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1 **The Weight-Focused Forms of Self-Criticising/Attacking and Self-Reassuring Scale:**
2 **Confirmatory Factor Analysis and associations with control, loss of control of eating**
3 **and weight in overweight and obese women**

4
5 **Abstract**

6
7 Objectives: The Weight-Focused Forms of Self-Criticising/Attacking and Self-reassuring scale
8 (WFSCRS) is based on the original Forms of Self-Criticising/Attacking and Self-reassuring
9 scale (FSCSRS; Gilbert et al., 2004) and assesses the inadequate and hated forms of self-
10 criticism and the ability to self-reassure when coping with attempts to control body weight,
11 shape and eating. The aim of the current study was to examine the factor structure, consistency
12 and reliability of the WFSCRS in overweight and obese women.

13 Methods: The factorial structure of the WFSCRS was examined through a Confirmatory Factor
14 Analysis in 724 overweight and obese women participating in a commercial weight
15 management programme. The scale's construct and convergent validity were also examined.

16 Results: The WFSCRS had a three-factor structure, similar to the FSCSRS, which fitted the
17 data well. The WFSCRS had high internal reliability, construct and discriminant validity. The
18 scale was positively associated with measures of shame, body image and eating-related
19 difficulties, symptoms of anxiety, depression and stress, and body mass index (BMI). The two
20 forms of self-criticism were significantly associated with higher BMI and this effect was
21 mediated by increased loss of control over eating (for both forms) and decreased flexible
22 control over eating (for the hated self form).

23 Conclusions: The WFSCRS is a valid measure for assessing self-reassurance and two
24 denigratory forms (inadequate self and hated self) of self-criticism in people who are
25 overweight and obese.

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Keywords: self-criticism, self-reassurance, obesity, body weight; confirmatory factor analysis

Practitioner Points

- The WFSCRS was developed to measure weight/shape and eating-related self-criticism and self-reassurance.
- The WFSCRS was examined in a large sample of overweight and obese women attending a community-based weight management programme.
- The WFSCRS presented a 3-factor structure measuring two forms of self-criticism (inadequate self and hated self) and the ability to be self-reassuring.
- The two forms of self-criticism and self-reassurance are differentially associated with BMI, through the mediating effect of loss of control over eating and flexible control over eating.

40 **Introduction**

41

42 Overweight, obesity and associated diseases are key societal challenges to the health of
43 almost 2 billion people worldwide (McPherson, Marsh, & Brown, 2007; WHO, 2013, 2018;
44 Swanton & Frost, 2007; Swinburn et al., 2011). The prevalence of overweight and obesity has
45 progressively increased over the last 40 years (WHO, 2018). Undernutrition is still a major
46 concern in many populations, but most individuals struggle to avoid weight gain as they grow
47 older due to an ‘obesogenic environment’ that facilitates excess energy intake and low levels
48 of energy expenditure (Lieberman, 2006). Despite this, there is a widespread attitude of
49 criticism of overweight/obesity, overeating patterns and physical inactivity (Puhl & Heuer,
50 2010). Modern Western societies tend to be punitive and discriminating towards perceived
51 failure, and obesity is often interpreted as a failure at self-control (Stubbs, Gale, Whybrow, &
52 Gilbert, 2013). Overweight and obese individuals are often stigmatized in different contexts of
53 their life such as their immediate social, health and employment contexts (Brownell, Puhl,
54 Schwartz, & Rudd, 2005; Puhl & Brownell, 2001). There is now consistent evidence that
55 weight stigma has detrimental effects on psychological adjustment (Puhl, Moss-Racusin, &
56 Schwartz, 2007). Being obese and trying to lose weight can create negative affect and stress,
57 which may impact on eating behaviour and derail weight loss attempts (Duarte, Matos, et al.,
58 2017; Foss & Dysrad, 2011). Stigma is an additional form of stress (Jackson, Beeken, &
59 Wardle, 2014; Puhl et al., 2007). Perceiving oneself as a member of a stigmatized group can
60 activate negative affect, feelings of shame and self-criticism (Gilbert, 2002).

61 Self-criticism can be viewed as a self-correcting or self-monitoring component of self-
62 regulation (Driscoll, 1989; Powers, Koestner, & Zuroff, 2007; Shahar, Henrich, Blatt, Ryan, &
63 Little, 2003). Self-criticism has been defined as occurring on a continuum. Indeed, Thompson
64 & Zuroff (2004) describe self-criticism as varying from a more externalized self-evaluative

65 domain that involves social comparisons and perceptions of hostility from others, to a more
66 internalized domain that entails a sense of inferiority and of falling short of one's (unrealistic)
67 goals (Thompson & Zuroff, 2004). Based on clinical practice with depressed patients and on
68 the Social Rank Theory (Gilbert, 1989, 2000, 2005), Gilbert et al. (2004) conceptualize
69 denigratory self-criticism as taking two forms: one form that involves evaluations of self-
70 inadequacies, limitations or faults (inadequate self) and another form that is characterized by
71 self-attacking, self-hatred, self-disgust and desires to hurt or attack the self (hated self). Several
72 studies show that the 'hated self' form of self-criticism is associated with shame and poorer
73 psychological adjustment (Castilho, Pinto-Gouveia, & Duarte, 2015; Duarte, Ferreira, & Pinto-
74 Gouveia, 2016; Gilbert et al., 2010; Harman & Lee, 2010; Luyten et al., 2007; Pinto-Gouveia,
75 Ferreira, & Duarte, 2014). In contrast, the ability to be self-reassuring and compassionate in
76 relation to personal setbacks or failures is negatively associated with indicators of
77 psychopathology and positively associated with psychological health (Gilbert et al., 2004,
78 2006).

79 In the context of eating and weight regulation, denigratory forms of self-criticism may
80 undermine self-regulation, as uncontrolled eating may be used as means to cope with negative
81 emotions resulting from self-criticism (Adams & Leary, 2007; Heatherton & Baumeister,
82 1991). Studies conducted in clinical samples with eating disorders (Duarte et al., 2016) and in
83 nonclinical samples from the general population (Duarte, Pinto-Gouveia, & Ferreira, 2014;
84 Palmeira, Pinto-Gouveia, Cunha, & Carvalho, 2017) show that the 'self-hated' form of self-
85 criticism is associated with greater eating disordered symptoms.

