated self form of self-criticism, negative social comparisons based on body image, while controlling for the effect of depressive symptoms, with standardized estimates and square multiple correlations ($N = 119$).

2. Material and method

2.1. Sample

A total of 119 adolescent and adult female eating disorders outpatients seeking-treatment at Portuguese public hospitals were enrolled in the study. Thirty-four patients presented Anorexia Nervosa, 34 Bulimia Nervosa, and 51 Binge Eating Disorder. The diagnoses followed DSM-5 criteria for eating disorders and were established through the Eating Disorder Examination 17.0D [35]. Patients with AN had ages ranging from 13 to 36 ($M = 19.85$; $SD = 4.96$), and presented 7 to 18 years of education ($M = 12.15$; $SD = 3.03$), and the majority were single (91.2%). Patients with BN presented ages ranging from 15 and 49 years old ($M = 26.91$; $SD = 9.23$), and years of education ranging from 6 to 17 ($M = 11.88$; $SD = 3.25$), with 73.5% being single and 20.6% married/living with a partner. Patients meeting the diagnosis for BED presented ages between 20 and 57 years old ($M = 38.48$; $SD = 10.47$) and years of education ranging from 4 to 19 ($M = 13.20$; $SD = 4.30$), with 64.7% being married/living with a partner and 29.4% were single. Regarding BMI, the AN patients' BMI ranged from 13.32 to 17.50 ($M = 16.04$; $SD = 1.19$); BN values ranged from 17.81 to 47.33 ($M = 24.94$; $SD = 7.19$); BED patients' BMI ranged from 20.83 to 50.32 ($M = 35.52$; $SD = 8.10$).

2.2. Measures and procedure

All ethical requirements were followed prior to data collection, with all procedures being approved by the involved institutions Ethics Committees. The procedure and aims of the study were explained to the potential participants. Written informed consent was obtained from those who accepted. Selection criteria for patients were as follows: i) to consent to participate in the study, ii) to meet the diagnostic criteria for AN, BN or BED [6], as established by the Eating Disorder Examination 17.0D; iii) to have ages below 60 years old; iv) absence of pregnancy or severe medical conditions; v) absence of severe comorbid mental disorder (e.g., bipolar disorder, severe major depression, and schizophrenia, substance and alcohol abuse), according to a screening clinical interview based on criteria from DSM-5 [6]. The study assessment procedures were conducted by two of the researchers, who have a large clinical experience with patients with eating disorders, and previous training and supervision in applying the Eating Disorder Examination interview. The individual assessment was conducted at the Psychiatry and Eating Disorders Care Units of the hospitals. The researchers were blind to the patients' current

diagnosis as established by the respective therapist in the intake assessment. Sixteen potential participants failed to meet the inclusion criteria and were excluded from the study. The 119 participants that met the selection criteria after the interviews assessments were asked to answer to the self-report measures and had their height and weight measured. The researchers were present during the questionnaires completion and assisted participants' whenever required. In cases where patients presented more severe symptomatology or to prevent bias due to fatigue, an additional session was schedule for the questionnaires completion.

2.3. Measures

Eating Disorder Examination 17.0D (EDE 17.0D; [35,36]). EDE is an investigator-based clinical interview that allows for a comprehensive assessment of key behavioral and psychological features of eating disorders. This interview comprises the subscales Restraint, Eating Concern, Weight Concern and Shape Concern, and a global score is obtained by calculating the mean of the subscales' scores. The overvaluation of body shape, weight and eating was calculated in the current study as the mean of the items assessing these dimensions. The EDE presents good psychometric properties, including internal consistency (.78 in the current study), discriminant and concurrent validity, and test–retest reliability (for a review see [1]).

Other as Shamer Scale (OAS; [37,38]). The OAS comprises 18 items that measure external shame, that is, evaluations that one is negatively evaluated, looked down or criticized by others, as being flawed, inferior, defective, or worthless. Participants are asked to rate each item on a 5-point Likert scale (0 = 'Never' to 4 = 'Almost always') according to the frequency with which they make these evaluations. Goss et al. [37] found that OAS presents good reliability, with a Cronbach's alpha of .92 (.94 in the current study).

Forms of Self-Criticizing & Self-Reassuring Scale (FSCRS; [24,39]). The FSCRS is a 22-item scale that measures self-criticism and the ability to self-reassure in face of setbacks or failures. The scale includes two forms of self-criticism: inadequate-self, which refers to a sense of inadequacy and inferiority; and hated-self, which entails feelings of disgust, hatred and contempt for the self. In the current study, the two self-criticism subscales were considered. Participants are asked to answer on a 5-point Likert scale (ranging from 0 = 'Not at all like me', to 4 = 'Extremely like me') how they feel and think about themselves when things go wrong for them. Gilbert et al. [24] found that the scale presents good internal consistency, with Cronbach's

alphas of .86 for hated self and .90 for inadequate self (.83 and .87, in the current study, respectively).

Social Comparison through Physical Appearance Scale (SCPAS; [17]). SCPAS measures social comparisons based on physical appearance in relation to Peers and to Models/Actresses/Celebrities. Participants are asked to rank themselves (on a 10-point scale) in comparison to others taking into account the physical appearance domain, regarding 11 bipolar constructs (e.g., inferior/superior, valued/devalued). Lower scores characterize more unfavorable social comparisons based on physical appearance. In the current study were considered comparisons with Peers. The SCPAS presented high internal consistency in its original study [17], presenting a Cronbach's alpha of .94 in the current study.

Depression Anxiety and Stress Scales (DASS21; [40,41]). DASS21 includes 21 items that measure levels of depression, anxiety and stress symptoms. Participants are asked to rate, using a 5-point Likert scale (0 = 'Did not apply to me at all' to 4 = 'Applied to me very much, or most of the time'), the frequency in which they experienced each symptom over the past week. DASS21 has good psychometric properties and in the current study the scale presented Cronbach's alpha values of .88 for the depression, .85 for the anxiety and .89 for the stress subscale.

The instruments used in the current study in their Portuguese version were previously validated and used in samples with similar characteristics to those of the current study (e.g., [14,16,17,42]).

2.4. Statistical analyses

Data were analyzed using SPSS (v. 21 SPSS; Armonk, NY: IBM Corp.). Differences between the groups in categorical variables were examined through chi-square tests. Comparison of the variables among groups was conducted with ANOVA procedures and post-hoc comparisons for quantitative variables (Scheffe). Effect sizes were reported using partial eta squares (η_p^2), with $\eta_p^2 = .01$ referring to a small effect size, .06 to a medium effect size and .14 to a large effect size [43]. Post-hoc power calculations revealed that the sample size was adequate to detect medium to large effects [$f = .30$, $p < .05$, power = .80; G*Power; [44]. The following analyses were conducted in the total sample, considering current approaches to eating disorders [1].

Product-moment Pearson Correlation analyses were conducted to test for the correlations between the variables considered in the hypothesized model that was examined [45]. These

associations were further assessed through a path analysis calculated using the software AMOS (v. 21; Analysis of Moment Structures, SPSS Inc. Chicago, IL). Path analyses allows for the simultaneous examination of structural direct and indirect associations between exogenous variables (in this study overvaluation of body shape, weight and eating), multiple mediators (hated self form of self- criticism, negative social comparisons based on body image, and depressive symptoms) and endogenous variables (external shame), while controlling for error [46]. Although the study's design is cross-sectional and thus it does not allow the establishment of direction of influence between variables, the path model examined in the current study may contribute for the understanding of the relational pathways between the study variables and whether they are consistent with the underlying hypothesized theoretical model (e.g., [47]: whether, in a mixed clinical sample of patients with eating disorders, the overvaluation of body weight, shape and eating has a significant effect on external shame, through the mechanisms of self-criticism (hated self), unfavorable social comparisons, and depressive symptoms. To account for the possible reciprocal influence between the examined variables, two alternative models were also examined. The Maximum Likelihood estimation method was used to conduct the path analyses and the required assumptions regarding model complexity and sample size were met to obtain valid and robust results. The following goodness of fit indices were selected to assess the adequacy of the model: Chi-square (χ^2), Tucker Lewis Index (TLI), Comparative Fit Index (CFI), and Root-Mean Square Error of Approximation (RMSEA). The significance of the direct, indirect and total effects was assessed by Chi-Square tests; the significance of the mediational paths were further examined through the Bootstrap resampling method, with 5000 Bootstrap samples and 95% bias-corrected confidence intervals (CI). A significant mediation effect is denoted when zero is not included in the interval between the lower and the upper limits of the CI [46]. A multigroup analysis was also conducted to test for model invariance between the groups [48].

Effects with $p < .050$ were considered statistically significant.

3. Results

3.1. Sociodemographic and weight status variables

The comparison of the sociodemographic features across the three clinical groups revealed statistically significant differences in age, with BED patients being significantly older, followed

by BN patients, and finally the AN patients were the younger, according to Scheffe post-hoc comparisons. The three groups did not present statistically significant differences regarding years of education (**Table 1**). In relation to marital status, there were statistically significant differences across all groups ($\chi^2 = 38.4$; $p < .001$), with AN patients being more frequently single and the BED patients being more frequently married.

Table 1

Comparison of sociodemographic and weight status variables, eating psychopathology, overall psychopathology, shame and self-criticism between groups (N = 119)

	AN (n = 34)		BN (n = 34)		BED (n = 51)		F; df	Significance	η_p^2	Post-Hoc
	M	SD	M	SD	M	SD				
Age	19.85	4.96	26.91	9.23	38.48	10.47	45.36; 2	< .001	.45	AN < BN < BED
Years of education	12.15	3.03	11.88	3.25	13.20	4.30	2.75; 2	.069	.05	AN; BN; BED
BMI	16.03	1.19	24.94	7.19	35.52	8.10	82.77; 2	<.001	.60	AN < BN < BED
Adjusting for BMI										
<i>Eating psychopathology</i>										
Eating Restraint	4.16	1.12	4.00	0.98	3.01	1.12	13.16; 2	<.001	.19	AN;BN>BED
Eating Concern	3.38	1.61	4.24	1.40	2.66	1.22	16.25; 2	<.001	.22	BN>BED
Shape Concern	4.63	1.12	5.49	0.60	5.16	0.66	9.66; 2	<.001	.14	AN<BN;BED
Weight Concern	3.65	1.41	4.76	1.08	4.85	0.78	12.94; 2	<.001	.18	AN<BN;BED
Overvaluation	5.56	0.75	5.78	0.54	5.58	0.72	1.00; 2	.371	.02	AN; BN; BED
Total	3.96	1.09	4.62	0.67	3.92	0.60	10.74; 2	<.001	.16	AN;BED<BN
<i>Overall psychopathology</i>										
Depression	9.50	6.25	12.38	5.98	11.86	5.52	1.79; 2	.172	.03	AN; BN; BED
Anxiety	6.75	5.30	8.66	5.52	8.73	5.49	1.16; 2	.318	.02	AN; BN; BED
Stress	11.25	5.39	17.79	4.87	12.43	5.06	0.72; 2	.488	.01	AN; BN; BED
<i>Self-criticism, social comparison and shame</i>										
Social Comparison	44.91	22.17	35.29	15.88	34.47	18.84	6.30; 2	.003	.10	AN>BED
Hated self	1.66	1.28	2.15	0.99	2.01	0.96	1.80; 2	.170	.03	AN; BN; BED
Inadequate self	2.65	0.91	3.01	0.66	2.76	0.75	2.30; 2	.105	.04	AN; BN; BED
Shame	35.65	15.65	40.33	11.78	42.52	14.74	1.95; 2	.147	.03	AN; BN; BED

ANOVA comparisons yielded significant differences on BMI across all groups, with AN patients presenting the lowest BMI values, and BED patients presenting the highest BMI values (**Table 1**).

3.2. Eating psychopathology

Table 1 presents means, standard deviations and results of ANOVA analyses, effect sizes, and Scheffe post-hoc tests comparing EDE and its subscales across the groups, adjusting for BMI. Results revealed that there were significant differences regarding the specific indicators of eating psychopathology. In fact, the three eating disorders groups presented significant differences regarding all EDE subscales and total score. In particular, AN and BN patients presented significantly higher levels of eating restraint than BED patients. In relation to eating concern, BN and BED patients presented significant differences between them, with BN patients presenting the most pathological score. Regarding shape and weight concern, AN patients presented lower scores in comparison to BN and BED patients, which did not present statistically significant differences between them. The same pattern was found in the global EDE score. Nonetheless, regarding the overvaluation of weight, shape and eating the three groups of patients did not present statistically significant differences between them.

3.3. Overall psychopathology

There were no significant differences between the groups in relation to overall psychopathology, namely depressive, anxiety and stress symptoms, after adjusting for BMI.

3.4. Self-criticism, social comparison and shame

Findings adjusting for BMI indicated that no statically significant differences on self-criticism, either in the form of inadequate self and hated self, were observed across groups. Regarding social comparisons based on physical appearance, results indicated that there were no statistically significant differences between AN and BN patients, neither between BN patients and patients with BED. Patients with AN and BED presented a statistically significant difference in relation to social comparison, with patients with AN presenting higher scores. Finally, no statistically significant differences on the specific emotion of shame between the groups were found.

3.5. Correlations

Product–moment Pearson correlations' results (Table 2) indicated that the severity of eating psychopathology and overvaluation, presented significant associations with unfavorable social comparisons, higher levels of self-criticism, either in the form of inadequate self or hated self, shame, and indicators of nonspecific psychopathology (depression, anxiety and stress symptoms). Moderate to strong associations were found between self-criticism and social comparisons and shame. These variables were also significantly associated with depression, anxiety and stress symptoms. No significant associations were found between eating psychopathology severity, overvaluation of weight, shape and eating and BMI. Partial correlations controlling for the effect of BMI confirmed the direction and strength of the associations.

Table 2

Product moment Pearson correlations between the study variables (N = 119)

	1	2	3	4	5	6	7	8	9
1_EDE	1								
2_Overvaluation	.49***	1							
3_Inadequate self	.38***	.24**	1						
4_Hated self	.45***	.30**	.66***	1					
5_Shame	.32***	.21*	.52***	.64**	1				
6_Social comparison	-.49***	-.41***	-.47**	-.68***	-.66***	1			
7_Depression	.40***	.20*	.45**	.66***	.59***	-.56***	1		
8_Anxiety	.37***	.21*	.27**	.48***	.45***	-.41***	.71***	1	
9_Stress	.36***	.21*	.51**	.55***	.49***	-.41***	.79***	.77***	1
10_BMI	-.02	.13	.07	.22*	.25**	-.35***	.21*	.16	.15

Note. EDE = Eating Disorder Examination; Overvaluation = Overvaluation of body shape, weight and eating as measured by the Eating Disorder Examination; Inadequate self and Hated self = Subscales of the Forms of Self-Criticism and Self-Reassurance scale; Social Comparison = Social Comparison through Physical Appearance Scale – Peers comparison; Depression, Anxiety and Stress = Depression, Anxiety and Stress Scale 21

*** $p < .001$; ** $p < .010$; * $p < .050$

3.6. Path analysis

Preliminary analyses indicated no evidence for multicollinearity; the Skewness coefficients ranged from to -2.10 to $.46$, and the Kurtosis coefficients ranged from $-.97$ to 4.14 , confirming that there was no serious violation of normal distribution [46].

As expected, the initial model indicated that the direct effect between the overvaluation and shame was nonsignificant ($b_{\text{shame}} = -1.58$; $SEb = 1.46$; $Z = -1.08$; $p = .279$), and thus the model was recalculated without this path. Results confirmed that all paths were significant and that the model presented an excellent model fit [$\chi^2_{(1)} = 1.17$, $p = .280$; TLI = .99; CFI = 1.00; RMSEA = .04, $p = .348$], accounting for a total of 53% of the variance of external shame. Results indicated that overvaluation presented a significant direct effect on self-criticism of .30 ($b_{\text{overvaluation}} = .47$; $SEb = .14$; $Z = 3.41$; $p < .001$), of $-.41$ on social comparison ($b_{\text{overvaluation}} = -11.61$; $SEb = 2.40$; $Z = -4.84$; $p < .001$), and of .20 on depression ($b_{\text{overvaluation}} = 1.77$; $SEb = 0.78$; $Z = 2.26$; $p = .024$), which shared a significant amount of variance. These hypothesized mediators presented a significant direct effect on external shame. In fact, self-criticism presented an effect of .23 ($b_{\text{self-criticism}} = 3.02$; $SEb = 1.30$; $Z = 2.32$; $p = .020$), social comparison an effect of $-.37$ ($b_{\text{social comparison}} = -.27$; $SEb = .07$; $Z = -4.22$; $p < .001$) and depression an effect of .24 ($b_{\text{depression}} = .58$; $SEb = .21$; $Z = 2.80$; $p = .005$). Finally, results indicated that together, self-criticism, social comparison and depression fully mediated the relationship between overvaluation and external shame, with an effect significantly different from 0 (CI = .13, .40, $p < .001$), according to the Bootstrap resampling method. The model invariance between the groups was examined through a multigroup analysis. Findings supported the model invariance between the three eating disorders groups ($\Delta CFI = .01$; $\Delta\chi^2_{(12)} = 8.983$; $p = .704$; [48]).

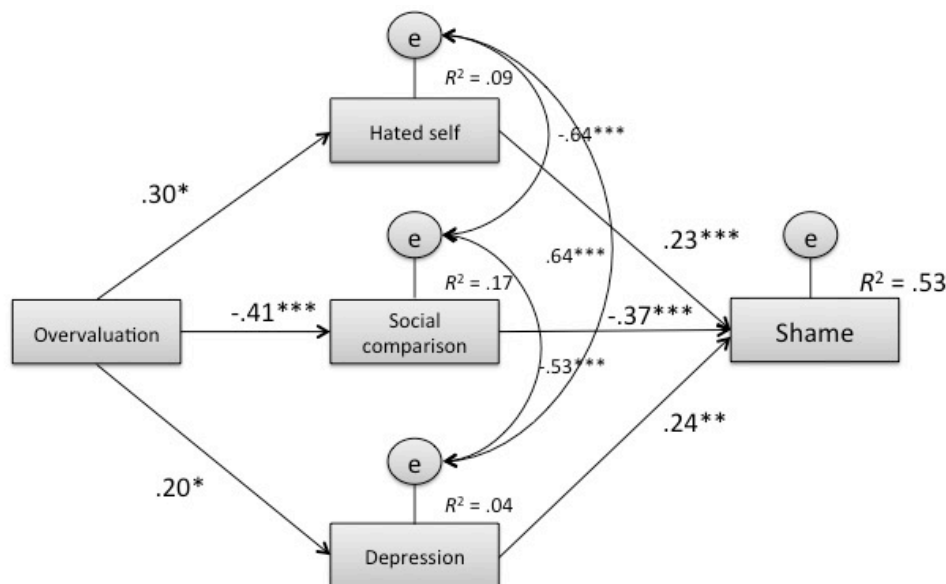


Figure 1 | Path model representing the association between overvaluation of body shape, weight and eating, and external shame, mediated by the hated self form of self-criticism, negative social comparisons based on body image, while controlling for the effect of depressive symptoms, with standardized estimates and square multiple correlations ($N = 119$).

In order to clarify the role of the variables tested in the model, two alternative models were also tested. A model examining the effect of social comparison and overvaluation (independent variables) on external shame (dependent variable), having self-criticism and depressive symptoms as mediators revealed a poor model fit [$\chi^2_{(3)} = 17.72, p = .000$; TLI = .68; CFI = .94; RMSEA = .26, $p = .001$]. The effect of self-criticism, depressive symptoms and social comparison as independent variables, predicting shame, having overvaluation as mediator, was also examined. This model also revealed an unacceptable fit [$\chi^2_{(3)} = 84.81, p = .000$; TLI = -.11; CFI = .67; RMSEA = .48, $p = .000$].

4. Discussion

The current study aimed at analyzing, in three eating disorders diagnoses – AN, BN, BED, eating disorders' symptoms and core features, nonspecific depressive, anxiety and stress symptomatology, and external shame, self-criticism and social comparisons, important self-evaluation and emotion regulation processes that have been identified as operating in eating psychopathology severity [13,15–17].

Findings indicated that the clinical groups that comprised the sample of the current study present similar characteristics to those of other studies with eating disorders samples [5,11,16]. In regard to the demographic variables, we found a different distribution of ages between the groups, with the patients with AN being younger in comparison to the BN patients and the BED patients, which are older. Moreover, as expected, results indicated that the three groups of patients present statistically significant differences in regard to BMI, with the patients who present binge eating – BN and BED – presenting higher levels of BMI in comparison to the AN patients. Results were also in accordance with prior research that supports a high comorbidity between BED and excess weight and obesity. In fact, differences regarding age and BMI between these groups are well established and reflect the characteristics and epidemiology of these clinical conditions [49].

The three clinical groups presented important differences in relation to the clinical manifestation of the eating disorder, that is, attempts to restrain one's eating behavior, concerns about eating, and concerns about body shape and weight. However, results suggested that the differences between the groups may be less pronounced in relation to the core

psychopathological feature of eating disorders – overvaluation of body shape, weight and eating (i.e., the undue influence of weight, shape and eating in one's self-evaluation). These findings are in accordance to prior research that shows that patients with BN and BED do not differ between them in relation to this core feature of eating disorders [11], but the current study contributes for the understanding of this aspect by suggesting that these two clinical groups (diagnosed according to current diagnostic criteria of DSM5 [6]) may be similar between them and also similar to AN patients. This indicates that regardless of physical features (i.e., levels of BMI and thus closeness to or distance from the thin body shape), AN, BN and BED patients may be identical in what regards the nucleus of the disorder – that their self-worth is unduly dependent on the ability to control one's eating, body shape and weight [1,8]. Findings also suggest that patients may not present significant differences in relation to overall emotional distress symptoms (depressive, anxiety and stress symptomatology).

There is growing evidence that common mechanisms contribute for the severity of eating psychopathology and among these mechanisms, shame, perceptions of inferiority in social rank comparisons and self-criticism, have been highlighted as playing a particularly important role in both nonclinical and clinical samples [13,15–17,20]. The comparisons between the three main eating disorders diagnoses in the current study indicated that patients presented identical levels of self-criticism, negative social comparisons and external shame.

Although the sample size of the current study lowered the statistical power of the analysis, these findings suggest that even though there is evidence for the distinctiveness of the phenomenological expression of the eating disorder between the three clinical conditions (e.g., severe restraint and low weight in AN patients, recurrent binge eating in BED and BN, and the adoption of compensatory behaviors in the latter), they present similar levels of the severity of the core psychopathology of eating disorders, nonspecific psychopathology symptoms, and affective and emotion regulation maladaptive mechanisms. These results seem to support the adequacy of eating disorders' transdiagnostic treatments, but simultaneously the need to consider the specificity of each group or the phase of the disorder.

Moreover, as shame has been identified as a key and specific emotion operating as a risk and maintenance factor of eating disorders [16,19,21], this study also aimed at understanding how the overvaluation of body shape and weight, and eating, is associated with an increased sense of a shamed self (e.g., the threatening perception of being negatively evaluated by others). Furthermore, we hypothesized that this association is not linear and that important

processes – a severe form of self-criticism and negative social comparisons based on body image – would mediate it. Results confirmed this by showing that the effect of the overvaluation on increased external shame was fully mediated by unfavorable social comparisons and harsh self-criticism, even when controlling for the effect of depressive symptoms. This model accounted for 53% of shame variance and was shown to have an excellent fit to the data. Previous research suggested that disordered eating behaviors and attitudes may have the maladaptive function of attempting to get close to a socially valued body image in order to feel safe, accepted and valued by others [16,17]. These findings suggest that placing one's sense of self worth on eating behavior and physical appearance is not linked to a more valued sense of self, but in contrast, it has the paradoxical effect of being associated with maladaptive processes of self-monitoring and self-correction. These processes, in turn, were found to be linked to higher levels of flawed and diminished sense of self, which may contribute to the maintenance of the disorder. Moreover, results revealed that the model was invariant between the eating disorders groups, further supporting that these are shared transdiagnostic processes and mechanisms operating in these disorders.

These results may point to important treatment directions. In particular, these findings highlight the relevance of working with AN, BN and BED patients' self-criticism and sense of inferiority, helping them to develop alternative adaptive emotion regulation processes, such as compassion [14,18,19], that undermine the dominance of the overvaluation of body weight, shape and eating on their sense of self, and, in turn, the consequent deleterious cycle that maintains the disorder (e.g., compassion-focused approaches to eating disorders [50]).

These findings should however be understood with caution given the cross sectional nature of the study. Actually, this study aimed at understanding the associations between a given set of variables, but conclusions regarding causality cannot be drawn at this point. Future prospective and experimental studies should be conducted to clarify these associations and propose causal inferences. Moreover, the small sample sizes in each group limit the generalization of the current findings. In fact, although the power of the analysis allowed for the detection of medium to large effects, it was reduced for the identification of small effects, which can result in Type II error (accepting a false null hypothesis). Thus, although the current findings point out to important trends, interpretations regarding the common features between patients with eating disorders should be made with caution. Future research with larger samples is required to corroborate the pattern of differences and similarities between the clinical samples

investigated in the current study. This could inform conceptualizations and treatment approaches for eating disorders, namely the need to consider that the overimportance of body weight and shape is relevant not only to AN and BN, but also for BED. Another important limitation of this study is that it comprised a sample of treatment-seeking patients, and thus these may not be representative of the generality of those suffering with body image and eating-related problems.

5. Conclusion

The current study examines the differences and similarities in patients with eating disorders. In particular, this study clarifies that core features and mechanisms operating in the maintenance of eating psychopathology (e.g., a sense of inferiority and severe self-criticism) are common to the three main eating disorders diagnoses, and offers important suggestions on and how they interact in the understanding of shame, a central emotion in eating disorders that requires particular clinical attention.

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Study XVI

The impact of early shame memories in Binge Eating Disorder: The mediator effect of current body image shame and cognitive fusion

Adapted from:

Duarte, C., & Pinto-Gouveia, J. (2016). *The impact of early shame memories in Binge Eating Disorder: The mediator effect of current body image shame and cognitive fusion*. Manuscript submitted for publication

Highlights

Physical appearance-related shame experiences were the most frequently recalled.

Traumatic and central to identity shame memories indirectly predict binge eating.

Current external shame and body image shame are associated with cognitive fusion.

External shame, body image shame and cognitive fusion were significant mediators.

Body shame and cognitive fusion are relevant for BED understanding and treatment.

Abstract

This study examined the phenomenology of shame experiences from childhood and adolescence in a sample of women with Binge Eating Disorder. Moreover, a path analysis was investigated testing the association between the traumatic and central to identity qualities of shame memories and binge eating symptoms' severity, mediated by current external shame, body image shame and body image cognitive fusion.

Participated in this study 114 patients, who were assessed through the Eating Disorder Examination and the Shame Experiences Interview, and through self-report measures of external shame, body image shame, body image cognitive fusion and binge eating symptoms.

Shame experiences where physical appearance was negatively commented or criticized by others were the most frequently recalled. A path analysis showed a good fit between the hypothesised mediational model and the data. The traumatic and centrality qualities of shame memories predicted current external shame, especially body image shame. Current shame feelings were associated with body image cognitive fusion, which, in turn, predicted levels of binge eating symptomatology.

Findings support the relevance of addressing early shame memories and negative affective and self-evaluative experiences, namely related to body image, in the understanding and management of binge eating.

