Profiles of Body Image Concerns and their Associations with Disordered Eating Behaviors

Sarah Baker*, Substantive-Methodological Synergy Research Laboratory, Department of Psychology, Concordia University, Montreal, Canada
Christophe Maïano*, Cyberpsychology Laboratory, Department of Psychoeducation and Psychology, Université du Québec en Outaouais (UQO|Campus de Saint-Jérôme), Saint-Jérome, Canada
Simon Houle, Substantive-Methodological Synergy Research Laboratory, Department of Psychology, Concordia University, Montreal, Canada
Lindsey Nadon, Substantive-Methodological Synergy Research Laboratory, Department of Psychology, Concordia University, Montreal, Canada
Annie Aimé, Department of Psychoeducation and Psychology, Université du Québec en Outaouais (UQO|Campus de Saint-Jérôme), Saint-Jérome, Canada
Alexandre J.S. Morin, Substantive-Methodological Synergy Research Laboratory, Department of Psychology, Concordia University, Montreal, Canada

* The order of appearance of the first and second authors (S. B. and C.M.) was determined at random: Both should be considered first authors.

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Corresponding author: Christophe Maïano, Université du Québec en Outaouais, Campus de Saint-Jérôme, Département de Psychoéducation et de Psychologie, 5 rue Saint-Joseph, Saint-Jérôme, Québec, J7Z 0B7, email: christophe.maiano@uqo.ca

Abstract

Although body image concerns (BIC) are recognized as a core driver in the development of disordered eating behaviors, the combined role of various types of BIC remains underexamined. This study relied on Latent Profile Analysis to identify the main configurations of self-reported BIC (i.e., body checking and avoidance, perceived physical appearance, and fear of negative appearance evaluation) observed in a sample of 419 French-Canadian individuals (M_{age}=26.59, SD_{age}=9.23). The role of body mass index, sex, and age on profile membership was also examined, as well as the relation between profile membership and disordered eating behaviors (i.e., dieting, bulimia and food preoccupation, oral control). Six distinct BIC profiles differing in terms of shape and level were identified, with women being more likely to display a profile characterized by higher levels of BIC. In turn, profiles characterized by higher levels of BIC were associated with more disordered eating behaviors. The present study can broaden our understanding of the onset and maintenance of disordered eating behaviors and inspire the development of more tailored body-image interventions.

Keywords. Body Image Concerns, Disordered Eating Behaviors, Latent Profile Analysis, Person-Centered.

Highlights

- Person-centered assessment of the nature of body image concerns (BIC) profiles
- Cognitive-perceptual, affective, and behavioral components of BIC were considered
- Six distinct BIC profiles differing in terms of shape and level were identified
- Women were more likely to display a profile characterized by higher levels of BIC
- Profiles with higher levels of BIC were related with disordered eating behaviors

Western sociocultural norms depict beauty as a visual factor (Etcoff et al., 2004), involving a frequent focus on thinness for women and muscularity for men (Paul, 2017). This Western ideal of beauty can lead individuals to develop complex and potentially harmful relationships with their bodies (Voelker et al., 2015). By way of illustration, a cross-national survey of 3,200 women (aged 18 to 64) found that most disliked at least one physical attribute of their bodies, with weight being the most common feature they wanted to change (Etcoff et al., 2004). These results suggest that body dissatisfaction might be a normative experience in Western cultures, possibly resulting from the internalization of an idealized view of physical beauty (Levine & Smolak, 2006). Importantly, negative attitudes towards one's physical appearance, such as body dissatisfaction, have been associated with increased psychopathology and, most commonly, with disordered eating behaviors (Dakanalis & Riva, 2013). Disordered eating behaviors (e.g., dieting, binge eating, or vomiting) may lead to the development of eating disorders (i.e., anorexia nervosa, bulimia nervosa and binge eating disorder) that in the long-term may have serious physical and psychological consequences, including a heightened risk of early mortality (Keski-Rahkonen & Mustelin, 2016). For this reason, many researchers have examined the biological, psychological, developmental, and sociocultural risk factors contributing to the onset and maintenance of these behaviors (Rikani et al., 2013). Yet, one of the most salient risk factors remains the presence of body image concerns – BIC (Jacobi et al., 2004).

BIC, encompassing preoccupations and negative evaluations related to the shape and appearance of one's body, have often been positioned as a core driver in the development of disordered eating behaviors (Cash & Pruzinsky, 2002). Despite the number of studies highlighting positive associations between BIC and disordered eating behaviors, the corresponding research literature remains mostly variable-centered in nature. Variable-centered research focuses on average associations between constructs that are assumed to generalize to the entire sample under study and are thus unable to consider how the combination of different types of BIC might influence the emergence of disordered eating behaviors (Morin et al., 2018a). In contrast, person-centered analyses are specifically designed to examine how individuals differ from one another in their unique configuration of BIC (Laursen & Hoff, 2006; Morin et al., 2018a). By capturing these distinct configurations, or profiles of individuals, person-centered research is uniquely able to help us achieve a more comprehensive understanding of how multiple types of BIC are related to disordered eating behaviors. This study relies on a person-centered approach to address this limitation through: (a) the identification of the most commonly occurring BIC profiles; (b) an examination of whether age, body mass index (BMI) and sex predict membership into these profiles; and (c) an examination of the associations between these profiles and disordered eating behaviors.

Body Image Concerns (BIC)

BIC refer to a multidimensional internal evaluation of one's body, encompassing intense concerns about one's perceived appearance defects, body checking and avoidance behaviors, and maladaptive behavioral manifestations (e.g., camouflaging or hiding one's body shape, and avoiding looking in the mirror) (Altabe & Thompson, 1996; Chin et al., 2008; Littleton et al., 2005). BIC can be categorized into four distinct, yet interrelated components: (1) cognitive - thoughts and attitudes regarding one's body, (2) perceptual – how one perceives their bodily shape and weight, (3) affective – one's emotions toward their body, and (4) behavioral - dysfunctional behaviors aimed at examining, altering, or avoiding one's body (Hosseini & Padhy, 2022).

Given the multidimensional nature of BIC, it is important to rely on comprehensive assessment procedures to adequately capture all their manifestations (Thompson, 2004). Past research has primarily focused on cognitive, perceptual, and affective components of BIC (Hosseini & Padhy, 2022). However, more recent research suggests the need to also consider maladaptive behavioral manifestations of BIC (Stapleton et al., 2016). Accordingly, the present study focuses on several aspects of BIC: body checking and avoidance (behavioral component), perceived physical appearance

(perceptual/cognitive component), and fear of negative appearance evaluations (affective component).

Body checking and body avoidance behaviors are used to deal with negative emotional feelings stemming from a negative body image (Fairburn et al., 2003; Williamson et al., 2004). Body checking entails an increase in negative attention directed at disliked body parts (Nikodijevic et al., 2018; Walker et al., 2021) through behaviors such as weighing oneself repeatedly, frequently looking in the mirror, pinching one's body parts to check for fat deposits, and inspecting one's body for imperfections (Linardon et al., 2019a; Reas et al., 2002). In contrast, body avoidance involves efforts to avoid interacting with, or showing to others, one's body, such as wearing baggy clothing, covering mirrors, avoiding physical intimacy, and refusing to be weighed (Nikodijevic et al., 2018; Shafran et al., 2004). These behaviors make it harder to collect new bodily evidence able to falsify ones' unrealistic body perceptions (Trottier et al., 2015). Body checking and avoidance behaviors are assessed by focusing on distinct units of behavior, namely touching, looking, pinching, measuring, and evaluating one's body (Kachani et al., 2011; da Silva et al., 2021), rather than on the global occurrence of these types of problematic behaviors. This is the approach taken in the present study.

Affective manifestations of BIC can also take the form of a fear of negative appearance evaluation (FNAE), defined as the presence of anxiety about the possibility of receiving negative feedback about one's physical appearance, and the corresponding avoidance of situations likely to elicit the external evaluation of one's body shape (Maïano et al., 2010). Finally, when considering BIC, it is important to pay attention to the perception of one's physical appearance. Perceived physical appearance refers to one's subjective feelings about one's body weight and shape, and thus forms a continuum ranging from total dissatisfaction with one's physical appearance (i.e., body dissatisfaction) to high levels of body satisfaction.

Relation between BIC and Disordered Eating Behaviors

BIC are a required diagnostic feature for most (except for binge eating disorder) eating disorders (American Psychiatric Association, 2022), underscoring their expected association with disordered eating behaviors. There is a strong theoretical foundation leading us to expect the various components of BIC (affective, behavioral and perceptual/cognitive) to be associated with disordered eating behaviors. For instance, the transdiagnostic cognitive behavioral model of eating disorder psychopathology postulates that the behavioral manifestations of BIC, specifically body checking and body avoidance behaviors, result from an overevaluation of the shape and weight of one's body, resulting in an undue influence of shape and weight on one's self-conceptions (Fairburn et al., 2003). Likewise, sociocultural models (e.g., the sociocultural model of bulimia nervosa: Stice, 1994; Stice & Shaw, 2002; the tripartite influence model of body image and eating disturbances; Thompson et al., 1999; Thompson et al., 2012) depict a pathway whereby BIC leads to the development of disordered eating behaviors. According to these models, the internalization of unrealistic societal ideals of beauty leads to the emergence of body dissatisfaction (or low levels of perceived physical appearance), a core component of BIC (Tiggemann, 2011). In a complementary manner, objectification theory (Fredrickson & Roberts, 1997; Szymanski et al., 2011) clarifies another pathway by which BIC may lead to disordered eating behaviors among women more specifically. This theory posits that, through the influence of mass media, societal norms depict women's bodies as sexual objects through which self-worth is intimately conditioned on appearance. In doing so, these norms increase the focus on specific body parts and characteristics, leading to the emergence of body shame and BIC among women, most of whom do not meet these unrealistic standards. From these theoretical perspectives, when coupled with the perceived inability to attain unrealistic societal standards, BIC may lead to the emergence of disordered eating behaviors as a penultimate attempt to control one's body shape (e.g., restrictive dieting, self-induced vomiting; Tylka & Hill, 2004; Vander Wal et al., 2008).

