

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

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

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7 **4 Abstract**

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10 Cognitive fusion has been related to the development and maintenance of a
11 series of mental health difficulties. Specifically, growing research on eating
12 psychopathology has been demonstrating the important role of cognitive fusion
13 related to body image in these disorders. Nonetheless, cognitive fusion specifically
14 focused on eating remained to be investigated. The current study aimed at developing
15 and validating the Cognitive Fusion Questionnaire – Food Craving, a measure
16 assessing the extent to which an individual is fused with food-craving undesirable and
17 disturbing thoughts and urges.
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21 This study was conducted with distinct samples comprising men and women
22 from the student and general population. An exploratory factor analysis was
23 conducted to assess the scale’s structure, which was further examined in a
24 confirmatory factor analysis. The scale’s reliability and validities were also analysed.

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27 Results indicated that the CFQ-FC presented a one-dimensional structure with
28 7 items, accounting for 66.14% of the variance. A CFA confirmed the plausibility of
29 the measurement model, which was found to be invariant in both sexes. The CFQ-FC
30 also revealed a very good internal consistency, construct reliability, temporal stability,
31 and convergent and divergent validity, being positively associated with similar
32 constructs and with indicators of eating and general psychopathology. CFQ-FC also
33 discriminated individuals with clinically significant symptoms of binge eating from
34 participants with no symptoms. Finally, the CFQ-FC presents incremental validity

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25 over a global measure of cognitive fusion in predicting eating psychopathology,
26 namely binge eating.

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

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33 **Key-words**

34 Cognitive fusion; food craving; eating psychopathology; binge eating; psychometric
35 properties; confirmatory factor analysis

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38 **Highlights**

39 • The CFQ-FC was developed to assess the entanglement with food urges and
40 cravings

41 • CFQ-FC shows very good model fit among women and men from the
42 community

43 • CFQ-FC has high internal consistency, retest, construct and incremental
44 validity

45 • CFQ-FC presents incremental validity over a global measure of cognitive
46 fusion

47 • CFQ-FC is linked to similar constructs, and general and eating
48 psychopathology

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50 Introduction

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

73 In particular, Acceptance and Commitment Therapy (Hayes, 2004; Hayes,
74 Strosahl, & Wilson, 1999) interventions have been showing promising results in a

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75 range of eating and weight-related difficulties in which food cravings play an
76 important role (e.g., Forman, Hoffman, Juarascio, Butryn, & Herbert, 2013; Jenkins &
77 Tapper, 2014; Juarascio, Forman, & Herbert, 2010; Lillis, Hayes, Bunting, & Masuda,
78 2009). ACT encourages an accepting, nonjudgemental stance towards thoughts and
79 feelings and behaviour change committed with one's wellbeing to foster
80 psychological flexibility. According to this perspective, human suffering is
81 conceptualized as resulting from psychological inflexibility (Greco, Lambert, & Baer,
82 2008; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Kashdan & Rottenberg, 2010).

83 Cognitive fusion and experiential avoidance have been conceptualized as key
84 mechanisms implicated in psychological inflexibility (Hayes et al., 2006). Cognitive
85 fusion refers to the tendency to become entangled with one's internal events (such as
86 thoughts, perceptions, sensations and emotions) perceiving these transitory mental
87 contents as permanent and as reflecting reality (Gillanders et al., 2014; Hayes et al.,
88 2006; Hayes, Strosahl, Bunting, Twohig, & Wilson, 2004; Luoma & Hayes, 2003).
89 As a consequence, one's behaviours tend to become dominated by these private
90 events, rather than by previous experiences and their direct consequences. Thus,
91 maladaptive experiential avoidance strategies may be adopted as reactive attempts to
92 avoid, escape or diminish such undesirable private events (Hayes et al., 2006). These
93 processes have been associated with difficulties in changing behaviour, even when
94 change is necessary, beneficial and committed with one's life values. In this sense,
95 cognitive fusion and experiential avoidance have been identified as playing a key role
96 in the development and maintenance of a series of psychopathological conditions
97 (Gillanders et al., 2014; Hayes, 2004; Hayes et al., 1999; Kashdan & Rottenberg,
98 2010; Merwin & Wilson, 2009).

