

1 **A structural equation model of intuitive eating with adolescents**

2 Un modèle d'équation structurelle de l'alimentation intuitive avec des adolescents

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26

Abstract

27

28 *Introduction.* - The tendency to eat by paying attention and respecting the body's hunger
29 and satiety cues is called intuitive eating. This eating behavior has been linked to positive
30 health and well-being outcomes.

31 *Objective.* - The purpose of this study was to test a global model linking intuitive eating
32 with self-esteem, body esteem, media influence and including fear of negative appearance
33 evaluation in adolescents' boys and girls.

34 *Method.* - In total, 740 adolescent high school students (51.5% girls; M age = 14, SD = 1.5)
35 completed self-report questionnaires with measures of intuitive eating, body esteem, self-
36 esteem, media influence and fear of negative appearance evaluation.

37 *Results.* - Structural equation modeling revealed an overall excellent fit for the final four-
38 variable model excluding the fear of negative appearance evaluation variable. Mediation
39 analyses showed an indirect relationship between intuitive eating and body esteem via
40 media influence, for girls but not for boys. Body esteem mediated the relationship between
41 intuitive eating and self-esteem, for girls and boys.

42 *Conclusion.* - A new model is proposed where intuitive eating is associated with self-
43 esteem through body esteem and media influence. These findings suggest that regulating
44 attitudes and behaviors toward food may be related to higher psychological well-being.

45 **Résumé**

46 *Introduction.* - La tendance à manger en portant attention et en respectant les indices de
47 faim et de satiété de son corps est appelée alimentation intuitive. Ce comportement est
48 associé à l'estime corporelle, à l'estime de soi et à l'influence des médias.

49 *Objectif.* - Le but de cette étude était d'établir un modèle mettant en relation l'alimentation
50 intuitive, l'estime de soi, l'estime corporelle, l'influence des médias et la peur d'être évalué
51 négativement par autrui chez des adolescents garçons et filles.

52 *Méthode.* - Au total, 740 adolescents du secondaire (51.5% de filles ; âge $M = 14.0$, $ET =$
53 1.5) ont rempli des questionnaires d'auto-évaluation avec des mesures de l'alimentation
54 intuitive, de l'estime corporelle, de l'estime de soi, de l'influence des médias et de la peur
55 d'être évalué négativement par autrui.

56 *Résultats.* - La modélisation par équation structurelle a révélé un excellent ajustement
57 global pour le modèle final à quatre variables excluant l'échelle de la peur d'être évalué
58 négativement par autrui. Les analyses de médiation ont montré une relation indirecte entre
59 l'alimentation intuitive et l'estime corporelle via l'influence des médias, chez les filles,
60 mais pas chez les garçons. L'estime corporelle avait un rôle de médiateur dans la relation
61 entre l'alimentation intuitive et l'estime de soi, pour les filles et les garçons.

62 *Conclusion.* - Un nouveau modèle est proposé où l'alimentation intuitive est associée à
63 l'estime de soi à travers l'estime corporelle et l'influence des médias. Ces résultats
64 suggèrent que la régulation des attitudes et des comportements à l'égard de la nourriture
65 puisse être reliée à des variables de bien-être psychologique.

A structural equation model of intuitive eating with adolescents

66 *Keywords:* eating behaviors; body image; self-esteem; media influence; appearance
67 evaluation.

68 *Mots-clés:* comportements alimentaires; image corporelle; estime de soi; influence des
69 médias; évaluation de l'apparence.