Empirical variable-centered studies support these assumptions by revealing positive associations between body checking and avoidance (for recent meta-analyses see Nikodijevic et al., 2018; Walker et al. 2018), perceived physical appearance (e.g., Monthuy-Blanc et al., 2012; Maïano et al., 2013; Voelker et al., 2015), fear of negative appearance evaluations (e.g., Almenara et al., 2017; Maïano et al., 2013; Levinson et al., 2013) and disordered eating behaviors.

Profiling Body Image Concerns

Beyond these generic associations, it remains important to highlight that not all types of BIC are equal and interchangeable. Rather, every individual is likely to display a unique configuration of

BIC. For instance, some people may solely be dissatisfied with their body, others may also rely on body checking and avoidance behaviors, whereas a third group may only display a strong FNAE without directly acting upon this fear via body checking or avoidance behaviors. These distinct BIC configurations are likely to play a role that extends beyond the additive contribution of isolated types of BIC. For instance, each type of BIC is likely to create a context for the expression of the others. Thus, a high level of FNAE might result in fewer negative consequences in the absence of body dissatisfaction. Unfortunately, the nature and effects of these unique configurations cannot be uncovered via variable-centered analyses (Howard & Hoffman, 2018; Meyer & Morin, 2016). More importantly, the bulk of previous research has mainly considered the role of body dissatisfaction, thereby ignoring the possible contribution of the other components (Quittkat et al., 2019).

Person-centered analyses provide a solution to these problems, as they are explicitly designed to uncover subpopulations (or profiles) of participants characterized by distinctive BIC configurations, while considering predictors and outcomes of these profiles (Howard & Hoffman, 2018; Meyer & Morin, 2016). This approach enables us to achieve a more holistic representation of the multidimensionality of BIC, while accounting for the heterogeneity of this multidimensionality in the population under study (Morin et al., 2018a). Thus far, four studies (Calzo et al., 2015; Hoffmann & Warschburger, 2018; Jackson et al., 2022; Paul, 2017) have considered BIC from a person-centered perspective and provide guidance for the present study. Indeed, despite their reliance on various types of samples and distinct BIC indicators, these studies generally identified three to four distinct profiles of BIC differing from one another both in terms of shape (i.e., displaying a distinctive configuration of BIC across indicators) and level (i.e., displaying generally higher or lower levels of BIC). Moreover, these studies also supported the presence of meaningful associations between these BIC profiles and various indicators of disordered eating behaviors and eating disorders. We provide a more detailed presentation of these studies in the first section of the online supplements.

Despite their interest, these studies all share the same limitation. That is, although they all focused on individuals (dis-)satisfaction, appreciation, and concerns with various body characteristics (shape, weight, muscularity, functionality), they all neglected the core behavioral components (i.e., body checking and avoidance) of BIC (Lavender et al., 2013; Linardon et al., 2019a; Nikodijevic et al., 2018). These behaviors entail the translation of harmful cognitions into actions. Such behaviors reinforce these harmful cognitions and can ultimately evolve into disordered eating behaviors or even eating disorders (e.g., Williamson et al., 1999, 2004). The present study addresses this limitation by focusing on cognitive-perceptual (perceived physical appearance), affective (FNAE), and behavioral (touching, looking, pinching, measuring, and evaluating) components of BIC.

Demographic Characteristics of BIC Profiles

To maximize the utility of the identified profiles, it is important to determine how they differ as a function of participant characteristics. In this study, we include age, BMI, and sex, three characteristics known to be associated with BIC (e.g., Pelegrini et al., 2014). BMI is a benchmark for characterizing individuals' height-to-weight ratio (Nuttall, 2015) and traditionally used as a screening method for weight categories (i.e., underweight, healthy, overweight, and obese), which has been found to be strongly associated with BIC (e.g., El Ansari & Berg-Beckhoff, 2019). More specifically, individuals with higher BMI tend to present higher levels of BIC (e.g., low weight satisfaction and concerns with body shape; Schwartz & Brownell, 2004; Toselli & Spiga, 2017). Moreover, the physiological changes resulting from aging tend to push individuals away from modern sociocultural beauty standards, leading to the increased levels of BIC as a function of age (e.g., Halliwell & Dittmar, 2003), at least up to a point. Indeed, other studies showed that elderly individuals struggle less with BIC than their younger peers (e.g., Montepare, 1996). Lastly, sex differences in BIC are well-documented. Thus, BIC are more pronounced among women than men, with women being generally less satisfied with their body, placing more importance on their appearance, and perceiving themselves as more overweight relative to men (e.g., Culbert et al., 2021; Quittkat et al., 2019; Ricciardelli & McCabe, 2001; Siham & Hamzeh, 2021; Striegel-Moore et al., 2009). Once again, current beauty standards, especially in connection with the tendency to objectify women's bodies (Fredrickson & Roberts, 1997; Szymanski et al., 2011), may underlie some of these differences.

When we consider previous person-centered studies of BIC, it is noteworthy that Hoffmann and Warschburger (2018) and Jackson et al. (2022) found that profiles characterized by higher levels of BIC are predominately comprised of women, and that men were unlikely to correspond to these

profiles. Moreover, Jackson et al. (2022) noted that older participants were less likely to correspond to problematic BIC profiles, whereas Hoffmann and Warschburger (2018) found an opposite association among adolescent girls. Finally, Hoffmann and Warschburger (2018) also reported that adults with higher BMI were more likely to belong to a profile characterized by high levels of BIC. The present study thus seeks to replicate and expand upon these findings among a sample of adults while relying on a more complete operationalization of BIC profiles.

The Present Study

This study was designed to address the limitations of previous research on BIC generally, and BIC profiles more specifically. We aim to achieve a more comprehensive understanding of the various configurations, or profiles, of BIC likely to be present among a sample of adult participants, while accounting for the full multidimensional nature of BIC as encompassing cognitive-perceptual, affective, and behavioral components (Cash, 2004; Chin et al., 2008). To clearly document the implications of these profiles, we also consider whether and how they relate to individuals' levels of disordered eating behaviors. Lastly, we attempt to document whether and how profile membership differs as a function of age, BMI, and sex.

In line with prior person-centered studies, we hypothesize that at least three BIC profiles will be identified (Hypothesis 1). Of those, we expect that one will be defined by high levels of BIC across indicators, whereas another should be defined by low levels of BIC across indicators. However, resulting from our comprehensive operationalization of BIC, we expect the remaining profiles to display more differentiated configurations dominated either by behaviors (i.e., touching, looking, pinching, measuring, evaluating), cognitions/perceptions (i.e., perceived physical appearance), affect (i.e., FNAE), or a combination of those (Hypothesis 2). In relation to the composition of the profiles (i.e., covariate), we hypothesize that women, relative to men, should be more likely to correspond to profiles characterized by higher levels of BIC (Hypothesis 3). In relation to demographic predictors, we expect to find a positive association between BMI and participants' likelihood of membership into profiles characterized by higher levels of BIC (Hypothesis 4). Given our focus on a sample composed mainly of young and working-age adults, thus excluding elderly participants, we also expect a positive association between age and membership into profiles characterized by higher levels of BIC (Hypothesis 5). Finally, we expect that the severity of the BIC identified within each profile will be directly related to the level of disordered eating behaviors observed in each profile (Hypothesis 6).

In addition to contributing to research on the association between BIC and disordered eating behaviors, this study should also have clinical implications for the treatment of disordered eating behaviors and more severe eating disorders. Indeed, new approaches to the treatment of these conditions have started to focus on teaching patients how to reduce emotional distress caused by their BIC (Linardon et al., 2019b). Documenting how BIC are distributed among different profiles of participants, the present study should help refine these interventions in a more targeted manner by directly focusing efforts on the unique configuration of BIC present in each of these profiles.

Method

Participants and Procedures

This convenience sample includes 419 (363 females and 56 males; M_{BMI} = 25.76, SD_{BMI} = 7.43) French-speaking Canadian individuals who had to be at least 14 years old. Participants were aged between 17 and 62 years (M_{age} = 26.59 years, SD = 9.23). Data was collected between January to October 2015. All participants agreed to a secondary analysis of their data (Maïano et al., 2021). Participants were recruited from colleges, universities, community organizations for eating disorders, and a private clinic specializing in treating eating disorders located in the Canadian Province of Quebec. Participants were invited to participate by generic announcements sent by school messaging (letters or e-mails), bulletin boards or community organizations websites. They completed an online informed consent form before anonymously completing the questionnaires online. This study was approved by the research ethics committee of the second author's institution (#2013-10, 1525).

Measures

Demographic Characteristics (Predictors). Participants were asked to self-reported their age, sex, height and weight. Self-reported height (in meters) and weight (in kilograms) were used to calculated BMI (in kg/m²).

Body Checking and Avoidance (Profiles indicators). Participants completed the French version (Maïano et al., 2022) of the Body Checking and Avoidance Questionnaire (BCAQ; Shafran et

al., 2004), which includes 22 items and measures five types of behaviors (Kachani et al., 2011; da Silva et al., 2021): (a) pinching (four items; α = .786; e.g., *Pinched your thighs*); (b) looking (four items; α = .761; *e.g., Looked in the mirror at your overall appearance*); (c) touching (six items; α = .812; e.g., *Touched your face*); (d) measuring (three items; α = .889; e.g., *Used tape measure around your thighs*); and (e) evaluating (five items; α = .766; e.g., *Compared your own body to others?*). Items were rated on a 6-point scale (0 = not at all – not interested, 1 = checked less than once a week, 2 = checked 1–6 times a week, 3 = checked 1–2 times a day; 4 = checked 3 or more times a day, and 5 = avoided doing so because of possible distress).

