

Self-Defining Memories of Body Image Shame and Binge Eating in Men and Women: Body Image Shame and Self-Criticism in Adulthood as Mediating Mechanisms

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Abstract Despite the growing evidence of the association between shame experiences and eating psychopathology, the specific effect of body image-focused shame memories on binge eating remains largely unexplored. The current study examined this association and considered current body image shame and self-criticism as mediators. A multi-group path analysis was conducted to examine gender differences in these relationships. The sample included 222 women and 109 men from the Portuguese general and college student populations who recalled an early body image-focused shame experience and completed measures of the centrality of the shame memory, current body image shame, binge eating symptoms, depressive symptoms, and self-criticism. For both men and women, the effect of the centrality of shame memories related to body image on binge eating symptoms was fully mediated by body image shame and self-criticism. In women, these effects were further mediated by self-criticism focused on a sense of inadequacy and also on self-hatred. In men, only the form of self-criticism focused on a sense of inadequacy mediated these associations. The present study has important implications for the conceptualization and treatment of binge eating symptoms. Findings suggest that, in both genders, body image-focused shame experiences are associated with binge

eating symptoms via their effect on current body image shame and self-criticism.

Keywords Binge eating · Body image shame · Centrality of shame memories · Self-criticism · Mediator effect · Gender differences

Binge eating involves episodes marked by the intake of large amounts of food, along with a sense of lack of control and accompanied by marked distress. These episodes are characterized by rapid consumption, by eating until uncomfortably full in the absence of hunger and in secrecy due to shame about the behaviour, or by feelings of disgust, depression, or guilt felt after eating (American Psychiatric Association 2013). Binge eating behaviours are currently recognized as a serious concern by virtue of their association with a host of physical and psychological problems, including overweight and obesity, and psychiatric symptoms and comorbidities (Bulik and Reichborn-Kjennerud 2003; Hudson et al. 2007; Kessler et al. 2013). Binge eating behaviours are prevalent in the general population (Johnson et al. 2002; Kinzl et al. 1999; Ribeiro et al. 2014) and are not restricted to clinically established eating disorders (e.g., Bulimia Nervosa [BN] and Binge Eating Disorder [BED]; American Psychiatric Association 2013). Data from the World Health Organization World Mental Health Survey initiative, obtained in 14 countries, indicate that on average the lifetime prevalence for BED is 2% for men and 3% for women, and approximately 4% of men and 5% of women experience any binge eating symptoms throughout their lifetime (Kessler et al. 2013). Despite the growing research on binge eating, the scientific examination of the factors underlying these behaviours is still warranted to better understand and address this problematic behaviour.

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Existent conceptualizations describe binge eating symptoms as a short-term attempt to escape, avoid or alleviate aversive negative emotional states and self-evaluations (Dakanalis et al. 2015; Goldfield et al. 2008; Goss and Gilbert 2002; Heatherton and Baumeister 1991). The role of negative affect on the development of binge eating symptoms is well documented (Dakanalis et al. 2014b; Goldschmidt et al. 2014a; Spoor et al. 2006). Goldschmidt et al. (2014b) found that stressful events, namely interpersonal stressors, predicted binge eating symptoms in women with BN and that this association was mediated by increases in negative affect. Other studies conducted with clinical samples support that greater negative affect precedes binge eating episodes (for a review, see Haedt-Matt and Keel 2011). Research conducted in non-clinical samples also supports the association between negative affect and binge eating. A study conducted with female college students indicated that negative familial experiences (e.g., weight and eating related criticism) were indirectly associated with binge eating symptoms—mediated by depressive symptoms, an externalized sense of control, and negative body esteem. These findings suggested that problematic eating behaviour may be adopted as a means to cope with negative internal states (Meno et al. 2008). Also, Saules et al. (2009) found that negative self-evaluations of being overweight and negative affect were associated with binge eating symptoms among college students. Moreover, a recent study conducted with women from the general community showed that the specific negative emotion of shame related to body image had a significant effect on binge eating symptoms, above the effect of overall negative affect (e.g., depressive symptoms; Duarte et al. 2014).

Nonetheless, theoretical considerations and empirical accounts indicate that even though binge eating may alleviate these negative emotions and cognitions in the short term, after engaging in these behaviours negative affect increases (Haedt-Matt and Keel 2011), and people may find themselves feeling ashamed and becoming self-critical (Goss and Gilbert 2002; Jambekar et al. 2003). These negative emotions and self-evaluations seem, in turn, to be associated with the severity of binge eating symptoms, possibly fuelling a self-sustained cycle (Duarte et al. 2014, 2015a, 2015c).