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99 Specifically, a rising number of studies have demonstrated the deleterious effect
100 of these processes in body image and eating related psychopathology (Duarte &
101 Pinto-Gouveia, 2014; Ferreira, Palmeira, & Trindade, 2014; Ferreira, Trindade, &
102 Martinho, 2015; Ferreira, Trindade, Duarte, & Pinto-Gouveia, 2015; Lillis & Hayes,
103 2008; Merwin et al., 2011; Sandoz, Wilson, Merwin, & Kellum, 2013). In this
104 context, specific measures have been developed to address psychological inflexibility
105 in domains that are central in eating psychopathology, such as body image (e.g., Body
106 Image Acceptance and Action Questionnaire – BIAAQ; Sandoz et al., 2013), weight
107 (Acceptance and Action Questionnaire for Weight-Related Difficulties – AAQW;
108 Lillis & Hayes, 2008) and eating-related attitudes and behaviours (e.g., Inflexible
109 Eating Questionnaire – IEQ; Duarte, Ferreira, Trindade, & Pinto-Gouveia, 2015). In
110 what regards the specific dimension of food craving, the Food Craving Acceptance
111 and Action Questionnaire – FAAQ (Juarascio, Forman, Timko, Butryn, & Goodwin,
112 2011) was developed to assess psychological flexibility in relation to food-related
113 experiences, namely cravings and urges to eat. This scale assesses two specific
114 constructs relevant to psychological flexibility, notably acceptance of food-related
115 distressing thoughts and feelings, and willingness to engage in healthy eating despite
116 this aversive internal experience. Although the psychometric properties and validity
117 of this scale in community samples warrant further investigation, the FAAQ appears
118 to be a measure with potential applicability in research focused on eating behaviours
119 and weight management. Nonetheless, a measure that allowed for the assessment of
120 the specific process of fusion with cognitive events related to food, was non-existent.

121 Gillanders et al. (2014) developed the Cognitive Fusion Questionnaire (CFQ), a
122 widely used and validated measure of cognitive fusion in distinct populations.
123 Nonetheless, the authors suggested the pertinence of developing measures of

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124 cognitive fusion that addressed specific thought contents, and that the CFQ could
125 form the basis for the development of such scales. Recently, Ferreira and colleagues
126 (2015) developed the Cognitive Fusion Questionnaire – Body image (CFQ-BI) in
127 order to address cognitive fusion in the specific domain of body image, that is, the
128 tendency to get entangled with body image-related cognitions and to become highly
129 regulated by them, presenting an inability to experiencing them as transient and
130 subjective events.

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

142 Alongside with body image, disturbing and recurrent thoughts and maladaptive
143 behaviours about eating, are a hallmark of eating psychopathology (Fairburn, 2008;
144 Spoor et al., 2006). In fact, there is evidence that eating psychopathology is marked
145 by the struggle with frequent eating concerns (e.g., what to eat, how much, when to
146 eat), with resisting food cravings, and with feelings of guilt about indulging in such
147 cravings eating or losing control over eating (Duarte, Pinto-Gouveia, & Ferreira,
148 2014; Goss & Allan, 2009; Goss & Gilbert, 2002; Heatherton & Baumeister, 1991).

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149 In fact, food craving has been identified as an important precipitant for binge eating
150 symptoms (Waters, Hill & Waller, 2001). Nonetheless, experiencing food-related
151 thoughts and cravings is not necessarily pathological (Gendall, Joyce, Sullivan, &
152 Bulik, 1998), which suggests the relevance of identifying potential mechanisms
153 operating on the association between urges and desires to eat, and disordered eating. It
154 is plausible that the extent to which individuals become trapped in disturbing
155 thoughts, urges and cravings about eating, believing that these must be acted upon,
156 create emotional distress and have an important impact on disordered eating
157 behaviours. Actually, disordered eating, either in the form of eating restraint or binge
158 eating behaviours, may be conceptualized as emerging from maladaptive control
159 strategies. Such strategies seem to be adopted as a means to avoid or diminish the
160 frequency, intensity and valence of disturbing and undesirable internal experiences
161 about food, even that if this subsequently leads to functional and psychosocial
162 impairment, and greater suffering (Goss & Gilbert, 2002; Heatherton & Baumeister,
163 1991; Striegel-Moore et al., 2000; Wilfley, Wilson, & Agras, 2003). Nonetheless,
164 research on the dimension of eating-related cognitive fusion is scant. The
165 development of a measure that specifically captures this process is an important step
166 in better understanding the role that it may operate in eating psychopathology.