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1 Introduction

Restriction of eating behaviors is believed by many to control body shape. However, research has largely shown that this approach is ineffective and rather may contribute to food and body preoccupation, thus reducing levels of well-being (Bacon & Aphramor, 2011). Given the high prevalence of low body esteem in the general population (Aimé, Cotton, Guitard, & Bouchard, 2012; As-Sa'Edi et al., 2013; Neighbors & Sobal, 2007), and its association with poorer psychoemotional functioning and higher levels of disordered eating that are an important economic and public health burden (Fallon, Harris, & Johnson, 2014; Haddad et al., 2019), research on how to promote healthy eating behaviors is worth pursuing. Intuitive eating — the tendency to follow physical hunger and satiety cues rather than emotional reason (Tylka, 2006) — has been shown to be linked to such variables as body esteem (Andrew, Tiggemann, & Clark, 2015), self-esteem (Schaefer & Magnuson, 2014) and media influence (Tylka & Kroon Van Diest, 2013). However, to date, only few studies have tested a model integrating all these variables together. Testing such a model would be especially relevant for adolescents who may be at greater risk due to their fear of negative peer evaluation (Trompeter et al., 2018). In this paper, we investigated the role of media influence and fear of negative peer evaluation in the association between intuitive eating, body esteem and self-esteem with adolescents as well as potential gender differences. This approach may shed light on the psychological benefits of intuitive eating and help identify processes influencing those relationships. This study will also help clarify how healthy eating may be associated with higher well-being.

92 **1.1 Intuitive Eating and Body Esteem**

93 Eating is much more than a process of bodily nourishment; it is also a social, cultural,
94 and psychological act. Indeed, individuals eat because they are hungry, but also in response
95 to socio-environmental cues or for emotional reasons, such as relieving boredom or anxiety
96 (Gast & Hawks, 1998). Some reasons for eating can lead to adaptive or maladaptive
97 behaviors. However, in contrast, intuitive eating has been consistently related to measures
98 of psychological well-being, such as satisfaction with life, proactive coping, and body
99 esteem (Linardon, Tylka, & Fuller-Tyszkiewicz, 2021; Schaefer & Magnuson, 2014;
100 Tylka, 2006; Van Dyke & Drinkwater, 2014). Indeed, because those who appreciate their
101 bodies are more likely to be receptive to their body signals, intuitive eating has been
102 hypothesized to be related to higher body esteem (Tylka & Kroon Van Diest, 2013).
103 Consistent with this, a group participating in an intervention program during 14 weeks with
104 a focus on intuitive eating concepts reported increased body esteem and a greater
105 association between intuitive eating and body esteem in the short and long term (Bégin et
106 al., 2019). Some studies have found that two intuitive eating components (i.e., eating for
107 physical rather than emotional reasons, and reliance on internal hunger and satiety cues)
108 made specific contributions to indicators of well-being (Tylka & Wilcox, 2006). A
109 systematic review indicated that intuitive eating correlated with higher body image (Bruce
110 & Ricciardelli, 2016), and this relationship was consistent for total scores and subscales
111 and across three different age groups from emerging adulthood to middle adulthood
112 (Augustus-Horvath & Tylka, 2011) as well as adolescents for boys and girls (Andrew et
113 al., 2015; Andrew, Tiggemann, & Clark, 2016; Dockendorff, Petrie, Greenleaf, & Martin,
114 2012; Williams et al., 2006). Because healthy lifestyle intervention programs targeting

115 intuitive eating behaviors have been shown to increase well-being (Carbonneau et al.,
116 2017), focusing on intuitive eating for health purposes could help foster body esteem and
117 self-esteem (Van Dyke & Drinkwater, 2014), important variables for the development of
118 young people. It is also important to consider external influence such as media which can
119 be associated with how people should look and on eating behavior (Kwon, 2020).

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121 **1.2 Intuitive Eating and Media influence**

122 Intuitive eating and media influence are connected through the internalization of
123 media appearance ideals. For example, eating for physical rather than emotional reasons
124 and reliance on satiety cues have both associated with lower internalization of media
125 appearance ideals (Tylka & Kroon Van Diest, 2013). It could be that lower internalization
126 of appearance ideals might lead to more intuitive eating, but it is possible that people who
127 eat intuitively may better resist media and social pressure. For instance, one study found
128 that women who eat according to their hunger and satiety cues were less likely to focus on
129 how their body appears to others (Augustus-Horvath & Tylka, 2011). Intuitive eating might
130 therefore create protective cognitive schemas that can buffer individuals against socio-
131 environmental pressure. This view of the relationship between these variables may be
132 useful for adolescents, given the potential impact of media on their health (Strasburger,
133 Donnerstein, & Bushman, 2014), and on their food consumption (Beaudoin, 2014;
134 Qutteina, De Backer, & Smits, 2019), especially with the fact that girls seem to be very
135 sensitive to media influence (Cusumano & Thompson, 2001; Dohnt & Tiggemann, 2006b;
136 Eisenberg, Ward, Linde, Gollust, & Neumark-Sztainer, 2017). If people can follow

137 intervention programs and eat more intuitively, they can also better resist external social
138 pressure as media influence, which in turn could affect their body and self-esteem.