Shame Experiences and Binge Eating

The aetiology of binge eating is complex and multidetermined (Fairburn et al. 1998; Striegel-Moore et al. 2002). Retrospective studies suggest that adverse experiences in childhood and adolescence—including bullying experiences by peers, sexual and physical abuse, parental criticism and low affection, and negative comments about body weight and shape—are risk factors for BED (Fairburn et al. 1998; Striegel-Moore et al. 2002; Striegel-Moore et al. 2005). Nonetheless, the mechanisms

underlying the associations between such negative experiences and binge eating symptoms remain less explored.

Difficulties in emotion regulation have been identified as resulting from early negative social experiences (e.g., abuse, neglect, rejection criticism; Blatt and Zuroff 1992; Gilbert et al. 2004; Perris and Gilbert 2000; Schore 1994). Among such negative early interactions, shame experiences are particularly pathogenic and are associated with several psychopathological indicators (Blatt and Zuroff 1992; Gilbert 1998, 2007; Matos and Pinto-Gouveia 2010; Matos et al. 2013; Pinto-Gouveia et al. 2013).

The effect of such experiences can be understood in light of the evolutionary biopsychosocial model of shame (Gilbert 1992, 1998, 2002, 2007). According to this model, humans are innately prone to be highly influenced by the quality of social relationships (Baumeister and Leary 1995; Cozolino 2007; Gerhardt 2004; Gilbert 1992, 2000; Schore 1994). Moreover, being able to stimulate positive affect and being regarded as attractive by one's social group are key to engaging others to form advantageous social relationships and to feeling safe within the social arena. On the contrary, perceiving or experiencing failures in these domains is perceived as highly threatening and sets the basis for the activation of shame and self-critical/attacking feelings and cognitions (Gilbert 1992, 1997, 1998, 2002, 2003, 2007; Tangney and Dearing 2002).

Researchers found that shame experiences occurring in childhood and adolescence can become central to self-identity and one's life story, becoming a key component of one's sense of self and a reference point for everyday inferences and expectations, as well as greatly influencing one's social interactions (Berntsen and Rubin 2006; Pinto-Gouveia and Matos 2011). These experiences can have enduring pathogenic effects. In fact, there is consistent evidence showing that the centrality of early shame memories is associated with depressive symptomatology later in life (Matos and Pinto-Gouveia 2010; Matos et al. 2012; Matos et al. 2013; Pinto-Gouveia et al. 2013; Pinto-Gouveia and Matos 2011). Moreover, studies conducted with patients with eating disorders showed that shame memories significantly predicted the severity of the disorder and that this effect was mediated by perceptions of being inferior in the social world (Ferreira et al. 2014; Matos et al. 2015). Nonetheless, little is known about the effect of shame memories on specific symptoms of eating psychopathology, namely binge eating, and the mechanisms involved in this association.

Body image has been identified as a particularly important source of shame because it represents a dimension of the self that can be easily assessed and scrutinised by others (Duarte et al. 2015c; Gilbert 2002; Goss and Gilbert 2002; Tangney et al. 1996). In fact, the display of a body image with valued features has always played an important role in the interplay of others' and self evaluations (Strahan et al. 2006). In particular for women, physical appearance has been a fundamental

dimension for self-evaluation and for determining whether one is accepted and valued by others (Burkle et al. 1999; Fredrickson and Roberts 1997; Gatward 2007; Gilbert 2002; Gilbert et al. 1995). There is growing evidence demonstrating that body image-related shame plays a significant role in the development and persistence of binge eating symptomatology among women composing clinical (Dakanalis et al. 2015; Duarte et al., 2015a; Fitzsimmons-Craft et al. 2011) and nonclinical samples (Dakanalis et al. 2014a; Duarte et al. 2014; Duarte and Pinto-Gouveia 2016).

Shame and Self-Criticism

Theoretical conceptualizations of shame (Gilbert 2002, 2007) suggest that shame can focus on two types of evaluation: external shame, which is externally focused on how others evaluate the self; and internal shame, which is focused inwardly. These two dimensions are closely related, with internal shame involving an identification with others' negative evaluations such that the individual self-devalues and self-criticizes. Thus, self-criticism involves the internalization of shame. Evidence suggests that self-criticism can take two forms with distinct functions: one involving perceptions of inadequacy and inferiority, as well as desires to correct one's flaws (inadequate-self), and a more severe form of self-criticism involving feelings of self-hate and contempt, as well as desires to punish and harm the self (hated-self; Gilbert et al. 2004; Gilbert and Irons 2005).

