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**Psychosocial Adjustment in Pediatric Obesity: The
Role of Body Image Dissatisfaction**

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Dissertação de Mestrado em Psicologia Clínica e da Saúde,
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Psychosocial Adjustment in Pediatric Obesity: The role of Body Image Dissatisfaction

O estudo do ajustamento psicossocial de crianças e adolescentes com obesidade tem mostrado que estes apresentam piores níveis de qualidade de vida e mais problemas psicopatológicos que crianças e adolescentes de peso normal. A insatisfação com a imagem corporal é um conceito que tem vindo a ganhar importância no estudo da obesidade pediátrica, no entanto, até ao momento, não é conhecido o seu papel no ajustamento psicossocial destas crianças. Deste modo, o presente estudo pretende comparar o ajustamento psicossocial (avaliado através da qualidade de vida, dos problemas internalizantes e dos problemas externalizantes) e a insatisfação com a imagem corporal de crianças e adolescentes com peso normal e com obesidade. Para além disso, pretende analisar se a relação entre o peso e o ajustamento psicossocial é mediada pela insatisfação com a imagem corporal e se a idade das crianças e adolescentes modera esta relação. A amostra foi constituída por 128 crianças e adolescentes com peso normal e 132 crianças e adolescentes com obesidade, com idades compreendidas entre os 8 e os 18 anos. Todos os participantes preencheram instrumentos de auto-resposta que avaliam a qualidade de vida (KIDSCREEN-10), os problemas internalizantes e externalizantes (Strengths and Difficulties Questionnaire) e a insatisfação com a imagem corporal (Collins Body Image scale).

Os resultados encontrados indicaram que as crianças e adolescentes com obesidade têm pior qualidade de vida, mais problemas internalizantes e externalizantes, e maior insatisfação com a imagem corporal, do que crianças e adolescentes de peso normal. Para além disso, os resultados evidenciaram que a insatisfação com a imagem corporal mediava a relação entre o peso e a qualidade de vida mas apenas para adolescentes a partir dos 15 anos. O mesmo efeito não foi encontrado para a relação entre o peso e os problemas internalizantes e externalizantes, sendo esta uma relação directa e independente da idade da criança/adolescente. No geral, os resultados demonstraram que estas crianças e adolescentes parecem estar em maior risco de apresentar dificuldades psicológicas e pior qualidade de vida. Desta forma, importantes implicações clínicas advêm destes resultados, na medida em que a satisfação com a imagem corporal se assemelha um importante mecanismo explicativo da relação entre o peso e a qualidade de vida,

tornando-se desta forma um alvo de intervenção relevante, especialmente nos adolescentes. Para além disso, deve ser valorizada a prevenção e a intervenção psicológica precoce no contexto de equipas multidisciplinares capazes de detectar e intervir eficazmente nos problemas psicossociais das crianças e adolescentes obesas.

Palavras-chave: Obesidade; qualidade de vida; problemas internalizantes; problemas externalizantes; insatisfação com a imagem corporal; crianças; adolescentes.

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Lista de Abreviaturas

QDV	Qualidade de Vida
IIC	Insatisfação com a imagem corporal
QOL	Quality of Life
BID	Body Image Dissatisfaction
WHO	World Health Organization
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
SDQ	Strengths and Difficulties Questionnaire
IV	Independent Variable
DV	Dependent Variable
M	Mediator
BCa CIs	Bias-corrected and accelerated Confidence Intervals

Introdução

Uma das condições crónicas de saúde em idade pediátrica de elevada e crescente prevalência em Portugal é a obesidade. Sendo já considerado um problema de saúde pública, este compromete não só a saúde física e psicológica (Riazi, Shakoor, Dundas, Eiser & McKenzie, 2010; Vivier & Tompkins, 2008; Wille et al., 2010; Zeller & Modi, 2008), como a qualidade de vida (QDV) destas crianças e adolescentes (Jelalian & Hart, 2009; Jensen & Steele, 2012; Pinhas-Hamiel et al., 2006; Riazi et al., 2010). Um possível fator envolvido na relação entre o peso e o ajustamento psicossocial é a insatisfação com a imagem corporal (IIC). Ainda que a sua relação com a adaptação psicossocial das crianças e adolescentes com obesidade tenha sido, até ao momento, escassamente investigada, vários estudos mostram que os jovens com obesidade apresentam uma maior insatisfação do que os jovens com peso normal (Neumark-Sztainer, 2011), dada a forte pressão social para apresentar uma imagem corporal magra ou musculada. Assim, a existência de um forte estigma social relacionado com a obesidade (Puhl & Latner, 2007; Latner & Stunkard, 2003) e a consequente insatisfação com o corpo, sublinham a necessidade de se compreender de que forma a (in)satisfação da criança/adolescente obesa(o) com a sua imagem corporal influencia o seu ajustamento psicossocial.

Muitos estudos têm demonstrado que o ajustamento psicossocial destas crianças e adolescentes está fortemente comprometido. De facto, estas crianças são muitas vezes vítimas de estigmatização pelos pares e de preconceitos relacionados com o peso mantidos pela sociedade actual que conduzem, frequentemente, à sua exclusão social (Jelalian & Hart, 2009; Latner & Stunkard, 2003). No geral, todos estes aspectos comprometem não só a QDV, como favorecem o aumento de problemas psicológicos (internalizantes e externalizantes), e potenciam a IIC destas crianças e adolescentes. No entanto, nem sempre isto acontece, sendo essencial conhecer os mecanismos e potenciais mediadores que permitem identificar importantes alvos de intervenção psicológica.