139

140 **1.3 Media influence and Body Esteem**

141 A large body of research has shown that media, television, and online video clips
142 affect how people feel about their bodies (Dohnt & Tiggemann, 2006a, 2006b; Eisenberg
143 et al., 2017; Grabe, Ward, & Hyde, 2008; Mulgrew, Volcevski-Kostas, & Rendell, 2014;
144 Peter & Valkenburg, 2014; Thompson & Heinberg, 1999). This media influence has the
145 capacity to change what people think about their physical appearance. Two important
146 factors need to be considered regarding media influence. First, there is the internalization
147 of an ideal body, referring to the adoption of media-publicized ideals as personal standards
148 of attractiveness (Cusumano & Thompson, 2001; Grabe et al., 2008). This variable refers
149 to the endorsement of the media ideal along with behavior modifications to try to reach
150 these standards, as reflected by comparison with ideal images in the media (Rodgers,
151 McLean, & Paxton, 2015; Thompson & Stice, 2001). Second, there is the perception of
152 pressure from the media to emulate the look promoted by models and actors (Cusumano &
153 Thompson, 2001). It seems that the media strongly influence how adolescents feel about
154 their body and the kind of ideals they pursue (Hargreaves & Tiggemann, 2002; Lawrie,
155 Sullivan, Davies, & Hill, 2006; Mulgrew et al., 2014), with a greater influence for girls
156 than for boys (Cusumano & Thompson, 2001; Dohnt & Tiggemann, 2006b; Knauss,
157 Paxton, & Alsaker, 2008).

158 **1.4 Body Esteem, Self-Esteem, and Fear of Peer Evaluation**

159 How people think about their body is important to their well-being. For instance,
160 body esteem has been shown to be associated with lower anxiety and depression, and with
161 higher self-esteem among university students and adolescents (Duchesne et al., 2017;
162 Gilbert & Meyer, 2005; Kostanski & Gullone, 1998). Abdollahi and Abu Talib (2016) have
163 shown that university students with low self-esteem and body esteem are more likely to
164 report social anxiety. A possible interpretation given by the authors is that individuals with
165 low body-esteem and self-esteem are concerned about negative evaluation from others.
166 Consistent with this, a significant correlation between body esteem and higher fear of
167 negative evaluation by others has also been reported (Lundgren, Anderson, & Thompson,
168 2004). In addition, an association between fear of negative evaluation by others and lower
169 self-esteem has been found (Begley & White, 2003). However, to our knowledge, there
170 have been no studies where fear of negative evaluation by others has been examined as a
171 possible mechanism between body esteem and self-esteem with adolescents' boys and
172 girls.

173

174 **1.5 The Present Research**

175 In sum, the literature suggests associations between intuitive eating and body esteem,
176 intuitive eating and media influence, media influence and body esteem and finally between
177 body esteem, self-esteem and fear of negative evaluation. The purpose of this study was to
178 consider all those relationships together for adolescent boys and girls by testing a global
179 path from intuitive eating to self-esteem through body esteem, media influence and fear of
180 negative appearance evaluation by others. To do so, we used structural equation modeling

181 analyses and mediation analyses. The inclusion of intuitive eating as a starting point should
182 contribute significantly to a better understanding of the mechanisms at play in the
183 relationship between intuitive eating and body esteem and self-esteem, both of which are
184 important in the success of intervention programs.