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

174 **Method**

175

176 *Participants*

177 Sample 1. The scale was initially examined in 300 women (171 college students and
178 129 women from the general population), with ages ranging from 18 to 55.
179 Participants presented a mean age of 27.22 ($SD = 10.04$) years old and of 12.73 ($SD =$
180 2.81) years of education. Regarding Body Mass Index (BMI), participants presented a
181 mean of 22.02 ($SD = 3.02$).

182 Sample 2. An independent sample of 518 participants was used to conduct a
183 Confirmatory Factor Analysis and to further examine the scale's validity. The sample
184 included 292 women (145 college students and 147 from the general population) and
185 226 men (112 college students and 114 from the general population). Participants
186 presented ages that also ranged from 18 to 55, with women presenting a mean age of
187 28.26 ($SD = 10.64$) and of 12.72 ($SD = 2.84$) years of education; and men a mean age
188 of 29.11 ($SD = 12.29$) and of 12.29 ($SD = 3.13$) years of education. Results indicated
189 no significant differences regarding these demographic variables $t_{age(516)} = 0.902, p =$
190 $.268; t_{education(516)} = 1.514, p = .131$). Women presented a mean BMI of 23.21 (SD
191 $= 3.85$), while men presented a mean BMI of 24.22 ($SD = 4.23$).

192 Sample 3. A sample of 54 participants (10 males and 44 females), with a mean age of
193 30.41 ($SD = 10.44$) and a mean of 13.09 ($SD = 3.20$) years of education was also used
194 to analyse the temporal stability of the scale. These participants were asked to
195 complete the CFQ-FC twice within a 3 to 4 week interval. Most of these participants
196 presented a normal BMI ($M = 22.10; SD = 3.19$).

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

200

201 *Measures*

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

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

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

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

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

240 *Intuitive Eating Scale-2* (IES-2; Tylka & Kroon Van Diest, 2013); Portuguese
241 version by Duarte, Pinto-Gouveia, and Mendes (2015). The IES-2 assesses a form of
242 adaptive eating – intuitive eating – that includes the awareness of internal hunger and
243 satiety signals, the ability to eat in response to internal physiological cues, instead of
244 following rigid dietary or as a way to cope with emotional distress, and to choose
245 nutritious foods according to the body’s needs. The scale includes 23 items and

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246 participants are asked to rate each statement selecting the option that better describes
247 their attitudes and behaviours, using a 5-point Likert scale (ranging from “Strongly
248 disagree” (1) to “Strongly agree” (5). Higher scores indicate higher intuitive eating.
249 The scale presented good internal reliability in the original (Cronbach’s alpha of .87;
250 Tylka & Kroon Van Diest, 2013) and in the Portuguese version (.97; Duarte et al.,
251 2015).

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

263 *Depression Anxiety and Stress Scales – 21* (DASS21; Lovibond & Lovibond,
264 1995); Portuguese version by Pais-Ribeiro, Honrado, and Leal (2004). DASS21 is a
265 self-report measure that includes three subscales that assess levels of depressive,
266 anxiety and stress symptoms, with 7 items each. Respondents are invited to indicate
267 the frequency with which they experienced each symptom over the past week, using a
268 4-point Likert scale (ranging from “Did not apply to me at all” (0) to “Applied to me
269 very much or most of the time” (3). Higher results indicate higher levels of
270 psychopathology symptoms. The scale presents high internal consistency, with the

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271 depression, anxiety and stress subscales presenting Cronbach's alpha values of .88,
272 .82, and .90, respectively, in the original version (Lovibond & Lovibond, 1995), and
273 .85, .74, and .81, respectively, in the Portuguese version (Pais-Ribeiro et al., 2004).