86 Gilbert and colleagues (2004) developed the Forms of Self-Criticising/Attacking and
87 Self-Reassuring Scale (FSCRS) to assess how individuals relate to themselves when
88 experiencing failures, limitations or threats to their social status. The scale's factor analysis
89 and psychometric properties were originally explored in a sample of female undergraduates.

90 Results suggested a three-factor model with one factor of self-reassurance and two factors of
91 self-criticism: inadequate self (linked to feelings of self-inadequacy) and hated self (related to
92 self-hatred, and feelings of self- disgust and self-contempt). Other studies confirmed the three-
93 factor structure of the FSCRS in nonclinical (Kupeli, Chilcot, Schmidt, Campbell, & Troop,
94 2013) and clinical samples (Baião, Gilbert, McEwan, & Carvalho, 2015; Castilho et al., 2015).
95 In recent studies of overweight/obese women attending a community-based weight
96 management programme (Duarte, Matos, et al., 2017; Duarte, Stubbs, et al., 2017) the FSCRS
97 was adapted to focus on the specific dimensions of body weight, shape and eating behaviour.
98 Higher scores on the inadequate self and hated self subscales were associated with higher
99 disinhibition of eating behaviour and with less weight loss in participants of the programme
100 (Duarte, Matos, et al., 2017). The ability to self-reassure was related to greater dietary restraint
101 and greater wellbeing (Duarte, Stubbs, et al., 2017). These results suggest that for some
102 individuals attending weight management programmes, internalisation of stigma as shame and
103 self-criticism may influence self-regulation of eating behaviour and weight outcomes. Weight
104 management programmes appear to be relatively effective for initial weight loss, but in the
105 longer-term the relapse and attrition rates are very high (Franz et al., 2007). Repeated cycles
106 of weight loss and weight regain may over time increase self-criticism and undermine self-
107 regulation of energy balance behaviours, which in turn may negatively impact psychological
108 wellbeing (Stubbs et al., 2013; Stubbs & Lavin, 2013).

109 This domain-specific version of the FSCRS – Weight-Focused Forms of Self-
110 Criticising/Self-Attacking and Self-Reassuring Scale (WFSCRS) – may enable researchers and
111 practitioners working with overweight/obese individuals to develop a wider understanding of
112 denigratory self-criticism and self-reassurance in self-regulation of eating behaviours and
113 related aspects of psychological adjustment. The current study examined the factorial structure
114 and psychometric properties of the WFSCRS in a sample of overweight and obese women

115 participating in a community-based weight management programme. This paper explored a
116 model examining the effect of these two forms of self-criticism (inadequate self and hated self)
117 and self-reassurance, on participants' BMI, mediated by increased loss of control over eating
118 (measured by the severity of binge eating symptomatology) and decreased control over eating
119 (measured by flexible dietary restraint).

120

121 **Method**

122

123 **Participants**

124 Participants were 724 women attending a diet and lifestyle commercial weight
125 management programme in the United Kingdom. Participants' mean (SD) age was 44.89
126 (11.30), with a range of 19-65, and mean (SD) BMI was 32.81 (6.40), with a range of 25.06-
127 66.14. 41.3% had a BMI between 25 and 29.99, 30.2% between 30 and 34.99, 15.4% between
128 35 and 39.99 and 13.1% > 40. At the time of the survey 44.2% had been in the programme for
129 6 months or less; 13.5% for 7 to 12 months, 12.5% for 13 to 18 months, 6.3% for 19 months
130 to 2 years, and 22.5% for more than 2 years. The number of self-reported previous weight loss
131 attempts were as follows, 40.7%, 1 to 5 times; 23.8%, 6 to 10 times; 5.6%, 11 to 15 times,
132 7.4%, 16 to 20 times; 21.7% >20 or countless times. On a scale from 1 ('Not at all') to 5
133 ('Extremely'), the mean perception of success at previous weight loss attempts was 2.99 (1.04),
134 perceptions that these efforts were too much of a struggle was 3.50 (0.92), and self-reported
135 relapse scores were 3.91 (0.91).

136

137 **Measures**

138

139 Weight-Focused Self-Criticising/Self-Reassuring Scale (WFSCRS)

140 This 22-item scale is derived from the Forms of Self-Criticising/Attacking and Self-
141 Reassuring Scale (FSCRS; Gilbert, Clarke, Hempel, Miles, & Irons, 2004). The FSCRS
142 assesses the degree to which people experience denigratory self-criticism or self-reassurance
143 when they encounter personal setbacks or failures. The WFSCRS' instructions to participants
144 were adapted to focus on weight, body shape and eating. The content of the items was not
145 changed (i.e., were kept as in the original FSCRS):

146 When we think about our weight and body shape we can sometimes have negative and self-
147 critical thoughts and feelings about ourselves, while at other times we can be caring and
148 supportive of ourselves. Below are a series of thoughts and feelings that you may have
149 experienced. Read each statement carefully and circle the number that best describes how
150 much each statement is true for you.

151 Participants rate each statement on a five-point scale (0 'Not at all like me' to 4
152 'Extremely like me'). The self-criticism scale has two subscales purporting to measure two
153 forms of denigratory self-criticism: i) inadequate self, which is a sense of feeling internally
154 put-down and inadequate (e.g., "I can't accept failures and setbacks without feeling
155 inadequate") and ii) hated self, which is a sense of self-dislike and aggressive/persecutory
156 desires to hurt the self (e.g., "I have become so angry with myself that I want to hurt or injury
157 myself"). The scale also purports to measure the construct of 'reassured self', which involves
158 an encouraging and supportive relationship with oneself when things go wrong (e.g., "I am
159 gentle and supportive with myself"). The original FSCRS has good reliability with Cronbach's
160 alphas of 0.90 for inadequate self, 0.86 for hated self, and 0.86 for reassured self.