Até ao momento, escassa é a compreensão do modo como estas variáveis estão relacionadas e de como se apresentam ao longo de diferentes fases do desenvolvimento. Neste sentido surge a pertinência deste estudo

que, de modo inovador, pretende analisar estas relações adoptando uma perspectiva desenvolvimental ao analisar crianças e adolescentes separadamente, e assim considerar os diferentes desafios que acompanham as duas fases de desenvolvimento. Mais concretamente, pretende-se que o presente estudo contribua para o aumento do conhecimento sobre a adaptação psicossocial (QDV, problemas internalizantes e problemas externalizantes) e a IIC de crianças e adolescentes com obesidade, bem como para o esclarecimento da forma como a IIC pode funcionar como um potencial mecanismo explicativo da relação entre o peso e a adaptação psicossocial destes jovens.

A presente dissertação apresenta-se no formato de artigo científico, tal como será submetido para um periódico internacional com arbitragem científica.

Abstract

Objectives: This study aims to compare levels of psychosocial adjustment (QOL, internalizing and externalizing problems) and body image dissatisfaction (BID) of normal-weight and obese children and adolescents. Moreover, it intends to explore whether the indirect effect of weight status on psychosocial adjustment, through BID, is moderated by children's age. **Methods:** The sample comprised 260 children and adolescents aged 8-18 years with normal-weight ($n=128$) and obesity ($n=132$). All participants completed self-report instruments including the KIDSCREEN-10, Strengths and Difficulties Questionnaire, and Collins Body Image scale. **Results:** Obese children and adolescents reported poorer QOL, more internalizing/externalizing problems, and higher rates of BID, comparing to normal-weight counterparts. BID mediated the relationship between weight status and QOL, but only for adolescents above 15-years-old. The relationship between weight status and internalizing/externalizing problems was direct and independent of the children's age. **Conclusions:** Pediatric obesity impacts on the psychosocial adjustment and on the satisfaction with body image of these youth. BID proved to be an important mechanism linking weight status and QOL among adolescents, which highlights the relevance of targeting body image concerns in psychological interventions. The increased risk of psychosocial maladjustment underlines the need of preventative and early interventions.

Key-words: Obesity; quality of life; internalizing problems; externalizing problems; body image dissatisfaction; child; adolescent.

Introduction

Obesity is a major public health problem among children and adolescents, worldwide and in Portugal (World Health Organization [WHO], 2012). The prevalence of pediatric obesity has increased tremendously over the past two decades (Steele, Nelson & Jelalian, 2008), with current estimates indicating that 20% and 23% of 11-years-old Portuguese girls and boys, respectively, are obese (WHO, 2012).

This high and increasing prevalence is concerning because pediatric obesity is associated with several negative consequences for the children's physical health (e.g., heart disease, diabetes, breathing difficulty, orthopedic complications, Vivier & Tompkins, 2008), and psychosocial adjustment (Riazi, Shakoor, Dundas, Eiser & McKenzie, 2010; Wille et al., 2010; Zeller & Modi, 2008). Poorer psychosocial outcomes may be related with a series of challenges and difficulties these children may face. For instance, obese children report higher rates of stigmatization and victimization and higher levels of intolerance and prejudice from others, even from their educators and parents, than their normal-weight peers (Latner & Stunkard, 2003). Moreover, they frequently face social exclusion, being less likely than normal-weight peers to be nominated as friends (Jelalian & Hart, 2009; Wardle & Cooke, 2005). Therefore, it is not surprising that the psychosocial adjustment of these children is frequently compromised, particularly their quality of life (QOL) (Jelalian & Hart, 2009; Jensen & Steele, 2012; Pinhas-Hamiel et al., 2006; Riazi et al., 2010; Swallen, Reither, Haas & Meier, 2005) and psychological functioning (Puder & Munsch, 2010; Storch et al., 2007; Vivier & Tompkins, 2008; Zeller & Modi, 2008).

Based on the WHO's definition of health, QOL has been conceptualized as a multidimensional and subjective construct that reflects an individual's subjective assessment of several domains of his or her life, such as physical, social, and psychological functioning (Eiser & Morse, 2001; WHO, 1993). Several studies have documented a strong and consistent relationship between pediatric obesity and decreased QOL across several domains (Jelalian & Hart, 2009; Riazi et al., 2010; Wille et al., 2010; Zeller & Modi, 2008), except for academic functioning, which appears to be relatively unaffected (Tsiros et al., 2009; Williams, Wake, Hesketh, Maher, & Waters, 2005). When compared with normal-weight children, those with

obesity tend to report a significantly worse QOL (Zeller, Roehrig, Modi, Daniels & Inge, 2006). Some studies have even found that the QOL of treatment-seeking obese youth was similar to that of children with cancer (Schwimmer, Burwinkle, & Varni, 2003) or lower to that of children with other chronic conditions such as asthma and diabetes (Moreira et al., 2013). The negative impact of obesity seems to be evident at an early stage of the development, with studies demonstrating that the QOL of overweight preschooler children may be already compromised (Kuhl, Rausch, Varni, & Stark, 2012; Tsiros et al., 2009).

The literature has been more inconsistent with regard to the psychological functioning of obese children, both in terms of externalizing (e.g. impulsivity, conduct problems, attention-deficit hyperactivity disorder) and internalizing problems (e.g. depression, anxiety, social withdrawal) (Puder & Munsch, 2010). Nevertheless, numerous studies have reported higher levels of overall psychopathology in youths with severe obesity and in weight-management programs, when compared to normal-weight peers (Braet, Mervielde, & Vandereycken, 1997; Britz et al., 2000; Moreira et al., 2013; Zeller et al., 2006; Zeller, Saelens, Roehrig, Kirk, & Daniels, 2004) or with children with other chronic conditions, such as diabetes (Moreira et al., 2013; Vila et al., 2004) or asthma (Moreira et al., 2013). However, there seems to be no differences between non-treatment seeking obese children and their normal-weight counterparts (Britz et al., 2000; Drukker, Wojciechowski, Feron, Mengelers, & Os, 2009; Lamertz, Jacobi, Yassouridis, Arnold, & Henkel, 2002), which suggest the existence of a treatment-seeking status (Braet et al., 1997).