274

275 *Procedure*

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

286

287 *Development of the measure*

288 The CFQ-FC was based on the original CFQ (Gillanders et al., 2014) and was
289 developed to assess the degree to which individuals are fused with specific eating-
290 related cognitions, including disturbing and undesirable thoughts and cravings about
291 food. Approval was obtained from the authors of the original CFQ (Gillanders et al.,
292 2014) to develop this specific measure. We focused on the original items of the CFQ
293 and developed a pool of items in which the original content was adapted to focus on
294 the specific dimension of eating-related cognitions and impulses. The preliminary
295 version of the scale comprised a pool of 20 items that were analysed by a research

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296 team with large clinical and research experience on the field of eating disorders. The
297 items were also administered to a group of 10 patients with BED who reported higher
298 levels of cognitive fusion with food-related content. They were asked to fill the
299 measure and to comment on whether the statements reflected their experience. After
300 this process, the items were further revised and minor changes of wording were made.
301 The final version of the scale was then submitted to a Principal Component Analysis
302 (PCA) with the aim of reaching a shorter and psychometrically robust measure.

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

307 308 *Analytic Strategy*

309 A PCA was conducted (Sample 1) with the aim of developing a brief measure
310 that comprised items designed to capture the related facets that entail the
311 unidimensional construct of cognitive fusion (Gillanders et al., 2014; Hayes et al.,
312 2006; Hayes et al., 2004; Luoma & Hayes, 2003), but focused on the specific
313 phenomenon of food craving. The analysis followed the procedures adopted in the
314 adaptation of the CFQ (Gillanders et al., 2014) to other populations (e.g., (Pinto-
315 Gouveia et al., 2011) and dimensions (e.g., Ferreira, Trindade, Duarte, et al., 2015);
316 and taking into consideration the assumptions to conduct the analysis (DeVellis,
317 2003; Field, 2004). The number of factors to extract was further confirmed through a
318 parallel analysis (Horn, 1965).

319 The obtained structure was then confirmed through a Confirmatory Factor
320 Analysis (CFA) with Maximum Likelihood estimation method (Sample 2). The

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321 plausibility of the model was examined by the Chi-Square (χ^2) and the following fit
322 indicators: the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), and the
323 Normed Fit Index (NFI), which indicate a very good fit with values above .95
324 (Bollen, 1986; Kline, 2005). The Root-Mean Square Error of Approximation
325 (RMSEA), with 90% confidence interval, was also considered; with values below .10
326 indicating an acceptable fit (Byrne, 2010; Hair, Black, Babin, & Anderson, 2010;
327 MacCallum, Browne, & Sugawara, 1996). The model invariance between sexes was
328 also examined (Cheung & Rensvold, 2002).

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

333 The scale's psychometric properties were further analysed in Sample 2. The
334 relationship between the CFQ-FC and other self-report measures was examined by
335 computing Pearson product-moment correlation coefficients (Cohen, Cohen, West, &
336 Aiken, 2003). The retest reliability of the measure was analysed by comparing the
337 values of the scale obtained in two assessment moments (with 3 to 4 weeks interval)
338 through paired samples t-tests and Pearson product-moment correlations. T-tests for
339 two independent samples were conducted to examine CFQ-FC's ability to
340 discriminate between individuals from the general population with clinically
341 significant levels of binge eating symptoms from individuals with no symptoms.
342 Finally, a series of hierarchical regression analyses were conducted to examine the
343 scale's incremental validity over a measure assessing broad cognitive fusion (CFQ) in
344 the prediction of eating psychopathology and, in particular, binge eating symptoms
345 (DeVellis, 2003; Field, 2004).

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346 The PCA and the remaining psychometric analyses were conducted using IBM
347 SPSS Statistics 20 (Statistical Package for the Social Sciences, Chicago, IL, USA);
348 the CFA was conducted using the software AMOS (Analysis of Momentary Structure,
349 software version 18, SPSS Inc. Chicago, IL).

350

351 **Results**

352

353 *Preliminary data analyses*

354 Preliminary data analyses were conducted and indicated that the Skewness and
355 Kurtosis values did not represent a significant bias to normal distribution ($Sk < |3|$ and
356 $Ku < |10|$; Kline, 2005).