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2 Method

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188 2.1 Participants

189 Of the 908 eligible students recruited from two French semi-urban high schools in
190 Canada, 740 completed questionnaires (81.5% participation rate; 51.5% girls; M age = 14,
191 $SD = 1.5$). Participants were told that the study would be helpful to better understand body
192 esteem. A total of 293 (oz 415) grade 7 students (70.6% participation rate; 52.2% girls; M
193 age = 12.1, $SD = 0.4$) and 447 (oz 493) grade 10 students (90.7% participation rate; 51.0%
194 girls; M age = 15.2, $SD = 0.4$) were recruited. The difference in response rates between
195 grade 7 and grade 10 could be explained by the parental consent needed for the younger
196 participants. The families' socioeconomic status was not available to the investigators, but
197 participating schools were in middle- and high-class socioeconomic settings (IMSE¹
198 between 2 and 4). Data were collected online in class (see Table 1 for descriptive statistics
199 on the questionnaires). Electronic informed consent was obtained from the participants and

¹ The IMSE is an official decile ranking of the school socioeconomic index based on the socioeconomic environment index ranging from 1 (the most advantaged) to 10 (the least advantaged). It is made up of the proportion of families with children whose mothers do not have a diploma, certificate, or degree (which is two thirds of the weight of the index) and the proportion of households whose parents were not employed during the Canadian Census reference week (one third of the weight of the index).

200 written informed consent was obtained from parents of participants under 14 years of age.
201 The Ethics Committee of the Jonquiere College approved this study.

202 **2.2 Measures**

203 - *French-Canadian adaptation of the Intuitive Eating Scale-2* (Carbonneau et al., 2016;
204 Tylka & Kroon Van Diest, 2013): From the original 23-item scale, we used four out of
205 eight items (i.e., items 11, 12, 13 and 15) from the eating for physical rather than
206 emotional reasons (EPR) subscale and two out of six items (i.e., items 7 and 8) from
207 the reliance on hunger and satiety cues (RHSC) subscale. The six items were used to
208 obtain a total score to keep the questionnaire as short as possible. Each item was
209 assessed on a Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The
210 rankings were then averaged, with higher scores indicating greater intuitive eating. In
211 this sample, Cronbach's alpha was 0.67 for the total score which is close to the
212 Cronbach's alpha of Carbonneau et al. (2016, study 2) ranging from 0.67 to 0.95 within
213 a sample of men and women. Furthermore, confirmatory factor analysis revealed a
214 good fit of selected items with a Goodness of Fit Index (GFI) of 0.93 and an adjusted
215 GFI of 0.84.

216 - *Body Esteem Scale for Adolescents and Adults* (Mendelson, Mendelson, & White,
217 2001; Valls, Rousseau, & Chabrol, 2011). From the original 23-item scale, we used the
218 10-item body esteem appearance subscale, which captures overall satisfaction with
219 appearance (e.g., I like what I see when I look in the mirror). The items were assessed
220 on a Likert scale ranging from 1 (*never*) to 5 (*always*). The rankings were averaged,
221 with higher scores indicating greater body esteem. Cronbach's alpha was 0.92 in this
222 sample.

- 223 - *French-Canadian adaptation of the Global Self-Esteem Scale* (Rosenberg, Schooler,
224 Schoenbach, & Rosenberg, 1995; Vallieres & Vallerand, 1990): This 10-item scale
225 measures the extent to which participants feel they possess good qualities and have
226 achieved success (Alessandri, Vecchione, Eisenberg, & Laguna, 2015). The items were
227 assessed on a Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*), with
228 higher scores indicating higher self-esteem. Cronbach's alpha was 0.87 in this sample.
- 229 - *Multidimensional Media Influence Scale* (Aimé, 2010; Cusumano & Thompson, 2001):
230 We calculated a total score using two of the original three subscales, the internalization
231 subscale with six items and the media pressure subscale with two items. Each item was
232 assessed on a Likert scale consisting of 1 (*disagree*), 2 (*not sure*), and 3 (*agree*). The
233 rankings were averaged, with higher scores indicating higher media influence. For our
234 sample, we obtained a Cronbach's alpha of 0.86. Confirmatory factor analysis revealed
235 a good fit with a Goodness of Fit Index (GFI) of 0.98 and an adjusted GFI of 0.96.
- 236 - *French Adaptation of the Fear of Negative Appearance Evaluation Scale* (Lundgren et
237 al., 2004; Maïano, Morin, Monthuy-Blanc, & Garbarino, 2010): This five-item scale
238 assesses apprehension about having one's physical appearance negatively judged by
239 others. Each item was evaluated on a Likert scale ranging from 1 (*not at all*) to 5
240 (*extremely*). The rankings were averaged, with higher scores indicating greater fear of
241 having one's physical appearance being evaluated negatively by others. Cronbach's
242 alpha in this sample was 0.91.
- 243 - *Figural rating scale* (Collins, 1991): The first scale series of this scale was used to
244 evaluate the adolescents' perceived shape. It comprises two gender-specific scales,
245 each presenting seven men or women figure drawings illustrating different body