161

162 Body Image Shame Scale (BISS)

163 The BISS (Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015) measures body image
164 shame. The scale comprises two subscales, with seven items each, designed to measure i)
165 externalized body image shame, which involves the avoidance of social situations in which

166 one's body image may be an object of negative scrutiny and denigratory criticism from others
167 and ii) internalized body image shame, which comprises negative self-evaluations and body
168 image concealment. Respondents are asked to rate each item according to the frequency with
169 which they experience shame about their body, using a 5-point scale (ranging from 0 'Never'
170 to 4 'Almost always'). Duarte et al. (2015) found the BISS total score and the externalized and
171 internalized body shame subscales to have high internal reliability (.92, .90, and .89,
172 respectively).

173

174 Depression, Anxiety and Stress Scales (DASS-21)

175 The DASS-21 is a 21-item scale (Lovibond & Lovibond, 1995) that measures
176 symptoms of depression, anxiety and stress (Lovibond & Lovibond, 1995). Respondents are
177 asked to rate how much each statement applied to them over the past week, using a 4-point
178 scale (ranging from 0 'did not apply to my' to 3 'Applied to me very much'). The subscales
179 have Cronbach's alpha values of 0.94 for depression, 0.87 for anxiety and 0.91 for stress
180 (Lovibond & Lovibond, 1995).

181

182 Binge Eating Scale (BES)

183 The BES (Gormally, Black, Daston, & Rardin, 1982) is a 16-item self-report instrument
184 that assesses behavioural, emotional and cognitive aspects of binge eating symptoms. Each
185 item comprises three to four statements that represent the severity of binge eating symptoms
186 (ranging from 0 'no difficulties with binge eating' to 3 'severe problems with binge eating').
187 In obese people the scale has good psychometric properties, with a Cronbach's alpha value of
188 0.85 (Gormally et al., 1982). In a sample of women from the general population the scale was
189 found to have good internal consistency (with a Composite Reliability value of 0.88; Duarte,
190 Pinto-Gouveia, & Ferreira, 2015).

191 Three Factor Eating Questionnaire (TEFQ)

192 The TFEQ (Stunkard & Messick, 1985) is a 51-item questionnaire that measures three
193 cognitive and behavioural dimensions of eating: restraint, a subscale that measures the
194 tendency to restrict food intake to control body weight and shape; disinhibition, which assesses
195 episodes of loss of control over eating; and susceptibility to hunger, which assesses subjective
196 perceptions of hunger and food craving. In the original study, the scale showed Cronbach's
197 alpha values of 0.93 for the subscale restraint, 0.91 for the subscale disinhibition, and 0.85 for
198 the subscale hunger.

199

200 Flexible and rigid control of eating behaviour

201 Additional items can be administered with the TEFQ (Westenhoefer et al., 2013;
202 Westenhoefer, Stunkard, & Pudel, 1999): five that assess flexible control of eating behaviour,
203 which involves the ability to follow a diet plan in which specific foods are not banned; nine
204 that assess rigid control of eating behaviour, including inflexible restrained eating behaviours
205 characterized by an 'all-or-nothing' attitude toward eating.

206

207 BMI

208 Participants' height was self-reported to the nearest 0.5 cm. Participants were weighed
209 in light clothing on scales with a precision of ± 0.23 kg (SECA bespoke model). Accuracy was
210 ensured by calibration against standard weights during routine service and scales were checked
211 weekly for accuracy. Participants were weighed weekly.

212

213 **Procedure**

214 The current study was part of a larger research programme investigating the effect of
215 adding an online digital compassion-based intervention to a multicomponent commercial

216 weight management programme (BLIND FOR REVIEW). The programme and approach to
217 behaviour change and weight management are described elsewhere (Stubbs, Morris, Pallister,
218 Horgan, & Lavin, 2015).

219 The study was approved by the [BLIND FOR REVIEW] Ethics Committee. The study
220 was presented to the programme Group Leaders who advertised it in-group to group attendees.
221 All study participants gave fully informed consent to take part in the study. Measures were
222 completed though an online survey. The questionnaire was constructed and administered using
223 Checkbox v4.4-Web Survey Software-Copyright ©2007, Prezza Technologies, Inc.

224

225 **Data analysis**

226 A Confirmatory Factor Analysis was conducted to assess the factorial structure of the
227 WFSCRS. The Maximum Likelihood method was applied. We first tested the adequacy of the
228 theoretical three-factor model of the original FSCRS (Gilbert et al., 2004). A two-factor model
229 (with the factors self-criticism and reassured self) was also assessed where the two forms of
230 denigratory self-criticism (inadequate self and hated self) were loaded on a higher-order factor
231 of self-criticism. The model fit was assessed using the following model fit indices: chi-square
232 statistic (χ^2), normed chi-square (χ^2/df ; with values ranging from 2 to 5 indicating good global
233 adjustment), Tucker Lewis Index (TLI) Comparative Fit Index (CFI), with values ranging from
234 .90 to .95 suggesting good fit, the Root Mean Square Error of Approximation (RMSEA), with
235 values between .05 and .08, indicating good fit; and the standardized root mean squared
236 residual (SRMR), with values below .08 suggesting good model fit. The Akaike information
237 criterion (AIC) and the Expected cross-validation index (ECVI) were used for model
238 comparison. Correlations among error terms with high modification indices were estimated
239 when the theoretical content of the item supported this approach (Brown, 2006; Kline, 2005).
240 The scale construct reliability was examined through the analysis of the composite reliability

241 (CR) and the average variance extracted (AVE; Fornell & Larcker, 1981). The association
242 between the WFSCRS and other related self-report measures and BMI were assessed through
243 Pearson product-moment correlation coefficients. A path analysis was conducted to model the
244 mediator effect of loss of control and control of eating on the association between inadequate
245 self, hated self, reassured self (exogenous variables) and participants' BMI (endogenous,
246 dependent variable). The significance of the indirect effects was assessed through the Bootstrap
247 method using 5000 resamples. Effects are statistically significant when zero is not included
248 between the lower and upper bound of the 95% bias-corrected confidence interval (CI).