Keywords: Binge Eating Disorder; Early shame memories; Body Image Shame; Cognitive Fusion; Path Analysis

1. Introduction

Binge eating has long been considered as a clinically significant problem (Stunkard, 1959), with significant negative psychological and physical health implications (Hudson et al., 2007; Kessler et al., 2013). Nonetheless, it was not until recently that BED was recognized as a distinct eating disorder diagnosis (DSM-5; American Psychiatric Association, 2013). The hallmark feature of BED is the occurrence of binge eating episodes, which involve the ingestion of an unusually large amount of food with a feeling of loss of control. These episodes involve emotional distress and shame because of the behaviour, as well as concerns about the effects of these episodes on body weight and shape and self-esteem. However, contrary to the currently established diagnoses of Bulimia Nervosa and Anorexia Nervosa, the diagnosis of BED does not contemplate the dimension of body image and its impact in one's self-evaluation (Ahrberg, Trojca, Nasrawi, & Vocks, 2011).

Recent studies suggest that shame feelings, especially those related to body image play an important role in binge eating symptoms (Dakanalis et al., 2015; Duarte et al., 2014; Duarte et al., 2015a; Duarte et al., 2015c; Fitzsimmons-Craft et al., 2011; Jambekar et al., 2003). The biopsychosocial model of shame (Gilbert, 1998; Gilbert, 2002, 2003; Gilbert, 2007) conceptualizes that shame emerges within the context of humans' innate motivation to stimulate positive feelings and create a positive image of themselves in the eyes of others to fit within the social group. From this perspective, shame acts as a warning signal that, because of shaming personal characteristics, attributes or behaviours (e.g., physical appearance and eating behaviour), the self is negatively evaluated by others, as unattractive, worthless, inferior or defective (Gilbert, 1998; Gilbert, 2003). These negative evaluations may also become the basis for self-evaluation (Gilbert, 1998; Kaufman, 1989). As a consequence, a series of defensive behaviours (e.g., concealment, avoidance) are activated to down-regulate such potential social threats (Gilbert, 1998; Gilbert, 2002, 2003; Gilbert, 2007).

Shame is significantly associated with eating psychopathology symptoms in both nonclinical (e.g., Gee and Troop, 2003; Murray et al., 2000; Sanftner et al., 1995) and clinical samples (Duarte et al., 2016; Gee and Troop, 2003; Grabhorn et al., 2006; Swan and Andrews, 2003). Moreover, there is evidence that shame focused on body image plays a significant role in disordered eating symptoms (Duarte et al., 2015c; Gilbert, 2002; Goss and Gilbert, 2002). Duarte et al. (2014) found that body image shame had a significant effect on binge eating symptoms, above overall negative affectivity. Moreover, in a recent study conducted in a clinical sample of women with

BED (Duarte et al., 2015a), the effect of shame on the severity of binge eating symptoms was found to be influenced by the extent to which these negative evaluations are associated with cognitive fusion focused on body image, (Ferreira, Trindade, Duarte, & Pinto-Gouveia, 2015). This process involves the tendency to become attached to disturbing cognitions about one's body, which fosters maladaptive attempts to avoid these cognitions (e.g., through binge eating; Hayes et al., 1999; Luoma and Hayes, 2003).

Shame-related feelings and cognitions may have its roots in early negative shame experiences (Gilbert, 2007; Gilbert et al., 1996; Matos et al., 2013; Tangney and Dearing, 2002), such as being criticized by parents, bullied by peers, sexually or physically abused, or displaying negative characteristics of the self to others. Research shows that these experiences can be recorded in autobiographical memory as central to identity and life story (Pinto-Gouveia and Matos, 2011), influencing subsequent cognitive, emotional and attentional processing (Baumeister et al., 2001; Berntsen and Rubin, 2006; Berntsen and Rubin, 2007; Gilbert et al., 2003; Schore, 1994). Moreover, there is evidence that these early shame experiences can be encoded as traumatic memories (Matos and Pinto-Gouveia, 2010). These shame traumatic and central memories have been associated with current shame feelings and evaluations (Matos et al., 2013), difficulties in emotion regulation (Dinis et al., 2015; Pinto-Gouveia et al., 2013), and with a range of psychopathological indicators (Matos and Pinto-Gouveia, 2010; Pinto-Gouveia and Matos, 2011). Moreover, recent studies conducted in a mixed sample of patients with eating disorders showed that shame memories have a significant effect on the severity of eating disorder symptoms (Ferreira et al., 2014a) and that this effect is mediated by the extent to which these memories influence current self-evaluations (Matos et al., 2015).

There is evidence that early negative experiences are a risk factor for BED (Jackson, Grilo, & Masheb, 2000; Pike et al., 2006). Fairburn et al. (1998) found that women with BED revealed greater exposure to adverse childhood experiences (e.g., parental criticism, peer bullying, sexual or physical abuse, critical comments about weight, shape or eating) than women without eating disorders or with other psychiatric disorders. Other study also identified sexual abuse as a risk factor for BED (Striegel-Moore et al., 2002). However, the specific impact of shame experiences and their phenomenology in patients with BED and the pathways through which they may operate on the severity of the disorder, were never investigated.

The current study explores the phenomenology of shame experiences in a sample of women diagnosed with BED, and their traumatic and centrality to identity features. Moreover, we

sought to test the hypothesis that the traumatic and centrality features of shame memories from childhood and adolescence are indirectly associated with the severity of binge eating symptoms, via their effect on current shame, namely body image-focused shame, which, in turn, potentially impact binge eating symptoms via the process of cognitive fusion.

2. Methods

2.1. Subjects

The sample of this study consisted of 114 women with the diagnosis of BED. Participants were 20-63 years of age, with a mean of 36.62 years ($SD = 37.62$). Their years of education mean was 14.57 ($SD = 5.93$). All participants were Portuguese and Caucasian. The majority was married or cohabiting with a partner (52.6%). Forty patients (35.15%) worked in middle class professions and 25 (21.9%) were students. Participants Body Mass Index ranged from 16.59 to 53.07, with a mean of 33.79 ($SD = 7.75$). One (0.88%) participant presented low weight ($18.5 < BMI$); 19 (16.66%) presented normal weight ($18.5 < BMI < 24.99$), 15 (13.16%) were overweight ($25 < BMI < 29.99$), 28 (24.56%) presented Class I Obesity ($30 < BMI < 34.99$), 22 (19.30%) presented Class II Obesity ($BMI > 35 < 39.99$), and 26 (22.81%) presented class III Obesity ($BMI \geq 40$); data was not collected in three participants (WHO, 2011).

2.2. Measures

Body Mass Index (BMI). The participants' BMI was calculated by dividing the weight (in kg) by height squared (in m), which were collected with standard calibrated instruments.

Eating Disorder Examination 17.0D (EDE 17.0D; Fairburn et al., 2008). The EDE is a standardized clinical interview that allows a comprehensive assessment of the frequency and severity of the key behavioural and psychological features of eating disorders. This interview was administered in the current study to examine whether the patients met the diagnostic criteria for BED, according to the DSM-5 criteria. Research consistently supports that EDE has high internal consistency, discriminant and concurrent validity and good test-retest reliability (for a review see Fairburn et al., 2008). In the current study a Cronbach's alpha estimate of .83 was obtained for the total score.

Shame Experiences Interview (SEI; Matos and Pinto-Gouveia, 2014). The SEI is a semi-structured interview that assesses the phenomenology of a shame experience occurred in childhood or adolescence, including its emotional, cognitive, behavioural and contextual aspects. The SEI starts by explaining to participant the concept of shame and by providing some examples of shame experiences from childhood and adolescence. The participant is then asked to recall and describe a personal significant shame experience from childhood or adolescence. The characteristics of the recalled shame experience are then assessed throughout the interview. After this evaluation, participants were asked to fill the self-report measures Centrality of Event Scale (Berntsen and Rubin, 2006) and Impact of Event Scale – Revised (Weiss and Marmar, 1997) in relation to the recalled shame experience.

Impact of Event Scale – Revised (IES-R; Weiss and Marmar, 1997). The IES-R measures current subjective distress for a specific life event. In the current study the IES-R was used in regard to the shame experience the patient recalled. This scale includes 22 items, rated on a 5-point scale (score range: 0 = *Not at all* to 4 = *Extremely*), which assess traumatic memories' features: avoidance (e.g., 'I stayed away from reminders of it'), intrusion (e.g., 'Any reminder brought back feelings about it') and hyperarousal (e.g., 'I was jumpy and easily startled'). In the original study the scale revealed high internal consistency (Weiss & Marmar, 1997). The Portuguese version of the IES-R presented a Cronbach's alpha of .96 (Matos et al., 2011b). In the current study the scale presented a Cronbach's alpha of .95.

Centrality of Event Scale (CES; Berntsen and Rubin, 2006) The CES assesses the extent to which a memory for a distressing life event becomes a reference point for personal identity and for the attribution of meaning to other experiences in the person's life (e.g., 'I feel that this event has become a central part of my life story'). In this study, participants completed the CES in relation to the shame memory they recalled. The CES comprises 20 items, rated on 5-point scale (score range: 1 = *Totally disagree* to 5 = *Totally agree*). In its original study, the CES reported a high internal consistency, with a Cronbach's alpha of .94 (Berntsen and Rubin, 2006). In its Portuguese version the scale revealed a Cronbach's alpha of .96 (Matos et al., 2010). In the current study the scale revealed a Cronbach's alpha of .94.

Binge Eating Scale (BES; Gormally et al., 1982). The BES assesses the severity of binge eating symptomatology, including its emotional, cognitive and behavioural dimensions. The BES comprises 16 items and each item includes three to four statements. For each item participants are asked to select the statement that best describes their experience. Each statement

represents a rating of severity that ranges from 0 (no difficulties with binge eating) to 3 (severe binge eating symptoms). In the original study the scale revealed a Cronbach's alpha of .85 and the Portuguese version it also revealed high internal consistency (.88; Duarte et al., 2015b). The Cronbach's alpha of the scale in the current study was .80.

Body Image Shame Scale (BISS; Duarte et al., 2015c). The BISS is a 14-item scale that assesses body image shame. The BISS comprises two subscales: external body image shame, which measures perceptions that one is negatively evaluated or judged by others because of one's physical appearance (e.g., 'I feel uncomfortable in social situations because I feel that people may criticize me because of my body shape'); and internal body image shame, measuring negative self-evaluations due to one's physical appearance (e.g., 'My physical appearance makes me feel inferior in relation to others'). Participants are invited to rate each item according to the frequency they experience body image shame, using a 5-point scale (score range 0 = *Never* to 4 = *Almost always*). The two subscales were found to have high internal consistency with Cronbach's alpha estimates of .90 and .89 (Duarte et al., 2014). In the current study the two subscales also presented high internal consistency (External $\alpha = .92$ and Internal $\alpha = .88$).

Other as Shamer Scale (OAS; Goss et al., 1994). The OAS is a measure of external shame. The OAS includes 18 items, regarding which participants are asked to rate the frequency to which they make evaluations about how others negatively judge, criticize or belittle them (e.g., 'Other people see me as somehow defective as a person'). Items are rated on a 5-point scale (score range 0 = *Never* to 4 = *Almost always*). In the original study the scale presented a Cronbach's alpha value of .92. In the Portuguese version (Matos et al., 2011a) the scale also revealed high internal consistency (with a Cronbach's alpha value of .91. In the current study the scale presented a Cronbach's alpha value of .94.

Cognitive Fusion Questionnaire-Body Image (CFQ-BI; Ferreira et al., 2015). The CFQ-BI was based on the original Cognitive Fusion Questionnaire (Gillanders et al., 2014) and comprises 10 items that measure cognitive fusion related to body image. Participants are asked to rate the extent in which each statement (e.g., 'My thoughts relating to my body image cause me great distress or emotional pain') is true for them, using a 7-point scale (score range: 1 = *Never true* to 7 = *Always true*). The CFQ-BI presented a Cronbach's alpha of .96 in the original validation study (Ferreira et al., 2015) and of .97 in the current study.

2.3. Procedure

This study is part of a wider research investigating factors involved in the etiology and maintenance of binge eating. Participants were treatment-seeking adults, recruited at the Hospitalary Centre of the University of Coimbra, Portugal. Approval for the study was obtained from the Hospital Ethics Committee. The diagnostic and assessment procedures were performed by researchers and clinical psychologists, who have considerable experience in the assessment and treatment of eating disorders. The procedure and aims of the study were fully explained to the potential participants, and those wanting to take part in the study provided their written informed consent. Were included in the study adult women with current diagnosis of BED, assessed through the EDE 17.0D. The exclusion criteria were: i) current comorbid severe mental disorders (e.g., bipolar disorder, severe major depression, schizophrenia, psychotic substance and alcohol abuse) established through a screening clinical interview based on DSM-5 criteria (American Psychiatric Association, 2013); ii) current pregnancy; iii) medical or endocrine disorders (e.g., diabetes); vi) illiteracy and mental retardation. Participants who met the required criteria were asked to answer to a set of self-report questionnaires and to attend a second assessment session. The second assessment session took place approximately 1 to 3 weeks later, according to the patients' availability. In this session the patients answered to the SEI and to the respective self-report measures IES-R and CES.

2.4. Data analysis

Descriptive statistics (frequencies, means and standard deviations), were used to examine the phenomenology of the shame experiences recalled by the patients. Correlational analyses were conducted to examine the associations between the centrality and traumatic features of the shame memory, external shame, body image shame, cognitive fusion related to body image, binge eating symptoms and BMI. These analyses were conducted using the software SPSS (v.21 SPSS; Armonk, NY: IBM Corp.).

The AMOS software (v.21 SPSS; Armonk, NY: IBM Corp.) was used to analyse the hypothesised mediation model through a path analysis. Path analyses comprise a specific type of Structural Equation Modelling that allows the examination of the direct and indirect associations between multiple exogenous and endogenous variables, while controlling for error (Kline, 2005). The path analysis tested in this study examined whether the association between the centrality and traumatic features of the recalled shame experience (exogenous variables) and binge eating

severity (endogenous variable), would be mediated by external shame and body image-focused external shame (first mediators), which, in turn, would be mediated by body image cognitive fusion (second mediator). The Maximum Likelihood estimation method was used. The following fit indices were utilized to assess model fit: Chi-square (χ^2), which indicates good fit when the value is nonsignificant; the Comparative Fit Index (CFI), with values greater than .95 indicating very good model fit; the Root-Mean Square Error of Approximation (RMSEA), indicating very good model fit when values are less than .08 and $p > 0.05$; and the Standardised Root Mean Square Residual (SRMR), with values as high as .08 suggesting acceptable model fit. The hypothesised indirect effects were examined through the bootstrapping method, with 5000 Bootstrap samples originated from the data to compute a 95% bias-corrected confidence intervals (CI). Significant effects ($p < .050$) were found when zero was not included between the lower and the upper limits of the CI interval (Kline, 2005).

3. Results

3.1. Preliminary analyses

Before conducting the analyses, data were screened for univariate and multivariate normality, outliers and multicollinearity. The Mahalanobis distance analysis indicated that there were no outliers. The analysis of the coefficients of Skewness and Kurtosis, indicated that there was no severe violation of univariate and multivariate normality, with Skewness values ranging from -.75 (external body image shame - BISS) and -.03 (external shame - OAS), and Kurtosis values ranging from -0.61 (centrality of shame memory - CES) and -0.32 (external body image shame - BISS). There was no evidence of multicollinearity.

3.2. Shame experiences characteristics

Results regarding the phenomenology of the shame experience recalled indicated that the most frequent type of shame experiences were those where the patients' body weight, shape or physical appearance (including embarrassing physical features) were negatively commented or criticized by others ($n = 40$; 35.1%); followed by situations where participants were criticized, made fun of, teased or rejected by others ($n = 23$; 20.2%); situations where they felt shame for having negative personal attributes, characteristics or devaluing behaviours exposed to others ($n = 17$; 14.9%); sexual abuse ($n = 10$; 8.8%); and emotional abuse ($n = 9$; 7.9%). Less frequent

experiences were: shame of a family member behaviour or family status ($n = 6$; 5.3%); criticism or teasing by parents/caregivers ($n = 5$; 4.4%); and finally physical abuse (e.g., aggression by peers; $n = 4$; 3.5%). the majority of the participants reported that the experience occurred in a group/public context ($n = 90$; 78.9%).

Regarding the question of who shamed them, most participants recalled that they were shamed by their peers (i.e., friends and colleagues; $n = 42$; 36.8%); 19 (16.7%) identified themselves as the shamer (i.e., for having a negative devaluing attributes, characteristic or behaviours exposed to others); 18 identified the parents (15.7%) and 15 (13.2%) other family members (e.g., siblings) as the shamer; 6 (5.3%) were shamed by their teacher at the time and 14 (12.3%) by a stranger or by other nonspecific people. The shamer was usually someone they knew and/or liked ($n = 42$; 36.9%); someone older ($n = 50$; 43.9%) or about the same age ($n = 38$; 33.3%); equal in social rank ($n = 49$; 43.0%) or an authority figure ($n = 49$; 43.0%); 41 (36.0%) mentioned that the shamer was a male and 37 (32.5%) said that was female. The majority of participants indicated that during the experience they felt people were seeing them as inferior or worthless ($n = 67$; 58.8%), and also evaluated themselves as such ($n = 69$; 60.5%).

3.3. Correlations

Descriptive (means and standard deviations) statistics of the study variables are reported in **Table 1**. Results indicated that the centrality of the shame memory was positively associated with binge eating symptoms; positive smaller associations were also found in regard to external shame, body image-focused external shame, and body image-related cognitive fusion. The traumatic feature of the shame memory was positively associated with binge eating symptoms, the external and internal dimensions of body image shame, and external shame. Strong to moderate positive associations were found between binge eating symptoms and body image-related cognitive fusion, external shame and the external and internal dimensions of body image shame. Stronger associations were found between the study variables and the external dimension of body image shame and this variable was selected to be included in the path analysis. BMI was significantly associated with increased traumatic shame memory, the dimensions of body image shame and body image cognitive fusion.

Table 1

Means (M), Standard Deviations (SD) and correlations between the study variables

	IES-R	CES	OAS	BISS External	BISS Internal	CFQ-BI	BES
CES	.72***	1					
OAS	.21*	.26**	1				
BISS External	.30**	.19*	.33**	1			
BISS Internal	.31**	.17	.22*	.78***	1		
CFQ-BI	.33***	.27**	.35***	.56***	.55***	1	
BES	.32**	.30**	.33***	.43***	.34***	.53***	1
BMI	.22*	.11	.14	.35***	.26**	.21*	.17

Note. *** $p < .001$; ** $p < .010$; * $p < .050$; IES-R - Impact of Event Scale Revised; CES - Centrality of Event Scale; OAS - Other as Shamer Scale; BISS - Body Image Shame Scale; CFQ-BI - Cognitive Fusion Questionnaire-Body Image; BES - Binge Eating Scale

3.4. Path analysis

The initial analysis of the model indicated that the following direct effects were nonsignificant: the centrality and traumatic features of the shame memory on binge eating symptoms ($b_{CES} = .05$, $SEb = .04$, $Z = 1.01$, $p = .313$; $b_{IES} = .12$, $SEb = .30$, $Z = .41$, $p = .681$), and on body image-related cognitive fusion ($b_{CES} = .01$, $SEb = .01$, $Z = .62$, $p = .536$; $b_{IES} = .05$, $SEb = .06$, $Z = .95$, $p = .344$); the centrality of the shame memory on body image-focused external shame ($b_{CES} = -.00$, $SEb = .01$, $Z = -.46$, $p = .643$); the traumatic feature of the shame memory on external shame ($b_{IES} = .31$, $SEb = .72$, $Z = .43$, $p = .667$); external shame on binge eating symptoms ($b_{OAS} = .06$, $SEb = .04$, $Z = 1.44$, $p = .149$).

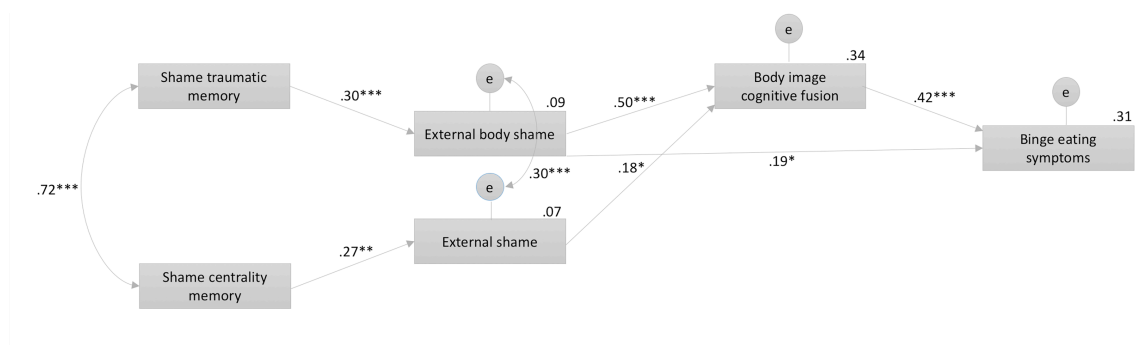


Figure 1 | Path analysis with standardized regression weights and squared multiple correlations.

Note. *** $p < .001$, ** $p < .010$; * $p < .050$

The model (**Figure 1**) revealed a good model fit: $\chi^2_{(7)} = 10.68$, $p = .153$; CFI = .98; RMSEA = .07 ($p = .305$); SRMR = .08. The traumatic feature of the shame memory presented a direct effect on body image-focused external shame ($b_{IES} = .11$, $SEb = .03$, $Z = 3.38$, $p < .001$), whereas the centrality of the shame presented a direct effect on external shame ($b_{CES} = .23$, $SEb = .08$, $Z = 3.03$, $p = .002$). Body image-focused external shame and external shame, in turn, presented a significant direct effect on body image-related cognitive fusion ($b_{BISS} = .68$, $SEb = .11$, $Z = 6.17$, $p < .001$; $b_{OAS} = .02$, $SEb = .01$, $Z = 2.29$, $p = .022$). Body image external shame had a significant direct effect on binge eating ($b_{BISS} = 1.35$; $SEb = .67$, $Z = 2.04$, $p = .042$). Body image-related cognitive fusion had a direct effect on binge eating ($b_{CFQ-BI} = 2.19$; $SEb = .49$, $Z = 4.47$, $p < .001$). The analysis of the indirect effects indicated that the traumatic and centrality features of shame memory had a significant indirect effect on body image-related cognitive fusion (.15 and .05 for IES and CES, respectively), fully mediated by body image-focused external shame and external shame ($CI_{IES} = .04$ to $.29$, $p = .005$ and $CI_{CES} = .01$ to $.13$, $p = .019$, respectively). Moreover, body image-related cognitive fusion mediated the effect of body image-focused external shame (.26) and external shame (.10) on binge eating symptoms ($CI_{BISS} = .13$ to $.33$, $p < .001$; and $CI_{OAS} = .01$ to $.18$, $p = .025$, respectively). The exogenous variables – traumatic and centrality features of the shame memory – also had a significant indirect effect on binge eating symptoms ($CI_{IES} = .03$ to $.24$, $p = .004$; and $CI_{CES} = .01$ to $.07$, $p = .014$, respectively).

The model was recalculated controlling for the effect of BMI ($\chi^2_{(7)} = 10.63$, $p = .156$; CFI = .98; RMSEA = .07 ($p = .304$); SRMR = .07) and the results confirmed that the indirect effects identified in the previous analyses persisted. Finally, an alternative model examined the effect of binge eating on early shame memories traumatic and centrality features, mediated by body image cognitive fusion, external shame and body image-focused external shame. Results indicated that the model did not fit the data well ($\chi^2_{(7)} = 24.11$, $p = .002$; CFI = .91; RMSEA = .14 ($p = .013$); SRMR = .17).

4. Discussion

The present research conducted in a clinical sample of women with BED obtained support for a theoretical model that suggests that early shame experiences are associated with more severe binge eating symptomatology, due to their effect on heightened current shame, particularly body image shame and the tendency to become overly fused with and distressed by body-image related cognitions.

The most recalled shame experiences were experiences related to negative comments or criticism about body weight, shape and physical appearance, which is consistent with prior evidence that early weight and body image teasing experiences are an important factor involved in the aetiology of BED (Fairburn et al., 1998; Jackson et al., 2000; Pike et al., 2006). Shame experiences of being bullied, criticized or rejected, of having negative features exposed to others, and experiences of sexual and emotional abuse were also recalled as significant shame experiences that these patients went through as a child or adolescent, which is also in line with previous theoretical and empirical accounts on negative experiences as risk factors for binge eating symptoms later in life (Striegel-Moore et al., 2002). We also found that peers were recalled as common shamers which is also consistent with research conducted in other patients with eating disorders (Ferreira et al., 2014a; Matos et al., 2015), which found that shame events that involved peers played a significant role on the severity of disorder.

The correlation analyses supported that the traumatic and centrality qualities of the shame experiences recalled were associated with current external shame, and more specifically, with body image-focused shame. The shame memories' features were also linked to body image cognitive fusion. Positive associations were also found between the shame memories' features, current shame, notably the external dimension of body image shame, and body image cognitive fusion.

Using a SEM approach, we analysed the goodness of fit of the hypothesized model that shame memories' features have an indirect effect on binge eating symptoms, mediated by external general shame, external body image-focused shame and body image cognitive fusion. Our analyses demonstrated that the model was a good fit to the data and the bootstrapping method confirmed the significance of the hypothesised mediation effects. The examined model seems to contribute to the understanding of the processes involved in the vulnerability and persistence of the symptoms of patients with BED. The mediational paths uncovered in the current study suggest that the effect that negative interpersonal events experienced in key developmental stages may have on deregulated eating behaviour depends on the extent to which these events become a reference for self-evaluation and contribute to a sense of inferiority, unattractiveness or unworthiness within the social group. Noteworthy, in women with BED, shame experiences related to physical appearance seem to play a key role in these associations. The tendency to become fused and overly involved and distressed with evaluations and judgements about body image is conceptualized as being at the root of experiential avoidance (Ferreira et al., 2014b;

Ferreira et al., 2015; Gillanders et al., 2014; Hayes et al., 1999; Hayes et al., 2006). Thus, it is plausible that binge eating symptoms emerge as a maladaptive strategy to attempt to temporarily avoid, escape or diminish the frequency or intensity of such negative memories, feelings and evaluations of feeling inferior, ostracized or rejected by others. However, these symptoms may ultimately amplify shame and generate more distress, suffering, and negative physical consequences (Hudson et al., 2007; Kessler et al., 2013; Wonderlich et al., 2009).

The current findings are based on a cross sectional design, limiting conclusions regarding the temporal relations between the variables. Nonetheless, they provide a useful framework for understanding the factors operating in the vulnerability and persistence of binge eating symptoms in a clinical sample with BED and the function that binge eating may serve for these patients. Findings support the growing evidence that the dimension of body image and its significance for self-evaluation is relevant in BED, bringing this disorder closer to the other established eating disorders (Ahrberg et al., 2011; Duarte et al., 2016). Clinically, our findings suggest that it is important to assess and address early shame experiences, namely those related to the physical appearance dimension, and to help patients to understand their negative self-evaluations and disordered eating behaviours as strategies they came to adopt as a means to protect them from interpersonal and emotional threats (Goss and Allan, 2009, 2010; Goss and Gilbert, 2002). Intervention approaches that focus on the defusion from the meaning of these memories for self-identity and life's story, and on the promotion of the willingness to turn towards and accept negative internal experiences (including memories, emotions, thoughts, physical sensations), rather than avoiding them, and on building more effective and flexible behaviours, may be particularly useful (Forman et al., 2013; Gilbert, 2005; Goss and Allan, 2010; Hill et al., 2014; Tirch et al., 2014).