246 weights, ranging from the thinnest silhouette on the left side to the heaviest silhouette
247 on the right side (Zitsman & Warschburger, 2018). The students were asked, using the
248 gender-appropriate drawings, to identify the figure that best matched their current body,
249 that is, their *perceived body*. We considered their perceived body image as a substitute
250 for the measure of the body mass index due to extensive missing data for the latter
251 variable.

252 **2.3 Procedure**

253 The participants completed the above-mentioned questionnaires and specified their
254 age, gender, and school grade (7 or 11). The data were collected in 2016.

255 **2.4 Data analyses**

256 To achieve our research objectives, we used structural equation modeling analyses
257 using the maximum likelihood (ML) estimation procedure in EQS for testing the global
258 model. We conducted path analyses with observed variables (five scales plus school grade
259 and self-perception of the body as covariable). Model fit was assessed using a chi-square
260 test in addition to the following indices: the Normed Fit Index (NFI), the Non Normed Fit
261 Index (NNFI), the Comparative Fit Index (CFI), the Incremental Fit Index (IFI), the Root
262 Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square
263 Residual (SRMR). According to Tabachnick and Fidell (2007) as well as Kline (2011), CFI
264 and IFI values above 0.90 indicate acceptable model fit. NFI and NNFI values above 0.95
265 indicate good fit. An RMSEA and SRMR value below 0.05 is indicative of a good fit and
266 0.08 is indicative of acceptable model fit (e.g., Kline, 2011). We first tested a model
267 (referred to as the original model) that reflected the associations among variables outlined

268 in the introduction. We also used conditional process analyses based on Hayes' work to
269 test the indirect effects (Hayes, 2018). To examine the significance of indirect effects, we
270 used 95% bootstrap confidence intervals with 5,000 iterations. When zero is not contained
271 in the confidence interval, the indirect effect is considered significant. A visual examination
272 of residuals for each model revealed that there was no serious deviations from the linearity
273 and homoscedasticity assumptions. All the analyses were conducted on standardized
274 variables and we controlled for school grade and body self-perception in all the models.
275 The missing data represented less than 4.8% of the sample for all analyses and were omitted
276 from the analyses.

277 **3 Results**

278 **3.1 Descriptive statistics**

279 Table 1 presents descriptive statistics of the questionnaires. There were significant
280 differences between girls and boys for each scale (all $p < 0.001$).

281
282 *Insert here Table 1*

283 284 285 **3.2 An integrated model with intuitive eating to self-esteem**

286 Results indicate that intuitive eating was negatively related to media influence and
287 positively related to body esteem (which was positively associated with self-esteem) and
288 self-esteem. Results also showed that body esteem was negatively associated with media
289 influence and fear of negative evaluation. Contrary to hypothesized, fear of negative
290 evaluation was positively associated with self-esteem. This model yielded fit indices that
291 were not optimal. The chi-square value was significant, $\chi^2 (df = 21, N = 705) = 45.36, p <$

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292 .001, and the other fit indices were not fully satisfying: NFI = .97, NNFI = .74, CFI = .97,
293 IFI = .97, SRMR = .03 and RMSEA = .17 (90% CI: [.13; .22]). The high value of RMSEA
294 indicated a poor fit. Then we adjusted the model according to the empirically driven Wald
295 and Lagrange Multiplier test (Bentler, 1995) recommendations. The Wald test indicates
296 which parameters should be dropped and the Lagrange Multiplier test indicates which
297 parameters should be added to enhance model fit. Here, the Wald test suggested we remove
298 the association between fear of negative evaluation and self-esteem from the model.