249

250

251 **Results**

252

253 **Confirmatory Factor Analysis**

254 Fit indices for the three-factor model (inadequate self, hated self and reassured self)
255 suggested a good fit to the data: $\chi^2_{(206)} = 1095.98$ $p < .001$; $\chi^2/df = 5.32$; TLI = .87; CFI = .88;
256 RMSEA = .08, $p < .001$, SRMR = .05. Analyses of the Modification Indices (MI) indicated the
257 correlation of two pairs of items. A re-specified model was calculated where the error
258 covariances between the items 1 and 2 (MI = 242.38) and the items 6 and 7 (MI = 103.63) were
259 correlated. Results revealed a good model fit: $\chi^2_{(204)} = 699.63$, $p < .001$; $\chi^2/df = 3.43$; TLI = .93;
260 CFI = .94; RMSEA = .06, $p = .003$, SRMR = .05. The values of AIC (1189.98 > 797.63) and
261 ECVI (1.65 > 1.10) were lower and the Chi-square difference test indicated that the model with
262 these two error terms specified was more plausible ($\chi^2_{diff} = 396.36$, $df_{diff} = 2$, $p < .001$). Also,
263 the removal of these two items did not improve model fit: $\chi^2_{(167)} = 621.61$, $p < .001$; $\chi^2/df =$
264 3.72; TLI = .91; CFI = .93; RMSEA = .06, $p = .000$; SRMR = .05. Finally, a second-order

265 model was examined and results revealed a poor fit to the data ($\chi^2_{(205)}=944.44$, $p < .001$; χ^2/df
266 = 4.61; TLI = .89; CFI = .90; RMSEA = .07, $p = .000$, SRMR = .12).

267 The items' standardized regression weights (Table 1) for the Inadequate Self subscale
268 ranged from .45 (item 20) to .77 (item 7), for the hated self subscale ranged from .47 (item 9)
269 to .79 (item 22), and for the reassured self subscale ranged from .41 (item 19) to .80 (item 13).

270

271 Table 1 around here

272

273 **Validity Analyses**

274 The scale presented high internal consistency, with a Cronbach's alpha of .89 for the
275 inadequate self subscale, .80 for the hated self subscale and .84 for the reassured self subscale.
276 Regarding construct validity, results revealed a high CR for the inadequate self (CR = .93), for
277 the hated Self (.87) and for the reassured self (CR = .90) subscales. Also, the inadequate self
278 subscale presented an AVE value of .59, the hated self subscale an AVE of .58 and the
279 reassured self subscale an AVE of .53. The subscale's discriminant validity was assessed by
280 comparing the subscales' AVE with the square correlation between each pair of subscales.
281 Results indicated good discriminant validity between inadequate self and reassured self ($r^2 =$
282 .41) and hated self and reassured self ($r^2 = .55$), given that the AVE values were higher than r^2 .
283 The r^2 between inadequate self and hated self was .74 suggesting a lower discriminant validity
284 between these subscales.

285

286 **Convergent Validity**

287 The two forms of self-criticism were positively associated with measures of body
288 shame, eating behaviour, and depressive, anxiety and stress symptoms, whereas self-
289 reassurance had an opposite pattern of associations with these variables. Moreover, the

290 inadequate and hated self forms of self-criticism were positively associated with BMI, while
291 self-reassurance was negatively associated with BMI.

292
293 **Path analysis testing the associations between emotional binge eating, control and loss of**
294 **control of eating and BMI**

295 The mediation model of flexible control and loss of control of eating on the association
296 between forms of denigratory self-criticism and self-reassurance, and BMI, is depicted in
297 Figure 1. An initial analysis indicated that the following paths were nonsignificant: the direct
298 effect of inadequate self on flexible control ($B = -.03$; $SE = .02$; $p = .171$; $\beta = -.07$) and on BMI
299 ($B = -.07$; $SE = .04$; $p = .086$; $\beta = -.09$), and the direct effect of reassured self on BMI ($B = .07$;
300 $SE = .05$; $p = .126$; $\beta = .07$). These nonsignificant paths were progressively removed from the
301 model. The trimmed model showed a very good model fit ($X^2_{(3)} = 8.03$, $p = .045$; $CFI = 1.00$;
302 $TLI = .98$; $RMSEA = .05$ [.01, .09], $p = .457$; $SRMR = .02$; $AIC = 56.03$). The model accounted
303 for a total of 38% of the variance of binge eating symptoms, 10% of the variance of flexible
304 control over eating and 17% of the variance of BMI. The inadequate-self form of self-criticism
305 had a significant mediated effect of .04 on BMI (95% CI (.02, .06), $p = .000$) via increased
306 binge eating symptoms. The hated self form of self-criticism had a direct positive effect on
307 BMI ($\beta = .20$) and a significant mediated effect of .08 (95% CI (.05, .12), $p = .000$), through
308 increased binge eating symptoms ($.35 \times .16 = .06$) and through decreased flexible control over
309 eating ($-.15 \times -.16 = .02$). A different pattern of associations was found for reassured self which
310 had a significant negative indirect effect on BMI of -.05 (95% CI (-.09, -.03), $p = .000$),
311 mediated by decreased binge eating symptoms ($-.12 \times .16 = -.02$) and increased flexible control
312 over eating ($.21 \times -.16 = -.03$). Overall, the model suggested that the hated self form of self-
313 criticism had a stronger association with increased BMI and that its effect was partially
314 mediated by eating behaviour.