The large majority of studies have focused on the depressive and internalizing symptomatology of obese youth (Jelalian & Hart, 2009; Zeller & Modi, 2008). In general, these children exhibit subclinical or average depressive or internalizing symptoms, and only a small subset report clinical significant symptoms or meet diagnostic criteria for a depressive disorder (Zeller & Modi, 2008). For instance, Zeller and Modi (2006) found a low prevalence of depressive symptoms (11%) in a clinical sample of obese youth, although in a sample of extremely obese adolescents referred for bariatric surgery the prevalence of depressive symptomatology was a little higher (Zeller et al., 2006).

Far less attention has been devoted to the externalizing problems. Studies in both treatment seeking and non-treatment seeking obese youths suggest the occurrence of externalizing behavior problems, although in a low rate. For instance, Lawlor et al. (2005) found a linear relationship between behavioral problems and increasing body mass index (BMI), but only for 14-years-old overweight girls. In addition, these adolescents exhibited significantly more behavioral problems than overweight boys and normal-weight peers. Other studies reported the occurrence of externalizing problems, particularly oppositional defiant disorder, in chronically obese children (Mustillo et al., 2003), or more peer problems and less prosocial behavior in obese and overweight adolescents from a community sample, comparing to normal-weight peers (Drukker et al., 2009).

Despite the increasing number of studies on the psychosocial adjustment of obese children, little is known about the factors that may account for its relationship with weight status (Allen, Byrne, Blair, & Davis, 2006; Shin & Shin, 2008; Tsiros et al., 2009). Empirical findings suggest that obese youths are not systematically at higher risk of psychological distress, and that their adjustment may depend on potential mediators such as body image (dis)satisfaction (Jelalian & Hart, 2009). It is therefore essential to investigate these mechanisms, which will allow the identification of relevant targets for intervention (Tsiros et al., 2009). The present study explores the relationship between weight status and children's psychosocial adjustment (QOL, internalizing and externalizing problems) and the mediating role of body image dissatisfaction (BID) on this association, in a sample of treatment-seeking obese youth.

Several studies have found that obese youth are at an increased risk of BID than their normal-weight peers (Jelalian & Hart, 2009; Loth, Mond, Wall, & Neumark-Sztainer, 2011; Neumark-Sztainer, 2011; Shin & Shin, 2008). Moreover, a recent meta-analysis, comparing body image of young people with and without different chronic diseases, demonstrated that obese children and adolescents have significantly higher rates of BID than those with other chronic conditions, except cystic fibrosis and inflammatory bowel disease (Pinquart, 2013). It has been argued that the higher prevalence of body image concerns among obese children may be related to the strong social pressure to be thin (for girls) and to be muscular (for boys) (Neumark-

Sztainer, 2011), and to the social stigma these children frequently face (Latner & Stunkard, 2003; Puhl & Latner, 2007; Strauss & Pollack, 2003). BID may also result from negative parental opinions about children's body weight or from weight-related teasing by peers, which may occur at an early age, contributing to the development of a "thinness schema" (Lawlor et al., 2005; Shin & Shin, 2008).

Although it has been suggested that higher levels of BID are associated with social anxiety, avoidance of social situations, low self-esteem (Pinquart, 2013; Smolak & Thompson, 2009), anxiety, depression (Kostanski & Gullone, 1998), more internalizing problems and negative affect (Gilliland et al., 2007) in normal-weight children and adolescents, much less is known about the links between BID and psychosocial adjustment of obese children. Shin and Shin (2008) found that higher levels of BID in obese children mediated the association between weight status and self-esteem, concluding that children become more vulnerable to psychological problems as they become more dissatisfied with their body image. Research has also suggested that obese adolescents with elevated weight and shape concerns are more likely to report depressive and anxious symptoms, stress, and poor QOL, than those who did not reported these concerns above the normative levels (Doyle, Le Grange, Goldschmidt, & Wilfley, 2007). Similarly, Allen et al. (2006) found that weight and shape concerns mediated the relationships between BMI and self-esteem, body dissatisfaction and depression of obese youths. BID may have implications not only for the psychosocial adjustment of obese children but also for their self-care behaviors (Pinquart, 2013). Some studies provided evidence about the association between higher levels of BID and less healthy weight-management behaviors, such as binge eating or extreme dieting (Neumark-Stainer, 2011).

The current study intends to explore the associations between weight status, BID and psychosocial adjustment of treatment-seeking obese children (between the ages of 8 and 12) and adolescents (between the ages of 13 and 18). Specifically, the first goal of the present study was to compare the levels of self-reported QOL, internalizing and externalizing problems, and BID among obese children and adolescents and their normal-weight peers. We hypothesized that obese children and adolescents would have lower QOL,

more internalizing and externalizing problems, and higher BID comparing to normal-weight peers. The second goal was to examine the potential role of BID as a mediator of the associations between the weight group and three indicators of children's psychosocial adjustment (QOL, externalizing and internalizing problems), and whether the proposed mediation model was moderated by the child's age. We expected that being obese would be associated with a higher BID, which, in turn, would be associated with a worse QOL and more internalizing and externalizing problems.

Methods

Participants

A total sample of 260 children and adolescents between the ages of 8 and 18 were recruited. Of these, 128 were normal-weight (BMI 5-84th percentile) and 132 were classified as obese (BMI \geq 95th percentile), according to the Centers for Disease Control and Prevention growth curves ([CDC], Kuczmarski et al., 2002). Children and adolescents were included if they met the following criteria: (1) age between 8 and 18 years; (2) ability to provide written informed consent when aged at or above 14 years, or available informed consent from parents of younger children; (3) verbal assent to participation from children under 14 years old; (4) ability to understand and answer the questionnaires; (5) no serious mental illness or developmental delay; (6) absence of genetic syndromes for which obesity is a comorbidity; (7) normal-weight children should not have any chronic health condition.