Physical Appearance (Profiles indicator). Participants completed the physical appearance subscale of the original French version of the Physical Self-Inventory – Revised Short form (PSI-S-R; Morin & Maïano, 2011; Morin et al., 2018b; Maïano et al., 2023), which includes three items (α = .852; *e.g., I have a nice body to look at*) rated on a 6-point scale (1 = not at all to 6 = entirely).

Fear of Negative Appearance (Profiles indicator). Participants completed the French version (Maïano et al., 2010) of the FNAE Scale (FNAES; Lundgren et al., 2004), which includes five items (α = .949; *e.g., I am concerned about what other people think of my appearance*) rated on a 5-point scale (1 = not at all to 5 = extremely).

Disordered Eating Behaviors (Outcomes). Participants completed the French version (Leichner et al., 1994) of the Eating Attitudes Test-26 (EAT-26; Garner et al., 1982), which includes 26 items and measures three types of disordered eating behaviors: (a) dieting (13 items; α = .093, *e.g., I am preoccupied with a desire to be thinner)*; (b) bulimia and food preoccupation (six items; α = 0.881; *e.g., I vomit after I have eaten)*; and (c) oral control (seven items; α = 0.815; *e.g., I avoid eating when I am hungry).* Items were rated on a six-point scale (6= always to 1= never).

Analyses

Preliminary Measurement Models

All analyses were conducted using *Mplus* 8.7 (Muthén & Muthén, 2021). We first verified the psychometric properties of our multi-item measures via the estimation of preliminary measurement models. The results from these analyses, reported in the online supplements (second section, and Tables S1 to S3), supported the factor structure and composite reliability of our measures. Factor scores (estimated in standardized units with $M = 0$ and $SD = 1$) were saved from these models and used as input for our main analyses. Factors scores provide a partial control for unreliability and retain the properties of the measurement models from which they are taken (Morin et al., 2016; Skrondal & Laake, 2001). Variables correlations are reported in Table S4 of the online supplements.

Latent Profile Analysis (LPA)

LPA were estimated using the maximum likelihood robust (MLR) estimator using the seven factor scores reflecting body checking and avoidance behaviors (i.e., touching, pinching, looking, measuring, and evaluating), physical appearance and FNAE. Solutions including one to eight latent profiles were estimated, allowing the means and variances of the indicators to be freely estimated in all profiles (Diallo et al., 2016) and using 10000 random start values, 1000 iterations, and 500 final optimizations (Hipp & Bauer, 2006). To guide the selection of the optimal number of profiles, we examined the theoretical conformity, empirical contribution, and statistical adequacy of the various solutions (Morin, 2016; Morin & Litalien, 2019). We also relied on person-centered indicators of model fit (Diallo et al., 2017; Peugh & Fan, 2013) including the Akaike information criterion (AIC), the Bayesian information criterion, the consistent AIC (CAIC), the sample-size adjusted Bayesian information criterion (ABIC), the adjusted Lo-Mendell-Rubin (aLMR) likelihood ratio test, and the Bootstrap Likelihood Ratio Test (BLRT). Lower values on AIC, Bayesian information criterion, CAIC, and ABIC indicate a better fitting model, while a statistically significant p-value associated with the aLMR and BLRT support the superiority of the current k-profile solution relative to a k-1 profile solution. Lastly, we report the entropy associated with each LPA solution as a measure of classification accuracy ranging from 0 (low) to 1 (high).

Predictors, Covariate, and Outcomes

Using the final retained solution from the LPA analyses, age and BMI were incorporated into the model using the multinomial logistic regression link function to test in a single step whether scores on the predictors were related to participants' likelihood of membership to the different profiles in a pairwise manner. To simplify interpretations, we also report odds ratios (*OR*) alongside the regression

coefficients. The sex composition[1] of the profiles was assessed using a model-based mean comparison procedure developed by Lanza et al. (2013) and implemented in Mplus via the auxiliary DCON function (Asparouhov & Muthén, 2014). As sex was coded as 0 for males and 1 for females, the DCON function provides the percentage of males versus females in each profile. Outcomes were directly included to the final LPA solution using the multivariate delta method (Raykov & Marcoulides, 2004) to obtain the outcomes' mean-level differences across each pair of profiles.

Results

Latent Profiles

Model fit indices for the LPA models estimated are available in Table 1. The BLRT continuously supported the addition of profiles to the solution, while the aLMR supported solutions including two, four, and six profiles. The AIC, CAIC, Bayesian information criterion, and ABIC are graphically represented in Figure S1 of the online supplements. Succinctly, all fit indices reached a plateau after the 4-profile solution, when the CAIC stopped decreasing. The Bayesian information criterion continued to decrease until the 6-profile solution, while the AIC and ABIC kept on decreasing all the way to the 8-profile solution. As the entropy is consistently high (i.e., >.800) greater attention was given to the CAIC and Bayesian information criterion (Diallo et al., 2017), thus necessitating a closer inspection of solutions including four to six profiles. The 4-profile solution closely matched Profiles 2, 3, 4, and 6 visually depicted in Figure 1. The 5-profile solution resulted in a small change in the nature, and number of people belonging to Profile 4, and in the addition of the fifth profile depicted in Figure 1, which arguably represents a meaningful addition to the solution. Likewise, adding a sixth profile led to the emergence of a substantively meaningful profile (i.e., Profile 1 in Figure 1) that is differentiated from Profile 2 both in terms of level (e.g., pinching and looking are much lower in profile 1) and shape (e.g., touching is well below average for Profile 1 and slightly above average for Profile 2). While the addition of a sixth profile is desirable, adding a seventh led to the emergence of a profile almost identical to profile six in Figure 1. We thus retained six profiles for further analyses and interpretation, supporting our first hypothesis.

The 6-profile solution is graphically depicted in Figure 1 and parameter estimates from this solution are reported in Table S5 of the online supplements. The first profile is characterized by very low levels of body checking and avoidance behaviors (i.e., pinching, looking, touching, measuring, and evaluating) and FNAE, in addition to very high levels of perceived physical appearance. This *Positive Body Image with a Lack of Body Checking and Concerns* profile corresponds to 6.62% of our sample. The second profile is characterized by moderately low levels of pinching, looking, measuring, and very low levels of evaluating and FNAE. Moreover, this profile also displayed slightly above average levels of touching and the highest levels of perceived physical appearance. This *Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts* profile corresponds to 11.85% of our sample. The third profile is the largest and corresponds to 31.61% of our sample displaying slightly below average levels on all indicators except perceived physical appearance, which is slightly above average. This profile was thus labelled *Normative* to reflect its large size and generally average – and yet desirable – nature. The fourth profile is characterized by high levels of body checking and avoidance behaviors and FNAE, as well as average levels of perceived physical appearance. This *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation* profile corresponds to 16.06% of our sample. The fifth profile is characterized by low levels of perceived physical appearance, high levels of evaluative behaviors and FNAE, moderately high levels of measuring, moderately low levels of touching, and average levels of pinching and looking. This *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation* profile corresponds to 20.57% of our sample. Finally, the sixth profile is characterized by very high levels of body checking and avoidance behaviors and FNAE as well as very low levels of physical appearance. This *Negative Body Image with Excessive Body Checking and Concerns* profile corresponds to 13.30% of our sample. These results support Hypothesis 2.

Predictors of Profile Membership

Associations between age and BMI and profile membership are reported in Table 2. These

[1] Arguably, sex could have been considered as another demographic predictor of profile membership. However, the lack of variability of this variable in some of the profiles (i.e., some profiles only included females) made it impossible to use a predictor specification for this variable.

results show that participants with a higher BMI were more likely to belong to the *Normative* (3) profile compared to the *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation* (4) and *Negative Body Image with Excessive Body Checking and Concerns* (6) profiles, thus failing to support Hypothesis 4. In partial support of Hypothesis 5, older participants were more likely to belong to the *Normative* (3) and *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation* (4) profiles relative to the *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation* (5) profile.

Sex Composition of the Profiles

Associations between sex and profile membership are reported in the top of Table 3. Males represented 56.5% of Profile 1, 28.6% of Profile 2, 11.4% of Profile 3, 1.5% of Profile 4, 10.6% of Profile 5, and 0.7% of Profile 6. Considering that males form only 12% of our sample, male membership in the two most desirable profiles (Profile 1- *Positive Body Image with a Lack of Body Checking and Concerns* and Profile 2- *Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts*) is much higher than expected given the number of males in our sample. In contrast, no males corresponded to the *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation* (4) profile, while a single male corresponded to the *Negative Body Image with Excessive Body Checking and Concerns* (6) profile. These results support Hypothesis 3.

Outcomes of Profile Membership

Associations between the profiles and the outcomes are reported in Table 3. The highest levels of dieting were observed in the *Negative Body Image with Excessive Body Checking and Concerns* (6) profile, followed by the *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation* (4) profile, then by the *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation* (5) profile, followed by the *Normative* (3) profile, and finally by the *Highly Positive Body Image with a Moderate Monitoring by Touching Body* (2) and *Positive Body Image with a Lack of Body Checking and Concerns* profiles (1) profiles which did not differ from one another. The highest levels of bulimia and food preoccupation were observed in the *Negative Body Image with Excessive Body Checking and Concerns* (6) profile, followed equally by the *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation* (4) and *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation* (5) profiles, then by the *Normative* (3) profile, followed by the *Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts* (2) profile, and finally by the *Positive Body Image with a Lack of Body Checking and Concerns* (1) profile. Oral control was higher in the *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation* (4) profile than in all other profiles except for the *Negative Body Image with Excessive Body Checking and Concerns* (6) profile. Oral control levels were higher in the *Negative Body Image with Excessive Body Checking and Concerns* (6) profile relative to the *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation* (5) profile.