315

316 Figure 1 around here

317

318 Given the cross-sectional design of the data, an alternative model was examined testing

319 the effect of BMI on the denigratory forms of self-criticism and self-reassurance, mediated by

320 control and loss of control of eating (Figure 2). The path coefficients from flexible control over

321 eating to inadequate self ($B = -.12$; $SE = .10$; $p = .222$; $\beta = -.04$), hated self ($B = -.05$; $SE = .05$;

322 $p = .311$; $\beta = -.03$) and reassured self ($B = -.12$; $SE = .10$; $p = .534$; $\beta = -.02$) were nonsignificant

323 and removed from the model. The path coefficients between BMI and inadequate self ($B = .05$;

324 $SE = .04$; $p = .241$; $\beta = .04$) and reassured self ($B = -.02$; $SE = .03$; $p = .534$; $\beta = -.02$) were

325 also excluded. This model also presented a good model fit ($X^2_{(5)} = 19.01$, $p = .002$; $CFI = .99$;

326 $TLI = .97$; $RMSEA = .06$ [.03, .09], $p = .212$; $SRMR = .03$; $AIC = 63.44$). Nonetheless the AIC

327 value was lower ($\Delta = 7.41$) suggesting a poorer fit (Burnham & Anderson, 2004). BMI had a

328 significant indirect effect of .19 on inadequate self (95% CI (.14, .23), $p < .001$) mediated by

329 increased binge eating symptoms; and a significant indirect effect of -.15 on reduced reassured

330 self (95% CI (-.20, -.12), $p < .001$), again mediated by binge eating symptoms. Regarding the

331 hated self form of self-criticism, BMI had a direct effect of .13, and an indirect effect of .18

332 (95% CI (.14, .23), $p < .001$) mediated by increased binge eating symptomatology.

333

334 Figure 2 around here

335 Discussion

336

337

338 The current study shows that adaptation of the FSCRS to the WFSCRS presents a three-

339 factor structure similar to the structure obtained by the authors of the original FSCRS (Gilbert

340 et al. 2004). The CFA also confirmed the factor structure of the FSCRS in nonclinical and

341 clinical samples (Baião et al., 2015; Castilho et al., 2015; Kupeli et al., 2013). Each subscale
342 presented high internal consistency and composite reliability. The two forms of self-criticism
343 presented good discriminant validity relative to the self-reassurance subscale. Discriminant
344 validity was less evident for the inadequate-self and hated self subscales. A second-order model
345 in which the two latent self-criticism subscales were specified to load on a higher-order factor
346 revealed a poorer fit to the data. Overall, results supported the plausibility of the three-factor
347 model previously identified in the original version of the scale (Gilbert et al., 2004) that
348 identifies a factor of self-reassurance and two forms of denigratory self-criticism: one focused
349 on feelings of self-inadequacy and discouragement, and the other focused on feelings of self-
350 hatred and desires to harm or persecute the self for its faults. A distinct dimension captured by
351 this measure is the ability to self-reassure when facing body weight, shape and eating
352 difficulties. The associations between the three subscales and the other variables in the study
353 corroborated WFSCRS convergent validity. As in previous research, results confirmed that
354 there is a significant association between denigratory self-criticism and body image shame and
355 that this association is stronger for the hated self form of self-criticism (Duarte et al., 2014).
356 Associations were also positive and strong between the two forms of self-criticism and
357 symptoms of depression, anxiety and stress. The two forms of self-criticism were associated
358 with greater eating disinhibition and susceptibility to hunger cues, which reflects results of a
359 study in a separate sample of the same weight management programme (Duarte, Matos, et al.,
360 2017; Duarte, Stubbs, et al., 2017).

361 Self-criticism (particularly the hated self subscale) was associated with lower flexible
362 control of eating behaviour and higher binge eating symptoms. Positive associations were also
363 found between self-criticism and participants' BMI. To better understand these associations, a
364 path analysis modelled the hypothesis that self-criticism vs. self-reassurance may have an
365 influence on BMI via their effect on loss of control over eating (binge eating symptoms and

366 lower flexible control of eating behaviour). The model suggested that the two forms of
367 denigratory self-criticism may operate differently on these associations. Inadequate self may
368 have an indirect effect on BMI through its effect on increased loss of control over eating. The
369 hated self form of self-criticism appears to have both a direct association with BMI and an
370 indirect effect that is mediated by binge eating symptoms and lower flexible control of eating.
371 As the cross-sectional design of this study does not allow cause-effect relationships to be
372 inferred, a competing model was examined. The model presented a poorer fit but suggested
373 that increased BMI and difficulties in regulating eating behaviour are directly associated with
374 self-hatred self-criticism. It is important that future studies using prospective and experimental
375 designs examine these findings. Weight management programmes could be developed to offer
376 personalised solutions to individuals who may benefit from more targeted approaches that
377 address problems related to feelings of shame and negative self-criticism around difficulties to
378 control eating behaviour and manage weight and that promote self-reassuring abilities (Stubbs
379 et al. submitted).

380 This study has other limitations. An important limitation of the WFSCRS is that the
381 items of the scale were not adapted to focus on weight, shape and eating behaviour. Also, the
382 scale does not consider the distinctiveness of these three dimensions. Future developments of
383 a scale of self-criticism and self-reassurance should address this distinction between body
384 weight and shape, and eating behaviour. Also, this measure assesses self-criticism as involving
385 a sense of inferiority, defectiveness and self-hatred, and does not include items that relate to a
386 corrective self-regulatory function of self-criticism (Driscoll, 1989; Powers et al., 2007). A
387 scale is currently being designed (by the authors) that accounts for both self-corrective and
388 self-denigratory forms of self-criticism. These different dimensions of self-criticism may have
389 different effects on energy balance behaviours and weight control capability. This study sample
390 is representative of individuals attending weight management programmes (predominantly

391 middle-aged Caucasian women). However, is important to evaluate the WFSCRS's
392 applicability to a wider range of people who experience distress relating to their weight, shape
393 and eating. These include men and overweight/obese individuals not engaged in weight loss
394 attempts. Also, given the cross-sectional design of the study, it was not possible to examine the
395 scale's temporal stability. Future research should investigate the scale's test-retest reliability
396 and its sensitivity to change during weight management interventions. Despite these
397 limitations, the WFSCRS seems to be an important contribution to research focused on the
398 correlates and effects of self-criticism and self-reassurance in the context of weight
399 management.

400

401 **References**

402

403 Adams, C. E., & Leary, M. R. (2007). Promoting self-compassionate attitudes toward eating
404 among restrictive and guilty eaters. *Journal of Social and Clinical Psychology, 26*, 1120-1144.
405 doi:10.1521/jscp.2007.26.10.1120

406 Baião, R., Gilbert, P., McEwan, K., & Carvalho, S. (2015). Forms of Self-Criticising/Attacking
407 & Self-Reassuring Scale: Psychometric properties and normative study. *Psychology and
408 Psychotherapy: Theory, Research & Practice, 88*(4), 438-452. doi:10.1111/papt.12049

409 Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford.