357

358 *Principal Component Analysis*

359 A PCA was conducted to examine the CFQ-FC factorial structure (Sample 1).
360 The adequacy of the data to conduct the analysis was confirmed given the results of
361 the Kaiser Meyer-Olkin test (.96) and the Bartlett's sphericity test ($\chi^2_{(190)} = 4806.80; p$
362 $< .001$). All items presented communalities above .59. Results indicated three factors
363 with eigenvalues above 1. However, the visual inspection of the scree plot suggested a
364 one-dimensional structure (Figure 1). This structure was further supported by a
365 parallel analysis, which indicated that one factor presented an eigenvalue that
366 exceeded the 95th percentile of the eigenvalues that emerge from a random data
367 matrix.

368 Thus, the analysis was recalculated forcing the retention of one factor (Table 1).
369 This solution accounted for a total of 57.14% (eigenvalue: 11.43). The items
370 presented factor loadings ranging from .56 to .84. To develop a briefer measure the

396 analysis. Results suggested a poor to adequate model fit (CFI = .95; TLI = .93; NFI =
397 .95; RMSEA = .13, $p = .000$). The analysis of the modification indices suggested the
398 correlation of the errors of items 2 and 7 (47.03) and 10 and 11 (30.77), which
399 resulted in an improvement of the model to a very good fit ($\chi^2_{(12)} = 60.59$; CFI = .98;
400 TLI = .97; NFI = .98; RMSEA = .09, $p = .002$).

401 The analysis of the local adjustment indices also confirmed the adequacy of the
402 model (Table 1). In fact, the items presented standardized regression weights
403 significantly above the recommended cut-off point of .40 (Tabachnick & Fidell,
404 2013), which ranged from .74 (item 2) to .88 (item 12). The individual items
405 reliability was also corroborated through the values of the squared multiple
406 correlations, which varied between .55 (item 2) and .77 (item 12).

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

413 Insert table 1 around here

415 *CFQ-FC validity and descriptives*

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

420 The validity of the scale was further assessed through the calculation of the

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

425 In regard to the descriptive statistics (Sample 2), results indicated that women
426 presented higher scores of food craving-related cognitive fusion ($M = 15.37$; $SD =$
427 8.67), in comparison to men ($M = 10.58$; $SD = 5.17$), and these differences were
428 statistically significant ($t_{(516)} = 7.81$, $p < .001$).

429

430 *Retest Reliability*

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

437

438 *CFQ-FC relation with other measures*

439 Pearson product-moment correlations coefficients were calculated (Sample 2)
440 to examine the convergent validity of CFQ-FC in association with similar constructs,
441 as well as to the scale's association with important indicators of eating and general
442 psychopathology (Table 2). Findings revealed, for both men and women, positive
443 moderate associations between CFQ-FC and broad cognitive fusion (CFQ). Stronger
444 associations were found in the association between CFQ-FC and cognitive fusion
445 related to the specific dimension of body image (CFQ-BI). Moreover, results

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446 indicated that CFQ-FC was positively and moderately associated with psychological
447 inflexibility (AAQ-II). Results also revealed that CFQ-FC was strongly and positively
448 associated with a global indicator of eating psychopathology, as well as with a more
449 specific measure of binge eating symptoms. On the contrary, CFQ-FC was negatively
450 associated with intuitive eating (IES-2). CFQ-FC was only marginally associated with
451 BMI in women. Finally, positive moderate associations were found between CFQ-FC
452 and symptoms of depression, anxiety and stress. Overall, the correlations were
453 stronger in the case of women.

454
455 Insert Table 2 around here
456

457 *Discriminant validity*

458 To confirm the CFQ-FC ability to discriminate between individuals with the
459 presence of clinically significant symptoms of binge eating from individuals with no
460 significant symptoms, we compared two samples with similar demographic
461 characteristics, namely age ($t_{(108)} = .111$; $p = .319$) and years of education ($t_{(108)} =$
462 $.001$; $p = .999$). The group with higher levels ($n = 42$; 5 men and 37 women) was
463 selected based on the cut point for the BES > 17 (Duarte et al., 2015b; Marcus, Wing,
464 & Lamparski, 1985). The group with lower levels of disordered eating symptoms
465 included 68 (11 men and 57 women) randomly selected controls. Results revealed that
466 participants with significant scores of binge eating present significantly higher scores
467 of cognitive fusion with food-related thoughts ($M = 27.33$; $SD = 9.88$), in comparison
468 to the participants with no symptoms ($M = 14.87$; $SD = 6.81$; $t_{(108)} = 7.83$; $p < .001$).