Discussion

BIC can take many forms, which all represent known risk factors for disordered eating behaviors (Jacobi et al., 2004). Despite this recognition, very little research has considered the combined role of behavioral, perceptual/cognitive, and affective components of BIC, as well as how these components combine within distinct profiles of individuals. This study was designed to address this limitation via the identification of the various configurations, or profiles, of BIC most commonly observed in the current sample of adults. To further document the validity and meaningfulness of these profiles, we also consider their associations with age and BMI (predictors), sex differences in their composition (covariate), as well as their implications for disordered eating behaviors (dieting, bulimia and food preoccupation, and oral control).

BIC Profiles

In line with our first hypothesis, we identified six BIC profiles differing in shape and level from one another: (a) *Positive Body Image with a Lack of Body Checking and Concerns* (Profile 1); (b) *Highly Positive Body Image with a Moderate Monitoring by Touching Body Part*s (Profile 2); (c) *Normative* (Profile 3); (d) *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation* (Profile 4); (e) *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation* (Profile 5); and (f) *Negative Body Image with Excessive Body Checking and Concerns* (Profile 6). These profiles clearly showcase that BIC are not distributed randomly in the

population, nor do they systematically co-occur among only a subset of individuals. Rather, they seem to occur according to specific configurations in a way that previous variable-centered studies could not identify (Howard & Hoffman, 2018). Interestingly, although the limited person-centered studies of BIC have neglected their behavioral manifestations, some of the present profiles remain consistent with those identified in these previous studies. For instance, Profile 1 (*Positive Body Image with a Lack of Body checking and Concerns*) seems to match the *Healthy* profile identified by Paul (2017) and Calzo et al. (2015), as well as the *Inconspicuous* profile identified by Hoffmann and Warschburger (2018). Likewise, Profile 6 (*Negative Body Image with Excessive Body Checking and Concerns*) aligns with the *Unhealthy* profile reported by Paul (2017) and with the *Conspicuous* profile identified by Hoffmann and Warschburger (2018). Finally, both Paul (2017) and Jackson et al. (2022) reported additional profiles defined by a unique configuration of BIC and sharing similarities with the distinctive configurations observed in Profiles 2, 3, 4 and 5.

Three of the profiles identified in this study can be considered to display a primarily undesirable (i.e., Profile 6), neutral/average (i.e., profile 3), or primarily desirable (i.e., Profile 1) configuration (aligned across indicators). In contrast, the remaining three profiles display distinctive configurations, dominated by specific types of BIC, thus supporting our second hypothesis. For example, Profile 2 (*Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts*) displays a more positive evaluation of their physical appearance than Profile 1, but report to engage more frequently in body checking and avoidance behaviors such as touching. Likewise, although Profile 4 (*Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*) generally displays higher levels of body checking and avoidance behaviors (especially pinching, touching, and looking) than Profile 5 (*Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation*), it also displays higher levels of perceived physical appearance. Our results thus demonstrate the heterogeneity of the configurations of BIC observed among different subsets of the population, showing that a more positive perception of one's physical appearance does not always comes with fewer body checking and avoidance behaviors.

On the one hand, the transdiagnostic cognitive behavioral model of eating disorder psychopathology helps explain why individuals with a negative perception of their physical appearance engage more frequently in body checking and avoidance behaviors as a result of fixating on the body parts that they dislike (Fairburn et al., 2003). This explanation is consistent with the configuration of Profiles 1 (*Positive Body Image with a Lack of Body checking and Concerns*), 3 (*Normative*), 6 (*Negative Body Image with Excessive Body Checking and Concerns)*, and even 5 (*Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation*) when considered in relation to the other profiles. On the other hand, the sociocultural model (Stice, 1994; Stice & Shaw, 2002) may be more appropriate to explain why some individuals with a positive perception of their physical appearance may also engage more frequently in body checking and avoidance behaviors than individuals with a more negative perception of their physical appearance (e.g., Profile 2 vs. 1; Profile 4 vs. 5). Indeed, according to this model some individuals may engage in body checking and avoidance behaviors to ensure that the image they are presenting to others is consistent with their own self-image. Thus, some individuals who perceive their physical appearance very positively (i.e., Profile 2) or in the average (i.e., Profile 4) may feel the need to more frequently physically evaluate themselves or check their body to make sure their perception aligns with what they want to project.

Sex Composition of BIC Profiles

The tripartite influence model of body image and eating disturbances (Thompson et al., 1999; Thompson et al., 2012) has been devised to explain the role of socio-cultural standards of beauty, involving thinness for women and muscularity for men. In this regard, it was particularly interesting to note that Profile 4 (*Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*) was primarily composed of women (98.5%), while Profile 2 (*Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts*) included one of the largest proportion of men (28.6%). This could possibly explain, in part, the unique configuration of these two profiles, as checking one's muscularity may be solely done by touching specific body parts, whereas checking for an ideal feminine body shape may require more widespread efforts.

Our results generally supported the idea (Hypothesis 3) that women were more likely than men to display a profile characterized by higher levels of BIC, including lower levels of perceived physical

appearance. Indeed, a majority of the men included in our sample corresponded to Profile 1 (56.5%; *Positive Body Image with a Lack of Body checking and Concerns*), followed by Profile 2 (28.6%), which also displayed high levels of perceived physical appearance. In contrast, only women corresponded to Profile 6 (99.3%; *Negative Body Image with Excessive Body Checking and Concerns*), which displayed the least desirable BIC configuration. Profiles 4 (*Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*) and 5 (*Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation*), also included at least 89% of women. These last results are consistent with the idea that individuals with high levels of FNAE tend to engage more frequently in body checking and avoidance behaviors to validate their physical appearance. This tendency may be more prominent among women, even for those displaying a generally average perception of their physical appearance. Yet, it seems that women body checking and avoidance behaviors are more extreme when they demonstrate higher levels of FNAE and perceive themselves as physically unattractive (e.g., Profile 6 vs. 4), thus re-enforcing the idea women who dislike their physical appearance tend to be concerned with, even fixate on, multiple parts of their body (Fairburn et al., 2003).

These results are generally well-aligned with previous findings (e.g., Culbert et al., 2021; Quittkat et al., 2019; Ricciardelli & McCabe, 2001; Siham & Hamzeh, 2021; Striegel-Moore et al., 2009) suggesting that, compared to men, women place higher importance on their physical appearance over its functionality (Voges et al., 2019). Our results also support the need for interventions seeking to cultivate women's appreciation of their body functionality over its appearance. Such interventions might help to reduce BIC and increase body satisfaction amongst women, offsetting the risks of disordered eating behaviors. However, as men were underrepresented (12%) in the present sample, it possible that this situation may have contributed to the lack of variability observes in profiles among male participants. Therefore, the present results should be interpreted with caution pending replication.

Demographics Predictors of Profile Membership

Failing to support Hypothesis 4, individuals with higher BMI did not present an increased risk of membership into profiles characterized by higher levels of BIC. Rather, we mainly found that a higher BMI increased individuals' likelihood of belonging to a normative (average) profile (Profile 3), relative to the two profiles displaying the highest levels of BIC (Profile 4: Average *Body Image with High Levels of Body Checking and Fear of Body Evaluation*; Profile 6: *Negative Body Image with Excessive Body Checking and Concerns*). This result was unexpected, as most previous studies found a positive association between BMI and BIC. This finding thus fails to support the growing body of evidence suggesting that, possibly as a result of societal weight bias and stigma, individuals with higher BMI tend to display more dissatisfaction with their bodily appearance than average-weight individuals (Radwan et al., 2019; Weinberger et al., 2016). One possible explanation of this finding is that BMI is not a perfectly accurate measure of body fat content, and ignores muscularity and bone density (Nuttall, 2015). As previous research has theorized, individuals with higher BMI tend to develop more pronounced BIC because they hold a greater body fat distribution (e.g., Schwartz & Brownell, 2004; Toselli & Spiga, 2017). Future research will be needed to assess the replicability of our findings while relying on more accurate measures of body fat, bone density, and muscularity.

Partially supporting Hypothesis 5, our results showed that older individuals were more likely to belong to Profiles 3 (*Normative*) and 4 (*Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*) relative to 5 (*Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation*). In contrast, age did not seem to be related to the likelihood of corresponding to the most (Profiles 1 and 2), or least (Profile 6) profiles, but only to profiles characterized by generally close to average levels of BIC (i.e., Profiles 3, 4, and 5). Profiles 3 and 4 differ from one another in terms of body checking and avoidance behaviors and FNAE but are both characterized by higher levels of perceived physical appearance than profile 5. Notably, virtually no men corresponded to Profile 4. As such, our results suggest that older males are only more likely to belong to a generally average profile (Profile 3: *Normative*). In comparison, older women seem less likely to experience negative perceptions of their appearance (i.e., Profile 5) relative to close to average levels of perceived physical appearance (Profiles 3 and 4). These results thus generally align with previous findings showing that as individuals age, they tend to redirect their priorities toward personal goals rather than physical appearance (e.g., Duman et al., 2005; Kilpela et al., 2015).