299 Figure 1 presents the final model based on the present data without fear of negative
300 evaluation. Overall, the final model fit was excellent, χ^2 (df = 15, n = 705) = 1.8, $p = 0.41$,
301 NFI = 1, NNFI = 1, CFI = 1, IFI = 1, SRMR = .01 and RMSEA = 0.00 (90% CI: [0.00,
302 0.07]). We then compared this final model to the original model using the Akaike's
303 Information Criterion (AIC). Between two models, the one with the lowest AIC value
304 should be chosen as it is more parsimonious (Kline, 2005). The original model yielded an
305 AIC of 41.36 whereas the final model yielded an AIC of -2.2. Therefore, the final model
306 should be preferred. Intuitive eating was negatively related to media influence ($\beta = -0.27$,
307 $p < .001$), which was negatively related to body esteem ($\beta = -0.43$, $p < .001$). In turn, body
308 esteem was positively related to self-esteem ($\beta = 0.73$, $p < .001$). Intuitive eating was
309 positively related to body esteem ($\beta = 0.24$, $p < .001$) and self-esteem ($\beta = 0.11$, $p < .001$).
310 All these effects were found controlling for school grade and self-perception of the body.

311 We then examined whether the final model was invariant across gender. Results
312 showed that the final model was significantly different from the conditional model for each
313 gender ($\Delta\chi^2$ (19) = 82,0682, $p < 0.001$, SRMR = .01 and RMSEA = 0.04 (90% CI: [0.00,
314 0.09])) with 337 boys and 368 girls. A significant relationship was found between intuitive

315 eating and media influence for girls ($\beta = -0.28, p < .001$) but not for boys ($\beta = -0.09, p =$
316 .1).

317

318

Insert here Figure 1

319

320 **3.3 Mediating role of media influence and body esteem**

321 Bootstrapping of 5,000 samples using PROCESS macro (Hayes, 2018) was used to
322 examine the mediating role of media influence and body esteem controlling for school
323 grade and body self-perception. Media influence was found to influence the relationship
324 between intuitive eating and body esteem for girls (95% bootstrap CI = 0.09 – 0.18) but
325 not for boys (95% bootstrap CI = -.003 – 0.05). An indirect effect between intuitive eating
326 and self-esteem via body esteem emerged both among boys (95% bootstrap CI = 0.07 –
327 0.23) and girls, among whom the effect appears stronger as suggested by the coefficient
328 estimates (95% bootstrap CI = 0.17 – 0.32).

329

4 Discussion

330

331 The purpose of this study was to test a path from intuitive eating to self-esteem through
332 body esteem, media influence and fear of negative appearance evaluation among
333 adolescent boys and girls. The results of the fit indices of the final model excluding fear of
334 negative appearance evaluation were excellent. Intuitive eating was associated with higher
335 body esteem for both boys and girls. Intuitive eating was also indirectly associated with
336 body esteem through media influence, but only for girls. The results showed a direct
337 relationship between intuitive eating and higher self-esteem, which was not dependent on
338 gender. Moreover, body esteem may be a mechanism at play in the relationship between
339 intuitive eating and self-esteem; this effect appeared stronger for girls. We proposed a final
340 general model where the path went from intuitive eating to self-esteem, with two mediators
341 of these relationships: media influence and body esteem. This global model suggests the
342 possibility that modifying behaviors and attitudes related to why and how people eat could
343 have a direct and indirect impact on body esteem and self-esteem.