470 *Incremental validity*

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

477 In women, results revealed that cognitive fusion measured by the CFQ
478 accounted for 17% of EDE-Q variance ($\beta = .41$; $F_{(1, 266)} = 54.62$; $p < .001$). On step
479 two, when CFQ-FC was included, findings revealed that the model was significant
480 and accounted for 52% of EDE-Q variance ($F_{(1,266)} = 190.72$; $p < .001$). CFQ-FC
481 emerged as the best global predictor ($\beta = .67$; $p < .001$), followed by CFQ ($\beta = .10$; p
482 $= .034$). In men, findings indicated that CFQ accounted for 7% of EDE-Q variance (β
483 $= .27$; $F_{(1,183)} = 14.35$; $p < .001$), and that when CFQ-FC was included, the model
484 accounted for 43% of EDE-Q variance ($F_{(1,182)} = 113.20$; $p < .001$). CFQ-FC emerged
485 as the only significant predictor ($\beta = .66$; $p < .001$), followed by CFQ ($\beta = -.00$; $p =$
486 $.970$).

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

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495 67.89; $p < .001$), and CFQ-FC was the best global predictor ($\beta = .53$; $p < .001$),
496 followed by CFQ ($\beta = .16$; $p = .015$).

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498

499 **Discussion**

500 The current study presents the development and validation of a new measure
501 designed to assess cognitive fusion with undesirable thoughts regarding food craving
502 and urges to eat – CFQ-FC. This specific measure was first examined in a sample of
503 women from the general population, with ages ranging from 18 to 55 years old. The
504 analysis confirmed that all CFQ-FC’ items presented strong factorial loadings. With
505 the aim of reaching a shorter and psychometrically robust measure, a stringent item
506 reduction process was conducted. Although all items presented high factorial
507 loadings, were elected to be included in the final version of the scale 7 items that
508 comprehensively addressed the dimensions of food craving-related cognitive fusion.
509 In fact, these items mirrored the content of the original CFQ (Gillanders et al., 2014),
510 but specifically focused on the domain of eating (e.g., CFQ item: “I tend to get very
511 entangled in my thoughts”; CFQ-FC item: “I tend to get very entangled in my food
512 urges or cravings”). Thus, the items comprising the one-dimensional structure of the
513 CFQ-FC are also strongly theoretically supported. Moreover, this structure accounted
514 for 66.14% of the variance and was found to have high internal consistency. Findings
515 also supported that CFQ-FC presents strong temporal stability.

516 This obtained shorter structure of the CFQ-FC was further examined in a
517 distinct sample of 518 participants comprising men and women from the general
518 population, with the same wide age interval. The CFA findings confirmed the
519 plausibility of the one-dimensional model (Kline, 2005; Tabachnick & Fidell, 2013).

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520 In fact, results indicated that the model presented a very good fit to the data and that
521 all items significantly contributed to the assessment of the construct of food craving-
522 related cognitive fusion. The items presented high factor loadings and strong
523 individual item reliability. Results indicated the pertinence of specifying correlated
524 measurement errors between two pair of items, which had similar content and
525 involved the same key terms (Brown, 2006). In particular, the formulation of items 2
526 and 7 in their original language may be analysed by respondents in a similar way. In
527 fact, the language in which the measure was developed and tested (Portuguese) could
528 have had implications in these method effects, and thus these specifications should be
529 analysed in future studies. Furthermore, an additional explanation for this question
530 may be related to the content of the items. Specifically, item 10 and 11 were
531 generated to address specific aspects of fusion, namely the way behaviour may come
532 to be dominated by thoughts and the tendency to overanalyse one's food cravings
533 even when this is unhelpful, respectively (Gillanders et al., 2014; Hayes et al., 2006)).
534 Nonetheless, it is plausible that these items both capture the dimension of how fusion
535 with one's internal experiences may govern one's behaviours and may hinder or limit
536 one's ability to engage in valued helpful actions towards wellbeing. These
537 assumptions should be further explored in future research examining the factorial
538 structure of this new measure and the potential existence of constructs underlying
539 fusion related to this specific eating-related dimension.