Outcomes of Profile membership

Supporting Hypothesis 6, the more pronounced forms of BIC observed in Profiles 4, 5, and 6 were associated with significantly higher levels of disordered eating behaviors with respect to dieting and bulimic tendencies, with the highest levels observed in the most extreme profile (Profile 6). This finding supports previous person-centered research (Hoffmann & Warschburger, 2018; Jackson et al., 2022; Paul, 2017) suggesting that BIC tends to lead to the emergence of disordered eating behaviors through efforts to attain one's ideal body shape and weight by taking control of one's eating behaviors (i.e., restrictive dieting, binge eating and purging behavior; Tylka & Hill, 2004; Vander Wal et al., 2008). Interestingly, members of Profiles 4 (*Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*) and 6 (*Negative Body Image with Excessive Body Checking and Concern)*, which primarily included women, experienced the highest number of disordered eating behaviors (i.e., dieting, bulimia and food preoccupation, and oral control). However, although members of Profile 5 also displayed a negative body image, this translated into fewer disordered eating behaviors overall (i.e., dieting and bulimia and food preoccupation), consistent with the less pronounced behavioral manifestations of BIC observed in this profile. These results are well-aligned with the assumption from the trans-diagnostic cognitive behavioral model of disordered eating (Fairburn et al., 2003) that body checking and avoidance behaviors (in conjunction with others psychological characteristics such as, for example, perfectionism, mood intolerance, low self-esteem, etc.) contribute to magnify concerns about body shape and weight, leading to disordered eating behaviors in an attempt to regain control of one's body shape. In addition, objectification theory accentuates the importance of body checking and avoidance by highlighting the insidious role of social norms (Fitzsimmons-Craft et al., 2014). When women objectify their bodies, they focus on its appearance over its functionality, thus perpetuating the excessive monitoring of their bodies. This tendency reinforces BIC and gives way to disordered eating behaviors as a last attempt to regain control (Fitzsimmons-Craft et al., 2014).

Our results are also aligned with the tripartite influence model of body image and eating disturbances (Thompson et al., 1999; Thompson et al., 2012), whereby individuals develop body dissatisfaction by internalizing sociocultural pressures regarding their physical appearance (i.e., thinness or muscularity ideals), which may be reflected in some participants' low levels of perceived physical appearance (Profiles 5 and 6). Be they focused on thinness (for women) or muscularity (for men), these sociocultural standards remain inherently fat-phobic, meaning that individuals who do not exhibit an ideal body shape will be more prone to social rejection, negative feedback, or teasing (Wang et al., 2022). Thus, for participants in Profiles 4, 5, and 6, internalizing beauty standards may contribute to higher levels of FNAE and, in turn, push them to rely on disordered eating behaviors to try reaching an appearance matching sociocultural ideals. For individuals who have a very negative view of their own physical appearance, sociocultural pressures may accentuate their FNAE and dislike for numerous body parts leading to even more extreme levels of body checking and avoidance behaviors and disordered eating behaviors (e.g., Profile 6 vs. 4). In this sense, it may be useful to consider the interplay between the transdiagnostic cognitive behavioral model (Fairburn et al., 2003) and sociocultural models (e.g., the sociocultural model of bulimia nervosa: Stice, 1994; Stice & Shaw, 2002; the tripartite influence model of body image and eating disturbances; Thompson et al., 1999; Thompson et al., 2012) when attempting to make theoretical sense of the connections between BIC and disordered eating behaviors.

Limitations

This study attempted to fill gaps in the existing literature through the adoption of a person-centered approach anchored in a multidimensional representation of BIC encompassing its cognitive-perceptual, affective, and behavioral components. Nevertheless, this study has limitations. First, as our sample was drawn from a French-speaking Canadian population, future studies should consider using more geographically diverse samples to investigate the generalizability of our profiles across nations and cultures. Furthermore, gender representation is limited because our sample included primarily women and no non-binary participants. Although past studies have focused on how women experience BIC, the number of men who experience BIC has been reported to be increasing (e.g., Ralph-Nearman & Filik, 2018). Importantly, our measures primarily focused on BIC more frequently experienced by women (i.e., body fat dissatisfaction) than men (i.e., muscularity dissatisfaction). We encourage future researchers not only to measure a broader range of BICs to accurately capture the experience of all genders, but also to consider additional demographic characteristics of the participants, such as race or ethnicity.

Although the approach we used offers novel person-centered insights, two methodological limitations should be considered. First, we solely relied on self-report questionnaires, which are subjected to self-report biases (i.e., social desirability bias and recall bias). Future research should attempt to incorporate data from other sources, such as collateral reports from family, medical records, body fat, fitness and muscularity, and observational data to obtain a more valid picture of the associations between the variables considered in this study. Second, we relied on a cross-sectional design, which made it impossible to establish the directionality (or even to infer causality) of the observed associations and to discard interpretations of reversed causality (e.g., that disordered eating behaviors could predict BIC). It would be important for future studies to expand upon the current results using a longitudinal design, which would make it possible to document the stability of profile membership over time and to shed light on the directionality of the associations reported in this study.

Finally, the current study is also limited by the number of variables used to predict profile membership. We did not consider that BIC are more common among individuals suffering from psychological disorders (e.g., depression and anxiety) or with a history of physical and sexual abuse (Hosseini & Paddy, 2022). Future studies should consider various co-morbid mental health disorders as predictors for membership to BIC profiles. Furthermore, our outcomes (i.e., dieting, bulimia and food preoccupation, and oral control) fail to capture the unique nature of binge eating disorders. Future research should thus consider including behaviors related to binge eating disorders to achieve a more comprehensive understanding of the impact of BIC on all types of disordered eating behaviors.

Conclusion

BIC entail a multidimensional evaluation of the body and have often been positioned as core drivers of disordered eating behaviors. Addressing the methodological limitations of past studies on BIC, the present study provides a person-centered evaluation of the relation between BIC and disordered eating behaviors, while accounting for the specific cognitive-perceptual, affective, and behavioral components of BIC. Our findings highlight the importance of the behavioral manifestations of BIC, and their influence on disordered eating behaviors. Furthermore, our results support the theoretical foundations underpinning the association between BIC and disordered eating behaviors (Fairburn et al., 2003; Fredrickson & Roberts, 1997; Halliwell & Harvey, 2006; Szymanski et al., 2011; Tiggemann, 2011). Lastly, we found tentative evidence suggesting that females may place higher importance on their physical appearance due to western sociocultural attitudes toward a thin appearance, whereas males might be more influenced by muscularity (Fredrickson & Roberts, 1997; Szymanski et al., 2011).

From a practical perspective, our study can help researchers and clinicians develop more tailored interventions for subgroups of individuals presenting unique patterns of BIC. To reduce disordered eating behaviors, patients could benefit from therapies focusing on the unique aspects of BIC they are struggling with – in particular, heightened body checking and avoidance behaviors. Clinicians should help clients reduce these behaviors through empirically-based treatments, like cognitive-behavioral therapy-enhanced (Fairburn et al., 2008), which includes, but is not limited to, cognitive restructuring, behavioral experiments, and exposure to one's body (e.g., Fairburn et al., 2008; Wilhelm et al., 2013). Finally, the present study contributes to the theoretical and empirical advancement of person-centered, multidimensional research examining the relation between body image concerns and disordered eating behaviors.

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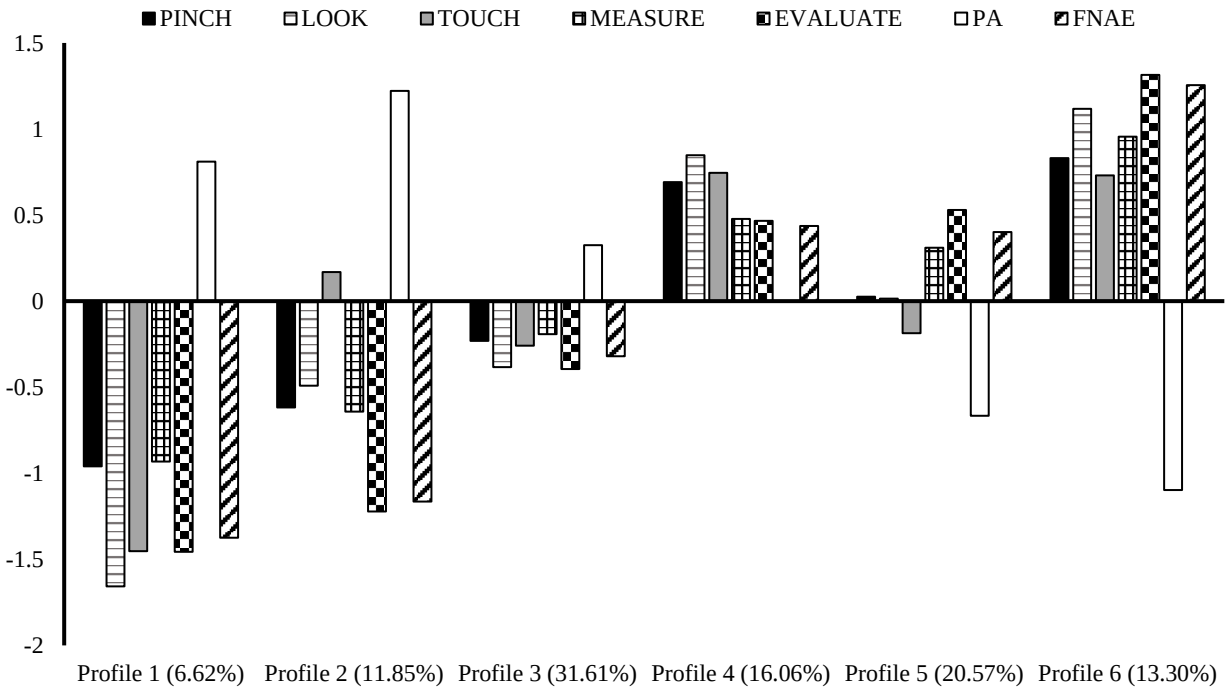
Figure 1
Final 6-Profile solution



Note. Profile indicators are factor scores estimated with a mean of 0 and a standard deviation of 1; PA = physical appearance; FNAE = fear of negative appearance evaluation. Profile 1 = *Positive Body Image with a Lack of Body checking and Concerns*; Profile 2 = *Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts*; Profile 3 = *Normative*; Profile 4 = *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*; Profile 5 = *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation*; Profile 6 = *Negative Body Image with Excessive Body Checking and Concerns*.