There are important limitations to the present study, such as the use of retrospective data to assess early shame experiences. However, evidence supports that retrospective data is usually accurate, stable over time, and not distorted by current emotional states (Brewin et al., 1999). A strength of this study was the use of a structured clinical interview to assure the accuracy and reliability of the data collected. Moreover, we found that an alternative model to our initial hypothesised model did not fit the data well. Nonetheless, future longitudinal research is necessary to expand this study and to test the hypothesis that early shame experiences influence binge eating through negative affective and self-evaluative experiences and maladaptive self-regulatory processes.

The current study was the first to examine the phenomenology of shame experiences occurred in childhood and adolescence in patients with BED. The data suggests that the tested model is a potentially useful lens through which to understand BED development and maintenance, and provides important directions for the clinical management of binge eating.

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Study XVII

Ashamed and fused with body image and eating: Binge eating as an avoidance strategy

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Abstract

Binge Eating Disorder (BED) is currently recognized as a severe disorder associated with relevant psychiatric and physical comorbidity, and marked emotional distress. Shame is a specific negative emotion that has been highlighted as central in eating disorders. However, the effect of shame and underlying mechanisms on binge eating symptomatology severity remained unclear. This study examines the role of shame, depressive symptoms, weight and shape concerns and eating concerns, and body image-related cognitive fusion, on binge eating symptomatology severity.

Participated in this study 73 patients with the diagnosis of BED, established through a clinical interview — Eating Disorder Examination 17.0D — who completed measures of external shame, body image-related cognitive fusion, depressive symptoms and binge eating symptomatology.

Results revealed positive associations between binge eating severity and depressive symptoms, shame, weight and shape concerns, eating concerns and body image-related cognitive fusion.

A path analysis showed that, when controlling for the effect of depressive symptoms, external shame has a direct effect on binge eating severity, and an indirect effect mediated by increased eating concern and higher levels of body image-related cognitive fusion. Results confirmed the plausibility of the model, which explained 43% of the severity of binge eating symptoms.

The proposed model suggests that, in BED patients, perceiving that others see the self negatively may be associated with an entanglement with body image-related thoughts and concerns about eating, which may, in turn, fuel binge eating symptoms. Findings have important clinical implications supporting the relevance of addressing shame and associated processes in binge eating.

Key Practitioner Message:

Shame is a significant predictor of symptomatology severity of BED patients.

Shame significantly impacts binge eating, even controlling for depressive symptoms.

Shame significantly predicts body image-related cognitive fusion and eating concern.

Body image-fusion and eating concern mediate the link between shame and binge eating.

Binge eating may be seen as an avoidance strategy from negative self-evaluations.

Keywords: Binge Eating Disorder; Shame; Body image-related cognitive fusion; Eating concern; Path analysis

Introduction

Only recently Binge Eating Disorder (BED) was recognized as a distinct eating disorder diagnosis (American Psychiatric Association, A. P. A, 2013). Nonetheless, binge eating has long been recognized as a severe problem with significant implications for physical and mental health, being linked to the development and maintenance of overweight/obesity and physical and psychiatric comorbidities (e.g., Kessler et al., 2013). According to DSM-5 (American Psychiatric Association, A. P. A, 2013) BED is defined by the engagement in recurrent binge eating episodes characterized by the consumption of a large amount of food, in a discrete period of time, accompanied by a sense of lack of control, in the absence of inappropriate compensatory behaviours. During these episodes at least three of the following are present: one may eat more rapidly than normal; eat until feeling uncomfortably full; eat large amounts of food in the absence of hunger; eat in secrecy because of feeling embarrassed about the behaviour; and feel disgusted with oneself, depressed or very guilty after eating. Binge eating is characterized by marked distress, shame and negative affectivity. Negative affect is therefore a key feature of BED, with research showing that negative emotional states are predictors of binge eating (Leehr et al., 2015), and also play an important role in the maintenance of the disorder (Arnow, Kenardy, & Agras, 1995; Macht, 2008; Masheb & Grilo, 2006; Ricca et al., 2009).

Shame entails a particularly important type of negative affect. Shame is a painful self-conscious and socially focused emotion that derives from evaluations that one is seen negatively by others, as defective, inferior, inadequate and unattractive because of one's shaming personal characteristics (e.g., physical appearance) or behaviours (e.g., eating; Gilbert, 1998, 2000, 2002). This emotion can be focused on the social world, involving evaluations related to the

aspects one believes others will negatively evaluate, which is referred to as external shame. Nonetheless, these social perceptions can become internalized as negative cognitions and affects about the self. According to Gilbert (1998, 2003, 2007), shame has a defensive function acting as a warning signal that others see and judge the self negatively, which might result in rejection or attack. Shame activates therefore a series of automatic defensive behavioural outputs (e.g., concealment, avoidance, control and excessive self-monitoring) in order to protect the self from such perceived threats.

Shame has been consistently associated with mental health problems (e.g., Kim, Thibodeau, & Jorgensen, 2011). Specifically, shame is related with disordered eating attitudes and behaviours and with body image difficulties (e.g., Duarte, Pinto-Gouveia, Ferreira, & Batista, 2014; Goss & Allan, 2009; Kelly & Carter, 2013; Murray, Waller, & Legg, 2000; Pinto-Gouveia, Ferreira, & Duarte, 2014). It has been suggested that disordered eating behaviours, such as dieting, may emerge as maladaptive strategies adopted to avoid this threatening emotion and to strive for approval and acceptance by others (e.g., through reaching a socially valued thin physical appearance; Gilbert, 2002; Goss & Allan, 2009; Goss & Gilbert, 2002). Binge eating may also be conceptualized as a maladaptive strategy to avoid or escape from disturbing thoughts or negative emotions (Arnou et al., 1995; Goldfield, Adamo, Rutherford, & Legg, 2008; Heatherton & Baumeister, 1991; Leehr et al., 2015). However, binge eating paradoxically increases negative affect and negative self-evaluations, being associated with increased shame, guilt and criticism (Duarte, Pinto-Gouveia, & Ferreira, 2014; Goss & Gilbert, 2002; Hayaki, Friedman, & Brownell, 2002; Jambekar, Masheb, & Grilo, 2003). Thus, such behaviours seem to fuel a maladaptive self-sustained cycle in which complex emotion regulation processes seem to be implicated.

A particularly important process operating in this cycle may be cognitive fusion, defined as the degree to which one's internal experiences are perceived as trustworthy presentations of reality and acted upon, instead of experienced as transitory and subjective mental events (Gillanders et al., 2014; Luoma & Hayes, 2003). It has been suggested that being fused and dominated by thoughts, tends to lead to avoidance-driven behavioural consequences that in themselves may be damaging and increase personal distress and suffering (Barnes-Holmes & Dymond, 2001; Hayes, 2004; Hayes et al., 2006). Furthermore, cognitive fusion has been related to difficulties in changing one's behaviours, even when that change would be desirable, beneficial and increase well-being (e.g., regulation of eating behaviour; Forman & Butryn, 2015; Hayes, Strosahl, & Wilson, 1999).

Research showed that cognitive fusion, especially regarding unwanted and disturbing thoughts or emotions related to body image, has an important effect on eating psychopathology (Ferreira, Trindade, Duarte, & Pinto-Gouveia, 2015; Merwin & Wilson, 2009; Trindade & Ferreira, 2014). In particular, a recent study has shown that body image-related cognitive fusion mediates the association between body image negative experiences, such as self-evaluations of inferiority, and eating psychopathology (Ferreira, Palmeira, & Trindade, 2014). Nonetheless, the specific impact of cognitive fusion (namely focused on body image) in patients with BED regarding the severity of the disorder, was never examined.

Moreover, in contrast to the eating disorder diagnoses of Bulimia Nervosa and Anorexia Nervosa, the diagnosis of BED does not include a criterion reflecting a disturbance in body image, although there is some evidence showing that body image is an important dimension for BED patients (Grilo, Masheb, & White, 2010; Masheb & Grilo, 2000). Thus, while the other formal eating disorder diagnoses are recognized as being characterized by disturbances in both eating behaviour and body image, the dimension of body image in BED and the way it may be related to maladaptive eating attitudes (involving concerns about losing control about eating, eating in secrecy to avoid the scrutiny from others, and guilt about eating) are still little explored. Moreover, the impact of perceptions of the self being negatively evaluated or derogated by others, and the processes through which they influence the severity of the disorder, remain unclear.

The current study aimed at examining the association between shame, depressive symptoms, eating psychopathology, body mass index, body image-related cognitive fusion and binge eating severity in patients with BED. In particular, this study presents and tests a parsimonious model explaining the severity of binge eating symptoms in this clinical condition. This model investigates the effect of the specific negative emotion of shame on both pathological concerns about eating and the entanglement with thoughts about body image (accounting for the effect of body mass index), which were hypothesized as mediator mechanisms explaining the severity of binge eating symptomatology.

Method

Participants

Seventy-three women meeting the DSM-5 criteria (APA, 2013) for BED participated in this study. The diagnoses were established through the interview Eating Disorders Examination 17.0D (Fairburn, Cooper, & O'Connor, 2008). Participants had between 20 and 59 years old ($M = 38.10$; $SD = 10.88$) and 4 to 19 years of education ($M = 13.74$; $SD = 3.80$), with the majority being married/living with a partner (58.9%). Participants' BMI ranged from 20.83 to 50.32, with 15.1% presenting normal weight ($18.5 < \text{BMI} < 24.99$), 12.3% being overweight ($25 < \text{BMI} < 29.99$), 30.1% presenting Class I Obesity ($30 < \text{BMI} < 34.99$), 15.1% presenting Class II Obesity ($\text{BMI} > 35 < 39.99$) and 27.4% presenting class III Obesity ($\text{BMI} \geq 40$).

Measures

Body Mass Index (BMI)

Participants' BMI was calculated by dividing the weight (in kg) by height squared (in m), which were collected using standard calibrated instruments.

Eating Disorder Examination 17.0D (EDE 17.0D; Fairburn et al., 2008; Ferreira, Pinto-Gouveia, & Duarte, 2010)

The EDE is an investigator-based clinical interview that provides a comprehensive assessment of the frequency and severity of key behavioural and psychological aspects of eating disorders. It comprises four subscales: Restraint, Eating Concern, Weight Concern and Shape Concern. A global score may be obtained by calculating the mean of the subscales' scores. Furthermore, the EDE 17.0D extends its previous version and allows for a thorough assessment of the diagnostic criteria and the specific psychopathology of patients with BED, according to the DSM-5 criteria. Research has shown that EDE presents high values of internal consistency (0.80 in the current study), discriminant and concurrent validity and test–retest reliability (for a review see [Fairburn, 2008]).

Binge Eating Scale (BES; Duarte, Pinto-Gouveia, & Ferreira, 2015; Gormally, Black, Daston, & Rardin, 1982)

This scale comprises 16 items assessing the severity of binge eating symptomatology, including the emotional and cognitive aspects and behavioural manifestations of binge eating. Each item comprises three or four statements regarding which participants are asked to select the one that best describes their experience. Each option represents a rating of severity that ranges from 0 (no difficulties with binge eating) to 3 (severe problems with binge eating). Higher scores indicate higher binge eating severity. The BES presents good psychometric properties (Gormally et al., 1982). The Cronbach's alpha of the scale in the current study was 0.81.

Depression, Anxiety and Stress Scales (DASS21; Apóstolo, Mendes, & Azeredo, 2006; Lovibond & Lovibond, 1995)

This scale includes 21 items measuring levels of depression, anxiety and stress symptoms. Respondents are asked to indicate the frequency with which they experienced each symptom over the past week, using a 5-point Likert scale (0 = 'Did not apply to me at all' to 4 = 'Applied to me very much, or most of the time'). Higher results indicate higher levels of emotional distress. In the current study, depressive symptomatology was assessed through the depression subscale. DASS21 presents good psychometric properties; the Cronbach's alpha for the depression subscale in the current study was 0.90.

Other as Shamer Scale (OAS; Goss, Gilbert, & Allan, 1994; Matos, Pinto-Gouveia, & Duarte, 2012)

This scale includes 18 items measuring external shame. Participants are asked to rate the items on a 5-point Likert scale (0 = 'Never' to 4 = 'Almost always') according to the frequency with which they make certain evaluations about how others negatively judge, look down or criticize them. In the original study the scale showed good reliability, with a Cronbach's alpha of 0.92 (Goss et al., 1994). In the present study we obtained a value of 0.95.

Cognitive Fusion Questionnaire-Body Image (CFQ-BI; Ferreira, Trindade, et al., 2015)

This questionnaire was based on the original Cognitive Fusion Questionnaire (Gillanders et al., 2014) and includes 10 items measuring cognitive fusion related to body image. Participants are asked to rate the extent to which each statement (e.g., 'My thoughts relating to my body image cause me great distress or emotional pain') is true regarding their own experience, using a 7-point scale (1 = 'Never true' to 7 = 'Always true'). This scale presents good internal

consistency, retest reliability, discriminant, convergent and divergent validities (Ferreira, Trindade, et al., 2015); with a Cronbach's alpha of 0.96 in the current study.

Procedure

Participants were treatment-seeking adults who met DSM-5 diagnosis criteria for BED, recruited at the Hospitalary Centre of the University of Coimbra, after the approval of the respective Ethics Committee. All the diagnostic and assessment procedures were performed by the two of the researchers, who are clinical psychologists with considerable experience in the assessment and treatment of eating disorders. The procedure and aims of the study were fully explained to the potential participants, and those wanting to take part in the study provided their written informed consent. Were included in the study participants who met the following criteria: (i) women with ages between 18 and 60 years; (ii) diagnosis of current BED, assessed through the EDE 17.0D. The exclusion criteria were as follows: (i) current comorbid severe mental disorders (e.g., bipolar disorder, severe major depression, schizophrenia, psychotic substance and alcohol abuse) as established by a screening clinical interview based on criteria from DSM-5 (American Psychiatric Association, A. P. A, 2013); (ii) current pregnancy; (iii) medical or endocrine disorders (e.g., diabetes); and (iv) illiteracy and mental retardation. Participants who met the required criteria answered the self-report measures.

Analytic strategy

Descriptives and correlational analyses were conducted using the software SPSS (v.21 SPSS; Armonk, NY: IBM Corp.). Product–moment Pearson correlation analyses were conducted to examine the correlations between binge eating severity, depressive symptoms, external shame, eating psychopathology attitudinal and behavioural symptoms, body image-related cognitive fusion, and BMI (Cohen, Cohen, West, & Aiken, 2003).

A path analysis, examined using the software AMOS 21.0 (Analysis of Moment Structures, SPSS; Armonk, NY: IBM Corp.), was conducted to estimate the associations between the study variables hypothesized in the model (**Figure 1**). Path analysis is a specific type of Structural Equation Modelling (SEM) used to simultaneously examine structural direct and indirect associations between multiple exogenous and endogenous variables, while controlling for error (Kline, 2005). The current study examined whether the association between external shame and depressive symptoms (exogenous variables) and binge eating severity (endogenous

variable) would be mediated by body image-related cognitive fusion and concerns about eating, having BMI as a covariate (endogenous mediator variables). The maximum likelihood estimation method was selected, and the following goodness of fit indices were used to evaluate the plausibility of the model: Chi-square (χ^2), Tucker Lewis Index (TLI), Comparative Fit Index (CFI), Normed Fit Index (NFI) and Root-Mean Square Error of Approximation (RMSEA). The significance of the direct, indirect and total effects was assessed by Chi-square tests, and the significance of the mediational paths was further confirmed through the Bootstrap resampling method, with 2000 Bootstrap samples and 95% bias-corrected confidence intervals (CI): effects were considered significant ($p < 0.050$) if zero was not included in the interval between the lower and the upper limits of the CI (Kline, 2005).

Effects with $p < 0.050$ were considered statistically significant.

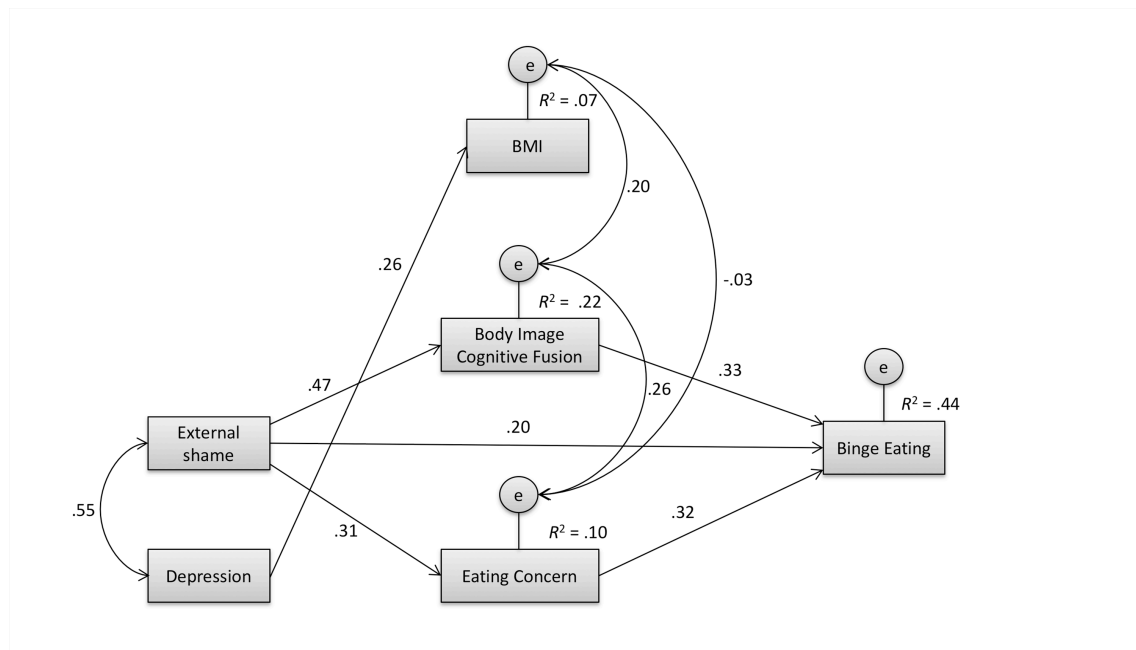


Figure 1 | Path model on the association between external shame and depressive symptoms, and binge eating symptomatology severity, mediated by body image cognitive-fusion and eating concerns, accounting for the effect of body mass index, with standardized estimates and square multiple correlations ($n = 73$)

Results

Descriptives

Results (**Table 1**) indicated that EDE scores were above the normative cut-off point for clinical significance (Fairburn, 2008; Fairburn & Beglin, 1994). Also, participants reported the presence of 4 to 30 objective binge-eating episode per month, over the last three months.

Participants' scores for BES corresponded to severe levels of binge eating. In particular, 5.5% of the participants presented low scores of binge eating, 27.4% presented moderate binge eating and 67.1% reported severe binge eating. The scores of the other study variables were above to those obtained in previous studies with nonclinical samples and similar to what was found in eating disorders samples (Duarte et al., 2015; Ferreira, Pinto-Gouveia, & Duarte, 2013; Trindade & Ferreira, 2014).

Correlations between the study measures

Product–moment Pearson correlation coefficients (two- tailed) are presented in **Table 1**. Results indicated that binge eating severity, as measured by the BES, was positively and moderately associated with the EDE subscales eating concern, shape concern and weight concern. A stronger association was found between the BES and the EDE total score. Also, binge eating was positively and moderately associated with depressive symptoms. Furthermore, binge eating severity presented a strong positive association with external shame and with body image-related cognitive fusion. No significant associations were found between the BES and BMI and eating restraint (EDE).

Table 1

Descriptive statistics and product-moment Pearson correlation coefficients between the study measures (N = 73)

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	
1_BES	29.55	7.08	1									
2_BMI	34.42	7.46	.18	1								
3_Depression	10.90	5.26	.30**	.29*	1							
4_EDE_Restraint	2.98	1.16	.14	-.07	.06	1						
5_EDE_Eating Concern	2.60	1.31	.51***	.02	.24*	.32***	1					
6_EDE_Shape Concern	4.86	1.06	.33**	.45***	.27*	.05	.39**	1				
7_EDE_Weight Concern	4.48	1.12	.38***	.42***	.40***	.16	.47***	.81***	1			
8_EDE Total	3.73	0.84	.48***	.27*	.33**	.54***	.78***	.75***	.83***	1		
9_OAS	40.73	15.62	.46***	.11	.55***	.02	.32**	.23	.28*	.29*	1	
10_CFQ_BI	50.89	14.68	.54***	.25*	.38**	-.06	.37**	.58***	.58***	.50***	.46***	1

Note. * $p < .050$; ** $p < .010$; *** $p < .001$

BES = Binge Eating Scale; BMI = Body Mass Index; Depression = DASS21 subscale; EDE = Eating Disorder Examination; OAS = Other as Shamer Scale; CFQ-BI = Cognitive Fusion Questionnaire-Body Image

Regarding external shame, results indicated a positive association with depressive symptoms, eating and weight concerns, and with the global EDE score. Also, external shame was positively and moderately correlated with body image-related cognitive fusion. Body image-related cognitive fusion, in turn, showed a positive albeit weak association with BMI, and a moderate association with depressive symptoms and eating concern EDE subscale. A stronger association was found between cognitive fusion and shape and weight concerns and the EDE total score.

Path analysis

Univariate and multivariate normality was confirmed through the coefficients of Skewness and Kurtosis, which confirmed that there was no serious violation of normal distribution, with values of Skewness ranging from -0.14 to -0.82, and Kurtosis values between 0.03 and -0.97 (Kline, 2005). Also there was no indication of multicollinearity.

The tested model accounted for 44% of the variance of binge eating severity. An initial analysis of the tested model indicated that the effects of depression on eating concern ($b_{\text{depression}} = 0.02$; $SEb = 0.03$; $Z = 0.69$; $p = 0.489$; $\beta = 0.09$), on body image-related cognitive fusion ($b_{\text{depression}} = 0.05$; $SEb = 0.03$; $Z = 1.44$; $p = 0.150$; $\beta = 0.18$) and on binge eating ($b_{\text{depression}} = -0.06$; $SEb = 0.15$; $Z = -0.38$; $p = 0.702$; $\beta = -0.04$), the effect of external shame on BMI ($b_{\text{OAS}} = -0.03$; $SEb = 0.07$; $Z = -0.53$; $p = 0.593$; $\beta = -0.07$), and the effect of BMI on binge eating ($b_{\text{BMI}} = 0.08$; $SEb = 0.09$; $Z = 0.88$; $p = 0.380$; $\beta = 0.08$) were nonsignificant and were therefore eliminated. The recalculated model

predicting binge eating severity revealed that all path coefficients were statistically significant, and presented an excellent model fit [$\chi^2_{(5)} = 3.11$ $p = 0.684$; TLI = 1.06; CFI = 1.00; NFI = 0.97; RMSEA = 0.00 ($p = 0.760$)].

Results indicated that external shame accounted for 22% of body image-related cognitive fusion, with a direct effect of 0.47 ($b_{OAS} = 0.04$; $SEb = 0.01$; $Z = 4.56$; $p < 0.001$); also, it accounted for 10% of eating concern variance with a direct effect of 0.31 ($b_{OAS} = 0.03$; $SEb = 0.01$; $Z = 2.80$; $p = 0.005$).

Depressive symptoms accounted for 7% of BMI variance ($b_{depression} = 0.37$; $SEb = 0.16$; $Z = 2.36$; $p = 0.018$; $\beta = 0.26$), but no significant associations were verified between BMI and the mediators.

Body image-related cognitive fusion directly predicted BES, with a direct effect of 0.33 ($b_{CFQ-BI} = 1.58$; $SEb = 0.50$; $Z = 3.16$; $p = 0.002$), while eating concern had a direct effect of 0.32 ($b_{EatConcern} = 1.75$; $SE = 0.53$; $Z = 3.33$; $p < 0.001$) on BES. External shame presented a total effect of 0.46 on BES, with a direct effect of 0.20 ($b_{OAS} = 0.09$; $SE = 0.05$; $Z = 2.00$; $p = 0.045$) and an indirect effect (0.26) mediated by increased body image-related cognitive fusion and eating concern. The examined effects were significant ($p < 0.001$) according to the Bootstrap resampling method. Specifically, the estimate of the indirect effect of external shame on binge eating framed by a CI of 0.95% revealed an effect significantly different from zero (CI = 0.12, 0.42; $p = 0.001$). **Figure 1** presents the model with standardized estimates.

Discussion

This study evaluated the association between shame, depressive symptoms, cognitive fusion, eating disorder symptomatology and binge eating severity. In particular, this study presents a model examining the effect of shame on binge eating symptoms' severity and the mediator role of body image cognitive fusion and eating concern on this association, in patients with BED.

Results corroborated prior research showing that BED is associated with excess weight and obesity, but that this disorder is also present in women with normal weight (Kessler et al., 2013). In fact, in the current sample, binge eating symptomatology severity was not associated with BMI, which is in accordance with prior research (Ricca et al., 2009).

Findings indicated that the severity of binge eating symptomatology, as measured by the BES, was associated with higher severity of eating psychopathology, especially concerns about eating. Furthermore, findings corroborated prior research regarding the association between binge eating symptomatology severity and increased depressive symptoms and shame (Duarte, Pinto-Gouveia, & Ferreira, 2014) but extended them to a clinical sample further showing that cognitive fusion related with body image is an important correlate of binge eating symptoms. Also, in these patients, this process of cognitive fusion, that is, feeling caught in thoughts about physical appearance, was positively associated with perceiving oneself as being seen negatively by others (e.g., as defective, inferior, unattractive in the eyes of others).

The path analysis findings revealed that the model examined to understand the relationship between shame and binge eating severity is plausible, explaining a total of 44% of binge eating severity variance. This model proposed that in patients with BED feeling that others look down on the self directly predicted higher severity of binge eating symptoms, even when controlling for the effect of depression. These results extend prior evidence on the association between shame and eating psychopathology (Ferreira et al., 2013; Pinto-Gouveia et al., 2014), especially bulimic symptomatology (Hayaki et al., 2002). In fact, results corroborate that negative affect has an important role in binge eating (Leehr et al., 2015) but extend existent considerations (Duarte, Pinto-Gouveia, & Ferreira, 2014) demonstrating that shame is a specific negative emotion important for the understanding of binge eating symptomatology.