Self-criticism has been consistently associated with poorer psychological adjustment, namely depressive symptoms (Gilbert et al. 2004). In particular, a study demonstrated that self-criticism mediated the relationship between the centrality of early shame memories and depressive symptomatology in a general community sample (Pinto-Gouveia et al. 2013). Self-criticism also seems to play an important role in body image and eating-related problems. In a study conducted with a non-clinical sample of women from the community and in a clinical sample of female patients with eating disorders, Pinto-Gouveia et al. (2014) found that self-criticism significantly mediated the link between shame and perceptions of inferiority and disordered eating symptoms. Research conducted with clinical samples of women with BED also identified self-criticism as a significant predictor of symptoms' severity (Duarte et al. 2016; Dunkley and Grilo 2007). Another study conducted with a nonclinical female sample found that the hated-self form of self-criticism significantly mediated the relationship between body image shame and binge eating symptoms (Duarte et al. 2014). Moreover, recent research conducted with adolescent girls suggested that the association between negative social experiences (e.g., bullying) and disordered eating symptoms was mediated by body image shame. The effect of body image shame on these symptoms was, in turn, mediated by this more severe form of self-criticism (Duarte et al. 2015d).

Nonetheless, the specific effect of memories of body image-related shame experiences and feelings on binge eating symptoms and the potential mediator effect of self-criticism on these associations were not explored.

The Effect of Gender

The study of body image in men is limited in comparison to research conducted with women (Pila et al. 2016; Striegel-Moore et al. 2009). Nonetheless, akin to what has been suggested for women, maladaptive attitudes toward body image in men seem to be influenced by what is valued by the social group (Adams et al. 2005). There is evidence that, for both men and women, the internalization of the ideal body image—that is, drive for thinness in women and drive for muscularity in men in current Western society (Yean et al. 2013)—and of the values associated with it (e.g., confidence and power; Grogan and Richards 2002; McCabe and Ricciardelli 2003) is linked to body dissatisfaction, poorer self-esteem, and disordered eating symptomatology (Dakanalis and Riva 2013; Fitzsimmons-Craft et al. 2011; McCreary and Sasse 2002).

Thus, it stands to reason that both genders are similarly affected by evaluations that one's physical appearance lacks qualities to create a positive image of oneself in the eyes of others and that instead potentially promotes their desire to criticize, reject or attack the self. In fact, research conducted with male college students suggests that social experiences focused on physical appearance (e.g., comments) are associated with increased negative affect and a decreased sense of self-worth (Calogero 2009; Dakanalis et al. 2012). A recent prospective study conducted with college men suggested that body dissatisfaction, negative affect, self-objectification, and lower self-esteem were significant predictors of binge eating symptoms (Dakanalis et al. 2016).

Nonetheless, in modern western societies women still face greater pressures than men do to approximate the images of idealized bodies as a means to reach social approval and acceptance (Buote et al. 2011; Gatward 2007; Gilbert 2002). In fact, whereas conceptions of traditional masculinity convey the notion that men's worth is related to their abilities to be powerful, socially dominant, and physically effective (Kilmartin 2007), women constantly face messages that their worth depends on how their physical appearance is perceived by others (Fredrickson and Roberts 1997), which negatively affects their self-evaluation, body image, and eating behaviour (Fitzsimmons-Craft et al. 2011; Dakanalis et al. 2014a, 2015; Duarte et al. 2014, 2015c). Women's perceptions that their body image may be at the root of social diminishment or attacks may give rise to shame perceptions of being seen by others as flawed, unattractive or inferior, as well as to the internal shaming process that includes severe self-criticism (Goss and Allan

2009; Goss and Gilbert 2002; Pinto-Gouveia et al. 2014). Binge eating symptoms may be adopted in this context as a means to cope with such negative evaluations and emotions (Duarte et al. 2014, 2015a).

The Current Study

To sum up, there is evidence for the interconnection between shame experiences and feelings, body image perceptions, and binge eating symptoms. Nonetheless, little is known about the specific effect of the centrality of early shame memories related to body image and binge eating symptoms as well as the mechanisms operating on this association. Also, no known study to date has investigated the effect of body image-related experiences and self-criticism on binge eating symptoms in men.

The current study aimed to test a model, in women and men from the general community, that examined the extent to which early memories of body image shame experiences recalled as central to one's identity predict current feelings of body image shame and binge eating symptoms, as well as whether self-criticism is a mediating process underlying these associations. We surmise that these are processes, common to both genders, may operate in the occurrence of binge eating symptoms. However, given the role that body image plays in women's self and others' evaluations, it is plausible that memories of experiences of shame related to body image have a stronger effect on women's current levels of body image shame, self-criticism, and binge eating symptoms than they do in men.