540 Studies on food craving have been conducted predominantly in women (e.g.,
541 Forman et al., 2013; Hill, 2007; Hooper et al., 2012) and thus questions remain about
542 the experiences associated with food craving across men and women, that can
543 potentially be addressed through the use of the CFQ-FC. In fact, results supported that
544 the CFQ-FC has high construct reliability and convergent validity for both men and

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545 women (Hair et al., 2010). CFQ-FC also demonstrated a strong measurement
546 invariance for both sexes (Chen et al., 2005; Cheung & Rensvold, 2002), which
547 supports that the scale has a simple and consistent structure across distinct
548 populations.

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

561 The correlation's analyses conducted for both men and women confirmed that
562 CFQ-FC was associated with other related measures in the expected directions. In
563 fact, results revealed that CFQ-FC was positively but moderately linked to a broad
564 measure of cognitive fusion. This result suggests that although CFQ-FC development
565 and content closely followed the original broad measure of CFQ (Gillanders et al.,
566 2014), the two measures assess specific and non-overlapping constructs. That is,
567 CFQ-FC seems to cover a specific construct that is related but distinct from a global
568 tendency to become entangled with one's internal experiences. Furthermore, cognitive
569 fusion focused on eating-related thoughts – CFQ-FC – was found to be closely linked

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570 but distinct from cognitive fusion focused on other construct that is key to disordered
571 eating problems – body image (CFQ-BI; Ferreira, Trindade, Duarte, et al., 2015).

572 Prior evidence showed that cognitive fusion is a central component of
573 psychological inflexibility, being associated with emotional distress and suffering
574 (Ferreira, Trindade, Duarte, et al., 2015; Gillanders et al., 2014; Hayes, 2004; Hayes
575 et al., 1999). In line with such findings, results also confirmed that cognitive fusion
576 focused on eating-related thoughts is associated with higher psychological
577 inflexibility and symptoms of depression, anxiety and stress (DASS21; Lovibond &
578 Lovibond, 1995). This result suggest that relating with one’s internal events about
579 eating as these were permanent events that reflect reality and require a reactive
580 response to them, may generate emotional distress and become problematic in one’s
581 life. The current findings are therefore in line with prior research that demonstrated
582 that food craving is associated with negative mood (e.g., depressive symptoms; Lafay
583 et al., 2000), while also supporting the assumption that more than this phenomenon
584 itself, it is the subjective experience and relationship the individual establishes with it
585 that may cause it to become associated with a range of deleterious psychological and
586 behavioural consequences (Gendall et al., 1998; Lafay et al., 2001). Although these
587 conclusions cannot be established through the current study’s findings and need to be
588 addressed through prospective experimental designs, it is plausible that the tendency
589 to become fused with the experience of food-related cognitive contents plays a critical
590 role in these associations.

591 In particular, our findings indicate that a higher tendency to become fused with
592 disturbing thoughts involving desires to eat, and with the struggle to resist impulses to
593 eat, is associated with a higher severity of eating psychopathology symptoms (EDEQ;
594 Fairburn & Beglin, 1994), namely binge eating (BES; Gormally et al., 1982). On the

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595 other hand, as expected, a negative association was found between CFQ-FC and the
596 capacity to guide one's eating behaviour by accepting, understanding and using one's
597 internal hunger and satiety signals, instead of eating in response to emotional or
598 external cues (IES-2; Tylka & Kroon Van Diest, 2013). Overall, the direction and
599 strength of the examined associations were similar in both sexes, although the link
600 between CFQ-FC and the study measures was stronger in women. These findings
601 corroborate prior studies that show that food cravings are associated with increased
602 maladaptive eating attitudes and behaviours, including episodes of loss of control
603 over eating (Greeno et al., 2000; Joyner et al., 2015; Waters et al., 2001).
604 Nonetheless, the associations examined in this study seems to support the hypothesis
605 that it is when individuals become fused with impulses or urges to eat that they tend
606 to present increased eating psychopathology symptoms. These findings are therefore,
607 in line with prior evidence that suggests that more than the occurrence of urges and
608 desires to eat, it is the cognitive and emotional processes associated with this
609 phenomenon that may determine its maladaptive impact.