Nonetheless, our findings also suggest that the relationship between shame and binge eating is complex and influenced by different mechanisms. Indeed, results indicated that the effect of this negative emotional experience of shame on binge eating is partially influenced by the tendency to become fused with thoughts about body image (even when accounting for the effect of BMI) and overly concerned about eating (e.g., with fears of losing control over eating, the perceived need to conceal eating behaviour from others, and feelings of guilt about eating). The model proposed in the current study suggests that binge eating may be understood as a strategy to avoid, escape or distract oneself from aversive internal experiences, such as the threat of feeling inferior, ostracized or rejected by others. It is likely that in BED patients feeling ashamed is linked to physical appearance and eating dimensions. As cognitive fusion fuels experiential avoidance (Gillanders et al., 2014; Hayes et al., 1999), it seems possible that binge eating emerges as a consequence of being fused with thoughts with body image and overly concerned about eating, even that, in the long term, binge eating may

cause greater distress and the patients find themselves in a perpetual cycle of shame and deregulated eating. This has important clinical implications suggesting the relevance of interventions for BED that target shame by helping people to disengage from negative self-evaluations, and that promote a willingness to turn towards and accept negative internal experiences, rather than turning away from them through avoidance strategies that create greater suffering (e.g., Compassion Focused Therapy and Acceptance and Commitment Therapy; Forman & Butryn, 2015; Gilbert, 2005; Goss & Allan, 2010; Hill et al., 2014).

These findings cannot however be understood without taking into account important limitations. This survey was cross-sectional impairing conclusions regarding causality and the directionality of the tested associations. Also, eating disorders are complex and multidetermined conditions and thus the model examined in this study was intentionally limited. Hence, future studies using larger samples should investigate the role of other variables influencing the severity of binge eating in patients with BED. For instance, future research should focus on the role that other dimensions of cognitive fusion may play on the studied associations, such as becoming fused with thoughts and concerns about eating. This model should also be investigated considering the specificity of eating psychopathology in male patients with BED, testing whether shame and body image-related variables remain salient or if other features are more pertinent in this population.

Nevertheless, this study presents a novel model that proposes the pathways through which shame may impact on the symptomatology of patients with BED, which open new avenues for research and carries important clinical implications.

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Chapter 7

Emotion regulation processes,
eating behaviour and well-being

Chapter overview

Study XVIII Body image and college women's quality of life: The importance of being self-compassionate.

Study XIX The impact of self-criticism and self-reassurance on weight-related affect on well-being in participants of a commercial weight management programme.

Study XVIII

Body image and college women's quality of life: The importance of being self-compassionate

Adapted from:

Duarte, C., Ferreira, C., Trindade, I., & Pinto-Gouveia, J. (2015). Body image and college women's quality of life: The importance of being self-compassionate. *Journal of Health Psychology, 20*(6), 754 – 764. doi:10.1177/1359105315573438

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Abstract

This study explored self-compassion as a mediator between body dissatisfaction, social comparison based on body image and quality of life in 662 female college students. Path analysis revealed that while controlling for body mass index, self-compassion mediated the impact of body dissatisfaction and unfavourable social comparisons on psychological quality of life. The path model accounted for 33 per cent of psychological quality of life variance. Findings highlight the importance of self-compassion as a mechanism that may operate on the association between negative body image evaluations and young women's quality of life.

Keywords: Body image; Compassion, Protective factors; well-being; youth

Introduction

It is increasingly recognized that an individual's health and well-being cannot be defined by the absence of physical morbidity (Hoffman and Driscoll, 2000). Research has suggested that one's perception of well-being and quality of life (QoL) is influenced, not only by one's physical state but also by the psychological domain (Camfield and Skevington, 2008; Hoffman and Driscoll, 2000; Muldoon et al., 1998; Skevington et al., 2004). In line with this, Haugland et al. (2001) found that even though young people present relatively low levels of serious physical morbidity, many report subjective health-related symptoms and psychological complaints. Thus, other aspects besides physical health play an important role in the determination of one's perception of well-being and QoL.

Transitional periods in life can be demanding and stressful and can affect one's QoL. College is a key developmental time that can have important implications for psychological well-being (Hunt and Eisenberg, 2010; Noel et al., 1985). Evidence reveals that 80 per cent of college students reported feelings of moderate stress (Abouserie, 1994), while 60 per cent of college students rated stress levels as high or very high (Makrides et al., 1998). College faces an individual with not only new academic tasks but also different social demands, such as the establishment of different relationships and the managing of one's autonomy. Furthermore, this period involves challenges regarding the maintenance of healthy behaviours in this new environment (Bryde and Milburn, 1990; Compas et al., 1986) with an increased vulnerability for a range of psychological difficulties (Eisenberg et al., 2007). In particular, there is evidence showing that female college students present considerable levels of body image dissatisfaction (BD) and are at greater risk for

developing body image and eating-related problems (Cook and Hausenblas, 2011; Johnson et al., 1982; Striegel-Moore et al., 1986). BD is highly prevalent, affecting more than 80 per cent of women (Mond et al., 2013). BD has been consistently found to be an important risk factor for disordered eating behaviours (e.g. rigid dietary restraint and bulimic behaviours; Anton et al., 2000; Heatherton et al., 1995, 1997; Heywood and McCabe, 2006; Pinto-Gouveia et al., 2014) and eating disorders (Stice et al., 2011). Research has also demonstrated that BD can negatively affect one's QoL in various domains, namely, psycho-social functioning and mental health (Liimakka, 2014; Mond et al., 2013; Pimenta et al., 2009). Nonetheless, the mechanisms mediating the association between negative perceptions of body image and impaired QoL remain unexplored.

Recent studies have shown that BD may be particularly problematic when it becomes linked to feelings of inferiority and inadequacy in comparison to others (Ferreira et al., 2013a). Even though social comparison can be an adaptive mechanism, low social rank perceptions are associated with poorer mental health indicators (e.g. depression; Allan and Gilbert, 1997; Gilbert, 2000). Body image is often an important aspect about which women evaluate themselves and estimate their social rank (e.g. whether they are inferior, undesirable, or unvaluable compared to others; Ferreira et al., 2013a; Gilbert, 2002) and how close/distant they are from qualities valued by their social group (e.g. thinness standards of physical attractiveness; Ahern et al., 2011). From this perspective, pathological eating behaviours (e.g. diet) may be seen as means to reach a body shape closer to the thin-ideal (Liimakka, 2014), and thus to avoid feelings of inferiority. However, this strategy can be in itself detrimental. There is consistent evidence demonstrating that perceptions of inferiority based on physical appearance – focused social comparison are associated with maladaptive emotion regulation, anxiety and depressive symptoms, and specifically with BD and eating psychopathology (Ferreira et al., 2013a; Pinto-Gouveia et al., 2014; Shroff and Thompson, 2006). Nonetheless, no studies to date examined whether one's social evaluations in comparison to others based on the body image domain are associated with QoL impairments.

There is evidence that the association between negative social comparisons and feelings of inferiority concerning dissatisfaction with one's body image and eating psychopathology may be ameliorated by self-compassion (Ferreira et al., 2013b; Pinto-Gouveia et al., 2014). Self-compassion is an emotion regulation strategy that involves the sensitivity to and the desire to alleviate one's suffering (Gilbert, 2005), and the ability to extend kindness and understanding

towards the self when facing personal setbacks or inadequacies, rather than being self-critical. Self-compassion involves an attitude of mindfulness, rather than over-identification with one's setbacks or limitations. Also, self-compassion entails a sense of common humanity, that is, the recognition that all humans are imperfect, face important life challenges and may fail or make mistakes, rather than adopting an isolating perspective (Neff, 2003a, 2003b). Growing research shows that self-compassion can play a positive role in mental health. Neff et al. (2007) found that self-compassion in college students was associated with adaptive psychological indicators such as happiness, optimism and positive affect. Furthermore, self-compassion can buffer people against the impact of illness and distressing and challenging situations (Brion, Leary and Drabkin, 2014; Leary et al., 2007). According to Neff (2004), self-compassion encourages individuals to gently hold and accept negative internal experiences (e.g. feelings of inferiority) with a sense of connectedness and to adopt effective actions towards well-being.

Studies also suggest that self-compassion can have a beneficial impact in the areas of body image and eating behaviour. Research conducted with female eating disorder patients and women from the general population show that self-compassion is associated with lower feelings of inferiority and negative social comparisons, and predicts lower drive for thinness and eating psychopathology symptoms (Ferreira et al., 2013b; Pinto-Gouveia et al., 2014). There is also some evidence that undergraduate women with higher levels of self-compassion present fewer body image concerns (Wasylikiw et al., 2012) and that self-compassion plays a protective role on the association between higher body mass index (BMI) and body image and eating difficulties (Kelly et al., 2014).

These findings seem to support, therefore, the positive effect of self-compassion in psychological health and well-being, as well as in association to body image and eating problems. Nonetheless, little is known about the role that self-compassion plays on the association between negative body image and perceptions of inferiority in comparison to others on the well-being of young women going through demanding personal and social changes.

The current study had three aims. First, the study aimed at clarifying the impact that BD has on undergraduate women's subjective QoL, namely, regarding the psychological QoL domain. Second, we hypothesized that perceptions of social inferiority are associated with worse subjective QoL. Third, we investigated the role that self-compassion plays among these variables. We hypothesized that self-compassion would be negatively associated with BD and positively associated with more favourable perceptions of social rank and QoL. We tested whether self-

compassion mediates the association between both BD and perceptions of social rank based on body image, and QoL.

Method

Participants

Participants were 662 female college students aged 18–26 years, with a mean age of 20.33 years (standard deviation (*SD*) = 1.76 years), and a mean of 13.22 years (*SD* = 1.38 years) of education. The participants' BMI mean was 21.86 kg/m² (*SD* = 3.12 kg/m²). In all, 71 participants (10.72%) were underweight (BMI < 18.5 kg/m²), 498 (75.23%) had a normal weight (18.5 kg/m² ≤ BMI ≤ 25.0 kg/m²) and 93 (14.05%) were overweight (BMI > 25 kg/m²), according to the conventional classification, which reflects BMI distribution in the young female Portuguese population (Póinhos et al., 2009).

Measures

BMI. BMI was calculated from the Quetelet index from self-reported participants' height and weight (kg/m²).

Figure Rating Scale. The Figure Rating Scale (FRS) is a measure of BD (Ferreira, 2003; Thompson and Altabe, 1991). It presents a series of nine schematic figures of different sizes, ranging from very thin (1) to very large (9). Participants are asked to select the silhouettes that best represent their current and ideal body images; the divergence between the two silhouettes reflects the degree of BD. The scale has shown good temporal, convergent and divergent validities (Thompson and Altabe, 1991).

Social Comparison through Physical Appearance Scale. Social Comparison through Physical Appearance Scale (SCPAS) is a brief and valid self-report measure to assess the perception of one's social attractiveness and ranking, according to the way one compares oneself with others, using physical appearance as a reference (Ferreira et al., 2013a). Participants are asked to compare themselves physically to proximal targets (Part A: Peers) and distal targets (Part B: Models) regarding 11 bipolar constructs (e.g. inferior/superior). Answers are given on a Likert scale ranging from 1 to 10, with lower scores characterizing more unfavourable social comparisons (e.g. feelings of inferiority, of being devalued, less accepted) based on the physical

appearance domain. The SCPAS presented a high internal reliability (.94 in Part A: Peers; and .96 in Part B: Models) in the original study. Given the aim of this study, only Part A was used in the analyses.

Self-Compassion Scale. This self-report instrument, with 26 items, assesses self-compassion (Castilho and Pinto-Gouveia, 2011; Neff, 2003b). Items are designed to capture how respondents perceive their actions towards themselves in difficult times (e.g. 'When I'm going through a very hard time, I give myself the caring and tenderness I need') and are rated using a Likert-type scale ranging from 1 (almost never) to 5 (almost always). It comprises two main components: a positive one that includes the self-kindness, the common humanity and the mindfulness subscales; and a negative one comprising the self-judgement, the isolation and the over-identification subscales. In this study, the three positive dimensions were gathered to compute a global measure of self-compassion. The Self-Compassion Scale (SCS) presents good internal reliability in the original version (.92) and in the Portuguese version (.89).

World Health Organization Brief Quality of Life Assessment Scale. The World Health Organization Brief Quality of Life Assessment Scale (WHOQOL-BREF) is a 26-item short-form of the subjective QoL assessment scale (Canavarro et al., 2007; The WHOQOL Group, 1998). This scale provides scores on four domains: physical health, environmental health, psychological health and social relationships. Furthermore, the scale includes an additional item to assess one's overall perception of QoL. Items are scored on a 5-point Likert-type scale, with scores ranging from '1' (extreme dissatisfaction) to '5' (extreme satisfaction), with higher scores indicating higher QoL. Prior studies suggest that the WHOQOL-BREF has adequate criterion and content validity, internal consistency and test-retest reliability, both in its original version and in the Portuguese adaptation.

Internal consistency and descriptive statistics of the variables in the current study are reported in **Table 1**.

Procedure

Participants comprised a sample that was part of a wider ongoing research regarding the effect of distinct emotional regulation processes on body and eating-related problems and QoL. The ethics committees of all the educational institutions involved in the study provided their approval. The female college students who were invited to participate in the study were fully informed about the study aims, that their cooperation was voluntary, about the confidentiality of

the collected data and signed the consent form. The questionnaires were completed during class (approximately 30 minutes), in the presence of the teacher in charge and one of the researchers. In all, 25 subjects declined to take part in the study.

Self-report questionnaires were initially completed by 719 students. After internal 'cleaning' procedures that excluded 7.9 per cent of the sample, 662 students were included in the data analysis. The 'cleaning' procedure was based on strict criteria (e.g. excluding participants who were older than 26 years, participants who did not provide details of both height or weight and cases in which more than 15 per cent of the responses were missing from a questionnaire).

Analysis

The software SPSS (v.21; IBM Corp, Armonk, NY) was used to conduct descriptives and correlational analyses. Pearson product-moment correlation analyses were conducted to examine the correlations between age, BMI, BD and social comparison based on physical appearance, self-compassion and QoL (Cohen et al., 2003). To estimate the association between the variables under analysis in the theoretical model, a series of path analyses were conducted (**Figure 1**) with the software Analysis of Moment Structures (AMOS, software version 18; SPSS Inc., Chicago, IL).

In the theoretical model, we tested whether the association between BD and social comparison (SCPAS; exogenous variables) and psychological QoL (endogenous variable) would be mediated by self-compassion (SCS; endogenous mediator variable) while controlling for BMI. To test for the significance of the regression coefficients and to compute fit statistics, the maximum likelihood estimation method was selected. A set of goodness of fit indices was used to test the plausibility of the model: chi-square (χ^2), the Tucker-Lewis index (TLI) and the comparative fit index (CFI), with values above .95 attesting a very good adequacy of the model; and the root-mean square error of approximation (RMSEA), with 95 per cent confidence interval (CI), which indicates a good model fit when values range between .05 and .08 (Byrne, 2010; Hu and Bentler, 1999).

The significance of direct, indirect and total effects was assessed by Chi-square tests. Furthermore, the bootstrap resampling method, with 2000 bootstrap samples and 95 per cent bias-corrected CIs around the standardized estimates of total, direct and indirect effects, was used to test the significance of the mediational paths. Effects with $p < .050$ were considered statistically significant.

Results

Preliminary data analyses

Univariate and multivariate normality was examined by the values of skewness and kurtosis. The skewness values ranged from -0.02 to 1.78 (in the SCPAS and in the BMI, respectively), while the values of kurtosis ranged from 0.12 to 8.62 (in BD and BMI, respectively). These values indicated that there was no severe violation of the normal distribution (Kline, 2005).

Table 1

Means (M), Standard Deviations (SD), Cronbach's alphas and Product-moment correlation coefficients between self-report measures (N = 662)

	α	M	SD	1	2	3	4	5	6	7	8	9	10
1_BMI	—	21.86	3.12	1									
2_BD	—	.67	.98	.58**	1								
3_SCPAS	.90	62.93	12.34	-.14**	-.25***	1							
4_SCS	.91	3.06	.68	-.10**	-.18***	.31***	1						
5_QoL_Physical	.72	75.42	11.91	-.04	-.08*	.30***	.29***	1					
6_QoL_Psychological	.79	68.72	13.53	-.09*	-.20***	.48***	.45***	.57***	1				
7_QoL_Relationships	.68	73.38	16.53	-.06	-.15***	.29***	.23***	.32***	.52***	1			
8_QoL_Environmental	.75	68.34	11.68	-.12**	-.12**	.21***	.23***	.49***	.47***	.29***	1		
9_QoL_General	—	3.96	.55	-.12**	-.14***	.23***	.26***	.29***	.40***	.20***	.50***	1	
10_Age	—	20.33	1.76	-.01	-.07	.11**	.02	-.00	.04	.03	-.06	-.14**	1

Note. * $p < .050$; ** $p < .010$; *** $p < .001$; BMI = Body Mass Index; BD = Body Dissatisfaction; SCPAS = Social Comparison through Physical Appearance Scale; SCS = Self-compassion Scale; QoL_Physical, QoL_Psychological, QoL_Relationships, QoL_Environmental, QoL_General: domains of the World Health Organization Brief Quality of Life Assessment Scale.

Descriptive statistics and correlations

The means and SDs of the study variables are reported in **Table 1**. Pearson product-moment correlation coefficients indicated that QoL was significantly associated with all the study variables. Specifically, general QoL scale and the subscales physical, relationships and environmental QoL showed low and negative associations with BMI and BD and, on the contrary, positive associations with favourable social comparisons and self-compassion. An exception was

verified regarding the subscales physical and relationships that revealed nonsignificant associations with BMI. It is noteworthy to mention that psychological QoL was significantly and positively associated, with moderate correlations, with favourable social comparisons and with self-compassion. Negative and weak correlations were also found between psychological QoL and BMI and BD.

BMI was found to be highly positively associated with BD. However, a weak correlation was found between BMI and favourable social comparisons. Self-compassion was positively and moderately associated with favourable social comparisons. Finally, participants' age was only marginally associated with social comparison and with general QoL and was not significantly associated with the remaining variables. Therefore, age was not considered in the following analyses.

Path analysis

The initial model comprised 22 parameters. Analyses indicated the progressive removal of the following nonsignificant paths: first, the direct effect of BMI on SCS (.001; $p = .936$) and BMI on Psychological QoL (.198; $p = .242$), and second, the direct effect of BD on Psychological QoL (-.74; $p = .103$).

After the re-specification of the model (**Figure 1**), results indicated that the model explained 33 per cent of psychological QoL. All path coefficients were statistically significant ($p < .050$), and model fit indices revealed an excellent fit to the empirical data, as supported by the, $\chi^2 = 4.019$, $p = .259$; TLI = .995; CFI = .998; RMSEA = .023 (.00 to .07; $p = .763$; Hu and Bentler, 1999).

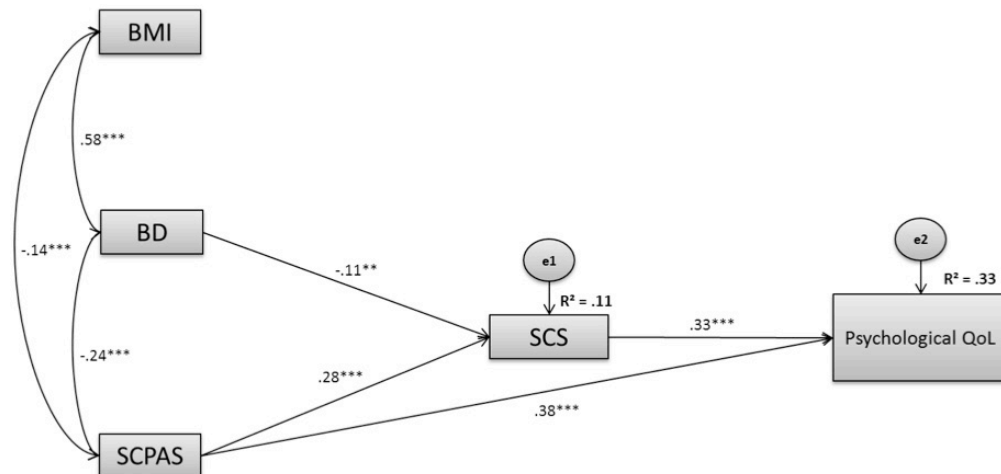


Figure 1 | Path Model

BMI = Body Mass Index; BD = Body Dissatisfaction; SCPAS = Social Comparison through Physical Appearance Scale; SCS = Self-Compassion Scale; Psychological QoL = domain of the WHOQOL-BREF.

Standardized path coefficients among variables are presented. All path coefficients are significant at the .05 level.

** $p < .010$; *** $p < .001$.

BMI was highly associated with BD and revealed a low association with unfavourable social comparisons (SCPAS). Furthermore, the model explained 11 per cent of SCS. BD had a direct effect on SCS of $-.11$ ($b_{BD} = -.08$; $SEb = .03$; $Z = -3.00$; $p = .003$). Also, SCPAS had a direct effect of $.28$ on SCS ($b_{SCPAS} = .02$; $SEb = .00$; $Z = 7.41$; $p < .001$). Finally, SCS had a direct effect of $.33$ on psychological QoL ($b_{SCS} = 6.67$; $SEb = .67$; $Z = 9.97$; $p < .001$).

Moreover, SCPAS had a total effect of $.47$ on psychological QoL, with a direct effect of $.38$ ($b_{BD} = .41$; $SEb = .04$; $Z = 10.27$; $p < .001$), and an indirect effect of $.09$, through the mechanism of self-compassion. BD, in turn, had a total effect of $-.04$ on psychological QoL, with its effect being operating fully through the mechanism of self-compassion. These effects were significant at the level of $p < .001$. According to the bootstrap resampling method, framed by a CI of 95 per cent, the estimate of the indirect effect of SCPAS on psychological QoL was significantly different from zero (CI = $.07$ to $.12$), as well as the estimate of the indirect effect of BD (CI = $-.07$ to $-.01$).

The final model pictured with the standardized estimates of the regression coefficients and the R^2 of the variables is represented in **Figure 1**.

Discussion

This is the first study to examine the associations between BMI, BD, social comparison based on body image and QoL in young college women. The associations between these variables and self-compassion were also explored. The sample presented a wide range of BMI values, and results indicated that BMI had small or nonsignificant associations with the dimensions of QoL. The study also confirmed that BD and perceptions of inferiority based on body image in comparison to others are associated with worse QoL in all of its dimensions: physical, environmental, social relationships and especially with the psychological dimension.

Results showed that the path model explained 33 per cent of the variance of psychological QoL, which is considered a main aspect of individuals' level of health (Camfield and Skevington, 2008; Hoffman and Driscoll, 2000). Furthermore, findings indicated that even though increased BMI was highly associated with the perceived discrepancy between one's real body and the desired one, BMI only showed a weak association with the degree in which one compares oneself (un)favourably with others based on the physical appearance domain. Also, BMI did not directly predict psychological QoL. Noteworthy, BD also did not have a direct impact on this important dimension of QoL.

In fact, even though there is evidence that BD is very common and can negatively impact women's mental health (Ahern et al., 2011; Mond et al., 2013), this study's findings suggest that, by itself, the perception that one's body is discrepant from an idealized body does not directly affect the perception of QoL. Indeed, the tested model shows that BD impacts psychological QoL fully through lower levels of self-compassion. This means that it is only when one has a lower ability to deal with one's BD in a kind and accepting manner that this negative evaluation may impact one's perception of psychological QoL. These findings add to current knowledge regarding the healing effect of self-compassion when faced with inadequacies or limitations (Berry et al., 2010; Neff et al., 2005) and the protective role that this ability plays on a range of indicators of mental health (Brion et al., 2014; Neff, 2003a, 2003b).

Furthermore, this study revealed that favourable social comparisons based on physical appearance have a direct effect on a positive perception of psychological QoL. This suggests that young women's psychological QoL is highly dependent on how they perceive themselves in relation to their peers using body image as a reference. Nonetheless, the data also showed that

social comparison exerts influence on psychological QoL partially through the mechanism of self-compassion.

These findings suggest that body image is an important domain to define individuals' QoL, namely the psychological dimension. However, this study highlights that more than one's actual weight or body shape, it is the way this body image dimension becomes linked to perceptions of inferiority or inadequacy in the social group that is key to individuals' psychological QoL. This is in line with prior research demonstrating that particularly among the feminine gender, weight perceptions and perceived external pressures regarding body image have a greater impact than BMI on the endorsement of thinness and QoL (Gillison et al., 2006). Moreover, self-compassion emerges in this model as an important emotion regulation process that may ameliorate the link between negative experiences related to body image and the subjective perception of QoL. In this sense, this study has important implications for the development of community-based interventions focused on the promotion of QoL in college women. In particular, this study emphasizes that these interventions should target not only one's experience related to body image but mostly how one relates to such experience. That is, our findings suggest that more relevant than efforts being placed in targeting weight or BD, interventions should focus on developing more adaptive ways to deal with such negative experiences related to body image. In particular, a more kind and accepting relationship with these negative aspects of the self should be promoted. This compassionate attitude in relation to one- self and one's body could increase women's sense that all bodies are unique, as well as their sense of connectedness (i.e. that some of these body-related negative experiences are shared). In this perspective, one's body-related flaws and limitations are kindly accepted and do not define one's sense of self-worth and well-being (Berry et al., 2010; Neff, 2003b).

This study contained some limitations. First, the cross-sectional design precludes causal conclusions to be drawn. Thus, future research should expand this investigation testing the temporal course of these pathways and the role of other variables (e.g. life events, shame) and emotion regulation processes that were not the focus of this work (e.g. thought suppression, decentering). Also, experimental studies should test the efficacy of compassion-based interventions on promoting body image acceptance and adaptive ways to deal with negative self-evaluations in order to diminish maladaptive behaviours (e.g. pathological dieting) and increase QoL. Thus, the current data offer important insights for future research and support

the importance of developing interventions that target self-compassion to promote QoL in under-graduate students.

To sum up, this study offers new insights on how BD and perceptions of inferiority based on body image can be important predictors of QoL in young women. Also, key to our findings was how the impact of these negative experiences related to the body on QoL may be highly dependent on one's ability to be self-compassionate.

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Study XIX

The impact of self-criticism and self-reassurance on weight-related affect and well-being in participants of a commercial weight management programme

Adapted from:

Duarte, C., Stubbs, R. J., Pinto-Gouveia, J., Matos, M., Gale, C., Morris, L., & Gilbert, P. (in press). The impact of self-criticism and self-reassurance on weight-related affect and well-being in participants of a commercial weight management programme. *Obesity Facts*.

Summary

Objective: Certain psychological and emotional factors can undermine attempts at weight management. Previously we have found that shame and self-criticism were significantly associated with disinhibition and perceived hunger in 2,236 participants of a weight management programme. This effect was fully mediated through weight-related negative affect. The present study examined the impact of self-criticism and self-reassurance on well-being and whether it was mediated by weight-related affect in the same population.

Method: Participants completed an online survey of measures of self-criticism and self-reassurance, and negative and positive affect associated with weight and well-being.

Results: Path analysis suggested that self-criticism was significantly associated with decreased well-being, both directly and indirectly, mediated by increased negative and decreased positive weight-related affect. Self-reassurance had a stronger association with increased well-being by predicting lower negative and increased positive weight-related affect. All effects were significant at $p < .001$.

Conclusion: Self-criticism and self-reassurance were related to well-being in participants attempting to manage their weight, both directly and through their impact on weight-related affect. The positive association between self-reassurance and well-being was stronger than the negative association between self-criticism and well-being. Supporting the development of self-reassuring competencies in weight management programmes may improve weight-related affect and well-being.