The children's demographic characteristics are present in the Table 1.

Procedure

Children and adolescents with obesity were recruited through the Nutrition outpatient services of two public and urban Pediatric Hospitals in the central region of Portugal, between May 2012 and April 2013. The Ethics Committee and the Direction Boards of both hospitals approved the study. After the medical consultation, a research assistant explained the study to children/adolescents and/or their parents and requested the children's participation.

Table 1

Demographic, Weight and Clinical Characteristics of Children and Adolescents (N = 260)

	Normal-weight <i>n</i> = 128	Obesity <i>n</i> = 132	<i>F/p</i> / <i>X</i> ² / <i>p</i>
Age (years) <i>M(SD)</i> ; range	12.07 (3.29); 8-18	12.92 (2.68); 8-18	5.19/.02
Age group (<i>n</i> /%)			
Children (8-12 years)	69 (53.90)	62 (47.00)	1.25/.26
Adolescents (13-18 years)	59 (46.10)	70 (53.00)	
Gender (<i>n</i> /%)			
Male	51 (39.80)	63 (47.70)	1.64/.20
Female	77 (60.20)	69 (52.30)	
BMI <i>M(SD)</i> ; range	18.25 (2.56); 12.24-24.46	29.47 (4.10) 21.03-40.56	684.90/.00
Comorbid Chronic Conditions (<i>n</i> /%)			
Yes	0 (0)	30 (22.7)	32.89/.00
Asthma/Breathing problems	-	19 (14.4)	
Heart disease	-	6 (4.5)	
Epilepsy	-	2 (1.5)	
Diabetes	-	2 (1.5)	
Others	-	1 (0.8)	
No	128 (100)	102 (77.3)	

Note. Differences between groups on age and BMI were computed with univariate analyses of variance; differences between groups on age group, gender and comorbid chronic condition were computed with qui-squared tests.

After providing consent, participants completed the self-reported questionnaires in a consultation office provided for this purpose and the research assistant was available to assist them whenever necessary. If children could not complete the questionnaires at the hospital (e.g., did not have time), they were given a package with the questionnaires and a pre-addressed and stamped envelope to complete the assessment battery at home and return them later by mail. Two weeks later, a phone call or a written message were sent to remember participants to return the questionnaires.

A community sample of children and adolescents were collected through three Portuguese public schools. Only those with normal-weight were retained; children and adolescents with overweight and obesity (*n* = 27) were excluded from the study. After the Direction Boards had authorized the study, teachers from several classes were contacted by the study researchers, instructed about the study and asked to serve as intermediaries between the researchers and the children and their families. The teachers gave parents of

children under 14 years old or adolescents at or above 14 years old a letter explaining the study and the informed consent form. Those who agreed to participate in the study returned the informed consent form and received packets with questionnaires to complete at home and return a week later.

Measures

Generic QOL.

The Portuguese self-report version of the KIDSCREEN-10 index (Gaspar & Matos, 2008; Ravens-Sieberer et al., 2010) was used to assess the generic QOL in children and adolescents with and without chronic conditions. This instrument contains 10 items, answered on a 5-point Likert response scale that ranges from 1 (*never; not at all*) to 5 (*always; extremely*), with higher scores indicating better QOL. Each item covers a different QOL domain: physical activity, depressive mood and stressful feelings, participation in social activities, quality of parents-child/adolescent relationship, quality of relationships with other children/adolescents, school performance and perception of his/her cognitive capacity. In the present sample, the Cronbach's alphas were .77 (normal-weight) and .65 (obesity).

Psychological functioning.

Psychological functioning was assessed with the Portuguese version of the Strengths and Difficulties Questionnaire ([SDQ], Fleitlich, Loureiro, Fonseca & Gaspar, 2005; Goodman, 2001). The SDQ is a brief screening questionnaire for assessing the psychological functioning of children and adolescents. Following the recent recommendations of the authors' scale (Goodman, Lamping, Ploubidis, 2010), the conduct problems and hyperactivity subscales were combined into an externalizing subscale, and the peer and emotional problems subscales were combined into an internalizing subscale, both with 10 items. Respondents should use a 3-point Likert scale ranging from 0 (*not true*) to 2 (*certainly true*), with higher scores indicating more internalizing/externalizing problems. In this study, the Cronbach's alphas were .68 for both groups in the internalizing problems subscale; and .67 (normal-weight) and .69 (obesity) for the externalizing problems subscale.

Body image dissatisfaction.

A pictorial instrument with child and adolescents figures was used to assess perceptions and preferences of body image in children and adolescents between 8 to 18 years (Collins, 1991). This instrument is composed by a set of seven male or female figures adapted to the age of the children/adolescent, illustrating body weight ranging from 1 (very thin) to 7 (obese). Each child or adolescent was asked to indicate the figure that looked most like him/herself (*real self*), and the figure that shows the way he/she would like to look (*ideal self*). The difference between real and ideal was used as a measure of body image dissatisfaction.

Socio-demographic and clinical characteristics.

Socio-demographic information was reported by parents of children under 14 years old or by adolescents at or above 14 years old and included age, gender and presence of chronic health conditions. The weight and height of the normal-weight children was self-reported by parents and adolescents, and weight and height of obese children was reported by the nutritionist. Using weigh (Kg) and height (cm) values, BMI was calculate for each individual according to the following formula: $\text{weight}/[\text{height}]^2$.

Data Analysis

The data were analyzed using the SPSS version 20.0 (IBM SPSS, Chicago, IL). Descriptive statistics were computed for all socio-demographic, clinical, and study variables. To determine the associations between weight status (obese, normal-weight) and socio-demographic variables (age, gender, comorbid chronic conditions) we used one-way ANOVAs and Chi-square tests. In order to determine if was necessary to control any of the socio-demographic variables in the subsequent analyses, we proceeded with correlations between socio-demographic and study variables.