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

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619 composition and related health risks, in community samples, in individuals struggling
620 with managing their weight and in clinical samples with eating disorders.

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

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

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

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

660 This data needs to be analysed with caution given that measures of eating
661 psychopathology inherently comprise the dimension of the excessive dominance of
662 eating-related cognitions (e.g., concerns about eating, attempts to control eating
663 behaviour or reactively eating in response to urges to eat), which could result in
664 artificially large associations between constructs, such as food craving-related
665 cognitive fusion and binge eating (e.g., as measured by the BES; Gormally et al.,
666 1982). The CFQ-FC items were carefully developed taking this aspect into
667 consideration. In fact, the items that comprise the final version of the CFQ-FC assess
668 the multiple dimensions of cognitive fusion (including the tendency to overidentify

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669 with, evaluate, overanalyse and try to control thought content, and to emotionally
670 react to it), instead of overly focusing on the impact of cognitive fusion over eating
671 behaviour. Nonetheless, future research should clarify these associations and examine
672 the relationship between CFQ-FC and other behavioural and experimental methods to
673 assess cognitive fusion related to eating, and its effect on eating behaviour and
674 psychological adjustment.

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

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

688 Nonetheless, future research is needed to further understand how this dimension
689 of cognitive fusion focused on eating interacts with other dimensions of cognitive
690 fusion (e.g., body image), and other processes (e.g., experiential avoidance) relevant
691 for eating psychopathology. In particular, it would be pertinent to investigate how this
692 new measure correlates with an existing food-craving measure focusing on the ACT
693 model processes of acceptance and willingness to experience aversive internal

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694 experiences, the FAAQ. This is an important limitation of the current study (as the
695 FAAQ is still not validated in the Portuguese population), which should be addressed
696 by future research.

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

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

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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	<i>M</i>	<i>SD</i>	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	1.73	1.03	.76	.58	.73			

anything else.

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			

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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**

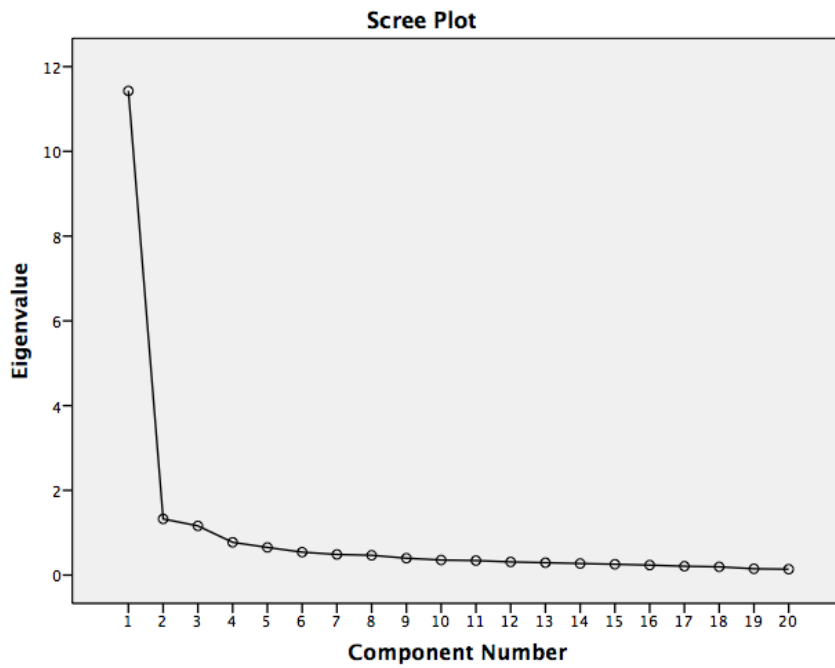
*** $p < .001$; ** $p < .010$

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