Keywords: obesity, overweight, psychological aspects, weight regulation, well-being

Introduction

Overweight and obesity are among the greatest societal challenges to health and well-being, affecting more than half of the adult population [1]. Obesity has detrimental effects on psychological well-being and is associated with increased morbidity, mortality, and greater health care expenditure [2-5]. Governments are calling for the public to take more responsibility for their own health by adopting healthier lifestyles through changes in eating behaviour and becoming more active [6,7]. However, translating the ostensibly simple principles of effective

weight management into practice to achieve population-level changes in health-related behaviours seems to be difficult [8].

Evidence now suggests that sustained weight loss requires behavioural strategies of self-regulation, action planning, developing self-efficacy, autonomy and motivation [9-13]. However, self-management of eating and activity can be undermined by a number of psychological and emotional factors [14]. Attempting to lose weight can create stress by putting motivations and emotions at odds with both physiological drives to defend against energy deficits and environmental cues to overeat [15,16]. Overweight and obese people commonly experience stigma, which can increase psychosocial stress and negatively impact on physical and mental well-being [17,18]. Believing oneself to be part of a stigmatised group can stimulate unfavourable social comparisons, creating feelings of inferiority and inadequacy, and self-criticism [19]. There is evidence that internalization of stigma is associated with overeating. Puhl, Moss-Racusin and Schwartz [20] found that overweight and obese individuals who internalize stigmatized stereotypes, and thus have negative views of themselves, may be more likely to binge eat and less likely to diet in response to stigma. This process could be counterproductive to self-regulation of eating behaviours and motivation to lose weight [20]. Our previous study is also consistent with these findings [61].

Developing a self-reassuring and accepting attitude towards one's imperfections and flaws (e.g., physical appearance) may buffer against the pervasive negative effects of shame, unfavourable social comparisons and body image dissatisfaction [21-23]. Self-critical versus self-reassuring responses to difficult situations during weight management attempts may be important in aligning emotion regulation to benefit self-regulation [24]. Recent relapse prevention models [25-27] now include third-wave psychotherapeutic approaches (e.g., Acceptance and Commitment Therapy [28]; Mindfulness-Based Cognitive Therapy [29]; and Compassion Focused Therapy [30]) because there is growing evidence that learning to accept and manage emotional responses to stresses associated with relapse can create opportunities for behavioural self-regulation [31-36]. Self-regulation of behaviour for weight management may be supported by strategies that promote stress management and emotion regulation *inter alia* through self-reassuring compassionate abilities [8,18,22,32-34,37-39]. Third-generation behavioural approaches seek to help individuals change their relationship to difficult thoughts, emotions or bodily sensations, rather than trying to change or control them, while engaging in adaptive actions towards effective and sustained behavioural change and well-being [40]. In particular,

CFT aims to help individuals to cope with negative self-evaluations, shame and self-criticism, through the cultivation of self-reassuring and compassion skills. CFT encourages the development of compassion motivation and engagement with adaptive behaviours with the goal of improving well-being [30].

Many individuals enter weight loss regimes with cycles of early success followed by relapse, which can be associated with a sense of failure, inefficacy, shame and self-criticism [41,42]. The recent NICE guidance on managing overweight and obesity in adults emphasises that lifestyle weight management services should protect people's physical and mental well-being [43]. Furthermore, NICE highlights the need for lifestyle weight management programmes to address "psychological issues, such as body confidence or attitude, depression, anxiety or self-esteem" and "wider lifestyle factors such as sleeping patterns and stress management". Few studies of weight management programmes have examined how self-evaluative processes, and the emotion regulation linked to them, impact on well-being. Well-being is a multidimensional, dynamic phenomenon that includes not just the absence of physical and mental illness but a subjective sense of happiness, satisfaction with life, positive psychological functioning, a perception of being connected to and accepted by others and of self-realisation [44,45]. Some authors have suggested that improvement of psychological well-being may be central to the long-term effectiveness of weight management programmes [46,47].

Recent work has revealed that the processes of negative and positive self-evaluation such as self-criticism versus self-reassurance are not bipolar constructs or mirror images of each other. For example, Körner and colleagues [48] found that positive *versus* negative self-evaluations had contrasting effects on depression in a large population sample, with negative self-evaluation being the primary predictor of depression. Indeed, studies of positive and negative affect [49,50] indicate that positive affect and well-being, in contrast to negative affect and psychopathology, should perhaps be studied separately. There is also evidence that self-criticism and self-reassuring are associated with different brain systems [51]. This suggests that, in overweight and obese individuals, self-criticism and self-reassurance relationship to outcomes such as well-being may be mediated differently by factors such as weight-related affect. Hence the current study examined the relationships between self-criticism *versus* self-reassurance and well-being as mediated by positive versus negative weight-related affect in 2,236 female participants of a weight management programme.

Method

Participants

Participants ($N = 2,236$) were female participants of a community-based weight management programme, which is an open programme of no fixed duration. They were individually engaged in the programme for varying lengths of time and lost differing amounts of weight. Mean (SD) age was 41.71 (12.34) years, height 1.65 (6.71) m, weight 95.61 (18.73) kg and mean BMI was 35.28 (6.49) kg/m^2 . Nineteen percent had a BMI between 25-29.9 kg/m^2 , 33.5% between 30-34.9 kg/m^2 , 23% between 35-39.99 kg/m^2 , and 24.4% above 40 kg/m^2 . The mean (SD) of the time taken to reach survey since joining the programme was 274.44 days (388.76). Since starting the programme and the point of survey, 2055 (91.9%) of the participants lost weight, 27 (1.2%) gained weight, and 7 (0.3%) maintained weight (no weight data was obtained from 147 participants); BMI change mean (SD) was -3.68 (3.22).

Measures

Weight-focused Self-Criticising/Self-Reassuring Scale (WFSCRS)

This 22-item scale is derived from the Forms of Self-criticising/attacking and Self-reassuring Scale (FSCRS) [52]. The FSCRS assesses people's typical responses when things go wrong for them in terms of whether they are self-critical or self-reassuring. In the WFSCRS the instructions of the measure were adapted to focus on the dimensions of weight, body shape and eating. Participants rate each statement on a five-point scale (0 = 'Not at all like me' to 4 = 'Extremely like me'). The self-criticism scale has been found to have two subscales (i) inadequate self, which is a sense of feeling internally put-down and inadequate (e.g., "I can't accept failures and setbacks without feeling inadequate") (ii) hated self, which is a sense of self-dislike and aggressive/persecutory desires to hurt the self (e.g., "I have become so angry with myself that I want to hurt or injury myself"). In contrast to being self-critical people can be reassuring of themselves in these contexts. Reassured self is an ability to be encouraging and supportive for self when things go wrong (e.g., "I am gentle and supportive with myself"). The original scale has good reliability with Cronbach's alphas of 0.90 for inadequate self, 0.86 for hated self, and 0.86 for reassured self [52]. For the purpose of the current study we combined the two self-criticism subscales (inadequate self and hated self) to obtain an overall measure of self-criticism.

Weight-focused Feelings Scale (WFFS)

This scale includes 11 items. Participants are asked to rate each item, using a 4-point scale (1= 'Not like me' to 4 'Extremely like me'), about their current feelings linked to body weight and shape. This scale includes two subscales: a 3-item subscale that assesses positive weight-focused affect (e.g., "I am quite happy in myself"), and an 8-item subscale that assesses negative weight-focused affect (e.g., "I feel depressed and down"). This scale presents good psychometric properties with the negative affect subscale presenting a Cronbach's alpha of 0.88 and the Positive Affect subscale a value of 0.79 [61].

Warwick-Edinburgh Mental Well-being Scale (WEMWBS)

The WEMWBS is a 14-item scale that was developed to measure subjective well-being and psychological functioning (e.g., 'I've been thinking clearly', 'I've been feeling loved'). Answers are given on a 5-point Likert scale (1 = 'None of the time' to 5 = 'All of the time') with higher scores indicating higher levels of mental well-being. This scale presents good psychometric properties, including good construct validity, test-retest reliability, and internal consistency, with a Cronbach's alpha of 0.91 in the general population [53].

Height and weight

Height was self-reported to the nearest 0.5 cm. Participants were weighed in light clothing on scales with a precision of ± 0.23 kg (SECA bespoke model). Accuracy is ensured by calibration against standard weights, during routine service and scales are checked for notable drift weekly in use. The same calibrated scales were used each week at a given group to record weight and weight change. Weights reported for the time of survey were < 10 days of the survey date.

The means, standard deviations and Cronbach's alpha estimates of the measures used in the current study are reported in **Table 1**.

Procedure

Slimming World is a national lifestyle-based weight management organisation that provides community based group support for ~ 800,000 members in regular attendance at any one time who are seeking to manage their weight and to develop healthy eating and activity behaviours. The organisation delivers a community-based behaviour change support programme for weight

loss, via networks of local classes, 4,000 group leaders and support staff, written, online and multi-media resources, eating plans, diet models and evidence-based behaviour change techniques promoting whole-diet approaches to weight management and gradual increases in physical activity [54-56].

This study was approved by the University of Derby Ethics Committee, and was advertised on the Slimming World members' website. The advertorial directed participants to a website designed specifically for this project, which provided detailed information about the study and contact details for the research team to answer any specific questions about the study. Those wishing to voluntarily participate were asked to indicate their consent by clicking the appropriate button on the website. Participants were offered the opportunity to enter a prize draw for one of five gift vouchers (each worth £100) as a "thank you" for their voluntary participation. Once consent had been obtained, participants were directed to a link to the self-report questionnaires, which were completed online. The questionnaire (available on request) consisted of questions in which the participant selected drop-down menus to describe their age, height, level of activity, date of birth, duration of membership, time taken to reach current weight and time at current weight. Data on employment status, ethnicity and socioeconomic status were not collected in this survey. However, data from a larger audit of participants of this programme suggest that their socioeconomic characteristics reflect the Index of Multiple Deprivation score distributions of the general UK population (within 1-3% across all 5 quintiles)[57]. The remainder of the questionnaire took the form of Likert-type scales asking questions about self-criticism and self-reassurance in relation to weight, negative and positive affect related to weight, and mental well-being as described above. The questionnaire took approximately 30 minutes to complete. Data was collected over a period of 6 weeks.

Data analysis

Pearson correlation coefficients were calculated to explore the correlations between the study variables. Data analyses were conducted using SPSS (v. 21 SPSS; Armonk, NY: IBM Corp.). A path analysis was conducted to explore the indirect effect of self-evaluation (weight-focused self-criticism/self-reassurance) on well-being through weight-focused positive and negative affect, using the software AMOS (v. 21; Analysis of Moment Structures, SPSS Inc. Chicago, IL). The path analysis aimed to determine whether weight-focused positive and negative affect (mediators, measured by the WFFS), would contribute for the association between self-criticism and self-

reassurance, as measured by WFSCRS (exogenous variables) and well-being as measured by WEMWBS (dependent, endogenous variable). Path analyses are a subset of Structural Equation Modelling (SEM), used to assess theoretically expected causal relations between previously defined variables, testing for direct and indirect effects between exogenous and endogenous variables, while controlling for error [58]. The Maximum Likelihood method was used to evaluate the regression coefficients' significance. The significance of direct, indirect and total effects was assessed using Chi-Square (χ^2) tests. Bootstrap resampling was further used to test for the significance of the mediation paths by selecting 2000 bootstrap samples and 95% bias-corrected confidence intervals (ICs). Effects were considered significantly different from zero ($p < 0.05$) when zero was outside the interval between the lower and the upper 95% bias-corrected confidence intervals.

Results

Descriptive statistics and Correlations

Descriptive statistics and Cronbach's alphas for the study variables are presented in **Table 1**.

Product-moment Pearson correlation results indicated that weight-focused self-criticism was strongly and negatively associated with self-reassurance, weight-related positive affect, and mental well-being. Self-criticism showed a strong positive association with weight-related negative affect. Conversely, weight-related self-reassurance showed a strong positive association with weight-related positive affect and with overall mental well-being. Weight-related negative affect was strongly and negatively associated with well-being, while weight-related positive affect was strongly and positively associated with well-being. Smaller but significant associations were found between higher BMI and increased self-criticism and weight-related negative affect, and lower self-reassurance, weight-related positive affect and well-being.

Table 1

Mean (M), Standard Deviation (SD), Cronbach's alpha (α) and Pearson correlation coefficients between the study variables (N = 2,236)

	M	SD	α	1	2	3	4	5
1 WFFSCRS Self-criticism	23.82	11.70	.91	1				
2 WFFSCRS Self-reassurance	16.38	6.31	.84	-.55***	1			
3 WFFS Negative affect	12.64	8.37	.88	.77***	-.55***	1		
4 WFFS Positive affect	5.13	3.45	.79	-.58***	.68***	-.63***	1	
5 WEMWBS Well-being	46.62	10.23	.95	-.55***	.62***	-.58***	.65***	1
6 BMI	35.28	6.49		.18***	-.14***	.19***	-.11***	-.09***

Note. *** $p < .001$;

WFFSCRS – Weight Focused Forms of Self-Criticising/Self-Reassuring Scale; WFFS – Weight-focused Feelings Scale; WEMWBS – Warwick-Edinburgh Mental Well-being Scale; BMI – Body Mass Index

Path analysis

Data was screened for uni and multivariate normality, Skewness (which varied from -0.04 WEMWBS and 0.42 WFFS Negative Affect) and Kurtosis (values ranged from -0.03 WEMWBS and -0.94 WFFS Positive Affect). There was no violation of normal distribution [58].

The model tested for the indirect effect of weight-focused self-criticism and self-reassurance on well-being, through the mechanism of weight-related negative and positive affect (Figure 1). The hypothesised model included 23 parameters to be estimated. The sample size (N = 2,236) was ideal to conduct the analysis considering the model's complexity (according to the N:q rule of 20:1[59]).

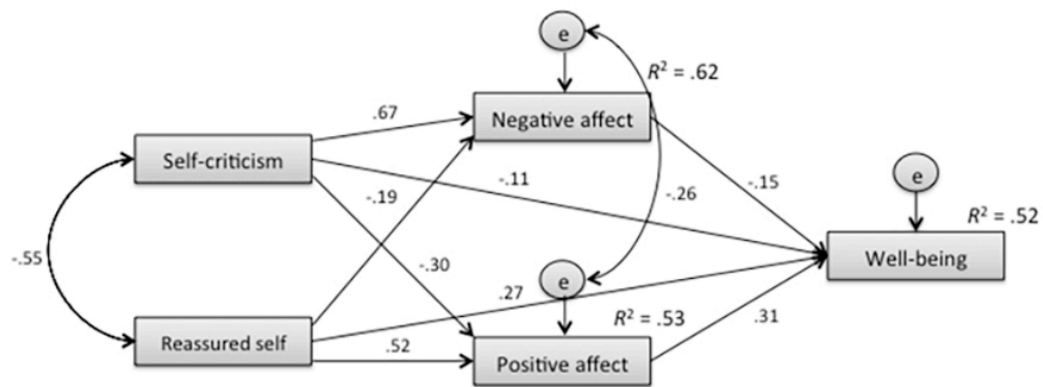


Figure 1 | Graphic representation of the path model showing the association between self-criticism and reassured self, and well-being, mediated by negative and positive weight-focused affect, with standardized estimates and square multiple correlations (R^2). All effects were significant ($p < .001$).

All the paths were statistically significant. The model accounted for a 52% of variance in well-being. Self-criticism and self-reassurance accounted for 62% of negative and for 53% of positive affect related to weight. Self-criticism and self-reassurance were significantly and moderately negatively correlated ($-.55$). Self-criticism had a direct effect of .67 ($b_{\text{Self-criticism}} = .48$, $SEb = 0.01$, $Z = 43.42$, $p < .001$) on negative affect related to weight, but a smaller direct effect on positive affect related to weight of $-.30$ ($b_{\text{Self-criticism}} = -.09$, $SEb = 0.01$, $Z = -17.09$, $p < .001$). Conversely self-reassurance positively predicted positive feelings about weight, with a direct effect of 0.52 ($b_{\text{Reassured self}} = .29$, $SEb = 0.01$, $Z = 30.11$, $p < .001$) and negatively predicted negative affect, with a direct effect $-.19$ ($b_{\text{Reassured self}} = -.25$, $SEb = 0.021$, $Z = -12.02$, $p < .001$). Weight related negative affect had a direct negative effect of $-.15$ on well-being; ($b_{\text{Negative affect}} = -.18$, $SEb = 0.03$, $Z = -5.90$, $p < .001$). Positive affect had a direct positive effect of .31 on well-being; ($b_{\text{Positive affect}} = .93$, $SEb = 0.07$, $Z = 14.12$, $p < .001$).

Regarding mediation effects self-criticism significantly decreased well-being, with a total effect of $-.27$, a direct effect of $-.11$ ($b_{\text{Self-criticism}} = -.10$, $SEb = 0.02$, $Z = -4.64$, $p < .001$), and an indirect effect of $-.19$, mediated by increased levels of negative weight-related feelings, and by decreased levels of positive feelings about one's weight. These effects were statistically significant according to the Bootstrap resampling method (95% $CI = -.23$ to $-.16$; $p = .001$).

Self-reassurance had a higher predictive effect on well-being than did self-criticism, with a positive total effect of 0.46 and a direct effect of .27; $b_{\text{Reassured self}} = .43$, $SEb = 0.03$, $Z = 12.70$, $p < .001$.

.001). Self-reassurance also had a significant indirect effect of .19 (95% *CI* = .16 to .22; *p* = .001) on well-being, mediated by lower negative and increased weight-related positive affect.

Discussion

There is a large body of evidence showing that self-criticism has a negative effect on mental health and well-being [52,60]. A recent study revealed that self-criticism is associated with shame, negative self-perceptions and emotions related to weight, which has a negative association with self-regulation of eating behaviours [61]. However, as noted in our introduction, research has also revealed that positive and negative self-evaluation are not bipolar constructs or mirror image of each other, but need to be studied separately. Hence, this study explored the relationship between the negative and positive emotion-based self-evaluative dimensions, weight-related self-criticism and self-reassurance, and well-being in participants of a weight-management organisation using a mediation model predicting subjective well-being. The model used self-criticism *versus* self-reassurance as predictors, and negative *versus* positive weight-related affect as mediators of the primary outcome (well-being).

Looking first at the correlations, results showed that self-criticism and self-reassurance were indeed negatively correlated but the correlation was not sufficiently high to suggest a bipolar construct. The findings suggested that self-criticism was not inspiring or encouraging but was actually linked to negative feelings about one's weight. In contrast, being self-reassuring was associated with more positive feelings about one's weight. Although small in magnitude, self-criticism and negative affect about one's weight were linked to BMI in a positive direction, whereas being more self-reassuring and positive feelings about one's weight were associated with lower BMI. Future research using prospective/experimental designs should explore these associations further, but the current results may indicate that the heavier the individuals are the more likely they are to belong to a stigmatized social group, internalize negative evaluations of being inferior and to engage in self-criticism. This may have negative consequences for self-regulation of eating behaviour and weight, and psychological well-being, promoting a self-sustained cycle.

This is the first study to clearly demonstrate the differential effects of self-criticism and self-reassurance on weight-focused affect or feelings. Our interpretation of the analyses is that being self-critical or self-reassuring of one's weight had contrasting effects on emotions linked to

weight, and these relationships, in turn, may have affected well-being. Our results suggested a linkage between increased BMI, self-criticism, weight-focused negative feelings, lower-reassurance, and lower well-being. These findings fit with the growing research on how self-criticism fuels negative emotions and undermines mental well-being [60,61] and suggests that distinct forms of self-relating and emotional dimensions of self-evaluation may impact on the well-being of overweight/obese individuals in different ways. These data highlight the potential importance for lifestyle weight management programmes in providing forms of support that promote positive aspects of self-relating and self-evaluation, which may have wider impacts on well-being and body confidence or attitude, depression, anxiety or self-esteem. This is an area for potential further investigation. The findings of the current study are consistent with other studies suggesting that promotion of adaptive emotion regulation and well-being may be important for sustained behavioural change for weight management [13,46,47].

These associations were further examined in the mediation path model, which accounted for 52% of the variance in well-being. This model suggested that being self-critical *versus* self-reassuring were significantly associated with how individuals feel about their body shape, weight and eating. These negative and positive emotional dimensions in turn mediated the association between self-criticism and self-reassurance and overall well-being of respondents attempting to manage their weight. Thus, this research suggested the importance of distinguishing between the psychological processes that undermine well-being and those that promote it. The mediation analysis indicated that these processes interacted, but also operated through different specific pathways. Self-criticism was significantly associated with lower well-being, and that this effect partially depended on the extent to which self-criticism was associated with increased weight-related negative affect, and to a lesser extent, decreased positive affect. On the other hand, being self-reassuring and self-supportive was associated with increased well-being, both directly and partially through increased weight-related positive affect. In other words, self-reassurance presented a significant direct effect on well-being, but its effect also partially operated through weight-related affect, especially positive feelings of happiness and optimism in relation to one's weight. Taken together with previous analysis [61] this study suggests that in a given weight management programme self-reassuring, supportive approaches may be associated with well-being and self-regulation of eating behaviour.

Limitations of the present study

Although these findings were supported by robust statistical analysis, the cross sectional design of this study does not allow the establishment of causal conclusions. Future research should investigate through prospective designs how interventions that target self-criticism and self-reassurance impact on well-being during attempted weight management.

The current study used a large sample representative of individuals attending weight management programmes. Nonetheless, participants were predominately middle-aged, Caucasian women. Although approximately 5% of the regular membership of the commercial weight management organisation are male, only 1.8% of the respondents to the survey were men, and so they were under-represented in this sample and were excluded from the analyses. Future research should include a wider range of sociodemographic groups and genders. As with most surveys of this type, only a small percentage of participants in the programme who had accessed the website, actually took part in the survey. The site is accessed by >100, 000 participants per week (although the number accessing the survey description was not recorded). In a separate online study where participant access was recorded from the same population of participants of a commercial weight management programme, we have found that 10,483 participants accessed a survey, of whom 2,492 completed it. These were relatively successful participants since on average, they had lost 10.19% of their initial weight in approximately 9 months prior to the survey. By definition of taking part in the study they were prepared to discuss their emotions in relation to their weight control. It may well be that the variables of interest present differently in those who are less successful participants in weight management programmes.

Conclusions

In this study of 2,236 female participants of a community-based weight management programme, weight focused self-criticism and self-reassurance were related to well-being in participants attempting to manage their weight, both directly and through their impact on weight-related affect. They were also related to BMI. The positive association between self-reassurance and well-being was greater than the negative association between self-criticism and well-being. These findings suggest that facilitating, supporting and developing self-reassuring competencies in weight management programmes may improve weight-related affect and well-

being. In other words, interventions should not just focus on trying to reduce self-criticism but should actively stimulate self-reassurance and well-being.

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Chapter 8

Binge eating:
Advances in treatment and future directions

Chapter overview

Study XX Compassionate Attention and Regulation of Eating Behaviour (CARE): A pilot study of a brief low intensity intervention for binge eating

Study XX

Compassionate Attention and Regulation of Eating Behaviour (CARE): A pilot study of a brief low intensity intervention for binge eating

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Abstract

A low intensity 4-week intervention that included components of compassion, mindfulness and acceptance was delivered to women diagnosed with Binge Eating Disorder. Participants were randomly assigned to one of two conditions: intervention ($n = 11$) or wait-list control ($n = 9$). Participants in the intervention condition were invited to practice mindfulness, soothing rhythm breathing and compassionate imagery practices with a focus on awareness and acceptance of emotional states and triggers to binge eat and engagement in helpful actions. Results revealed that, in the intervention group, there were significant reductions in eating psychopathology symptoms, binge eating, self-criticism and indicators of psychological distress; there were significant increases in compassionate actions and body image-related psychological flexibility. Data suggest that developing compassion and acceptance competencies may improve eating behaviour and psychological wellbeing in individuals with BED.

Keywords: Binge Eating Disorder; Compassion; Mindfulness; Psychological Flexibility; Intervention; Pilot study

Introduction

Binge Eating Disorder (BED) is the most common eating disorder, affecting 0.2% to 4.7% of individuals in their lifetime (Kessler et al., 2013). BED is characterized by recurrent (1 or more per week for 3 months) emotionally distressing binge eating episodes. During these episodes, individuals consume amounts of food that are larger than most people would consume under similar circumstances with a sense of lack of control. Individuals may eat faster than usual, in the absence of hunger, in secrecy due to embarrassment, or feel very guilty, ashamed or disgusted with themselves because of this behaviour. BED and binge eating symptomology is currently recognized as a public health problem given its comorbidity with psychological and physical problems, most notably obesity (de Zwaan, 2001; Hudson, Hiripi, Pope, & Kessler, 2007; Kessler et al., 2013). Nonetheless, BED can also occur in normal weight individuals and have significant impact on psychological distress, regardless of actual weight status (Didie & Fitzgibbon, 2005; Duarte, Pinto-Gouveia, & Ferreira, 2015b; Kessler et al., 2013).

Some conceptual models view binge eating as resulting from ineffective emotion regulation processes, in which food overconsumption operates as a means to momentarily escape or avoid

distressing and unwanted thoughts and emotions (Goldfield, Adamo, Rutherford, & Legg, 2008; Heatherton & Baumeister, 1991; Leehr et al., 2015). There is growing evidence that body image-related perceptions of inferiority, shame and self-criticism may underlie and fuel binge eating symptomatology (Duarte, Pinto-Gouveia, & Ferreira, 2014; Dunkley & Grilo, 2007; Hayaki, Friedman, & Brownell, 2002; Jambekar, Masheb, & Grilo, 2003). A tendency to develop inflexible negative self-evaluative cognitions and emotions related to body image may also account for the severity of binge eating symptoms in the general population (Duarte & Pinto-Gouveia, 2016) and in patients diagnosed with BED (Duarte, Pinto-Gouveia, & Ferreira, 2015a). Patients with BED may engage in overeating episodes as a reaction to the aversive experience of extreme negative self evaluation. Binging could therefore be a momentary attempt to find relief from these experiences, that overrides and disregards internal satiety and hunger cues that could exert some control over eating behaviour (Baer, Fischer, & Huss, 2005; Kristeller & Wolever, 2010; Mathieu, 2009). Paradoxically, if binging is a means to find momentary comfort or escape from one's own negative self evaluations, the consequence of binging is often to increase the intensity and frequency of negative affectivity, shame and self-criticism (Sandoz, Wilson, & DuFrene, 2010). Binge eating may therefore be maintained through a cycle that has detrimental consequences for the psychological health of the individual.