Table 1

Results from the Latent Profile Analyses

Model	*LL*	*#fp*	SC	AIC	CAIC	BIC	ABIC	Entropy	aLMR	BLRT
1 Profile	-3750.575	14	.883	7529.150	7599.681	7585.681	7541.255	-	-	-
2 Profiles	-3199.914	29	1.014	6457.828	6603.926	6574.926	6482.901	.885	≤ .001	≤ .001
3 Profiles	-3023.071	44	1.296	6134.143	6355.809	6311.809	6172.184	.867	.177	≤ .001
4 Profiles	-2916.270	59	1.122	5950.540	6247.774	6188.774	6001.550	.888	≤ .001	≤ .001
5 Profile	-2863.557	74	1.186	5875.114	6247.917	6173.917	5939.093	.868	.245	≤ .001
6 Profiles	-2813.273	89	1.127	5804.545	6252.916	6163.916	5881.493	.884	.003	≤ .001
7 Profiles	-2769.128	104	1.077	5746.256	6270.195	6166.195	5836.173	.897	.091	≤ .001
8 Profiles	-2731.183	119	1.104	5700.366	6299.873	6180.873	5803.251	.881	.290	≤ .001

Note. LL = loglikelihood; #fp = free parameters; SC = scaling correction; AIC = Akaïke information criterion; CAIC = consistent AIC; BIC = Bayesian information criterion; ABIC = sample-size adjusted BIC; aLMR = Lo-Mendel and Rubin's likelihood ratio test; BLRT = bootstrap likelihood ratio test.

Table 2

Results from the Multinomial Logistic and Multiple Regressions Predicting Profile Membership

	Profile 1 vs Profile 2		Profile 1 vs Profile 3		Profile 1 vs Profile 4		Profile 1 vs Profile 5		Profile 1 vs Profile 6	
Predictors	*Coeff* (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR
ZAGE	.008(.327)	1.008	.012(.288)	1.012	-.237(.306)	.789	.272(.290)	1.313	.169(.306)	1.184
ZBMI	.027(.322)	1.027	-.237(.279)	.789	.141(.292)	1.151	.019(.281)	1.019	.217(.299)	1.242
	Profile 2 vs Profile 3		Profile 2 vs Profile 4		Profile 2 vs Profile 5		Profile 2 vs Profile 6		Profile 3 vs Profile 4	
Predictors	*Coeff* (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR
ZAGE	.003(.204)	1.003	-.245(.235)	.783	.264(.200)	1.302	.160(.229)	1.174	-.249(.180)	.780
ZBMI	-.264(.207)	0.768	.114(.221)	1.121	-.008(.208)	.992	.190(.236)	1.209	.378(.158)*	1.459
	Profile 3 vs Profile 5		Profile 3 vs Profile 6		Profile 4 vs Profile 5		Profile 4 vs Profile 6		Profile 5 vs Profile 6	
	Coeff (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR	*Coeff* (SE)	OR
ZAGE	.260(.133)*	1.297	.157(.174)	1.170	.509(.194)**	1.664	.406(.221)	1.501	-.103(.183)	.902
ZBMI	.256(.136)	1.292	.454(.170)**	1.575	-.122(.165)	.885	.077(.194)	1.080	.198(.175)	1.219

Note. **: $p < .01$; *: $p < .05$. SE = standard error of the coefficient; OR = Odds Ratio. The coefficients and OR reflects the effects of the predictors on the likelihood of membership into the first listed profile relative to the second listed profile; Predictors are standardized age and BMI; Profile 1 = *Positive Body Image with a Lack of Body checking and Concerns*; Profile 2 = *Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts*; Profile 3 = *Normative*; Profile 4 = *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*; Profile 5 = *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation*; Profile 6 = *Negative Body Image with Excessive Body Checking and Concerns*.

Table 3

Associations between Profile Membership and the Covariate (Sex) and Outcomes (Eating Attitude Test-26)

Covariates	Profile 1 Est. (SE)	Profile 2 Est. (SE)	Profile 3 Est. (SE)	Profile 4 Est. (SE)	Profile 5 Est. (SE)	Profile 6 Est. (SE)	SSD
Sex	.565(.095)	.286(.063)	.114(.030)	.015(.000)	.106(.033)	.007(.017)	1>2=3>4=6; 1>3=5>6; 2>4>5.
Outcomes	**Profile 1 M [CI]**	**Profile 2 M [CI]**	**Profile 3 M [CI]**	**Profile 4 M [CI]**	**Profile 5 M [CI]**	**Profile 6 M [CI]**	**SSD**
Dieting	-1.093 [-1.363;-.823]	-1.049 [-1.209;-.888]	-0.373 [-.488;-.257]	.645 [.454;.836]	.241 [.060;.422]	1.157 [.928;1.387]	6>4>5>3>1 = 2
Bulimia and food preoccupation	-1.179 [-1.361;-.998]	-.841 [-1.053;-.628]	-.296 [-.425;-.168]	.429 [.260;.599]	.400 [.237;.563]	1.135 [.927;1.342]	6>4=5>3>2>1
Oral control	-.067 [-.324;.189]	-.059 [-.253;.135]	-.028 [-.155;.099]	.749 [.512;.986]	-.174 [-.395;.048]	.322 [-.033;.676]	4>1=2=3=5; 1=2=3=6; 6>5;4=6

Note. M = Mean; [CI] = 95% Confidence Interval; Eating Attitude Test-26 are factor scores estimated with mean of 0 and a standard deviation of 1; Sex is interpreted as the percentage of males belonging to each profile; SSD = Summary of Significant Differences; Est = Estimate; SE = Standard Error; M = Mean; CI = 95% Confidence Intervals; Profile 1 = *Positive Body Image with a Lack of Body checking and Concerns*; Profile 2 = *Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts*; Profile 3 = *Normative*; Profile 4 = *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*; Profile 5 = *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation*; Profile 6 = *Negative Body Image with Excessive Body Checking and Concerns*.

Online Supplements for Profiles of Body Image Concerns and their Associations with Disordered Eating Behaviors

Previous Studies Seeking to Profile Body Image Concerns

First, in a study of adolescent and young adult males, Calzo et al. (2015) identified two BIC profiles at ages 15-16 years and three profiles of BIC at 17-18 years and 19-20 years. Across all age groups, a *Healthy* profile emerged, characterized by low desire for toned muscles and low concern with weight and shape (54-74% of their sample), as well as a *Lean-Concerned* profile, characterized by higher levels of weight and shape concerns (19-28%). Amongst 17-18- and 19–20-year-old participants only, an additional *Muscle-Concerned* profile emerged, characterized by a higher level of concerns regarding muscularity (18-21%). The type of weight and shape-related behaviors observed were specific to each profile. More precisely, the *Lean-Concerned* profile displayed higher levels of binge eating and restrictive dieting relative to *Healthy* and *Muscle-concerned* profiles. However, the *Muscle-concerned* profile was associated with the greatest use of muscle-enhancing products.

Second, Paul (2017) identified four distinct profiles of male youth characterized by (1) high levels of BIC (labelled *Unhealthy*; 13% of their sample), (2) high levels of preoccupation with weight and appearance (*Over-Preoccupied*, 15%), (3) low levels of BIC (*Healthy*; 58%) and (4) moderate levels of satisfaction but low levels of appearance concerns (*Unconcerned*; 13%). Levels of disordered eating attitudes and behaviors also differed between profiles, where fears of getting fat and eating related guilt were highest in the *Unhealthy* and *Over-Preoccupied* profiles relative to the *Unconcerned* and *Healthy* profiles, levels of eating-related control were highest in the *Over-Preoccupied* profile relatives to other profiles, and levels of perceived social pressures to gain weight were highest in the *Unconcerned* profile relative to the *Unhealthy* and *Healthy* profiles.

Third, in a study of male and female adolescents, Hoffmann and Warschburger (2018) identified three profiles, the largest of which displayed low weight, shape, and muscularity concerns (labelled *Inconspicuous*; 86.49% of the boys; 68.47% of the girls). The other profiles displayed average (*Borderline*; 9.91% of boys; 23.06% of girls) or high (*Conspicuous*; 3.60% of boys; 8.47% of girls) levels of body-related concerns. Restrained eating behaviors were higher in the *Borderline* and *Conspicuous* profiles and lower in the *Inconspicuous* profile among boys and girls. Moreover, among girls, binge eating behaviors were higher in the *Conspicuous* profile relative to the other profiles.

Fourth, Jackson et al. (2022) identified four BIC profiles (unfortunately, the authors did not report the size of these profiles) among adult males and females. The first profile displayed close to average levels of body appreciation, functionality appreciation, body dissatisfaction and weight bias internalization (labelled *Appreciation and Mild Dissatisfaction*). The second profile displayed slightly lower levels of body and functionality appreciation and slightly higher levels of body dissatisfaction and weight bias internalization (*Functional Appreciation and Moderate Dissatisfaction*), while the last two profiles were more extreme (*Strong Dissatisfaction*; *Strong Appreciation*). The *Strong Appreciation* profile displayed more adaptive levels than the other profiles on a range of outcomes related to intuitive eating (e.g., eating for physiological reasons, following hunger/satiety cues, choosing food congruent with one's body, and giving oneself unconditional authorization to eat) and disordered eating behaviors (i.e., uncontrolled and emotional eating and cognitive restraint), followed by the *Appreciation and Mild Dissatisfaction* profile, then by the *Functional Appreciation and Moderate Dissatisfaction* profile, and finally by the *Strong Dissatisfaction* profile.