344 This is the first study leading to an over-arching model based on intuitive eating as a
345 starting point and with psychological variables outcome as body esteem and self-esteem,
346 which are important for well-being (Olenik-Shemesh, Heiman, & Keshet, 2018; Rosenberg
347 et al., 1995). Intuitive eating has been considered the final outcome of models in several
348 studies (Avalos & Tylka, 2006; Carbonneau, Carbonneau, Cantin, & Gagnon-Girouard,
349 2015; Schoenefeld & Webb, 2013). For instance, Avalos and Tylka (2006) posited in their
350 acceptance model of intuitive eating that perception of body acceptance by others predicts
351 body function (focusing on how the body feels internally rather than monitoring

352 appearance) and body appreciation. The two latter variables both predicted intuitive eating.
353 Those authors highlighted external influences that lead to healthy eating behaviors. Indeed,
354 they considered that body acceptance by others would help people to be less preoccupied
355 with their appearance and thus to focus more on how they felt internally. People would
356 then be more likely to appreciate their bodies and be more aware of their bodily needs, such
357 as internal hunger and satiety signals, which lead to intuitive eating. Other researchers have
358 considered external influences, such as acceptance by others, mother's controlling style, or
359 partner's controlling style, as direct or indirect influences on intuitive eating (Avalos &
360 Tylka, 2006; Carbonneau et al., 2015). Although this view of the relationship between
361 variables is relevant, it is difficult for individuals to control external factors that influence
362 their propensity to eat intuitively. Acting on internal factors would be more powerful and
363 effective, and would thus place individuals in an active process (Walton, 2014).

364 **4.1 Intuitive eating, body esteem, and media influence**

365 When conducting research on the relationship between eating and one's body, it is
366 relevant to consider the influence of media and gender. The results of this study suggest
367 that the more extensive the intuitive eating, the stronger the cognitive structure to protect
368 individuals from such external influences as the media, which in turn could positively affect
369 body esteem among girls. Past experimental research has shown that exposing participants
370 to images promoting appearance-related beauty reduced appearance satisfaction and
371 increased depression compared with viewing neutral images or non-appearance
372 commercials (Birkeland et al., 2005; Groesz, Levine, & Murnen, 2001; Hargreaves &
373 Tiggemann, 2002). One mechanism accounting for this is that viewing such images may
374 lead to appearance comparisons with the thin ideal (Cattarin, Thompson, Thomas, &

375 Williams, 2000; Festinger, 1954). However, individual's variation in the tendency towards
376 appearance comparisons cannot explain all the variance in body esteem. Appearance
377 comparisons occur between an idealized image and a cognitive representation of the body
378 related to a global self-schema. This self-schema, resulting from knowledge of the self,
379 may modulate the importance of information related to the body (Jung & Lennon, 2003),
380 and thus influence the way information is processed. Indeed, all individuals are likely to
381 compare themselves with others, but not all with the same emphasis on appearance. Some
382 people are cognitively sensitive to and concerned with their appearance, while others are
383 less so (Ahadzadeh, Pahlevan Sharif, & Ong, 2017; Markus, Hamill, & Sentis, 1987). The
384 possibility of altering the body self-schema through intuitive eating may help youth,
385 particularly girls, being less vulnerable to media pressure and enable them to have a more
386 positive view of their body appearance. Markus et al. (1987) showed that individuals highly
387 concerned about their body self-schema were more likely to perceive themselves as
388 overweight than less concerned people. Regarding the gender effect, boys may be less
389 targeted than girls by the media, or they may simply be less exposed, for example, girls
390 going to malls more often than boys do (Biolcati, 2017), or being influenced differently by
391 social medias. Social medias have different effects on boys' and girls' perceptions,
392 cognitions, and behaviors pertaining to one's appearance. For example, girls (vs. boys) are
393 likely to report higher appearance-related social media consciousness (i.e., awareness of
394 whether one looks attractive to a social media audience; Choukas-Bradley, Nesi, Widman,
395 & Galla, 2020). Girls are also more likely than boys to post pictures in which they display
396 seductive behavior (Kapidzic & Herring, 2015). Self-schema construction in boys could
397 also be influenced by the media differently from the way it is in girls.

398

399 **4.2 Intuitive eating, body esteem, and self-esteem**

400 We found that body esteem significantly mediated the relationship between
401 intuitive eating and self-esteem. Thus, the greater the intuitive eating, the higher the level
402 of body esteem, which in turn predicted higher self-esteem. This effect was greater for girls
403 than for boys. The difference between genders can be explained by the fact that body
404 esteem is more important in the definition of self-esteem for girls than boys (Murnen &
405 Don, 2012) or that girls and boys do not focus on the same body characteristics (Dion et
406 al., 2014). Indeed, among adolescent boys body esteem is more related to physical
407 attractiveness, upper body strength, and physical condition, whereas adolescent girls focus
408 on sexual attractiveness, weight concern, and physical fitness (Franzoi & Shields, 1984;
409 Mendelson et al., 2001).