Cognitive-Behavioural Therapy is the recommended treatment for BED (Brownley, Berkman, Sedway, Lohr, & Bulik, 2007; Grilo, Masheb, Wilson, Gueorguieva, & White, 2011; Health, 2004; Yager et al., 2014). However, treatment efficacy is limited (Brownley et al., 2016; Vocks et al., 2010). Over the years, new intervention approaches derived from the third wave of cognitive-behavioural therapies (Baer et al., 2005) have been developed and applied to BED, including mindfulness (Kristeller & Wolever, 2010; Kristeller, Baer, & Quillian-Wolever, 2006), compassion (e.g. Compassion-Focused Therapy; Gilbert, 2005, 2010; Goss & Allan, 2010) and Acceptance and Commitment Therapy-based interventions (e.g., Hill, Masuda, Melcher, Morgan, & Twohig 2014; Juarascio, Manasse, Schumacher, Espel, & Forman, 2016). Mindfulness-based interventions have been effective in improving awareness of internal hunger/satiety sensations and reducing binge eating symptoms (Kristeller & Hallett, 1999; Kristeller, Wolever, & Sheets, 2014). CFT was developed to help individuals with high shame and self-criticism (Gilbert, 2010; Gilbert & Choden, 2013; Gilbert & Procter, 2006) develop the competencies to manage negative self-evaluation, self-criticism, and associated defensive behavioural responses (e.g., avoidance; Gilbert, 2005; Gilbert, 2010; Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Gilbert, Clarke, Hempel, Miles, & Irons, 2004)). The CFT model aims to increase individuals' capacity for self-

compassion by being sensitive to self-suffering and engaging in adaptive/helpful actions to alleviate and prevent that suffering (Gilbert, 2010; Gilbert & Choden, 2013). CFT-E has shown some effectiveness at reducing eating psychopathology in a mixed sample of patients with eating disorders (Gale, Gilbert, Read, & Goss, 2014) and in patients with BED (Kelly & Carter, 2015). Self-compassion scores have been found to be significantly associated with decreased eating disorder symptoms in clinical and nonclinical samples (Braun, Park & Gorin, 2016; Ferreira, Matos, Duarte, & Pinto-Gouveia, 2014; Ferreira, Pinto-Gouveia, & Duarte, 2013; Wasyliw, MacKinnon, & MacLellan, 2012). Kelly, Vimalakanthan and Miller (2014) found that self-compassion significantly buffered the impact of Body Mass Index (BMI) on body image flexibility (Hayes, 2004; Hayes, Strosahl, & Wilson, 1999; Sandoz, Wilson, Merwin, & Kellum, 2013). ACT interventions focus on the development of psychological flexibility, i.e. the ability to flexibly and mindfully note and be willing to accept negative or disturbing internal experiences (e.g., shame-focused cognitions, body image-related evaluations, urges to eat), without reacting to them, and while remaining committed to act in ways that bring the individual closer to what he/she truly values in life (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Hayes, Strosahl, & Wilson, 2011; Sandoz et al., 2010). The ACT literature advocates that compassion is an integral component in therapy for the development of psychological flexibility (Dahl, Plumb, Stewart, & Lundgren, 2009; Luoma & Platt, 2015; Neff & Tirch, 2013; Tirch, Schoendorff, & Silberstein, 2014). A recent study revealed that a 12-week psychological group programme for overweight/obese patients with BED that integrates psychoeducation and mindfulness, compassion and acceptance-based components (BEfree; Pinto-Gouveia et al., 2016), reduced binge eating symptomatology, shame and depressive symptoms, and increased mindfulness, self-compassion and psychological flexibility over a 6 month follow-up period.

“Light touch” interventions may improve treatment availability access, and engagement compared to more intensive, resource intensive face-to-face approaches. Evidence shows that brief-self-help interventions are effective in reducing symptomatology in patients with BED (Carter & Fairburn, 1998; Kelly & Carter, 2015). The current study aimed at testing the effectiveness of a mindfulness and compassion-based brief (4-week) self-help intervention (CARE – Compassionate Attention and Regulation of Eating Behaviour) in women from the general population with BED. We hypothesized that the intervention would: i) reduce binge eating symptomatology and related eating disorder pathology, depressive symptoms, shame and self-criticism and ii) improve self-compassion, mindfulness skills and psychological flexibility.

Method

Participants

Participants were 20 women from the community with a diagnosis of BED. Participants in the intervention condition (IC, $n = 11$) had a mean (SD) age of 37.73 (7.50), BMI of 31.89 (6.25); 15.36 (2.34) years of education; 72.7% were married and most of them had medium socio-economic status. Participants in the wait-list control group (WLC; $n = 9$) had a mean age of 35.78 (9.08), BMI of 31.89 (6.25), 16.75 (2.49) years of education; 66.7% of the participants were single and had medium to high socio-economic status (66.6%). All participants were Caucasian. The two groups did not present statistically significant differences regarding age ($Z = -.88$; $p = .380$), years of education ($Z = -1.07$; $p = .283$), marital status ($\chi^2 = 5.46$; $p = .065$), socioeconomic status ($Z = 5.50$; $p = .240$) and BMI ($Z = -.46$; $p = .648$).

Procedure

This pilot study is part of a wider research investigating the effect of psychological processes in the maintenance and treatment of binge eating. The study was approved by the Ethics Commission of the Faculty of Psychology and Educational Sciences of the University of Coimbra. Participants were recruited through flyers and advertisements in the University of Coimbra website and in national newspapers. Participants met DSM-5 (American Psychiatric Association, 2013) diagnosis criteria for BED, as established through the Eating Disorder Examination (17.0D; Fairburn, Cooper, & O'Connor, 2008) and met the following inclusion criteria: > 18 years old; able to access the internet; available to attend the assessment sessions. The exclusion criteria were: i) receiving current psychological treatment for BED; ii) current comorbid severe mental disorders (e.g., bipolar disorder, severe major depression, schizophrenia, substance abuse) as established by a screening interview based on DSM-5 criteria (American Psychiatric Association, 2013); iii) pregnant; iv) medical or endocrine disorders affecting appetite control; v) illiteracy or significant cognitive impairment. The procedure and aims of the study were explained to the potential participants, and those who agreed to take part in the study provided their written informed consent. **Figure 1** details the recruitment process of the study. Participants were randomly assigned to either the IC or the WLC conditions. Participants were assessed at baseline and at post-treatment. At 1-month follow-up participants filled the self-report measures through an online questionnaire.

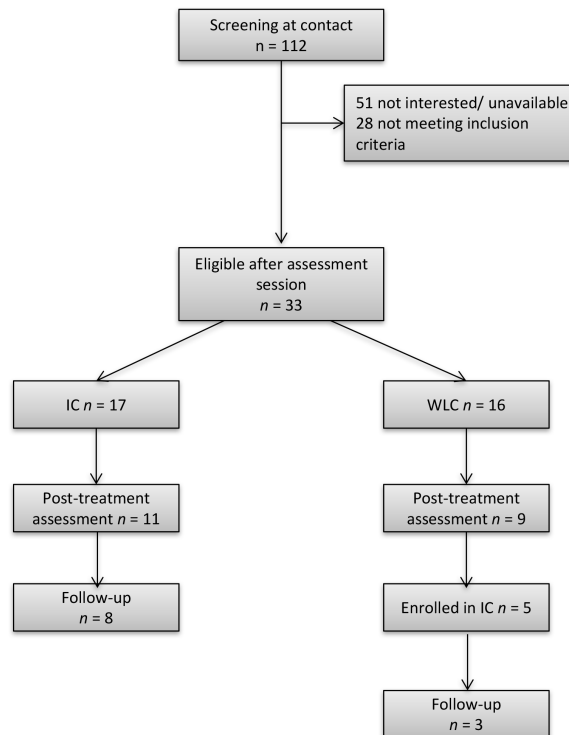


Figure 1 | Participation flowchart

Measures

BMI

Participants' BMI was assessed through the formula kilograms divided by height in meters squared. Weight was estimated using a Body Mass Analyzer (TANITA-SC-330) accurate to 0.1kg. Participants were weighed dressed and without shoes.

Eating Disorder Examination 17.0D (Fairburn et al., 2008)

EDE is a semi-structured clinical interview that assesses the frequency and intensity of key behavioural and psychological features of eating disorders. The EDE comprises four subscales: restraint, eating concern, shape concern and weight concern. It can also provide a measure of overvaluation of weight and shape. The mean of the four subscales provides a global score of overall eating psychopathological severity. EDE has good psychometric properties (Fairburn, 2008). In the present study, EDE presented an internal consistency of $\alpha = .93$. For the follow-up

measurement the self-report version of this interview was used (Fairburn & Beglin, 1994; Machado et al., 2014).

Binge eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982).

BES is a 16-item self-report questionnaire that measures the severity of binge eating symptomatology, including the emotional, cognitive and behavioural dimensions of binge eating. Each item includes three to four statements and participants are asked to choose which of the statements best describes their experience. Each statement represents a rating of severity ranging from 0 (no difficulties with binge eating) to 3 (severe difficulties with binge eating). Both the original (Gormally et al., 1982) and Portuguese (Duarte, Pinto-Gouveia, et al., 2015b) versions show good internal consistency. In the current study BES also presented high internal consistency ($\alpha = .84$).

Body Image Shame Scale (BISS; Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015). The BISS is a 14-item scale that assesses body image shame, i.e. negative self-evaluations and evaluations that others negatively evaluate the subject's physical appearance. Participants are asked to rate each item according to the frequency they experience body image shame, using a 5-point scale (ranging from 0 = *Never* to 4 = *Almost always*). The scale revealed high internal consistency in the original (Duarte, Pinto-Gouveia, Ferreira, et al., 2015) and in the current study ($\alpha = .88$).

Depression, Anxiety and Stress Scale (DASS21; (Lovibond & Lovibond, 1995). The 21-item DASS21 comprises three subscales measuring depression, anxiety and stress symptoms. Participants are asked to rate how much each statement applied to them over the past week, on a 4-point scale (0 = *Did not apply to me at all*, 3 = *Applied to me very much, or most of the time*). The DASS21 has good psychometric properties in both the original (Lovibond & Lovibond, 1995) and Portuguese versions (Pais-Ribeiro, Honrado, & Leal, 2004). In the current study the subscales depression, anxiety and stress presented Cronbach's alpha values of .84 .91 and .84, respectively.

Cognitive Fusion Questionnaire – Food Craving (CFQ-FC; Duarte, Pinto-Gouveia, Ferreira, & Silva, 2016). The CFQ-FC is a 7-item self-report measure that assesses the degree to which individuals are fused with disturbing and undesirable thoughts and cravings about food. Participants are asked to evaluate the extent in which each statement is true to them, using a 7-point scale

(ranging from 1= *Never true* to 7 = *Always true*). The original version of the scale was found to have good psychometric properties (Duarte et al., 2016). The scale presented a Cronbach's alpha of .86 in this study.

Body Image Acceptance and Action Questionnaire (BIAAQ; Sandoz et al., 2013)

BIAAQ is a 12-item self-report questionnaire that assesses the ability to openly accept body image-related internal experiences without attempts to avoid or alter them. Items are rated in a 7-point scale (1 = *Never true* to 7 = *Always true*). Both the original (Sandoz et al., 2013) and the Portuguese version (Ferreira, Pinto-Gouveia, & Duarte, 2011) show good psychometric properties. In the current study BIAAQ presented an internal consistency of $\alpha = .84$.

Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006).

FFMQ is a 37-item self-report questionnaire that assesses the distinct facets of trait mindfulness, including the subscales: observe; describe; act with awareness; nonjudgement; and non-reacting. Participants are asked to rate how mindful they feel in their daily life using a 5-point scale (1 = *Never or very rarely true* to 5 = *Often or always true*). The scale shows good psychometric properties both in the original (Baer et al., 2006) and in the Portuguese version (Gregório & Pinto-Gouveia, 2011). In the current study, the subscales presented the following internal consistencies: observe ($\alpha = .84$), describe ($\alpha = .89$), act with awareness ($\alpha = .86$), nonjudgement ($\alpha = .91$) and non-reacting ($\alpha = .77$).

Compassion Attributes and Actions Scales (CAAS; Gilbert et al., 2016).

The CAAS includes three scales that measure compassion to self, compassion to others, and the capacity to be open and aware of the compassion from others. In each scale two subscales assessing the two core components of compassion are measured: Attributes, referring to the sensitivity to the suffering of self and others; Actions, involving the commitment to try to alleviate and prevent suffering (Gilbert & Choden, 2013). In the current study we used the scale compassion for self, which revealed a Cronbach's alpha of .61 for the Attributes subscale and a Cronbach's alpha of .95 in the Actions subscales.

Self-Compassion Scale (SCS; Neff, 2003).

SCS is a 26-item scale that assesses self-compassion considering the dimensions self-kindness (vs. self-judgement), common humanity (vs. isolation) and mindfulness (vs. over-identification). Participants indicated how often they engaged in these ways of self-relating using a 5-point scale (1 = *Almost never* to 5 = *Almost always*). The SCS has good internal consistency (Castilho, & Pinto-Gouveia, J. , 2011; Neff, 2003). The internal consistency in the current study was .93.

Forms of Self-Criticism and Self-Reassurance Scale (FSCRS; Gilbert et al., 2004).

This 22-item scale measures people's critical and self-reassuring responses to setbacks or disappointments. Participants rate on a 5-point scale (0 = Not at all like me to 4 = Extremely like me) how they usually think and react in those situations. The scale measures two forms of self-criticism: inadequate self, which focuses on a sense of personal inadequacy and hated self, which measures the desire to hurt or persecute the self. The scale also measures self-reassurance when things go wrong. The scale has good psychometric properties in the original (Gilbert et al., 2004) and Portuguese version (Castilho, Pinto-Gouveia, & Duarte, 2015). In the current study the subscales presented the following internal consistency values: inadequate self ($\alpha = .90$), hated self ($\alpha = .72$), self-reassurance ($\alpha = .87$).

Feedback data

Participants were asked to report how frequently did they practice the exercises, their perceived utility and importance and to provide general feedback on the practices and on the programme as a whole.

Overview of the CARE intervention

Participants assigned to the IC condition were invited to attend a 2 1/2 hour group session. In this session the researchers gave a psychoeducation presentation (PowerPoint) on the factors underlying difficulties in regulating eating, on emotion regulation systems and on the binge eating cycle. This presentation also focused on the concepts of mindfulness and compassion and how they may help individuals manage impulses to binge eat in the face of negative affectivity, shame or self-critical thoughts. The potential role of compassion in supporting and motivating engagement in helpful actions that are committed with one's wellbeing and life pursuits were described. Participants were shown mindfulness meditation and the compassionate imagery exercises and had the opportunity to practice and ask any questions about the programme. At

the end of the session, participants were given a programme support manual with instructions on how to follow the exercises during the next 4 weeks and were given personal access keys to the webpage where they could find the audio exercises.

The instructions guided participants to practice mindfulness during week 1 of the 4 week intervention. The practices aimed at increasing participants' present moment awareness, sensitivity to internal cues of hunger and satiety, eating awareness and reducing reactivity and impulsive eating. These included: i) Mindfulness of the breath; ii) Body scan; iii) Mindful eating. During this first week participants were also asked to practice Soothing Rhythm Breathing, a practice that aims to lower arousal and induce calmness through the activation of the vagal parasympathetic nervous system (Porges, 2007; Gilbert, 2010). At the end of week 1 participants were directed to a link to an online questionnaire where they were asked to give feedback on the practices.

During weeks 2-4 participants were invited to practice compassionate imagery (Gilbert & Choden, 2013). These practices focused on (i) helping participants develop their ability to experience and generate compassionate feelings when experiencing body image and eating-related problems, (ii) improving a caring intention and commitment to alleviate one's suffering and support helpful actions. The practices included: i) Building the Compassionate self; ii) Cultivating compassion for others; iii) Cultivating compassion for someone with eating difficulties; iv) Cultivating compassion for the self.

Throughout the 4 week intervention participants were encouraged to adopt daily informal practices (i) to bring awareness to the present moment, especially when eating, (ii) keep an aware and compassionate perspective during their daily life, (iii) accept negative emotional experiences without engaging in reactive behaviours (iv) to be kind and supportive of themselves in adopting compassionate helpful actions in those moments. Participants were encouraged to commit to cultivating this compassionate mindset and to choose the most effective actions that may help them build a life they find more meaningful.

At the end of the four week intervention participants were invited to attend an assessment session where they provided self-reported feedback on the compassionate imagery practices, on the programme as a whole, and completed post-intervention measurements. Participants completed an online questionnaire with follow up self-report measures 1 month after the end of the programme. After the IC completed the programme and the post-intervention assessment, participants on the WLC group were invited to participate in the programme.

Analytic Plan

The baseline differences between the IC and WLC groups were compared using non-parametric Mann-Whitney U tests were conducted for the continuous variables and chi-square tests for categorical variables.

A series of 2 (condition) x 2 (time) Repeated Measures Analysis of Variance (ANOVA) were conducted to examine differences between pre- and post-intervention between the IC and the WLC groups. Significant time-group interactions were interpreted as effects of the intervention compared to control. Within-group differences were examined using Non-parametric Wilcoxon Signed Rank tests.

A Repeated Measures ANOVA was conducted in all participants who completed the intervention and the 1-month follow up assessment, to examine evidence of sustainability one month later. Descriptive statistics were calculated for the post-intervention feedback data.

Effect sizes were calculated through partial eta squares (η_p^2): .20 indicate a small effect size, .50 a medium effect and .80 a large effect size (Tabachnick & Fidell, 2013). The effect sizes for the Wilcoxon Signed Rank were calculated by dividing the z value by the square root of *N*, with .1 indicating a small effect, .3 a medium effect and .5 a large effect (Cohen, 1988). All statistical analyses were computed using SPSS version 20 (IBM, Armonk, NY).

Results

Baseline differences

There were no significant differences in the self-report measures between the intervention and control group (all estimates had an associated $p > .050$).

Changes from pre-intervention to post intervention

Results of the 2x2 Repeated Measures ANOVA and associated Wilcoxon Signed Rank tests are presented in **Table 1**. The intervention significantly reduced binge eating symptoms, eating psychopathology indicators, overvaluation of weight and shape, cognitive fusion with food

craving, inadequate self subscale for self-criticism, depressive and stress symptoms. The intervention significantly improved psychological flexibility regarding body image and the nonjudging facet of mindfulness. There was a marginal effect on self-compassion ($p = .054$) and a significant effect on improving the ability to engage in compassionate actions. Effects sizes were small to medium. Wilcoxon Signed Rank tests also indicated that, comparing to participants in the WLC, participants in the IC condition presented a significant reduction in body image shame, the hated-self form of self criticism, and increases in acting with awareness and self-reassurance.

Table 1

Mean scores, standard deviations and statistics for intervention and control groups at pre and post-intervention

Eating and body image psychopathology						
Measures	Time	Intervention	Control	Time	Time X Group	Significant Wilcoxon Signed Rank tests
		Group <i>n</i> = 11 Mean (<i>SD</i>)	Group <i>n</i> = 9 Mean (<i>SD</i>)			
BES Binge Eating	T1	22.81 (7.41)	17.00 (5.77)	$F_{(1,18)} = 70.12, p < .001, \eta^2 p = .80$	$F_{(1,18)} = 42.72, p < .001, \eta^2 p = .70$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
	T2	12.00 (7.63)	15.66 (4.85)			
EDE Total	T1	3.40 (0.84)	3.21 (0.81)	$F_{(1,18)} = 65.65, p < .001, \eta^2 p = .79$	$F_{(1,18)} = 60.09, p < .001, \eta^2 p = .78$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
	T2	1.46 (0.81)	3.17 (0.57)			
EDE Restraint	T1	2.98 (0.82)	2.30 (1.25)	$F_{(1,18)} = 27.50, p < .001, \eta^2 p = .62$	$F_{(1,18)} = 27.50, p < .001, \eta^2 p = .62$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
	T2	0.92 (0.86)	2.30 (1.16)			
EDE Eating Concern	T1	2.25 (0.99)	1.98 (1.29)	$F_{(1,18)} = 28.51, p < .001, \eta^2 p = .63$	$F_{(1,18)} = 21.58, p < .001, \eta^2 p = .56$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
	T2	0.45 (0.63)	1.85 (0.86)			
EDE Shape Concern	T1	4.39 (1.21)	4.53 (0.60)	$F_{(1,18)} = 45.19, p < .001, \eta^2 p = .73$	$F_{(1,18)} = 41.01, p < .001, \eta^2 p = .71$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
	T2	2.45 (1.10)	4.48 (0.55)			
EDE Weight Concern	T1	3.98 (1.06)	4.05 (0.78)	$F_{(1,18)} = 34.10, p < .001, \eta^2 p = .67$	$F_{(1,18)} = 34.10, p < .001, \eta^2 p = .67$	Intervention Group: T2 > T1 $Z = -2.95, p = .003, d = .89$
	T2	2.00 (1.07)	4.05 (0.68)			

EDE overvaluation	T1	5.00 (1.18)	5.35 (0.63)	$F_{(1,18)} = 45.33, p < .001, \eta^2 p = .74$	$F_{(1,18)} = 29.60, p < .001, \eta^2 p = .65$	Intervention Group: T2 > T1 $Z = -2.95, p = .003, d = .89$
	T2	1.63 (1.43)	5.00 (1.04)			
Binge eating episodes	T1	4.73 (1.62)	6.14 (2.04)	$F_{(1,18)} = 16.82, p = .001, \eta^2 p = .51$	$F_{(1,18)} = 5.11, p = .038, \eta^2 p = .24$	Intervention Group: T2 > T1 $Z = -2.97, p = .003, d = .89$
	T2	1.27 (3.04)	5.14 (3.39)			
BMI	T1	31.89 (6.25)	30.67 (7.47)	$F_{(1,18)} = 1.74, p = .204, \eta^2 p = .09$	$F_{(1,18)} = 1.02, p = .326, \eta^2 p = .05$	
	T2	31.85 (6.40)	30.38 (7.44)			
BISS	T1	2.59 (0.71)	2.56 (0.45)	$F_{(1,18)} = 13.66, p = .002, \eta^2 p = .43$	$F_{(1,18)} = 2.03, p = .172, \eta^2 p = .10$	Intervention Group: T2 > T1 $Z = -2.45, p = .014, d = .74$
	T2	2.02 (0.87)	2.30 (0.56)			
	T2	2.64 (0.95)	2.75 (0.50)			

General Psychopathology

Measures	Time	Intervention Group	Control Group	Time	Time X Group	Significant Post-hoc Paired t-test
		<i>n</i> = 11	<i>n</i> = 9			
		Mean (SD)	Mean (SD)			
DASS21 Depression	T1	5.64 (4.95)	4.67 (2.00)	$F_{(1,18)} = 11.10, p = .004, \eta^2 p = .38$	$F_{(1,18)} = 5.90, p = .026, \eta^2 p = .25$	Intervention Group: T2 > T1 $Z = -2.68, p = .007, d = .81$
	T2	2.09 (3.44)	5.64 (4.94)			
DASS21 Anxiety	T1	3.55 (5.41)	2.00 (2.29)	$F_{(1,18)} = 0.94, p = .346, \eta^2 p = .05$	$F_{(1,18)} = 1.27, p = .247, \eta^2 p = .07$	
	T2	2.09 (2.77)	2.11 (2.15)			
DASS21 Stress	T1	9.18 (4.98)	7.22 (2.54)	$F_{(1,18)} = 11.44, p = .003, \eta^2 p = .39$	$F_{(1,18)} = 7.66, p = .013, \eta^2 p = .30$	Intervention Group: T2 > T1 $Z = -2.73, p = .006, d = .82$
	T2	4.73 (2.24)	6.78 (2.73)			

Psychological Flexibility

	Time	Intervention Group	Control Group	Time	Time X Group	Significant Post-hoc Paired t-test
		<i>n</i> = 11	<i>n</i> = 9			

Measures	Time	Mean (SD)	Mean (SD)			
CFQFC Cognitive Fusion Food Craving	T1	33.02 (7.10)	30.67 (9.41)	$F_{(1,18)} = 10.54, p = .001, \eta^2 p = .53$	$F_{(1,18)} = 14.29, p = .001, \eta^2 p = .44$	Intervention Group: T2 > T1 Z = -2.94, $p = .003, d = .89$
	T2	22.55 (10.27)	29.56 (7.10)			
BIAAQ Body Image Flexibility	T1	41.55 (16.00)	42.33 (13.74)	$F_{(1,18)} = 7.73, p = .012, \eta^2 p = .30$	$F_{(1,18)} = 6.47, p = .020, \eta^2 p = .26$	Intervention Group: T2 > T1 Z = -2.40, $p = .016, d = .72$
	T2	54.09 (18.81)	42.89 (11.70)			

Mindfulness

Measures	Time	Intervention Group	Control Group	Time	Time X Group	Significant Post-hoc Paired t-test
		n = 11	n = 9			
Measures	Time	Mean (SD)	Mean (SD)			
FFMQ - Observe	T1	25.09 (5.56)	22.56 (5.58)	$F_{(1,18)} = 0.02, p = .905, \eta^2 p = .00$	$F_{(1,18)} = 0.00, p = .960, \eta^2 p = .000$	
	T2	25.18 (3.57)	22.78 (3.49)			
FFMQ Describe	T1	27.09 (5.73)	26.78 (5.74)	$F_{(1,18)} = 0.91, p = .353, \eta^2 p = .05$	$F_{(1,18)} = 0.42, p = .523, \eta^2 p = .02$	
	T2	27.36 (6.44)	28.22 (5.63)			
FFMQ Act awareness	T1	23.55 (4.99)	23.67 (5.00)	$F_{(1,18)} = 9.52, p = .006, \eta^2 p = .35$	$F_{(1,18)} = 1.02, p = .326, \eta^2 p = .05$	Intervention Group: T2 > T1 Z = -2.00, $p = .045, d = .60$
	T2	27.27 (4.63)	25.56 (4.75)			
FFMQ Nonjudging	T1	20.18 (5.34)	24.89 (6.41)	$F_{(1,18)} = 10.77, p = .004, \eta^2 p = .37$	$F_{(1,18)} = 16.64, p = .001, \eta^2 p = .48$	Intervention Group: T2 > T1 Z = -2.68, $p = .007, d = .60$
	T2	27.36 (5.26)	24.11 (6.94)			
FFMQ Nonreact	T1	15.90 (4.39)	16.22 (1.86)	$F_{(1,18)} = 3.32, p = .085, \eta^2 p = .16$	$F_{(1,18)} = 1.92, p = .183, \eta^2 p = .10$	
	T2	18.37 (3.85)	16.55 (2.46)			

Self-criticism and self-compassion

Measures	Time	Intervention Group	Control Group	Time	Time X Group	Significant Post-hoc Paired t-test
		n = 11	n = 9			
Measures	Time	Mean (SD)	Mean (SD)			

Measures	Time	Mean (SD)	Mean (SD)			
SCS total	T1	2.83 (0.65)	2.84 (0.50)	$F_{(1,18)} = 9.13, p = .008$, $\eta^2 p = .36$	$F_{(1,18)} = 4.34, p = .054$, $\eta^2 p = .21$	Intervention Group: T2 > T1 $Z = -2.37, p = .018, d = .71$
	T2	3.38 (0.72)	2.94 (0.45)			
CAAS Attributes	T1	35.09 (7.35)	33.44 (9.79)	$F_{(1,18)} = 1.86, p = .190$, $\eta^2 p = .09$	$F_{(1,18)} = 1.62, p = .220$, $\eta^2 p = .08$	
	T2	41.54 (10.58)	33.67 (7.30)			
CAAS Actions	T1	21.27 (8.22)	20.56 (8.14)	$F_{(1,18)} = 9.10, p = .007$, $\eta^2 p = .34$	$F_{(1,18)} = 7.83, p = .012$, $\eta^2 p = .30$	Intervention Group: T2 > T1 $Z = -2.58, p = .010, d = .78$
	T2	30.09 (6.92)	20.89 (6.33)			
FSCRS Reassured self	T1	1.99 (0.71)	1.88 (0.44)	$F_{(1,18)} = 7.49, p = .014$, $\eta^2 p = .29$	$F_{(1,18)} = 2.17, p = .158$, $\eta^2 p = .11$	Intervention Group: T2 > T1 $Z = -2.00, p = .045, d = .60$
	T2	2.64 (0.88)	2.07 (0.59)			
FSCRS Hated self	T1	1.15 (0.78)	1.02 (0.55)	$F_{(1,18)} = 7.86, p = .012$, $\eta^2 p = .30$	$F_{(1,18)} = 1.21, p = .286$, $\eta^2 p = .06$	Intervention Group: T2 > T1 $Z = -2.28, p = .022, d = .69$
	T2	0.64 (0.84)	0.80 (0.53)			
FSCRS Inadequate self	T1	2.45 (0.82)	2.21 (0.73)	$F_{(1,18)} = 12.61, p = .002$, $\eta^2 p = .41$	$F_{(1,18)} = 8.38, p = .010$, $\eta^2 p = .32$	Intervention Group: T2 > T1 $Z = -2.70, p = .007, d = .69$
	T2	1.61 (0.87)	2.12 (0.94)			

Note. BES = Binge Eating Scale; EDE = Eating Disorder Examination 17.0; BMI = Body Mass Index; DASS21 = Depression, Anxiety and Stress Scales; CFQFC = Cognitive Fusion Questionnaire Food Craving; BIAAQ = Body Image Acceptance and Action Questionnaire; BISS = Body Image Shame Scale; SCS = Self-Compassion Scale; CAAS = Compassion Attributes and Actions Scale; FSCRS = Forms of self-criticising and self reassurance scale.