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Preliminary Measurement Models: Specifications

All analyses were conducted using *Mplus* 8.7 (Muthén & Muthén, 2021). To verify the psychometric properties of our measures, preliminary measurement models were estimated using the robust means and variance adjusted weighted least square (WLSMV) estimator, previously shown to outperform maximum likelihood-based estimators when responses are ordinal and follow asymmetric thresholds (Finney & DiStefano, 2013; Morin et al., 2020). Missing data at the item level ranged from .5% to 22.7% and was handled using the default algorithms implemented in *Mplus* (Asparouhov & Muthén, 2010), allowing us to estimate factor scores using all available information without relying on the suboptimal listwise deletion of participants with missing data or on the improper imputation of their missing responses. For all measurement models, we report multiple statistical indices to assess model fit including the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA) and its confidence intervals, as well as the WLSMV chi-square test of exact fit (χ^2) (Hu & Bentler, 1999; Marsh et al., 2005). However, as the chi-square test is known to be oversensitive to minor model misspecifications, sample size, and even omitted variables (Marsh et al., 2005) it is not used to evaluate model fit but simply reported for transparency. We relied on typical interpretational guidelines suggesting that CFI and TLI values greater than .90 and .95, and RMSEA values lower than .008 and .06, to respectively support adequate and excellent model fit (Hu & Bentler, 1999; Marsh et al., 2005).

To investigate the construct relevant sources of psychometric multi-dimensionality inherent to the Body Checking and Avoidance Questionnaire (BCAQ), as indicated by past results indicating strong cross-loadings between specific dimensions of this measure (Kachani et al., 2011; da Silva et al., 2021) and the presence of construct-relevant conceptual overlap between each dimension, we conducted and contrasted a confirmatory factor analytic (CFA) with an exploratory structural equation modelling (ESEM) representation of responses to this instrument (Morin et al., 2016a; Morin et al., 2020). Statistical research has shown that when no cross-loadings are present in the population model, ESEM should result in unbiased parameter estimates comparable to CFA estimates, whereas they result in more accurate parameter estimates in the presence of cross-loadings (Asparouhov et al., 2015).

Therefore, the measurement model underlying the profiles indicators (including the BCAQ, the physical appearance subscale from the Physical Self-Inventory – Revised Short form, and the Fear of Negative Appearance Scale) was estimated using both CFA and ESEM representations of the data. In CFA responses to the: (a) BCAQ were explained by five correlated factors defined by their a priori items; (b) physical appearance was explained by one factor defined by all of its *a priori* items; and (c) the Fear of Negative Appearance Scale was represented as one factor defined by all of its a priori items. In the second model, physical appearance and the Fear of Negative Appearance Scale remained operationalized as in the first model, whereas an ESEM specification was used for the BCAQ. Thus, each BCAQ factor was defined as in the first CFA model, but all cross-loadings were freely estimated, albeit *targeted* to be as close to zero as possible through the application of a confirmatory type of rotation (i.e., *target* rotation; Morin et al., 2020). To determine which of these two models provided the best representation of the data, we considered model fit indices, parameter estimates (i.e., factor loadings, cross-loadings, and factor correlations), and the theoretical conformity of the model. Similar procedures were used to estimate the factor structure of the Eating Attitude Test-26 (EAT-26; CFA vs. ESEM). We provide the composite reliability coefficients (ω; McDonald, 1970) associated with each factor for all models used to save the factor scores for the main analyses.

Preliminary Measurement Models: Results

Goodness-of-fit results for the measurement models comparing the CFA and ESEM solutions for the profiles indicators and the EAT-26 are available in Table S1 of these supplements. In accordance with previous results (Kachani et al., 2011; da Silva et al., 2021) we observed the presence of construct-relevant overlap between the each of the BCAQ dimensions (i.e., pinching, looking, touching, measuring, evaluating) as evidenced by the presence of substantively meaningful cross-loadings and a better model fit for the ESEM solution compared to the CFA solution. Moreover, standardized factor correlations between the BCAQ dimensions were all high for the CFA solution (i.e., average r = .77) while these correlations dropped substantively to a more reasonable range for the ESEM solution (i.e., average r = .42) revealing that omitting cross-loadings results in inflated factor correlations. Very similar results were observed for the comparison of CFA and ESEM for the EAT-26, with model fit supporting the ESEM solution, which also revealed the presence of meaningful cross-loadings.

Standardized factor correlations between the three EAT-26 dimensions were all high for the CFA solution (i.e., average r = .76) but were again lower and more reasonable for the ESEM solution (i.e., average r = .38). Target factor loadings were acceptable in CFA and ESEM for the profiles indicators and the EAT-26. Based on the superiority of the ESEM solution in capturing the different sources of psychometric multidimensionality inherent to the profiles indicators and the EAT-26, factor scores were saved from the ESEM models and used as profile indicators and outcomes in the main analyses. Standardized parameter estimates are reported in Table S2 of these supplements for the profile indicators, and in Table S3 of these supplements for the EAT-26. Overall, all factors were well defined as shown by acceptable factor loadings and strong composite reliability coefficients (ω; McDonald, 1970): (a) BCAQ-Pinching ($M_{|\lambda|}$ = .439; ω = .701); (b) BCAQ-Looking ($M_{|\lambda|}$ = .664; ω = .838); (c) BCAQ-Touching ($M_{|\lambda|}$ = .486; ω = .779); (d) BCAQ-Measuring ($M_{|\lambda|}$ = .857; ω = .974); (e) BCAQ-Evaluating ($M_{|\lambda|}$ = .411; ω = .645); (f) physical appearance ($M_{|\lambda|}$ = .809; ω = .865); (g) Fear of Negative Appearance Scale ($M_{|\lambda|}$ = .924; ω = .967); (h) EAT-26-Dieting ($M_{|\lambda|}$ = .683; ω = .949); (i) EAT-26-Bulimia and Food Preoccupation ($M_{|\lambda|}$ = .672; ω = .932); (j) EAT-26-Oral Control ($M_{|\lambda|}$ = .562; ω = .831).

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Table S1

Goodness-of-Fit Information for the Measurement Models

Model	df	χ^2	CFI	TLI	RMSEA	RMSEA 90% CI
Profile Indicators (All CFA)	435	1166.828*	.968	.964	.070	.065;.074
Profile Indicators (ESEM for BCAQ and CFA for PAS and FNAES)	316	711.525*	.984	.978	.055	.049;.060
Eating Attitude Test-26 (CFA)	325	1791.524*	.933	.926	.120	.115;.125
Eating Attitude Test-26 (ESEM)	250	704.078*	.980	.973	.072	.066;.078

Note. * $p < .01$; CFA = confirmatory factor analytic; ESEM = exploratory structural equation modelling; BCAQ = Body Checking and Avoidance Questionnaire; PAS = Physical Appearance Scale; FNAES = Fear of Negative Appearance Evaluation Scale; df = degrees of freedom; χ^2 = chi-square; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square approximation; CI = 90% confidence intervals for the RMSEA.

Table S2

Standardized Parameter Estimates for Profile Indicators Model

	BCAQ						PAS		FNAES	
	Pinch	Look	Touch	Measure	Evaluate					
	λ	λ	λ	λ	λ	δ	λ	δ	λ	δ
Item 1	**.780**	.135	.103	.148	-.083	.152	.977	.045	.881	.223
Item 2	**.452**	.085	.126	.031	.311	.391	.917	.159	.923	.148
Item 3	**.481**	.014	.428	.122	.099	.272	.533	.716	.957	.084
Item 4	**.043**	-.121	.582	.239	.111	.498			.947	.103
Item 5	-.125	**.801**	.035	-.039	.024	.421			.914	.164
Item 6	.344	**.619**	-.079	.147	-.067	.289				
Item 7	.120	**.522**	-.133	-.100	.489	.218				
Item 8	-.362	**.713**	.323	.067	-.176	.438				
Item 9	.364	.283	**.446**	-.042	-.011	.321				
Item 10	.281	.220	**.345**	-.141	.276	.401				
Item 11	.309	.062	**.701**	-.160	.089	.263				
Item 12	-.274	.092	**.711**	.015	.034	.473				
Item 13	.140	.139	**.313**	.252	.161	.465				
Item 14	.171	.075	**.402**	.276	.028	.498				
Item 15	.100	.136	-.020	**.875**	-.013	.061				
Item 16	.005	.104	-.163	**.857**	.191	.062				
Item 17	.043	-.055	.083	**.838**	.201	.051				
Item 18	-.080	.173	.087	.061	**.608**	.426				
Item 19	-.019	.116	.135	.049	**.597**	.443				
Item 20	.258	.226	.106	.180	**.265**	.399				
Item 21	.049	.077	.340	.274	**.164**	.548				
Item 22	.048	.033	-.145	.391	**.420**	.511				
$M_{\|\lambda\|}$	.439	.664	.486	.857	.411		.809		.924	
ω	.701	.838	.779	.974	.645		.865		.967	

Note. BCAQ = Body Checking and Avoidance Questionnaire; PAS = Physical Appearance Scale; FNAES = Fear of Negative Appearance Evaluation Scale; λ = factor loading; δ = item uniqueness; $M_{|\lambda|}$ =mean factor loading; ω = omega coefficient of model-based composite reliability

Table S3

Standardized Parameter Estimates for the Eating Attitude Test Measurement-26 Model