Comparison analyses were subsequently conducted. The effect of the weight-group and age categories (children and adolescents), as well as their interaction, in QOL and psychological functioning (internalizing/externalizing problems), controlling for gender, was assessed with a two-way ANCOVA and a two-way MANCOVA, respectively.

Finally, the effect of the same independent variables on BID was evaluated with a two-way ANOVA (without controlling for the effect of gender).

To examine whether the direct and indirect effects of weight status (independent variable; IV) on children's psychosocial adjustment (dependent variables; DV) through BID (mediator; M) were moderated by children's age, conditional process analysis were conducted. These analyses were conducted with the Process computation tool, a SPSS macro for path analysis-based moderation and mediation analyses, as well as their integration in the form of conditional process analysis (Hayes, 2013). Three models were estimated, one for each DV (QOL, internalizing and externalizing problems), in which the moderator was hypothesized to affect the path linking the IV and the M (path *a*), the path linking the M and the DV (path *b*) and the direct effect from the IV to the DV, holding constant the M (path *c*). Therefore, three interactions were tested in each model (weight status x age in both the paths *a* and *c*, and BID x age). Prior to model estimation, the variables used in the construction of products were mean-centered to reduce multicollinearity (Aiken & West, 1991) and the children's gender was entered as a covariate to control for its influence on the DV. In the absence of a significant interaction in one or more paths, the models were re-estimated after the removal of nonsignificant interactions. Interactions involving a component of an indirect effect were probed by estimating the conditional indirect effect at values of children's age corresponding to the 10th, 25th, 50th, 75th, and 90th percentiles of the distribution (i.e., 8, 10, 12, 15, and 17 years old), using a bootstrapping procedure (with 5000 bootstrap samples). This procedure creates 95% bias-corrected and accelerated confidence intervals (BCa CIs), with an indirect effect considered significantly different from zero if zero is not contained within the lower and upper CIs. Similarly, if the direct effect was moderated by children's age, conditional direct effects at 10th, 25th, 50th, 75th, and 90th percentiles of age were estimated and considered significant if $p < .05$.

Significance was set at the .05 level, and partial eta squared (η^2_p) provided the estimate of the effect size for the analyses of variance. Post hoc power calculations (G*Power; Faul, Erdfelder, Lang, & Buchner, 2007) performed for analyses of variance, with a significance level of .05 and power of .80, demonstrated that medium to large effects could be detected.

Results

Preliminary Analyses

Differences between groups on socio-demographic characteristics were analyzed through chi-squared tests (age group, gender and comorbid chronic conditions) and one-way ANOVAS (age and BMI). As presented in Table 1, no significant differences were found in gender, $\chi^2(1) = 1.64, p = .200$, and age groups, $\chi^2(1) = 1.25, p = .263$. Significant group differences were found in age, $F(1, 258) = 5.19, p = .024$, BMI scores, $F(1, 255) = 684.90, p < .001$, and comorbid chronic conditions, $\chi^2(1) = 19.76, p < .001$.

Bivariate associations between sociodemographic and study variables were analyzed. Significant correlations were found between gender and externalizing problems ($r = -.15, p = .013$), internalizing problems, ($r = .12, p = .050$), and QOL ($r = -.14, p = .020$); between age and QOL ($r = -.36, p < .001$); and between comorbid chronic conditions and BID ($r = .14, p = .029$).

Comparison Analyses

Table 2 presents the descriptive statistics of the study variables according to type of group (normal-weight, obesity), age categories (children, adolescents) and respective group, age and interaction effects. With regard to the QOL, the two-way ANCOVA, controlling for children's gender, found a significant group effect, $F(1, 255) = 22.38, p < .001, \eta^2_p = .081$, with children and adolescents with obesity reporting a worse QOL than those with a normal-weight. A significant age effect was also found, $F(1, 255) = 30.92, p < .001, \eta^2_p = .108$, with children reporting a better QOL than adolescents. The interaction effect was not significant, $F(1, 255) = 2.92, p = .089, \eta^2_p = .011$.

Regarding children and adolescents' psychological functioning, the MANCOVA, controlling for children's gender, yielded a multivariate group effect, Wilks' Lambda = 0.99, $F(2, 254) = 16.44, p < .001, \eta^2_p = .115$. The subsequent univariate analyses revealed a significant difference between weight groups for internalizing, $F(1, 255) = 13.71, p < .001, \eta^2_p = .051$, and externalizing problems, $F(1, 255) = 28.93, p < .001, \eta^2_p = .102$. A significant multivariate interaction effect was also found, Wilks' Lambda = 0.98, $F(2, 254) = 3.08, p = .048, \eta^2_p = .024$, with subsequent univariate analyses revealing a significant interaction only for internalizing problems, $F(1, 255)$

= 4.66, $p = .032$, $\eta^2_p = .018$. Simple effect tests showed that adolescents with obesity reported higher levels of internalizing problems than normal-weight adolescents, $F(1, 126) = 17.05$, $p < .001$, $\eta^2_p = .119$; among children, weight groups did not differ significantly, $F(1, 128) = 1.20$, $p = .276$, $\eta^2_p = .009$. The multivariate age effect was not significant, Wilks' Lambda = 1.00, $F(2, 254) = 0.11$, $p = .899$, $\eta^2_p = .001$.

With regard to the children's BID, the two-way ANOVA yielded a significant group, $F(1, 256) = 277.24$, $p < .001$, $\eta^2_p = .520$, and interaction effects, $F(1, 256) = 12.03$, $p = .001$, $\eta^2_p = .045$. Simple effects tests showed that normal-weight adolescents were more dissatisfied with their body image than normal-weight children, $F(1, 126) = 10.20$, $p = .002$, $\eta^2_p = .075$. In the obesity group, no significant differences were found between children and adolescents, $F(1, 130) = 3.71$, $p = .056$, $\eta^2_p = .028$. The main effect of age was not significant, $F(1, 256) = 0.20$, $p = .656$, $\eta^2_p = .001$.