410 Brownell, K. D., Puhl, R. M., Schwartz, M. B., Rudd, L., (2005). *Weight bias: Nature,
411 consequences, and remedies*. New York, NY: The Guilford Press.

412 Burnham, K. P., & Anderson, D. R. (2004). Multimodel Inference: Understanding AIC and
413 BIC in Model Selection. *Sociological Methods & Research, 33*(2), 261-304.
414 doi:10.1177/0049124104268644

415 Castilho, P., Pinto-Gouveia, J., & Duarte, J. (2015). Exploring self-criticism: Confirmatory
416 Factor Analysis of the FSCRS in clinical and nonclinical samples. *Clinical Psychology &*
417 *Psychotherapy*, 22(2), 153-164. doi:10.1002/cpp.1881

418 Driscoll, R. (1989). Self-condemnation: A comprehensive framework for assessment and
419 treatment. *Psychotherapy: Theory, Research, Practice, Training*, 26, 104–111.
420 doi:10.1037/h0085394

421 Duarte, C., Ferreira, C., & Pinto-Gouveia, J. (2016). At the core of eating disorders:
422 Overvaluation, social rank, self-criticism and shame in anorexia, bulimia and binge eating
423 disorder. *Comprehensive Psychiatry*, 66, 123-131. doi:10.1016/j.comppsy.2016.01.003

424 Duarte, C., Matos, M., Stubbs, R. J., Gale, C., Morris, L., Gouveia, J. P., & Gilbert, P. (2017).
425 The impact of shame, self-criticism and social rank on eating behaviours in overweight and
426 obese women participating in a weight management programme. *PloS One*, 12(1), e0167571.
427 doi:10.1371/journal.pone.0167571

428 Duarte, C., Pinto-Gouveia, J., & Ferreira, C. (2014). Escaping from body image shame and
429 harsh self-criticism: Exploration of underlying mechanisms of binge eating. *Eating Behaviors*,
430 15(4), 638-643. doi:10.1016/j.eatbeh.2014.08.025

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

434 Duarte, C., Pinto-Gouveia, J., Ferreira, C., & Batista, D. (2015). Body image as a source of
435 shame: A new measure for the assessment of the multifaceted nature of body image shame.
436 *Clinical Psychology & Psychotherapy*, 22(6), 656-666. doi:10.1002/cpp.1925

437 Duarte, C., Stubbs, J., Pinto-Gouveia, J., Matos, M., Gale, C., Morris, L., & Gilbert, P. (2017).
438 The Impact of Self-Criticism and Self-Reassurance on Weight-Related Affect and Well-Being

439 in Participants of a Commercial Weight Management Programme. *Obesity Facts*, 10(7), 65-
440 75. doi:10.1159/000454834

441 Fornell, C., & Larcker, D. (1981). Evaluating structural equation models with unobservable
442 variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50. Retrieved
443 from: [http://faculty-gsb.stanford.edu/larcker/PDF/6 Unobservable Variables.pdf](http://faculty-gsb.stanford.edu/larcker/PDF/6%20Unobservable%20Variables.pdf)

444 Foss, B., & Dysrad, S. (2011). Stress in obesity: Cause or consequence? *Medical Hypotheses*,
445 77, 7-10. doi: 10.1016/j.mehy.2011.03.011

446 Gilbert, P. (1989). *Human nature and suffering*. Hove: Lawrence Erlbaum Associates.

447 Gilbert, P. (2000). Social mentalities: Internal 'social' conflicts and the role of inner warmth
448 and compassion in cognitive therapy. In P. Gilbert & K. G. Bailey (Eds.), *Genes on the couch:*
449 *Explorations in evolutionary psychotherapy* (pp. 118-150). Philadelphia: Brunner-Routledge.

450 Gilbert, P. (2002). Body shame: A biopsychosocial conceptualisation and overview with
451 treatment implications. In P. Gilbert & J. Miles (Eds.), *Body shame: Conceptualisation,*
452 *research and treatment* (pp. 3-54). New York: Brunner Routledge.

453 Gilbert, P. (2005). Social mentalities: A biopsychosocial and evolutionary reflection on social
454 relationships. . In M. B. Baldwin (Ed.), *Interpersonal cognition* (pp. 299-335). New York:
455 Guilford.

456 Gilbert, P., Clarke, M., Hempel, S., Miles, J., & Irons, C. (2004). Criticizing and reassuring
457 oneself: An exploration of forms, styles and reasons in female students. *British Journal of*
458 *Clinical Psychology*, 43(1), 31-50. doi:0.1348/014466504772812959

459 Gilbert, P., McEwan, K., Irons, C., Bhundia, R., Christie, R., Broomhead, C., & Rockliff, H.
460 (2010). Self-harm in a mixed clinical population: the roles of self-criticism, shame, and social
461 rank. *British Journal of Clinical Psychology*, 49(Pt 4), 563-576.
462 doi:10.1348/014466509X479771

463 Gormally, J., Black, S., Daston, S., & Rardin, D. (1982). The assessment of binge eating
464 severity among obese persons. *Addictive Behaviors*, 7(1), 47-55. doi:10.1016/0306-
465 4603(82)90024-7

466 Harman, R., & Lee, D. (2010). The role of shame and self-critical thinking in the development
467 and maintenance of current threat in post-traumatic stress disorder. *Clinical Psychology and*
468 *Psychotherapy and Psychosomatics*, 17, 13–24. doi:10.1002/cpp.636

469 Heatherton, T., & Baumeister, R. (1991). Binge eating as escape from self-awareness.
470 *Psychological Bulletin*, 110(1), 86-108. doi:10.1037/0033-2909.110.1.86

471 Jackson, S. E., Beeken, R. J., & Wardle, J. (2014). Perceived weight discrimination and
472 changes in weight, waist circumference, and weight status. *Obesity*, 22, 2485-2488.
473 doi:10.1002/oby.20891

474 Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New
475 York: The Guilford Press.