	Dieting	Bulimia and Food Preoccupation	Oral Control	
	λ	λ	λ	δ
Item 1	**.640**	.363	-.097	.208
Item 2	.624	.072	**.362**	.266
Item 3	.583	**.321**	.130	.240
Item 4	.164	**.645**	-.248	.451
Item 5	.155	.105	**.502**	.622
Item 6	**.764**	-.085	.077	.450
Item 7	**.768**	-.165	.215	.409
Item 8	-.008	.142	**.884**	.154
Item 9	-.076	**.851**	.367	.111
Item 10	**.590**	.445	-.033	.140
Item 11	**.764**	.342	-.312	.064
Item 12	**.781**	-.007	-.110	.438
Item 13	-.247	.065	**.862**	.322
Item 14	**.777**	.274	-.194	.130
Item 15	-.062	.216	**.431**	.760
Item 16	**.836**	-.391	.267	.393
Item 17	**.708**	-.057	.175	.443
Item 18	.263	**.745**	.021	.118
Item 19	.469	-.076	**.205**	.724
Item 20	.091	.264	**.689**	.306
Item 21	.230	**.724**	.110	.152
Item 22	**.685**	.265	-.003	.232
Item 23	**.724**	.183	-.008	.279
Item 24	**.465**	.222	.404	.288
Item 25	**-.376**	.203	-.300	.778
Item 26	.089	**.745**	.353	.106
$M_{\|\lambda\|}$	.683	.672	.562	
ω	.949	.932	.831	

Note. λ = factor loading; δ= item uniqueness; $M_{|\lambda|}$ = mean factor loading; ω = omega coefficient of model-based composite reliability

Table S4

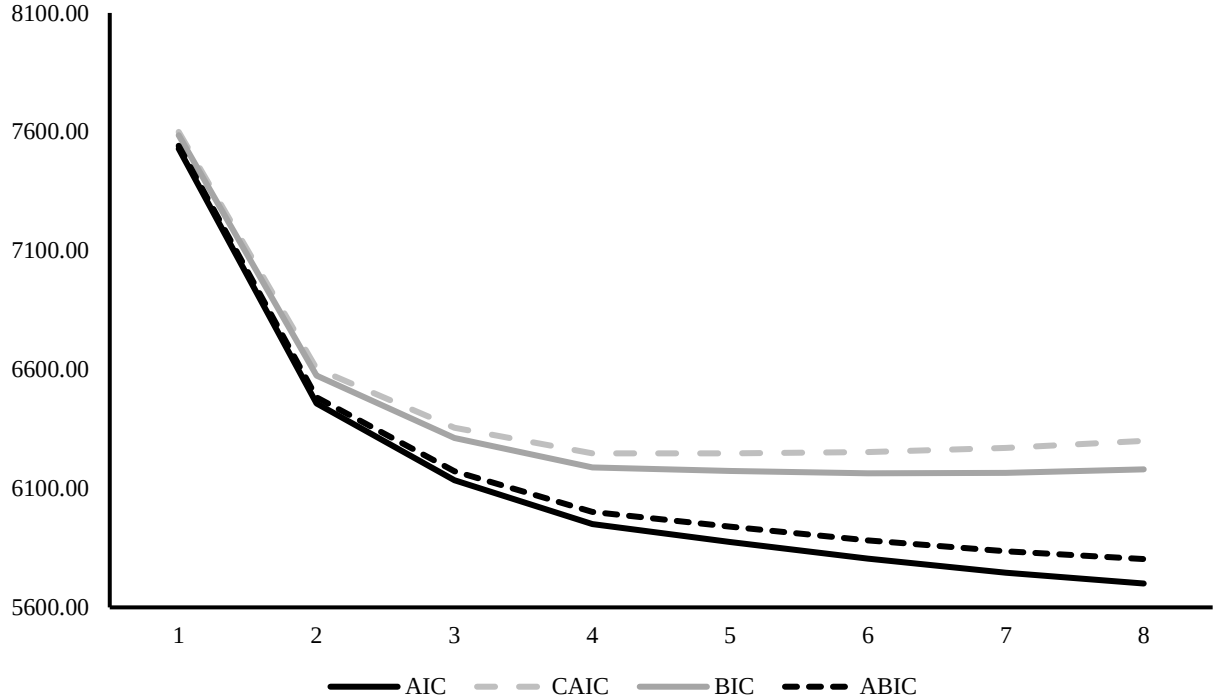
Correlations

	1	2	3	4	5	6	7	8	9	10	11	12.
1. Pinch (fs)												
2. Look (fs)	.607**											
3. Touch (fs)	.419**	.557**										
4. Measure (fs)	.446**	.542**	.419**									
5. Evaluate (fs)	.546**	.737**	.367**	.627**								
6. PA (fs)	-.398**	-.382**	-.176**	-.543**	-.786**							
7. FNAE (fs)	.535**	.630**	.421**	.629**	.827**	-.696**						
8. Dieting (fs)	.550**	.564**	.316**	.532**	.697**	-.586**	.655**					
9. Bulimia and Food Preoccupation (fs)	.457**	.486**	.317**	.533**	.657**	-.613**	.620**	.682**				
10. Oral Control (fs)	.109*	.236**	.247**	.186**	.134*	-.032	.202**	.312**	.166**			
11. ZBMI	.110*	.115*	.045	.088	.099*	-.070	.080	.115*	.120*	.115*		
12. Zage	-.009	-.029	-.095	.046	.087	-.170**	-.016	.193**	.121*	-.114*	.016	

Note. * $p < .05$; ** $p < .01$; fs = factor score; PA = physical appearance; FNAES = fear of negative appearance evaluation; Zage = standardized age; ZBMI = standardized body mass index.

Figure S1

Elbow Plot of the Information Criteria for the Latent Profile Analyses



Note. AIC = Akaike information criterion; CAIC = consistent AIC; BIC = Bayesian information criterion; ABIC = sample-size adjusted BIC.

Table S5

Detailed Results from the Final Latent Profile Analytic Solution

	Profile 1 (6.62%)		Profile 2 (11.85%)		Profile 3 (31.61%)		Profile 4 (16.06%)		Profile 5 (20.57%)		Profile 6 (13.30%)	
	Mean	CI	Mean	CI	Mean	CI	Mean	CI	Mean	CI	Mean	CI
P	-.960	[-1.241, -.679]	-.618	[-.843, -.393]	-.231	[-.356, -.107]	.691	[.506, .876]	.026	[-.343, .394]	.831	[.623, 1.040]
L	-1.657	[-1.874, -1.440]	-.491	[-.682, -.299]	-.384	[-.512, -.256]	.847	[.619, 1.076]	.015	[-.211, .240]	1.117	[.747, 1.488]
T	-1.452	[-1.585, -1.318]	.169	[-.003, .342]	-.258	[-.394, -.123]	.745	[.528, .962]	-.186	[-.506, .135]	.730	[.465, .996]
M	-.932	[-1.088, -.776]	-.642	[-.799, -.484]	-.191	[-.325, -.057]	.478	[.302, .654]	.310	[.023, .597]	.956	[.750, 1.162]
E	-1.456	[-1.688, -1.224]	-1.222	[-1.359, -1.085]	-.395	[-.490, -.300]	.467	[.302, .631]	.529	[.340, .718]	1.314	[1.099, 1.529]
PA	.811	[.601, 1.020]	1.221	[1.034, 1.407]	.325	[.213, .437]	-.001	[-.225, .222]	-.666	[-.883, -.450]	-1.097	[-1.221, -.973]
FNAE	-1.375	[-1.561, -1.189]	-1.165	[-1.295, -1.034]	-.320	[-.432, -.208]	.437	[.256, .618]	.401	[.162, .640]	1.255	[1.103, 1.408]
	Profile 1 (6.62%)		Profile 2 (11.85%)		Profile 3 (31.61%)		Profile 4 (16.06%)		Profile 5 (20.57%)		Profile 6 (13.30%)	
	Var	CI	Var	CI	Var	CI	Var	CI	Var	CI	Var	CI
P	.393	[.146, .639]	.555	[.296, .815]	.388	[.296, .479]	.258	[.139, .376]	.607	[.240, .975]	.502	[.263, .741]
L	.215	[.112, .318]	.403	[.237, .570]	.340	[.248, .433]	.151	[.027, .274]	.287	[.154, .420]	.236	[-.094, .567]
T	.104	[.057, .152]	.268	[.134, .402]	.450	[.313, .587]	.369	[.216, .522]	.625	[.278, .972]	.451	[.041, .861]
M	.151	[.090, .212]	.268	[.145, .391]	.356	[.257, .454]	.329	[.215, .442]	.414	[.188, .640]	.363	[.228, .497]
E	.197	[.103, .290]	.124	[.072, .177]	.095	[.057, .133]	.117	[.078, .156]	.162	[.087, .237]	.100	[-.006, .206]
PA	.236	[.109, .364]	.282	[.164, .400]	.236	[.169, .303]	.371	[.214, .529]	.184	[.131, .237]	.139	[.094, .185]
FNAE	.165	[.092, .238]	.138	[.083, .193]	.207	[.142, .272]	.299	[.208, .389]	.248	[.115, .380]	.113	[.075, .151]

Note. The profile indicators are factor scores estimated with mean of 0 and a standard deviation of 1; CI = 95% Confidence Interval; Var = variance; P = pinch; L = look; T = touch; M = measure; E = evaluate; PA = physical appearance; FNAE = fear of negative appearance evaluation; Profile 1 = *Positive Body Image with a Lack of Body checking and Concerns*; Profile 2 = *Highly Positive Body Image with a Moderate Monitoring by Touching Body Parts*; Profile 3 = *Normative*; Profile 4 = *Average Body Image with High Levels of Body Checking and Fear of Body Evaluation*; Profile 5 = *Negative Body Image with High Levels of Evaluation and Measurement of Body Shape and Fear of Body Evaluation*; Profile 6 = *Negative Body Image with Excessive Body Checking and Concerns*.