Table 2

Generic QOL, BID and Psychological Functioning: Comparisons Between Normal Weight Group and Obesity Group (N = 260)

	Normal-weight <i>n</i> = 128		Obesity <i>n</i> = 132		Group effect		Age effect		Interaction Effect	
	Child <i>n</i> = 69	Adol. <i>n</i> = 59	Child <i>n</i> = 62	Adol. <i>n</i> = 70	<i>F</i>	η^2_p	<i>F</i>	η^2_p	<i>F</i>	η^2_p
Generic QOL	M (SD)	M (SD)	M (SD)	M (SD)						
	84.60 (10.16)	73.39 (12.32)	75.24 (11.26)	69.61 (12.87)	22.38***	.08	30.92***	.11	2.92	.01
BID					277.24***	.52	0.20	.00	12.03***	.05
	-.15 (0.77)	.31 (0.82)	2.17 (1.29)	1.82 (0.75)						
Psychological Functioning										
Internalizing Problems	5.36 (3.10)	4.59 (2.82)	5.93 (2.83)	6.57 (3.06)	13.71***	.05	0.21	.00	4.66*	.02
Externalizing Problems	4.75 (2.94)	4.66 (2.79)	6.95 (3.82)	6.69 (2.60)	28.93***	.10	0.06	.00	0.19	.00

* $p < .05$. ** $p < .01$. *** $p < .001$.

The Indirect Effect of Weight Group on Children and Adolescent Psychosocial Adjustment through Body Image Dissatisfaction

Three moderated mediation models were estimated, one for each DV. In each model, weight group (0 = normal-weight; 1 = obesity) was the IV, BID was the proposed M, and children's age was the moderator. The

effects of the IV on the M (path *a*), the effects of the M on dependent DV controlling for the effect of the IV (path *b*), the direct effect of the IV on the DV after controlling for the M (path *c*'), the total effect of the IV on the DV (path *c*) and the conditional indirect effects of IV on DV through M ($a*b$) at each percentile of children's age are presented in Table 3.

With regard to QOL, both paths *a* and *b* were moderated by children's age. Specifically, the interaction between age and weight group was significant ($b = -0.11, p = .004$), as well as the interaction between age and BID ($b = -0.61, p = .033$). The conditional indirect effects were statistically different from zero among children aged 15 (75th percentile; $b = -5.77, 95\%BCaCI = -9.72/-1.85$) and 17 (90th percentile; $b = -6.68, 95\%BCaCI = -11.87/-2.24$), based on 95% bootstrap BCa CIs. As regards the direct effect of weight group on QOL, a marginally significant interaction was found between age and weight group ($b = 1.25, p = .09$), and the conditional direct effects were only significant at the 10th ($b = -8.67, p = .04$) and 25th ($b = -6.16, p = .04$) percentiles of children's age. These results indicate that for adolescents aged 15 or above, being obese is associated with a worse QOL through BID. For children aged 10 or less, being obese seems to be directly associated with a worse QOL, regardless of their BID.

For internalizing and externalizing problems, the only significant interaction was in path *a*, between age and weight group ($b = -0.11, p = .004$). In the model of internalizing problems, the interactions between age and BID in the path *b* ($b = 0.09, p = .222$) and between age and weight group in the direct effect ($b = 0.06, p = .759$) were not statistically significant. After the removal of the nonstatistical significant interactions, the final model evidenced no significant conditional indirect effects at any level of the children's age (see 95%BCa CIs in Table 3). As presented in Table 3, being obese was associated with higher levels of BID ($b = 1.92, p < .001$), but having higher levels of BID were not significantly associated with higher levels of internalizing problems ($b = -0.07, p = .722$). Additionally, the direct effect of weight group on internalizing problems suggested that obese youths have higher levels of internalizing problems, when controlling for the effect of BID ($b = 1.47, p = .007$).

Table 3

Summary of Moderated Mediation Analyses for Model Including QOL, Internalizing Problems and Externalizing Problems (5000 bootstraps)

Dependent variable	Effect of IV on M <i>b</i> (SE)	Effect of M on DV <i>b</i> (SE)	Direct effect <i>b</i> (SE)	Indirect effect <i>b</i> (boot SE)	Total effect <i>b</i>	
(DV)	(path a)	(path b)	(c')	(a*b)	(c)	
				95% CI (LLCI; ULCI)		
QOL			-8.67 (4.09)*	1.86 (3.49)	-4.68; 9.04	
			-6.16 (2.91)*	-1.02 (2.23)	-5.14; 3.66	
	1.92 (0.12)***	-1.99 (0.82)*	-3.66 (2.18)	-3.34 (1.67)	-6.49; 0.09	-30.74
			0.10 (2.77)	-5.77 (2.01)	-9.72; -1.85	
			2.60 (3.91)	-6.68 (2.44)	-11.87; -2.24	
Internalizing problems				-0.18 (0.57)	-1.36; 0.90	
				-0.16 (0.51)	-1.22; 0.80	
	1.92 (0.12)***	-0.07 (0.20)	1.47 (0.54)**	-0.14 (0.46)	-1.10; 0.72	0.77
				-0.12 (0.38)	-0.91; 0.60	
				-0.10 (0.33)	-0.80; 0.52	
Externalizing problems				0.60 (0.57)	-0.45; 1.79	
				0.54 (0.52)	-0.41; 1.60	
	1.92 (0.12)***	0.24 (0.21)	1.56 (0.55)**	0.48 (0.46)	-0.37; 1.43	3.92
				0.40 (0.38)	-0.31; 1.17	
				0.34 (0.33)	-0.26; 1.03	

Note. IV = independent variable; M = mediator; DV = dependent variable; SE = standard error; CI = confidence interval; LLCI = lower limit confidence interval; ULCI = upper limit confidence interval.
 Conditional indirect effects were estimated for the 10th, 25th, 50th, 75th and 90th percentiles of children's age (8, 10, 12, 15 and 17 years old, respectively). In the table, the percentiles are displayed in ascending order, from top to bottom.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

As regards the model for externalizing problems, the interactions between age and BID in path *b* ($b = -0.04$, $p = .561$), and between age and weight group in the direct effect ($b = 0.02$, $p = .926$) were not significant. After the removal of nonstatistical interactions, the final model showed no conditional indirect effects at any level of the children's age (see 95%BCa CIs in Table 3). Analysis of individual paths showed that BID was not significantly associated with externalizing problems ($b = 0.24$, $p = .24$), although the direct effect of weight status on the DV was significant ($b = 1.56$, $p = .005$).