410

411 **4.3 Clinical implications**

412 Given the study findings, working on intuitive eating and promoting healthy eating
413 behaviors and attitudes may positively impact psychological well-being, including body
414 esteem and self-esteem. These findings are in line with a recent meta-analysis in which
415 intuitive eating was found to be associated with less disordered eating, a more positive
416 body image, better emotional functioning, and several other psychosocial correlates (Bruce
417 & Ricciardelli, 2016). Targeting intuitive eating may affect long-term outcomes and
418 constitute “a wise intervention” (Walton, 2014). It is also important to consider people’s
419 emotions while they eat, which can be powerful tools affecting behaviors and attitudes. A
420 person who feels ashamed or guilty while eating would probably be more likely to develop

421 anxiety and have a less positive body image and lower self-esteem. Eating by desire in the
422 absence of hunger may perhaps also be associated with positive outcomes, however, it was
423 not evaluated in our study. Also, the reasons for adopting intuitive eating can probably
424 influence the success of this mechanism because weight loss and harmony with one's body
425 are two distinct goals that can hinder or favor the outcome.

426 **4.4 Study Limitations**

427 The originality of this study lies in the inclusion of different potential outcomes of
428 intuitive eating. Other strengths include a large sample size and the use of psychometrically
429 sound instruments. Yet more extensive results might have been obtained using all items
430 and subscales of the global intuitive eating scale, body image scale, and media influence
431 scale. Possible question order effect in classical global scales, were not present in this
432 research. Although the Cronbach's alpha for the intuitive eating scale was a little low, the
433 other psychometric measurements for all scales were adequate. Furthermore, the scale
434 assessing media influence did not consider social media, which seems to affect body image
435 and mental health (Fardouly, Diedrichs, Vartanian, & Halliwell, 2015; Fardouly &
436 Vartanian, 2016; Ghaznavi & Taylor, 2015; Perloff, 2014). Due to the higher rates of social
437 media usage among adolescents, future studies should definitively consider TikTok,
438 Instagram, Snapchat, and other social media very carefully. In this research, we have
439 considered intuitive eating as the first step in our model. However, the cross-sectional and
440 correlational nature of the data cannot demonstrate causality even if we used statistical tests
441 with a causal sequence with mediations (Hayes, 2018). The tested models examine one
442 possible combination of all the variables that we used, and the converse causal relation
443 would be possible. For instance, having a positive self-esteem or body esteem could lead

A structural equation model of intuitive eating with adolescents

444 to a better intuitive eating. This view supporting intuitive eating as an outcome is proposed
445 by other authors (Andrew, Tiggemann, & Clark, 2015; Avalos & Tylka, 2006). Future
446 longitudinal studies would be able to give a clearer vision of the best position of intuitive
447 eating as a first step or outcome.

448 **4.5 Conclusion**

449 The novel pathway we proposed from intuitive eating to self-esteem, may have
450 practical implications for healthy eating program development. For example, our results
451 suggest that working on intuitive eating, that is, educating adolescents to follow their
452 physical hunger and satiety cues rather than their emotions, could lead to several benefits,
453 such as being less influenced by media, and having better body esteem and self-esteem.
454 Those parameters are very important for positive personal development. Recent research
455 in this area has suggested that mindfulness (Sairanen et al., 2015), yoga (Mahlo &
456 Tiggemann, 2016; Ostermann, Vogel, Starke, & Cramer, 2019), and mobile applications
457 (Brevers et al., 2017) as potential interventions for increasing intuitive eating. Future
458 studies should center on how to promote intuitive eating effectively, for instance, by
459 including parents or teachers in the interventions. In conclusion, efforts should continue to
460 promote positive eating behaviors and body image during adolescence, which is a crucial
461 development phase for youths and their families.

462

463 **Disclosure of interest**

464 The authors declare no conflict of interest.

465

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