Follow up analyses

Results of the 1-month follow-up analyses are reported in **Table 2**. Findings indicate that the intervention effects were maintained for binge eating, general eating psychopathology, overvaluation of weight and shape, depression and stress symptoms, cognitive fusion with food craving, body image psychological flexibility, self-compassion and compassionate actions.

Table 2

Means (M) and Standard deviations (SD) for the 1-month follow up and ANOVA results for the comparison between post-intervention and the follow up assessment (N = 11)

	Follow up
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Variable	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
BES Binge Eating	10.45	9.50	0.539	.480
EDE Total	1.76	1.28	2.93	.226
EDE Overvaluation shape and weight	2.18	1.85	4.25	.066
EDE Restraint	1.38	1.18	6.34	.030
EDE Eating Concern	1.02	1.43	5.27	.045
EDE Shape Concern	2.45	1.64	.057	.816
EDE Weight Concern	2.18	1.50	0.51	.493
BISS	2.79	0.86	139.80	< .001
Depression	2.81	3.22	1.24	.291
Anxiety	0.55	9.83	9.83	.011
Stress	4.73	3.10	0.01	.930
CFQFC Cognitive Fusion Food Craving	20.82	8.41	0.29	.603
BIAAQ Body Image Flexibility	56.81	16.12	1.04	.332
FFMQ Observe	20.91	5.17	5.77	.037
FFMQ Describe	21.27	4.76	12.37	.006
FFMQ Act awareness	21.27	6.15	12.15	.006
FFMQ Nonjudging	23.09	5.96	12.18	.006
FFMQ Nonreacting	16.72	5.68	0.663	.445
SCS total	3.41	0.68	0.15	.708
CAAS Attributes	33.82	7.90	4.326	.064
CAAS Actions	25.19	7.61	2.06	.181
FSCRS Reassured self	3.20	0.71	14.61	.003
FSCRS Hated self	1.51	0.38	38.91	<.001
FSCRS Inadequate self	2.42	1.10	20.79	.001

Intervention feedback data

Feedback data obtained for the first week indicated that 62.5% of the participants practiced using the audio files 5 times or more; 43.8% practiced on their own 5 times per week or more; 43.8% practiced the additional informal tasks 5 times or more; 75% noticed an increase in present moment awareness; 50% noticed an increase in eating awareness.

56.3% of the participants practiced with the compassionate imagery audio files 5 times per week or more; 50% practiced on their own 5 times or more; 37.5% did the informal proposed tasks 5 times or more; 100% kept the practices of the first week. On the third week 43.8% practiced with the audio files 5 times or more; 31.3% practiced on their own 5 times or more; 37.5% did the

informal proposed tasks 5 times or more; 87.5% kept the practices of the first week. On the fourth week, 37.5% practiced 3 to 4 times a week and 25% practiced everyday with the audio files, 56.3% practiced on their own 1 to 2 times a week; 31.3% did the informal proposed tasks 3 to 4 times a week; 81.3% kept practices of the first week.

After completing the programme, 87.5% of the participants mentioned being more able to bring their awareness to the present moment; 93.8% mentioned being more able to eat in a more aware and calmer way; 93.8% mentioned being more able to act more compassionately or feeling like their best compassionate self. 87.5% of the participants reported that the mindfulness of the breath meditation was very useful; 43.8% reported that the body scan meditation practice was moderately useful and 31.3% indicated that it was very useful; 68.8% reported that the mindful eating meditation practice was very useful; 87.5% reported that the Soothing rhythm breathing practice was very useful. Regarding the compassionate imagery practices, 56.3% reported that the Compassion for others practice was very useful; 36.6% reported that the Compassion for someone with eating difficulties practice was very useful; and 62.5% reported that the Compassion for self practice was very useful.

Sixty-two point five percent of the participants reported that they experienced 'a lot' of positive changes on their life and on how they deal with thoughts and emotions. On average (scale range 1-10) participants found the group introductory session ($M = 7.73$; $SD = 2.38$), the support manual ($M = 6.44$; $SD = 2.48$) and the programme website ($M = 8.25$; $SD = 2.32$) important.

Discussion

This pilot study examined the effectiveness of a 4-week low intensity intervention for women from the general community with BED. Results offered preliminary evidence that this intervention could be effective in reducing the severity of self-reported binge eating symptomatology, general eating psychopathology, overvaluation of body weight and shape, symptoms of depression and stress, the inadequate-self form of self-criticism, and cognitive fusion with food craving. There was also evidence of improved psychological flexibility regarding body image, non-judgemental facet of mindfulness and aspects of self-compassion.

The fact that both groups had disclosed difficult body image experiences and problems with controlling eating behaviour in the assessment session may have accounted for the lack of

significant effects of the intervention on body image shame and the hated self form of self-criticism. Nonetheless, results of the within group analysis indicated that these decreases were only significant on the participants in the IC condition. Participants of the intervention also presented a significant increase in the mindful ability to act with greater awareness.

The current results indicate that even though the intervention did not have significant effects in improving participants' ability to be sensitive and moved by their own suffering, they significantly increased their commitment to change their course of action to alleviate and prevent it, with potential beneficial effects on their eating behaviour (Gilbert & Choden, 2013). This could indicate a lack of effectiveness of the intervention and be reflective of the participants' responses to the demand characteristics of the study. Another interpretation may be that in people struggling with binge eating and body image difficulties a more intense or prolonged intervention may be required to produce changes in the ability to connect with one's suffering and to be sensitive and tolerant of one's faults or difficulties.

The findings of this study suggested that helping individuals cultivate a compassionate self-awareness and focus could reduce the tendency to become entangled in thoughts about eating and on perceiving urges to eat as requiring an inevitable reaction in their response (Duarte et al., 2016; Gillanders et al., 2014; Hayes et al., 1999; Luoma & Hayes, 2003). There was some evidence that the intervention may have promoted some degree of psychological flexibility around body image. It has been suggested that this entails a capacity to accept ongoing thoughts and emotions related to body image while being flexibly sensitive to contextual cues and persisting in behaviours that are aligned with one's valued goals in life (Hayes et al., 1999; Sandoz et al., 2010; Sandoz et al., 2013). These findings are in line with previous empirical evidence (Kelly et al., 2014; Pinto-Gouveia et al., 2016) and theoretical suggestions (Dahl et al., 2009; Neff & Tirsch, 2013; Tirsch et al., 2014) that compassion is a fundamental therapeutic ingredient to support acceptance of the present moment experiences, and the choice of acting effectively (instead of reactively) even when experiencing difficult and aversive thoughts and emotions.

The feedback data provided by the participants who completed the programme suggest that most participants revealed high engagement with the proposed practices. Most participants also found that the programme improved their ability to be more mindful and focused on the present moment when eating, and that it improved their ability to act from a more compassionate perspective, especially when coping with negative thoughts and emotions.

Some of the intervention effects were maintained one month after the intervention.

This pilot study has important limitations. Firstly, it is not possible in the current study design to dissociate the effect of the intervention content from the setting in which it was conducted (e.g., interactions with the investigators who had a vested interest in the outcome). The present analysis did not control for such effects. This may have inflated the effect size estimates in the present study and future studies should control for such possible confounders. Secondly this was a very small sample of female participants with low to moderate BED pathology. Future research should seek to replicate the current findings in larger samples with varying degrees of BED severity. Future studies should explore gender differences in response to interventions of this nature. Thirdly, longer periods of follow-up are necessary to ascertain whether participants' responses are maintained over time. Fourth the use of the FFMQ may have limited the findings of our study, as there is evidence that this measure may have inconsistent results depending on the meditation experience of the respondents (R.A. Baer et al., 2008). Future studies should consider using specifically designed eating-focused measures of mindfulness. Fifth, the effects of the intervention were assessed through the comparison of participants randomly assigned to the IC or the WLC conditions. It would be important to conduct a full randomized control trial comparing the CARE intervention with other low intensity interventions (e.g., self help-based CBT or CFT-based interventions; (Kelly & Carter, 2015) using a full process evaluation framework (e.g. Moore et al., 2015). Future research should investigate possible mechanisms and contaminants through which the intervention produces changes in outcomes.

Results of this study offer some preliminary evidence that this brief low intensity integrative intervention may be effective in treating BED. Although the full effectiveness of the content of this type of intervention is yet to be established, the findings need to be understood with caution, this is a cost-effective intervention that may improve access to treatment of individuals from the general community who struggle with binge eating.

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Part III

General discussion

Chapter 9

Synthesis and concluding remarks

Chapter 9

Synthesis and concluding remarks

Chapter overview

The current chapter provides a synthesis of the main findings of this dissertation and how they can be integrated into a perspective on the processes involved in the vulnerability to and persistence of binge eating symptoms and associated problems. The findings of each study have been individually discussed in relevant sections of those chapters. This chapter also explores the potential treatment and preventive implications of this work and how it can inform future studies and intervention strategies. Finally, this chapter will discuss the main limitations of the current investigations and how future research may address them.

Chapter 1 described how binge eating is a public health concern, prevalent in the general population, in varying degrees of severity, with deleterious physical and emotional consequences and its associations with overweight and obesity (Brownley et al., 2016; Hudson et al., 2007; Kessler et al., 2013; Spitzer et al., 1993). In the past few decades, the literature on binge eating has expanded considerably and BED has been formally recognized as a clinical occurrence (APA, 2013). BED is still a challenging clinical situation and there is still a need to develop effective treatment approaches that offer long-term solutions. Current theoretical models of binge eating already recognize the role that interpersonal variables, negative affect and emotion regulation play in difficulties of regulating eating behaviour (Greeno et al., 2000; Heatherton & Baumeister, 1991; Leehr et al., 2015; Masheb & Grilo, 2006; Pike et al., 2006; Polivy & Herman, 1993; Stice et al., 2001; Stickney et al., 1999; Striegel-Moore et al., 2002; Striegel-Moore et al., 2005; Whiteside et al., 2007). However, the specific nature of negative interpersonal experiences and the processes through which they influence the continuum of binge eating symptomatology remained unexplored. Because BED symptomology occurs in a spectrum of severity within the general population, it may be of particular relevance to the development and maintenance of obesity, and may also be an important factor in the high attrition/relapse rates seen in weight management programmes. A greater understanding of the psychological mechanisms involved could assist in the development of more effective approaches that support weight loss maintenance and relapse prevention.

General discussion of the main findings

This thesis aimed to contribute to the development of a functional model of binge eating that helps to address significant unanswered research questions about this phenomenon: i) Why and how are contextual variables and interpersonal experiences associated with disordered eating symptoms?; ii) Are there specific dimensions of negative affect that influence binge eating symptoms?; iii) What is the role of body image in these associations – does body image play a specific role in the vulnerability and persistence of disordered eating and binge eating symptoms?; iv) What are the processes by which these associations are established and strengthened?; v) Do adaptive self-regulatory processes through self-reassurance and compassion ameliorate these associations?; vi) How can the pathways involved in the cycle of shame and dysregulated eating behaviour be disrupted?

This dissertation aimed at answering these questions by examining the interaction between contextual variables and emotion regulation processes involved in the vulnerability to and persistence of difficulties in regulating eating behaviour in different populations including: i) adolescents, ii) nonclinical samples from the general community with varying weight ranges, iii) individuals from the general community who were overweight/obese, and iv) clinical samples with eating disorders, notably BED. This general discussion considers the main findings of these studies, their contribution to the above research questions and implications for future research and for prevention and intervention development.

Why and how are contextual variables and interpersonal experiences associated with disordered eating symptoms?

The studies in **Chapter 4** provided the empirical basis to begin to address our first research question regarding the pathways through which sociocultural pressures and negative interpersonal experiences become associated with disordered eating symptoms. Difficulties with body image and disordered eating symptoms tend to develop during adolescence and binge eating tends to start in late adolescence and early adulthood (Hudson et al., 2007; Kessler et al., 2013; Spitzer et al., 1993; Stice et al., 2013). Therefore, it was considered important to investigate experiences and processes involved in the vulnerability to disordered eating symptoms starting in early adolescence.

Study VII tested whether psychological inflexibility focused on the eating dimension would mediate the link between weight status, body dissatisfaction and social comparisons. Results showed that desires to lose weight and to become closer to the sociocultural norms that glorify thinness (Buote et al., 2011; Strahan et al., 2006; Sypeck et al., 2006) are common among young adolescent girls and confirmed prior evidence that these factors are associated with disordered eating symptoms (Cusumano & Thompson, 2001; Spoor et al., 2006; Stice, 2001, 2002; Stice et al., 2011; Stice et al., 2002). These results also demonstrated the relationship between adolescent girls' desires to approximate one's body to a sociocultural idealized pattern (such as models, actresses or other celebrities) and perceptions of personal inferiority and inadequacy (Ferreira et al., 2013a; Gilbert & Thompson, 2002; Pinto-Gouveia, Ferreira, et al., 2014). Together, these factors seem to impact disordered eating symptoms via heightened psychological inflexibility focused on the eating through inflexible adherence to idiosyncratic eating rules which guide one's eating behaviours regardless of internal and contextual cues (Ferreira, Trindade, & Martinho, 2016; Sandoz et al., 2010).

Study VIII corroborated prior evidence that victimization experiences perpetrated by peers have a detrimental impact on adolescent girls' mental health, through their association with depressive symptoms and disordered eating symptoms (Engström & Norring, 2002; Kaltiala-Heino et al., 2000). The findings clarified that this is not a direct association. This relationship is influenced by the extent to which these negative interpersonal experiences become associated with body image-focused shame and in turn, by how these shame feelings become internalized as severe self-hating self-criticism (Gilbert et al., 2004). These findings suggest that during adolescence when the peer group is perceived as a source of social threat instead of validation and support, these negative external interactions may contribute to the construction of a conceptualized self as rejectable, defective and inferior. Some adolescents may then start to self-attack in regard to potential reasons (e.g., physical appearance) that may make others see them in such negative manner and bully them. These threatening external and internal environments may then activate a defensive submissive and avoidance-driven response expressed by increased depressive symptoms (Gilbert, 2000a) and by the engagement in disordered eating behaviours (Ferreira et al., 2013a; Pinto-Gouveia, Ferreira, et al., 2014).

However, these are complex associations and even though victimization experiences are common during adolescence, not all adolescents are equally affected by them – not all girls who

are bullied develop body image disturbances or eating disorders. Identifying factors that can promote resilience against the negative effect of such threatening interpersonal experiences was therefore an important goal of our research. **Study IX** focused on corroborating suggestions that memories of warmth and safeness in childhood promote positive self-regulation through self-reassurance (Cunha, Xavier, Martinho, & Matos, 2014; Matos et al., 2015; Richter et al., 2009). The study examined whether the ability to self-reassure would protect against the engagement in defensive body image and pathological eating attitudes and behaviours. Findings suggested that adolescent girls who are more able to be self-reassuring as a potential way of coping with bullying situations, present lower body image shame and less disordered eating symptomatology. Findings also suggested that self-reassurance capabilities did not moderate the association between body image shame and disordered eating symptoms. This raises the possibility that when self-identity becomes fused with these evaluations focused on body image, one's behaviours may become inflexibly dominated by attempts to avoid and control such negative internal experiences.

A 3-wave longitudinal examination of the association between victimization experiences with peers, body image shame and disordered eating symptoms (**Study X**) extended these initial cross-sectional analyses. Results indicated that victimization experiences in early adolescence have a significant indirect effect on adolescent girls' disordered eating symptoms, mediated by body image shame. Most importantly, results suggested that once the link between body image shame and disordered eating symptoms are established it becomes relatively stable over time. Shame-based self-judgements that the body makes the self inferior, inadequate and vulnerable to rejection and attack seem to stimulate disordered eating symptoms and these, in turn, reinforce shame feelings. This longitudinal study suggested that it is when victimization experiences become associated body image shame, that their effect in adolescent girls' mental health may be more pervasive (Gilbert, 2002; Gilbert & Thompson, 2002; Pinto-Gouveia, Ferreira, et al., 2014). Notably, as discussed below, body image shame was identified in our studies as the most significant form of negative affect influencing binge eating symptoms.

Are there specific dimensions of negative affect influencing binge eating symptoms?

Study I corroborated prior evidence that binge eating symptoms occur in samples from the general population with considerable variability in weight, in varying degrees of severity (Gormally et al., 1982; Hudson et al., 2007; Johnson et al., 2002; Kessler et al., 2013; Kinzl et al., 1999; Ribeiro et al., 2014). Results also supported previous findings by revealing the associations between binge eating symptoms and negative affectivity, especially depressive symptoms (Kessler et al., 2013; Latner & Clyne, 2008), and emotional eating (Arnow et al., 1995; Leehr et al., 2015; Macht, 2008). As will be discussed below, this dissertation further contributed to understand the specific dimensions of negative affect influencing binge eating symptoms, providing important directions to address the following research questions.

What is the role of shame and body image in the vulnerability to binge eating symptoms and what processes influence these associations?

The findings in **Chapter 5** contributed to previous research by identifying body image shame as a distinctive form of negative affect that accounts for the severity of binge eating (**Study XI**). In a sample of women from the general population with normative weight ranges, we found that the specific emotion of body image shame was associated with binge eating symptoms, over and above the effect of overall negative affectivity. Moreover, the self-hated form of self-criticism appears to be an important mechanism through which this association is established. These results extend current models of binge eating that highlight negative affect as an important factor involved in the aetiology of binge eating (Leehr et al., 2015; Polivy & Herman, 1993; Spoor et al., 2006; E. Stice et al., 2001; Van Strien et al., 2005). Our findings also expanded insights from the IPT model of binge eating (Ansell et al., 2012; Wilfley et al., 2002), by clarifying the specific nature of interpersonal difficulties that underlie negative affectivity and binge eating symptomatology.

The role of early interpersonal experiences as potential susceptibilities for dysregulated eating behaviour and the psychological processes implicated in these associations were further investigated in the adult general population. Research outlined in **Chapter 5** focused the investigation on memories of being bullied or teased about body image in childhood and adolescence (regardless of actual body size or weight) and whether they might associate with

the severity of binge eating symptoms in adulthood. **Study XII** confirmed that these memories seem to impact binge eating symptoms and BMI via decreased psychological flexibility related to body image (Sandoz et al., 2013). These results suggest that a current negative sense of self rigidly connected to physical appearance may be rooted in these negative emotional memories of interpersonal experiences of social judgement, belittlement or rejection.

The current dissertation also considered whether these considerations can be extended to men. Results from **Study XIII** established that for men and women early negative interpersonal experiences related to body image may have an important influence on i) the construction of self-identity (Matos et al., 2015; Pinto-Gouveia & Matos, 2011), ii) later emotion regulation capabilities (Dinis et al., 2015; Pinto-Gouveia et al., 2013), and iii) binge eating symptomatology. Findings also showed important gender differences in these associations. For both sexes childhood and adolescent memories of being shamed about body image were associated with current body image shame. This is particularly important because it indicates that body image plays a significant role in self-evaluation and social sense of self-worth for both men and women (Adams et al., 2005; Calogero, 2009; Dakanalis, Clerici, et al., 2014; Dakanalis & Riva, 2013; Fitzsimmons-Craft et al., 2011; Grogan & Richards, 2002; McCabe & Ricciardelli, 2003; McCreary & Sasse, 2002). Notably, in women, early memories of body image-related experiences seem to be at the root of self-identity as being shameful and with a self-self relationship characterized by self-disgust, self-hatred and self-contempt. This self-hatred seems to fuel binge eating symptomatology. In men, only the inadequate-self dimension of self-criticism mediated these associations. This may be explained by the fact that women historically have been targets of the sociocultural messages that advocate the importance of displaying an attractive physical appearance for social acceptance (Buote et al., 2011; Fredrickson & Roberts, 1997; Fredrickson et al., 1998; Gilbert & Thompson, 2002; Noll & Fredrickson, 1998; Strahan et al., 2006). Historically, these messages have been less directed towards men. Nonetheless, our results suggest that early body image shame experiences may also influence the development of self-perceptions of inferiority, inadequacy and binge eating symptomatology later in life in men.

What is the role of shame and body image in the persistence of binge eating symptoms and what processes influence these associations?

Studies in **Chapter 6** examined the role of body image-related affective experiences, self-criticism and psychological processes related to psychological (in)flexibility in disordered eating symptoms in overweight/obese individuals and those with eating disorders.

Study XIV focused on overweight/obese women from the general population trying to manage their weight. Findings indicated that perceptions of inferiority, shame and self-criticism have a significant effect on increased negative affect related to one's body weight, shape and eating. This cluster of outcomes was associated with increased eating disinhibition and susceptibility to hunger and poorer weight loss in a weight management programme. Conversely, positive social comparisons and self-reassuring capabilities may facilitate the control of eating behaviour and weight.

Study XV focused on patients with clinically diagnosed eating disorders and provided novel evidence of the similarities between patients with BED and patients with BN and AN. Even though there are specificities in the phenomenological manifestation and clinical presentation of each of these clinical groups, the "core psychopathology" of eating disorders – the overvaluation of body weight, shape and their control as determinant of one's self-worth (Fairburn, 2008) – are common to AN, BN and BED. This suggests that this dimension should be considered in the assessment and treatment of BED patients (Ahrberg et al., 2011; Grilo et al., 2009; Grilo et al., 2015; Grilo et al., 2010; Lewer et al., 2016; Masheb & Grilo, 2000). Results indicated that this excessive focus on self-evaluation based on weight/shape is associated with negative social comparisons and self-criticism. These processes fuel a perception of the self as being shameful, inferior and flawed. Most importantly, this shame-focused self-identity seems to play a key role in the maintenance of the eating disorder.

Study XVI explored the origins of self-evaluations as being inferior, unattractive and in patients with BED. A semi-structured clinical interview assessed the nature and complexity of these patients' early shame-eliciting experiences and how they may become encoded as traumatic and self-defining memories (Matos & Pinto-Gouveia, 2010; Pinto-Gouveia et al., 2013). This study confirmed other research highlighting the role of early negative experiences on disordered eating in general (Copeland et al., 2015; Engström & Norring, 2002; Mamun, O'Callaghan, Williams, & Najman, 2013; Matos et al., 2015) and specifically on BED (Fairburn et al., 1998; Pike

et al., 2006; Striegel-Moore et al., 2002; Striegel-Moore et al., 2005). This study also found that negative experiences related to body image are the most frequently recalled shame experiences by patients with BED. Other common shame experiences reported by BED patients included generally being criticized, ridiculed or rejected by others, having negative characteristics exposed to others, and situations of sexual or emotional abuse. As in other studies with samples of patients with eating disorders (Ferreira, Matos, et al., 2014; Matos et al., 2015), peers were the social agents most frequently recalled as the ones who shamed the patient. This is consistent with the literature (Copeland et al., 2015; Cunha et al., 2012; Gilbert & Irons, 2009; Hawker & Boulton, 2000; Kaltiala-Heino et al., 2000) and the findings of **Chapter 4** which highlight the importance of peer group dynamics in the competition to be seen as socially attractive and avoid social rejection. This study further suggested that these experiences may become encoded as emotional memories of feelings unattractiveness and inferior (Matos et al., 2015; Matos, Pinto-Gouveia, & Duarte, 2013; Pinto-Gouveia & Matos, 2011). These emotional memories may become the basis for subsequent negative self-evaluation. According to some theoretical accounts, the rigidification of this sense of self, overly focused on and reinforced by distressing cognitions and emotions related to body image and potential social threats, may promote experiential avoidance and may come to dominate one's behaviours (Blackledge & Hayes, 2001; Hayes et al., 1999; Hayes et al., 2006; Luoma & Platt, 2015; Tirsch et al., 2014). **Study XVII** clarified that the process of being overly focused or fused with shame-based thoughts about body image and eating as though they were literal events (Gillanders et al., 2014) is a key process influencing the severity of binge eating symptomatology in patients with BED.

Together, these studies provided compelling evidence that binge eating is simultaneously the process and the outcome of experiential avoidance (Hayes, 2004; Hayes et al., 1999; Hayes et al., 2006; Juarascio et al., 2016). Binge eating appears to be a reactive avoidant way to momentarily suppress, avoid or escape unwanted body image-related internal negative events, shame-related emotional memories, negative shame-based self-evaluations and those of others, and related negative affectivity.

Do adaptive self-regulatory processes through self-reassurance and compassion offer protection against binge eating and promote well-being?

This research also contributed to the identification of potential mechanisms that may protect against binge eating symptomatology. A particularly important process seems to be

psychological flexibility (Ferreira et al., 2011; Hayes et al., 2006; Hayes et al., 2004; Sandoz et al., 2013; Tirch et al., 2014). **Study V** found that the capacity to fully contact with and accept ongoing experiences (including unwanted thoughts about body image) is associated with intuitive eating, i.e., the ability to being mindfully aware of physical signals of hunger and satiety to guide one's eating behaviour (Avalos & Tylka, 2006; Mathieu, 2009; Tylka & Kroon Van Diest, 2013). Results also indicated that women with a higher awareness and use of these internal body signals to manage food consumption, have a lower tendency to engage in binge eating when they experience higher negative affectivity. **Study VI** provided evidence that higher psychological flexibility protects against binge eating even in individuals with a high tendency to eat in response to negative emotions (i.e., emotional eating; Arnow et al., 1995).

In **Chapter 7**, evidence from Studies **XVIII** and **XIX** suggested that self-reassuring and self-compassionate capabilities provide a means of coping with negative body image and self-perceptions of inferiority. Adaptive emotion regulation through self-reassurance and self-compassion is associated with increased quality of life and well-being in women across a range of age and BMI spans.

These studies suggest that intervention approaches may be developed that support the development of acceptance, mindfulness, self-reassurance and compassionate skills as means to manage difficult thoughts and emotions, reactivity, negative affectivity and improve well-being.

A new conceptualization of binge eating

Taken as a whole, the studies of this thesis have led to the provisional development of a model of the self-evaluative and emotion regulation processes involved in binge eating. The model outlines the likely psychological processes involved in the vulnerability to and persistence of dysregulated eating behaviour in the continuum of binge eating symptomatology. This model is not exhaustive and excludes other potentially important social, genetic and physiological variables involved in appetite control that may account for the variance of binge eating. **Figure 9** represents this new proposed model.