The results for psychological functioning suggested that being dissatisfied with body image was not associated with internalizing/externalizing problems, and that the link between weight group and internalizing/externalizing problems was direct and, therefore, independent of BID.

Discussion

The results of the present study suggest that obese children and adolescents have a more impaired psychosocial adjustment and are more dissatisfied with their body image than normal-weight peers. This study has also demonstrated that, for adolescents, dissatisfaction with body image is an important mechanism explaining the association between weight status and QOL. Conversely, the effect of weight status on internalizing and externalizing problems was direct and independent of children's age.

According to expectations, obese children and adolescents reported a worse QOL and higher levels of psychological problems than normal-weight peers. Similar findings were found in several studies (Lawlor et al., 2005; Moreira et al., 2013; Riazi et al., 2010; Wille et al., 2010; Zeller & Modi, 2006, 2008), suggesting a consistent relationship between pediatric obesity and poorer psychosocial outcomes. This may be due to the higher rates of social rejection, stigmatization and weight victimization that these children frequently face (Jelalian & Hart, 2009; Wardle & Cooke, 2005), which may seriously compromise their psychosocial adjustment and mental health. Moreover, we should also note that 22.7% of the obese children and adolescents of our sample had comorbid chronic conditions, which may also explain their poorer psychosocial results.

Data from the present study suggest that adolescence is a period of greater psychosocial vulnerability. Levels of QOL were lower for adolescents of both weight groups, which is an expected result given the several new and unique biological and psychosocial challenges, that occur during this phase, such as dealing with the changing body in puberty, searching their new identity or transitions in school (Bisegger et al., 2005). These developmental tasks can lead to age-related differences in QOL, specifically in physical, psychological, self perception, relation with parents and school functioning (Bisegger et al., 2005), towards a negative impact on

adolescents' psychosocial adjustment (Moreira et al., 2013; WHO, 2012).

Additionally, we found that adolescents with obesity had higher levels of internalizing problems than normal-weight adolescents, but no differences were found among children. Although it remains to determine which factors contribute to this differential trend between children and adolescents, we hypothesize that being obese may be more challenging for adolescents than for children, conducting to higher levels of peer problems and emotional symptoms. Adolescence is a period during which peer acceptance and integration into groups are much valued (Huebner, 2009). Being obese can put adolescents at greater risk of stigmatization and marginalization by peers, leading to interpersonal difficulties and increased levels of internalizing difficulties (Jelalian & Hart, 2009; Wardle & Cooke, 2005).

As regards BID, we found that obese children and adolescents were more dissatisfied with their body shape than their normal-weight counterparts. This is an expected result given the social pressures to be thin (for girls) or muscular (for boys), and the social stigma associated with overweight and obesity (Jelalian & Hart, 2009; Loth et al., 2011; Neumark-Sztainer, 2011; Shin & Shin, 2008). We also found that normal-weight adolescents had higher levels of BID than normal-weight children, which is in accordance with previous research indicating that, during adolescence, weight and shape concerns tend to substantially increase (Wertheim & Paxon, 2011). Interestingly, no differences were found between obese children and adolescents, which indicate that, in both development stages, obese youths evaluate negatively their body weight and prefer to be thinner. Although children tend to be less concerned with their weight and physical appearance than adolescents, those with obesity are likely to be exposed, from an early age, to "anti-fat messages" (Smolak, 2011), peer teasing or negative social comparisons, which may lead them to feel a strong dissatisfaction with their body shape and weight.

One of the major goals of the present study was to explore the role of BID as potential mechanism explaining the associations between weight status and children's psychosocial adjustment. Contrary to our initial hypothesis, an indirect effect was only found for QOL and this effect was only significant for adolescents aged 15 years or older. Being obese was associated with higher levels of BID, which, in turn, was associated with a

worse QOL. This is an important and innovative finding that highlights the importance of BID as an explanatory mechanism of the well-established association between obesity and decreased QOL in adolescents. For children aged 10 years or less, being obese was directly related with a lower QOL, independently of their BID. This suggests that weight and shape dissatisfaction are not central aspects of children's QOL, even though this might already be present at an early stage of development (as suggested by nonsignificant differences in BID between obese children and adolescents). Curiously, no direct or indirect associations were found for preadolescents (i.e., for children with about 12 years old). This unexpected finding underlines the need of conducting further studies on the psychosocial adjustment during this transitional phase, which could help illuminate the present findings.

In addition, conditional process analyses indicated that obese children and adolescents have higher levels of internalizing and externalizing problems, regardless of their BID. Moreover, BID was not significantly associated with these psychological problems, which is inconsistent with previous findings showing that obese children with high levels of weight and shape concerns are at increased risk for psychological maladjustment (Allen et al., 2006; Shin & Shin, 2008). It is important to note that although the direct effects of weight on psychological functioning were not moderated by children's age, we found an interaction effect between weight group and children's age in the comparison analyses, with obese adolescents exhibiting more internalizing problems than normal-weight adolescents. This apparent inconsistency is related to the fact that the influence of BID is controlled for, when analyzing the direct effect of weight in the conditional process analyses.