476 Kupeli, N., Chilcot, J., Schmidt, U., Campbell, I., & Troop, N. (2013). A confirmatory factor
477 analysis and validation of the forms of self-criticism/reassurance scale. *British Journal of*
478 *Clinical Psychology*, 52(1), 12-25. doi:10.1111/j.2044-8260.2012.02042.x

479 Lieberman, L. S. (2006). Evolutionary and anthropological perspectives on optimal foraging
480 in obesogenic environments. *Appetite*, 47(1), 3-9. doi:10.1016/j.appet.2006.02.011

481 Lovibond, S., & Lovibond, P. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd
482 ed.). Sydney: Psychology Foundation.

483 Luyten, P., Sabbe, B., Blatt, S. J., Meganck, S., Jansen, B., De Grave, C., . . . Corveleyn, J.
484 (2007). Dependency and self-criticism: relationship with major depressive disorder, severity
485 of depression, and clinical presentation. *Depression and Anxiety*, 24(8), 586-596.

486 McPherson, K., Marsh, T., & Brown, M. (2007). Tackling obesities: Future choices -
487 Modeling future trends in obesity and the impact on health. London: Government Office for
488 Science.

489 World Health Organization (2013). Methodology and summary: Country profiles on nutrition,
490 physical activity and obesity in the 53 WHO European Region Member States Retrieved from:
491 <http://www.euro.who.int/en/health-topics/noncommunicable-diseases/obesity>.

492 World Health Organization (2018). Double burden of malnutrition: Policy brief. Retrieved
493 from: <http://www.who.int/nutrition/double-burden-malnutrition/en/>.

494 Palmeira, L., Pinto-Gouveia, J., Cunha, M., & Carvalho, S. (2017). Finding the link between
495 internalized weight-stigma and binge eating behaviors in Portuguese adult women with
496 overweight and obesity: The mediator role of self-criticism and self-reassurance. *Eating
497 Behaviour*, 26, 50-54. doi:10.1016/j.eatbeh.2017.01.006

498 Pinto-Gouveia, J., Ferreira, C., & Duarte, C. (2014). Thinness in the pursuit for social safeness:
499 An integrative model of social rank mentality to explain eating psychopathology. *Clinical
500 Psychology & Psychotherapy*, 21(2), 154-165. doi:10.1002/cpp.1820

501 Powers, T., Koestner, R., & Zuroff, D. (2007). Self-criticism, goal motivation, and goal
502 progress. *Journal of Social and Clinical Psychology*, 26(7), 826-840.
503 doi:10.1521/jsocp.2007.26.7.826

504 Puhl, R., & Brownell, K. D. (2001). Obesity, bias, and discrimination. *Obesity Research*, 8,
505 788–805. doi:10.1038/oby.2001.108

506 Puhl, R., Moss-Racusin, C., & Schwartz, M. (2007). Internalization of weight bias:
507 Implications for binge eating and emotional well-being. *Obesity*, 15(1), 19-23.
508 doi:10.1038/oby.2007.521

509 Puhl, R. M., & Heuer, C. A. (2010). Obesity stigma: Important considerations for public health.
510 *American Journal of Public Health*, 100(6), 1019-1028. doi:10.2105/AJPH.2009.159491

511 Shahar, G., Henrich, C. C., Blatt, S. J., Ryan, R., & Little, T. D. (2003). Interpersonal
512 relatedness, self-definition, and their motivational orientation during adolescence: A
513 theoretical and empirical integration. *Developmental Psychology*, 39(3), 470—483.
514 doi:10.1037/0012-1649.39.3.470

515 Stubbs, R. J., Gale, C., Whybrow, S., & Gilbert, P. (2012). The evolutionary inevitability of
516 obesity in modern society: implications for behavioral solutions to weight control in the general
517 population. In M. P. Martinez & H. Robinson (Eds.), *Obesity and Weight Management:
518 Challenges, Practices and Health Implications*: Novo Publishing.

519 Stubbs R.J., & Lavin, J. H. (2013). The challenges of implementing behaviour changes that
520 lead to sustained weight management. *Nutrition Bulletin*, 38, 5-22. doi:10.1111/nbu.12002

521 Stubbs, R. J., Morris, L., Pallister, C., Horgan, G., & Lavin, J. H. (2015). Weight outcomes
522 audit in 1.3 million adults during their first 3 months' attendance in a commercial weight
523 management programme. *BMC Public Health*, 10(15), 882. doi:10.1186/s12889-015-2225-0

524 Stunkard, A., & Messick, S. (1985). The Three-factor Eating Questionnaire to measure dietary
525 restraint, disinhibition and hunger. *Journal of Psychosomatic Research*, 29(1), 71-83.
526 doi:10.1016/0022-3999(85)90010-8

527 Swanton, K., & Frost, M. (2007). Lightening the load: Tackling overweight and obesity.
528 National Heart Forum. Retrieved from:
529 http://www.heartforum.org.uk/Publications_NHFreports_Overweightandobesitytool.aspx).

530 Swinburn, B. A., Sacks, G., Hall, K. D., McPherson, K., Finegood, D. T., Moodie, M. L., &
531 Gortmaker, S. L. (2011). The global obesity pandemic: Shaped by global drivers and local
532 environments. *Lancet*, 378(9793), 804-814. doi:10.1016/S0140-6736(11)60813-1

533 Thompson, R., & Zuroff, D. C. (2004). The levels of self-criticism scale: Comparative self-
534 criticism and internalized self-criticism. *Personality and Individual Differences*, 36(2), 419-
535 430. doi:10.1016/S0191-8869(03)00106-5

536 Westenhoefer, J., Engel, D., Holst, C., Lorenz, J., Peacock, M., Stubbs, J., . . . Raats, M. (2013).
537 Cognitive and weight-related correlates of flexible and rigid restrained eating behaviour.
538 *Eating Behaviors*, 14, 69-72. doi:10.1016/j.eatbeh.2012.10.015
539 Westenhoefer, J., Stunkard, A. J., & Pudel, V. (1999). Validation of the flexible and rigid
540 control dimensions of dietary restraint. *International Journal of Eating Disorders*, 26, 53-64.
541 doi:10.1002/(SICI)1098-108X(199907)26:1<53::AID-EAT7>3.0.CO;2-N
542