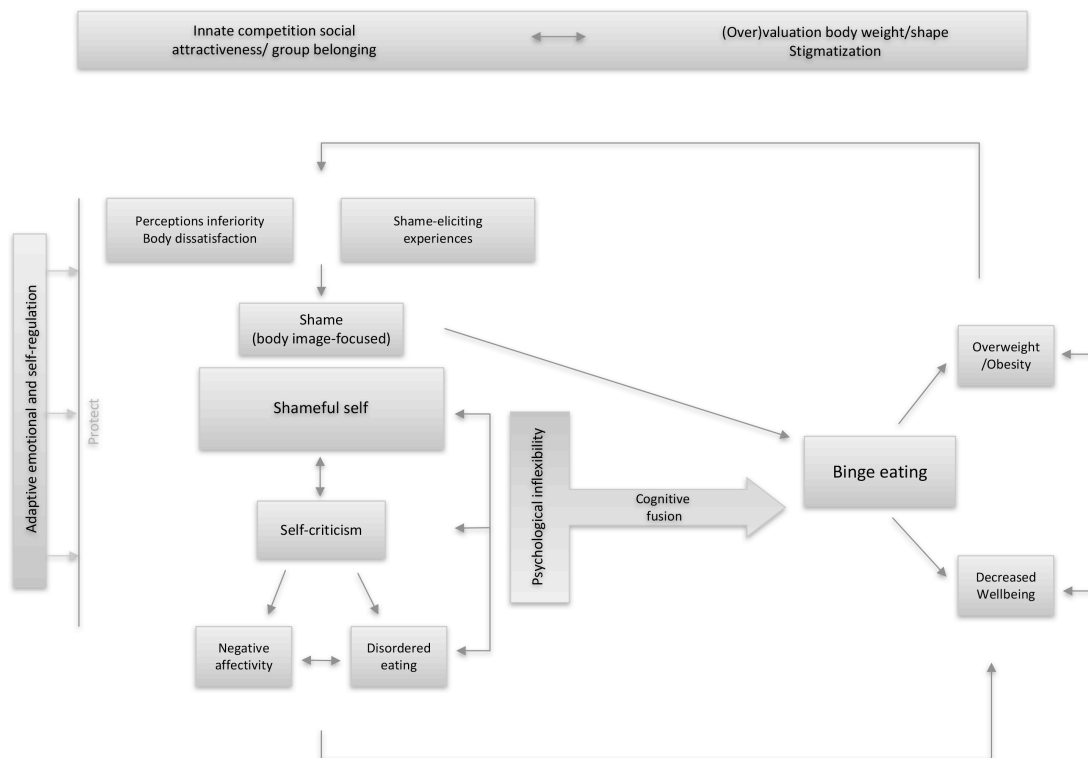


Figure 9 | Proposed conceptualization model of the psychological processes involved in the vulnerability and persistence of binge eating and associated problems.

Framing this model are humans' social concerns with social rank, the competition for social attractiveness and group belonging, and how these needs interact with the pressures of our current reality (Gilbert, 1989, 2007; Gilbert & McGuire, 1998; Goss & Gilbert, 2002; Stubbs et al., 2012). Humans are strongly motivated to be seen as attractive by others, to be valued and avoid stigmatization and rejection (Gilbert, 1997, 2002, 2003; Gilbert, 2007; Kurzban & Leary, 2001). The ability to stimulate positive feelings in others and to engage them to establish advantageous relationships are key to the development of safe models of the social world and promotes adaptive affect regulation through self-soothing and self-reassurance (Baumeister & Leary, 1995; Cacioppo et al., 2000; Gilbert, 1989; Richter et al., 2009). These needs operate within our current social and cultural context, which define what is valued and attractive and what is not. Our modern context dictates that a slender physical appearance is synonymous of social attractiveness (Buote et al., 2011; Cash & Pruzinsky, 2002; Dakanalis, Clerici, et al., 2014; Ferreira et al., 2013a; Gilbert, 2002; Pinto-Gouveia, Ferreira, et al., 2014). At the same time, we are living in a paradoxical reality where food is abundant but overconsumption and overweight/obesity are punished and stigmatized (Puhl & Brownell, 2001; Puhl & Heuer, 2009; Puhl & Heuer, 2010),

despite the innate human tendency to eat beyond need when energy is available (Power, 2012; Stubbs et al., 2012). These conflicting pressures may increase personal sensitivities to others' evaluations about the self.

In this context, physical appearance may become a barometer of one's social standing and of one's value as a social agent in comparison to others. As other contributions (Cunha et al., 2012; Eder, 1995; Gilbert & Irons, 2009) this model proposes that early adolescence is a critical period in which these interpersonal sensitivities and concerns with social attractiveness are particularly heightened. Thus, negative interpersonal experiences during this developmental period, including experiences of being criticized, rejected, discriminated against, demoted or even attacked, may activate the defensive emotion of shame (Gilbert, 2002, 2007). With the broadening of the social arena during this stage, shame-eliciting experiences with peers may be particularly harmful. Experiences of social threat can impact the sense of self and influence emotion regulation capabilities (Dinis et al., 2015; Pinto-Gouveia et al., 2013; Pinto-Gouveia & Matos, 2011). In this context, body image-related shame experiences appear particularly relevant and may trigger the internal shaming process of self-criticism (Gilbert, 2002, 2007; Gilbert & Irons, 2009). A more severe form of internal self-hatred may be activated as a means of self-monitoring in an attempt to diminish the threat of social rejection from others. These potential external and internal attacks may activate a threat-based submissive negative affectivity response (Gilbert, 2000a; Gilbert & Irons, 2005; Gilbert & Procter, 2006; Irons & Gilbert, 2005). Pathological attempts to rigidly control eating behaviour to try and control body shape to meet socially prescribed ideals may be a functional defensive response in face of these feared experiences (Gilbert & Thompson, 2002; Goss & Gilbert, 2002; Pinto-Gouveia, Ferreira, et al., 2014). Feelings of inferiority and shame can be encoded as emotional traumatic memories central to subsequent self-definition (Brewin, Reynolds, & Tata, 1999; Gilbert, 2010; Matos et al., 2015; Matos & Pinto-Gouveia, 2010; Pinto-Gouveia & Matos, 2011). When triggered, these conditioned emotional memories may further fuel the internalization of body image shame. The engagement in maladaptive attempts at self-regulation and defensive disordered eating symptoms may then be reactivated.

The model outlines that psychological inflexibility is a key mechanism implicated in binge eating. Individuals may become entangled in the content of these mental representations (that due to the symbolic functions of language may be endlessly evocable; Hayes, 2004; Torneke, 2010), and these representations may come to dominate eating behaviour, neglecting other sources of

behaviour regulation (i.e., internal cues of hunger or satiety; Tylka, 2006). That is, the individual becomes *fused* with the content of unwanted self-evaluative thoughts and emotions related to body image and eating behaviour. Under the aversive control of these internal experiences, the individual may then engage in attempts to momentarily avoid, escape, or diminish their intensity or frequency. Binge eating, ranging from losses of control over eating, to occasional compulsive overeating, to recurrent binge eating episodes (as in BED), could therefore be a maladaptive avoidance strategy. By allowing a short-term reduction in negative affect, this dysregulated eating behaviour may be negatively reinforced (Hayes et al., 1999; Kristeller & Wolever, 2010). Attempts to manage negative memories, thoughts and emotions potentially have the paradoxical effect of increasing their frequency and intensity (Blackledge & Hayes, 2001; Hayes et al., 1999; Hayes et al., 2006). The recurrence of these dysregulated eating behaviours may increase negative affectivity, negatively affect well-being and hinder effective weight management (Forman & Butryn, 2015; Lillis et al., 2011; Lillis & Kendra, 2014). In fact, finding oneself engaging in these disruptive behaviours that drive the individual further closer to an inferior shameful self, vulnerable to social criticism and stigmatization, may reactivate and reinforce shame, self-criticism and, paradoxically, binge eating as a resistant form of experiential avoidance. This may then further damage mental and physical health and well-being.

The model also highlights potential adaptive emotion regulation mechanisms that could protect against the development and maintenance of this cycle. Self-reassuring and compassionate abilities (Gilbert, 2010) may protect against the effect of negative experiences and disordered eating and improve psychological adjustment. The ability to be mindful and open to the present moment experience, understanding negative thoughts, self-evaluations, memories and distressing emotions as transient events that do not necessarily reflect reality nor require a behaviour in their response (Sandoz et al., 2013), may promote self-regulation of eating behaviour and buffer against the tendency to engage in avoidance-driven disordered eating behaviours. Cultivating the development of these adaptive mechanisms may then help prevent this cycle to be established or disrupt its maintenance.

How can the pathways involved in the cycle of shame and dysregulated eating behaviour be disrupted?

The identification of the psychological vulnerabilities and protective factors for binge eating guided the development of the brief intervention described in **Study XX** conducted in a

community-based sample of women with BED. Results of this study provided preliminary evidence that a brief, light touch intervention, focused on the development of present-moment awareness, acceptance and compassionate skills, can be effective in i) reducing binge eating symptomatology, self-criticism, negative affectivity and ii) increasing psychological flexibility and the ability to engage in compassionate actions.

Treatment and prevention implications

The findings of this dissertation have treatment and prevention implications. The model of binge eating symptomatology clarifies the role of emotion regulation processes in the pathways through which certain risk factors elevate the vulnerability to dysregulated eating behaviour and how these behaviours may be maintained. The model suggests for possible protective factors that may help alleviate risk and maintenance factors.

Our findings suggest that assessing and addressing body image may have therapeutic relevance for the aetiology and maintenance of binge eating. This supports a growing body of evidence that indicates that the dimension of body image has clinical relevance for BED and warrants consideration in the diagnostic features of this disorder (Grilo et al., 2009; Grilo et al., 2015; Grilo et al., 2010). The current findings indicate a feature common to BED, BN and AN which is the excessive focus on self-worth based on body shape, weight and the (in)ability to control them. BED differs from BN and AN in that patients with BED repeatedly fail to exert control over these aspects and do not engage in attempts to “erase” the effects of loss of control (i.e., through inappropriate compensatory behaviours). Further research is necessary to understand these differences in the behavioural manifestation of these disorders.

When addressing BED, clinicians should carefully assess the degree to which body image is associated with patients’ sense of self-worth and how negative self-evaluations and shaming thoughts are linked to this dimension. It may be particularly important for clinicians to adopt a deshaming approach to patients’ symptoms and: i) assess BED patients’ early negative interpersonal experiences and how they may be encoded as shame-eliciting memories; ii) evaluate the emotional impact of these experiences and how they may be associated with (body image) shame and negative affect; iii) conduct a functional analysis to understand how these negative self-evaluations and emotions may be associated with the maintenance or aggravation of binge eating symptomatology; iv) evaluate the existence of emotional memories of warmth

and safeness and develop abilities to self-reassure; v) assess potential fears or resistances in therapy, associated with the possible activation of shame feelings and how they may hinder therapy (e.g., compassion-based interventions; Gilbert, 2010; Gilbert, 2014; Gilbert & Choden, 2013).

This dissertation offers clinical directions for the treatment of binge eating. Cognitive-behavioural therapy paired with medication as an adjunctive therapy is currently the treatment of choice for BED (NICE, 2014; Yager et al., 2005; Yager et al., 2014). However, existing treatments limited in effectiveness (Brownley et al., 2016; Brownley et al., 2007; Vocks et al., 2010). Over the years there has been an increase in the development of mindfulness and acceptance-based treatments for BED (e.g., Kristeller & Hallett, 1999; Kristeller & Wolever, 2010; Kristeller, Wolever, & Sheets, 2014; Telch, Agras, & Linehan, 2001; Telch et al., 2000), which show some promise (e.g., Katterman, Kleinman, Hood, Nackers, & Corsica, 2014; Wanden-Berghe, Sanz-Valero, & Wanden-Berghe, 2010). The results of the current dissertation corroborate this promise and suggest there may be addition value in the further development of these approaches to BED treatment.

Some evidence suggests that mindfulness practices focused on increasing eating awareness enhance awareness of physical cues of hunger, fullness and satiety and decreases binge eating and associated symptomatology (e.g., depressive symptoms; Kristeller et al., 2014). Compassion focused approaches aimed at reducing shame and self-criticism have shown some benefits in the treatment of eating disorders, and BED in particular (Gale et al., 2014; Goss & Allan, 2010; Kelly & Carter, 2015). Recent studies also suggest that interventions aimed at promoting psychological flexibility through mindfulness, acceptance and values-based actions are potentially useful for BED treatment and possibly weight regulation (Hill et al., 2015; Juarascio et al., 2010; Juarascio et al., 2016; Lillis et al., 2009).

Recent theoretical and empirical contributions suggest that these are complementary approaches (Dahl, Plumb, Stewart, & Lundgren, 2009; Luoma & Platt, 2015; Neff & Tirch, 2013; Tirch et al., 2014) and that their integration may be useful for the treatment of BED (Pinto-Gouveia et al., 2016). The theoretical model proposed in this dissertation may help with such integrative approaches and inform new intervention strategies for those experiencing binge eating symptomatology. Developing the ability to mindfully observe one's self-evaluative thoughts and shaming memories (e.g., body-focused) and to willingly connect with one's suffering and negative emotions, without allowing them to dominate behaviour may provide

alternative venues for self soothe, rather than using food as a means of momentary escape. By developing compassionate awareness competencies the individual may notice the activation of shame-eliciting memories and negative self-evaluations and emotions, with self-kindness and self-validation, without their interference on behaviour (Luoma & Hayes, 2003). This may facilitate motivation and engagement in helpful actions, the cessation of unhelpful actions (Neff, Kirkpatrick, & Rude, 2007), and promote general well-being (Dahl et al., 2009; Gilbert, 2010; Gilbert, 2014; Gilbert & Choden, 2013; Hayes et al., 2012; Neff & Tirsch, 2013; Sandoz et al., 2010; Tirsch et al., 2014).

The current dissertation has prevention and treatment implications for weight management difficulties. The prevention of overweight and obesity is pressing issue in our modern society. Governments are calling for the general population to improve their eating behaviour, increase physical activity and to manage their own weight (DGS, 2005; HM Government, 2010; U.S. Department of Health and Human Services, 2010). However obesity prevention and management are extremely difficult in our obesogenic and stigmatizing environment (Puhl & Brownell, 2001; Puhl & Heuer, 2009; Puhl & Heuer, 2010; Stubbs & Lavin, 2013; Stubbs et al., 2012). Eating regulation and the ability to lose and sustain weight loss may be hampered by emotional aspects related to self-perceptions of inferiority and shame (**Study XIV**). There is evidence that weight management approaches that include behavioural strategies of self-regulation and motivation show some efficacy on weight loss (Dombrowski, Knittle, Avenell, Araujo-Soares, & Sniehotta, 2014; Dombrowski, Avenell, & Sniehott, 2010; Maes & Karoly, 2005; Sniehotta, Scholz, & Schwarzer, 2005; Sniehotta, Schwarzer, Scholz, & Schüz, 2005; Stubbs et al., 2011; Teixeira, Mata, Williams, Gorin, & Lemieux, 2012; Teixeira, Silva, Mata, Palmeira, & Markland, 2012). However, sustaining of behaviour changes needed to maintain weight loss in the longer term remains a key challenge (Franz et al., 2007). The development of interventions that address behavioural change techniques and target emotion regulation pathways associated with overeating and weight relapse may improve longer term outcomes. Findings of the studies in this dissertation suggest that shame and self-criticism do play a role in control/loss of control of eating behaviours in some overweight and obese individuals. Body image shame and severe self-criticism may disrupt some individuals' ability to manage weight. Supportive interventions that target the development of alternative effective emotion regulation through the practice and development of mindfulness skills, self-compassion and acceptance may have a beneficial impact

on self-regulation of eating behaviour and improve the effectiveness of weight loss and weight maintenance approaches (Forman & Butryn, 2015; Gale et al., 2014; Gilbert et al., 2014; Lillis et al., 2009; Lillis & Kendra, 2014; Pinto-Gouveia et al., 2016).

This thesis also highlights the need to develop preventive interventions for body image shame and disordered eating behaviours in adolescence. It is perhaps important to consider the role that perceptions of inferiority, shame and self-criticism play in adolescents' psychological adjustment and on their body image and eating behaviour. This dissertation suggests that adolescence is a critical period where negative self-identity and a problematic relationship with body image and eating behaviour may become established. Prevention programmes that address these aspects could be developed and implemented in educational settings. Adolescents spend a considerable amount of time at school, which is often the scenario where shame-eliciting experiences with peers occur. Therefore, education and mental health professionals working with adolescents should be aware of the potentially enduring effect of these experiences on self-identity and on the development of defensive body image and eating-related symptoms.

Preventive programmes that incorporate strategies aimed at improving the awareness and sensitiveness to one's and others' difficulties (including bullying experiences), paired with the motivation to prevent or alleviate them (Gilbert, 2005; Gilbert & Choden, 2013), may be particularly important to promote safe, deshaming school environments, prevent negative peer interactions and promote adolescents' psychosocial adjustment. Targeted and individual interventions should carefully assess the quality of the adolescent social network and interactions and the occurrence and subjective impact of peer victimization experiences. Body image difficulties and associated shame and self-criticism and their influence on self-identity should also be the target of a detailed assessment. Even though the studies we conducted in adolescent samples were restricted to female samples, **Study XIII** and other research (Adams et al., 2005; Dakanalis & Riva, 2013; Grogan & Richards, 2002; McCabe & Ricciardelli, 2003; McCreary & Sasse, 2002), suggest the importance of also considering the role that body image plays in young boys' sense of self and psychological and behavioural adjustment. Therefore, future preventive and treatment development efforts should be extended to male adolescents and young adults. Our results suggest that preventive and intervention programmes should focus on the development of strategies to manage interpersonal difficulties and on the

development of positive emotion regulation through the cultivations of inner compassion and psychological flexibility (Tirch et al., 2014).

Limitations and future research recommendations

There were important methodological limitations in the studies of the current thesis, which were detailed in each individual study. This section outlines the main limitations of the current thesis and points out to directions for future inquiry.

Research on body image and eating-related problems, binge eating and obesity has been biased towards female samples, given that historically this population is more vulnerable. However, concerns with body image, self-presentation and disordered eating is rising in men and this population should not be neglected when addressing the factors and processes contributing to these difficulties (Dakanalis & Riva, 2013). Future studies should investigate whether the results found for female participants are replicable in male participants and explore potential gender and sexual orientation-related effects.

The studies that were correlational and cross-sectional preclude conclusions about causality or directionality of the examined associations, as other alternative conclusions can be drawn based on the same data. Nonetheless, each individual study aimed at testing whether the hypothesized associations between the study variables were consistent with a specific theoretical framework previously supported by empirical evidence. To do so, each study was conducted in targeted samples with characteristics relevant to the hypothesis under scrutiny using robust statistical procedures (e.g., path analysis). Cross-sectional data does not invalidate this specific approach to the organization of empirical data into a consistent body of knowledge (e.g., Hayes, 2013; Mueller & Hancock, 2008). Future research using longitudinal and experimental designs is needed to corroborate the associations found in the current set of studies.

The longitudinal study conducted in a sample of adolescent girls provided compelling evidence on the interaction between victimization experiences with peers, shame feelings and body image and eating-related problems over time. These findings corroborated cross-sectional findings and offered important suggestions for prevention initiatives in this population. While this study focused on a critical time period for the development of body image and eating difficulties (early

to late adolescence), the duration of the study was necessarily limited to the timeframe of the current research project. It would be important to extend the examination of this population for longer periods of time and to test whether over time these shame-eliciting experiences predict the onset of binge eating problems in late adolescence and early adulthood.

Another limitation was the use of retrospective data and/or data based on self-report measures. This raises concerns about the accuracy and reliability of the reported data, which may be influenced by current emotional states and social desirability biases. There is evidence supporting the stability, reliability and accuracy of retrospective data (Brewin, Andrews, & Gotlib, 1993). Also the current studies focused primarily on the emotional and self-defining meaning of the experiences recalled rather on the experiences themselves. The studies conducted in this dissertation that used semi-structured clinical interviews to assess eating psychopathology and the recollection of shame-eliciting experiences corroborated the results of the studies based on self-report data. Nonetheless, it is important that future studies address these issues by using other sources of information (e.g., other informants, such as peers, family members) and structured methodologies to assess the shame-eliciting quality of interpersonal experiences (e.g., through the systematic use of semi-structured interviews such as the SEI; Matos & Pinto-Gouveia, 2014).

Future studies could extend the current investigation of the association between negative evaluative thoughts and emotions and disordered eating symptoms, using other forms of data collection that reduce report biases. For instance, the assessment of thoughts, emotions and behaviours in “real time” and in the individual natural environment (e.g., through ecological momentary assessment methods; Shiffman, Stone, & Hufford, 2008) would contribute to further test the adequacy of the model proposed in the current dissertation. Moreover, it is important that future studies implement methodologies that allow for a more direct and implicit measure of the cognitive and motivational processes underlying binge eating tendency. For instance, emergent research using eye tracking methodology have been providing enticing evidence on the processes underlying eating behaviour in overweight and obese individuals (Castellanos et al., 2009; Doolan, Breslin, Hanna, Murphy, & Gallagher, 2014; Nijs, Muris, Euser, & Franken, 2010) and also in patients with BED (Schag et al., 2013).

The model proposed in this dissertation is provisional and by no means exhaustive. It does not include other important social variables (e.g., race, sociocultural context), psychological mechanisms (e.g., impulsivity, perfectionism) and physiological systems underlying the control of appetite and food intake (Finlayson, King, & Blundell, 2007; Finlayson, King, & Blundell, 2008; Mathes, Brownley, Mo, & Bulik, 2009; Stubbs et al., 2011). This set of studies accounts for a specific framework that understands binge eating symptomatology as the result and expression of threat-based emotional processes and emotion regulation difficulties. In this sense, it excludes the role that other processes and mechanisms may play in binge eating. For instance, there is evidence that positive affect and reward per se may also be a trigger of food (over)consumption in binge eating (e.g., Bongers, Jansen, Havermans, Roefs, & Nederkoorn, 2013; Dingemans, Martijn, van Furth, & Jansen, 2009). Future research should extend the current model by analysing the effect of positive emotions and reward in binge eating symptomatology and how they interact with the variables analysed in the current dissertation. Other mechanisms associated with homeostasis mechanisms and with the hedonic and reward-related response to food have been found to play a determinant role on the continuum of binge eating symptomatology (Berthoud & Morrison, 2008; Dalton & Finlayson, 2014; Finlayson et al., 2007). Future research could extend the model proposed in the current dissertation considering the role of these mechanisms.

A potential avenue for future research is to experimentally examine whether the activation of the negative self-evaluative and emotional dimensions found in the current dissertation to be associated with dysregulated eating behaviour, actually trigger the tendency to attend to food cues as a restorative or as an avoidance mechanism. Also, studies should explore the neurophysiological (e.g., heart rate variability) and the cognitive and motivational processing variables implicated in these associations. A relevant area of further inquiry is also to examine whether, how and in which individuals, these emotional dimensions interact and potentially override the prewired physiological mechanisms of appetite control (Power, 2012; Stubbs & Tolkamp, 2006).

Evidence from the pilot treatment reported in **Study XX** suggested the potential benefits of helping individuals with binge eating problems develop mindfulness, self-compassion and acceptance abilities through low intensity interventions. Nonetheless, it is important that future research seek to replicate the current results in larger samples and to investigate the processes

underlying intervention effectiveness to improve the development of these intervention approaches. Moreover, it is pertinent that future studies examine whether these interventions are equally effective in improving regulation of eating behaviour, body image difficulties and overall well-being in individuals facing weight and eating regulation problems; or whether they are more beneficial to some individuals with significant levels of shame, self-criticism, and a more rigid sense of being a shameful self.

Synthesis of the contributions this research

The set of studies that comprised the current dissertation contribute to knowledge of the processes involved in the vulnerability and maintenance of the continuum of disordered eating symptoms and binge eating symptomatology, and provided important directions for the development and improvement of preventive and treatment initiatives for this public health concern. The current dissertation indicated that:

- i) Binge eating symptomatology (i.e., the range of emotions, cognitions and eating behaviours associated with binge eating) is prevalent in the general population, with different weight ranges, in a continuum of different degrees of severity. BED is at the end of this spectrum.
- ii) Self-perceptions of inferiority and early negative interpersonal experiences, including bullying, body image-related victimization can be shame-eliciting experiences and are associated with disordered eating symptoms in adolescent girls, both cross-sectionally and longitudinally.
- iii) Shame focused on body image seems to be a consequence of these negative interpersonal experiences and may have a specific effect on binge eating symptomatology, above the effect of overall negative affectivity. Moreover, a severe form of self-criticism, characterized by self-hatred, self-contempt and desires to persecute and harm the self may be a specific mechanism through which body image-related shame influences binge eating symptomatology.
- iv) Among men, memories of early negative shame experiences are also associated with later binge eating symptomatology. But in men it is the inadequate-self form of self-criticism that seems to be the key mediating mechanism.

- v) In overweight/obese women perceptions of inferiority, shame and self-criticism may predispose to poor self-regulation of eating behaviour and is associated with less weight change.
- vi) These self-perceptions and experiences seem to contribute to increased psychological inflexibility, characterized by the rigid adherence to dietary rules despite internal or contextual cues, and by the non-acceptance and judgement of thoughts, emotions, perceptions and sensations related to body image.
- vii) A particular process implicated in psychological inflexibility is cognitive fusion. Findings suggest that cognitive fusion with disturbing self-evaluations and negative emotions associated with the body image dimension and the excessive focus on negative memories about body image predicts the severity of binge eating symptomatology in women with BED.
- viii) Patients with BED, BN and AN present distinctive symptoms, but have similar levels of shame, perceptions of inferiority, self-criticism and overvaluation of body weight and shape. This "core" of eating psychopathology seems to be associated with maladaptive processes of self-monitoring and self-correction – social comparison and self-criticism – which, in turn, further predict shame feelings.
- ix) Binge eating may be the result and a form of experiential avoidance, i.e., a means of momentarily escape, diminish or avoid negative self-perceptions of inferiority, shame and self-criticism.
- x) Self-perceptions of inferiority and self-criticism also seem to play a significant role in quality of life and well-being in women with distinct age and weight ranges.
- xi) Abilities to be self-reassuring and self-compassionate, as well as the capacity to accept the present moment experience, and relate to difficult thoughts, memories, emotions as transient subjective experiences, are potential adaptive mechanisms that may promote adaptive eating behaviour, counteract the effect of shame and self-criticism, reduce disordered eating symptomatology and improve psychological well-being.
- xii) Preventive and treatment approaches should address the role of shame and self-criticism and target emotion regulation through the cultivation of self-reassurance

and acceptance skills to enhance self-regulation of eating behaviours and improve the effectiveness of weight management and binge eating treatment approaches.

The findings of the current thesis contribute for understanding the processes involved in the aetiology and persistence of the spectrum of dysregulated eating behaviour, binge eating and associated weight and psychological problems. Hopefully, these advances will stimulate further research and facilitate the development of prevention and treatment approaches for these complex problems.

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