Some limitations of this study should be noted. First, the cross-sectional design precludes the possibility of establishing causal relationships between variables because associations can be bidirectional. For instance, psychological distress might foster weight gain, which may subsequently lead to more psychosocial problems (Puder & Munsch, 2010). Futures longitudinal studies should evaluate changes in the weight, BID and psychosocial adjustment over time and analyze the directionality of the associations between these variables. Secondly, the lack of a non-treatment

seeking sample of obese youths did not permit to ascertain whether the results could be explained only by weight or, instead, by a treatment-seeking status and related issues (Braet et al., 1997). Also, we cannot disregard the possibility that our clinical sample of obese youth may have presented a worse adjustment because they had comorbid conditions or even previous psychosocial difficulties. Third, the representativeness of our sample can be questioned, once it has been collected from only two major public hospitals and three public schools in the central region of Portugal. Furthermore, we used different sample collection procedures, as obese youths were recruited in a clinical setting with the support of a research assistant, while normal-weight youths completed the questionnaires at home. Future studies should use similar recruitment procedures for all the subjects involved.

Despite these limitations, the study had several strengths. To our knowledge, this was the first study to explore the mediation role of BID on the associations between weight and psychosocial adjustment of obese youth. This was also an innovative study because it adopted a developmental perspective, by evaluating separately children and adolescents in the group comparison analyses and by exploring the moderating effect of children's age in the conditional process analyses. Most studies focus on a specific developmental stage or analyze children and adolescents as a single group, ignoring any differences that may occur as a consequence of the different characteristics of each stage. Another methodological strength of this study was the use of self-reported instruments, instead of parent proxy-reports, privileging the children's self-evaluation and avoiding biases from other's evaluation of the youth's psychosocial adjustment.

These findings have important practical implications. The worse psychosocial adjustment of obese children and adolescents highlight the need for prevention and early intervention. It is essential that these children and adolescents are treated in multidisciplinary teams that are able to assess and identify psychosocial difficulties and needs, in order to provide an adequate and multi-level intervention. Moreover, BID was identified as an important modifiable mechanism linking weight and QOL and therefore it should be considered as an important target in psychological interventions. Strategies aimed at improving children's body image satisfaction can have important positive repercussions in their QOL. Nevertheless, as BID did not

explain the association between weight and psychological difficulties, it is essential that future studies should attempt to identify other mechanisms underlining psychological problems. Addressing the psychosocial needs of obese children and adolescents is of vital importance as it may promote a better adherence to the weight-management programs and diminish the likelihood of obesity and further complications in adulthood.

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Conclusão

Este estudo teve como objectivo avaliar o ajustamento psicossocial e a insatisfação com a imagem corporal, bem como o papel mediador da insatisfação com a imagem corporal na relação entre o peso e três medidas de ajustamento psicossocial (QDV, problemas internalizantes e problemas externalizantes), numa amostra de crianças e adolescentes portugueses com peso normal e obesidade.

Com este estudo verificou-se que as crianças e adolescentes obesos têm pior QDV e mais problemas internalizantes e externalizantes que as crianças e adolescentes de peso normal. Assim, é possível inferir importantes implicações clínicas destes resultados, na medida em que compreender como estes jovens estão psicológica e socialmente adaptados à obesidade pode ter repercussões no processo de perda de peso e no envolvimento em possíveis intervenções psicológicas. Tal deve-se ao facto de que uma pior adaptação psicossocial da criança/adolescente obesa(o) pode estar associada a uma pior adesão ao processo terapêutico ou a uma maior probabilidade de obesidade ou outras complicações físicas e psicológicas na idade adulta. É, por isso, de importância fundamental avaliar precoce e cuidadosamente o ajustamento psicossocial destes jovens bem como desvendar potenciais mecanismos envolvidos na sua relação com o peso. Tal tem implicações clínicas muito úteis, na medida em que identificar o mecanismo subjacente a esta relação permite intervir directamente na variável que está a mediar.

Deste modo, considera-se que este estudo contribuiu de forma inovadora para a compreensão do ajustamento psicossocial destas crianças e adolescentes, uma vez que permitiu compreendê-lo à luz da IIC. De facto, os resultados deste estudo sugerem que a IIC parece ser um importante alvo de intervenção com adolescentes, uma vez que esta tem consequências directas na modificação da QDV. Desta forma, fomentar precocemente na criança/adolescente obesa(o) a satisfação com a imagem corporal pode permitir uma maior aceitação da sua condição de saúde e, em consequência, melhores resultados terapêuticos, interações sociais mais positivas e uma melhor qualidade de vida. Para isso, pode ser útil a implementação de estratégias numa equipa multidisciplinar que permita não só avaliar e identificar os diferentes problemas que estes jovens enfrentam, como fazer

com que estes sejam adequada e eficazmente abordados. No caso da relação entre o peso e os problemas psicológicos (internalizantes e externalizantes), a IIC não parece ter um papel importante, ressaltando-se a necessidade de que posteriores estudos tentem explicar quais os mecanismos subjacentes a esta relação.

No seu conjunto, mais que compreender a relação existente entre o peso, a imagem corporal e o ajustamento psicossocial destes jovens, este estudo permitiu perceber que estas relações não são estanques e dependem de variáveis moderadoras como a idade da criança. Assim, este estudo acrescenta uma compreensão do ponto de vista desenvolvimental ao ajustamento psicossocial e à insatisfação com a imagem corporal de crianças e adolescentes com obesidade. Estudos longitudinais posteriores podem procurar alargar estes resultados, no sentido de compreender de forma mais lata as relações de causalidade entre estas variáveis ao longo do tempo. Avaliar também o possível efeito moderador de outras variáveis como o género, o estatuto socioeconómico, o ambiente familiar, ou outros, reveste-se assim de importância fundamental para a investigação e para uma intervenção clínica eficaz e adequada à criança ou adolescente obesa(o).