Table 1. Standardized Regression Weights (SRW) and Squared Multiple Correlations (SMC)

	SRW	SMC
Inadequate self		
1. I am easily disappointed with myself.	.68	.46
2. There is a part of me that puts me down.	.70	.49
4. I find it difficult to control my anger and frustration at myself.	.60	.36
6. There is a part of me that feels I am not good enough.	.76	.58
7. I feel beaten down by my own self-critical thoughts.	.78	.61
14. I remember and dwell on my failings.	.75	.56
17. I can't accept failures and setbacks without feeling inadequate.	.67	.45
18. I think I deserve my self-criticism.	.74	.54
20. There is a part of me that wants to get rid of the bits I don't like	.45	.20
Hated self		
9. I have become so angry with myself that I want to hurt or injure myself	.47	.23
10. I have a sense of disgust with myself.	.75	.57
12. I stop caring about myself.	.68	.47
15. I call myself names.	.66	.43
22. I do not like being me.	.78	.62
Reassured self		
3. I am able to remind myself of positive things about myself	.61	.37
5. I find it easy to forgive myself.	.45	.20
8. I still like being me.	.76	.58
11. I can still feel lovable and acceptable.	.77	.59
13. I find it easy to like myself.	.81	.65
16. I am gentle and supportive with myself.	.68	.47
21. I encourage myself for the future.	.60	.36

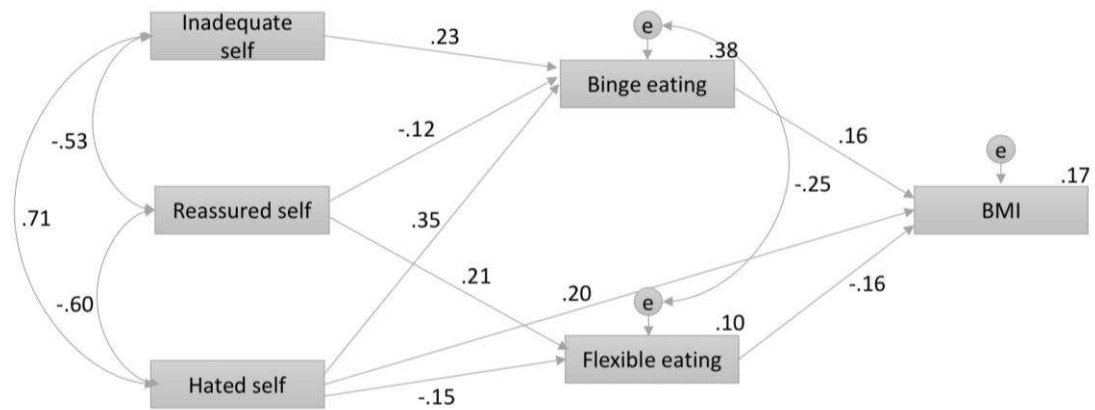
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Table 2. Correlations between WFSCRS subscales and measures of shame, eating behaviour, psychological adjustment and BMI.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Inadequate self	1												
2 Reassured self	-.53**	1											
3 Hated self	.71**	-.60**	1										
4 BISS	.64**	-.53**	.67**	1									
5 Disinhibition	.37**	-.29**	.34**	.43**	1								
6 Hunger	.30**	-.22**	.28**	.37**	.61**	1							
7 Restraint	-.13**	.24**	-.16**	-.13**	-.33**	-.28**	1						
8 Flexible control	-.25**	.29**	-.27**	-.22**	-.38**	-.32**	.73**	1					
9 Rigid control	.13**	.01	.11*	.18**	.13**	.11**	.50**	.37**	1				
10 Binge Eating	.55**	-.45**	.58**	.60**	.68**	.57**	-.28**	-.37**	.13**	1			
11 Depression	.60**	-.52**	.69**	.59**	.35**	.30**	-.18**	-.27**	.06	.54**	1		
12 Anxiety	.48**	-.31**	.52**	.50**	.22**	.23**	-.07	.14**	.08*	.42**	.71**	1	
13 Stress	.57**	-.41**	.56**	.52**	.27**	.24**	-.05	.14**	.13**	.44**	.76**	.73**	1
14 BMI	.23**	-.19**	.34**	.40**	.19**	.20**	-.25**	-.27**	.04	.34**	.28**	.28**	.17**

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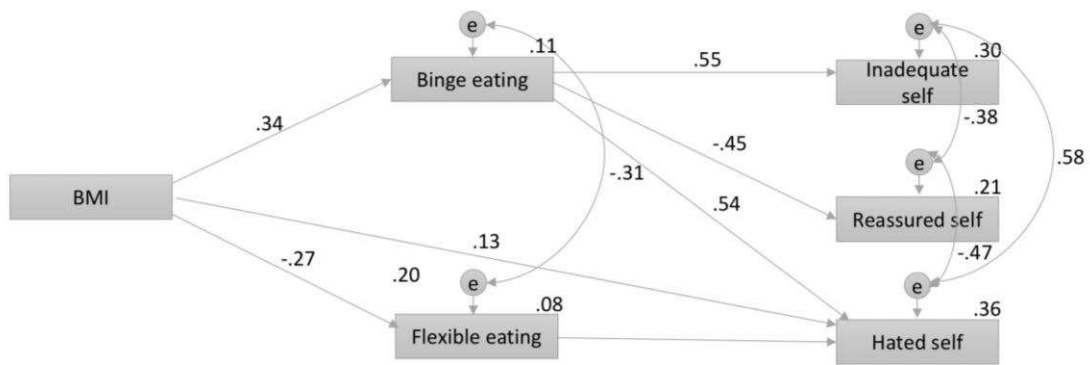
** p < .001



548

549 Figure 1. Path model with the association between self-criticism and self-reassurance
 550 and BMI mediated by binge eating symptoms and flexible control of eating, with standardized
 551 estimates and square multiple correlations.

552



553

554 Figure 2. Alternative path model with the association between BMI and self-criticism

555 and reassured self, mediated by binge eating symptoms and flexible control of eating, with

556 standardized estimates and square multiple correlations.

557