We hypothesized that for both men and women: (a) current body image shame would mediate the effect of the centrality of shame memories related to body image experiences on inadequate-self and hated-self forms of self-criticism, as well as on depressive symptoms; (b) current body image shame would mediate the effect of the centrality of shame memories related to body image shame experiences on binge eating symptoms; and (c) body image shame would have a direct effect on binge eating symptoms, and an indirect effect mediated by self-criticism. Moreover, we hypothesize that, for women, body image shame would have an effect on binge eating symptoms directly and indirectly via the more severe self-hating form of self-criticism. Finally, we expected these associations to persist when accounting for the effect of body mass index (BMI) and depressive symptoms and that the strength of these associations would be stronger for women than for men.

Method

Participants

Participants in our study were Portuguese college students (102 men; 205 women) and participants recruited from the

community (7 men; 17 women), with ages ranging from 18 to 60 years-old ($M = 22.83$, $SD = 6.98$, $mdn = 20$). The overall sample comprised 331 participants (109 men and 222 women). Most participants were either in or had completed higher education (309; 93.6%), 5 (1.3%) participants completed secondary education, 1 (.3%) completed basic education; 16 (4.8%) student participants did not report their completed years of education. Regarding relationship status, 308 (93.1%) were single, 18 (5.4%) were married or partnered, 3 (.9%) were divorced, and 2 (.6%) did not provide information on relationship status. Fully 327 (98.79%) participants were Caucasian; 4 (1.21%) participants were Black. No gender differences were found in regard to demographic variables: $t_{age}(329) = .99$, $p = .324$; $t_{education}(329) = .16$, $p = .873$; $\chi^2_{relationship}(3) = 3.01$, $p = .390$.

Participants' mean Body Mass Index (BMI), calculated as the quotient of participants' self-reported weight (in Kg) divided by height squared (in m), was 22.09 ($SD = 2.87$, range = 15.81–32.81). Of the men in our study, 2.7% ($n = 3$) presented low weight, 76.2% ($n = 83$) presented normal weight, 18.3% ($n = 20$) were overweight, and 2.7% ($n = 3$) were obese. In women, 8.1% ($n = 18$) of the participants presented low weight, 81.1% ($n = 180$) normal weight, 9.4% ($n = 21$) were overweight, and 1.4% ($n = 3$) were obese. The BMI's distribution of the sample was similar to the distribution found in the general population (Poinhos et al. 2009). In regard to binge eating symptoms, 92.7% ($n = 307$) of the participants presented mild to no binge eating; 5.2% ($n = 17$) moderate binge eating; and 2.1% ($n = 7$) severe binge eating, according to the cut scores for binge eating severity (Marcus et al. 1985). This distribution of binge eating symptoms in this study's sample is in accordance with recent evidence (Kessler et al. 2013). There were no differences in binge eating symptomatology between the students and the community sample participants, $t(329) = 1.22$; $p = .239$.

Procedure and Measures

Participants were recruited from different courses of Higher Education institutions and from the staff of distinct labour institutions (e.g., schools, health services, retail, private companies). The present study is part of a wider research project advertised as: "The aim of this research is to investigate how people's eating behaviour may be influenced by the experiences people go through and by how they feel (such as shame experiences)." ["O objetivo desta investigação é estudar de que forma o comportamento alimentar das pessoas pode ser influenciado pelas experiências pelas quais passam e pela forma como se sentem (tais como experiências de vergonha)."] Approval was obtained by the institutions' Boards to conduct the study, which required that participants completed a set of self-report measures. The authors presented the aims of the research, clarified that participation was voluntary and

confidential, and administered the pencil-and-paper questionnaires, which were counterbalanced to avoid order effects. All participants provided their written informed consent to voluntarily participate. The students completed the measures at the end of a designated lecture, and the remaining participants filled in the instruments at an authorized break during work.

Centrality of Event Scale – Body Image

The CES-BI was adapted from the Centrality of Event Scale (CES; Berntsen and Rubin 2006; Portuguese version by Matos et al. 2010). The CES measures the extent to which a memory of a stressful event forms a reference point for personal identity, is viewed as a landmark in one's life story, and is a key reference point to attribute meaning to other experiences in one's life (e.g., "I feel that this event has become part of my identity"). This self-report questionnaire comprises 20 items, rated on a 5-point scale ranging from 1 (*Totally disagree*) to 5 (*Totally agree*). A composite score is obtained by calculating the mean of the items' scores, with higher scores indicating that the event is viewed as being more central to one's identity. In its original study (Berntsen and Rubin 2006), this measure revealed good psychometric properties with a high internal consistency ($\alpha = .94$). In the Portuguese version of the scale, the instructions for the measure were adapted to focus on shame experiences and presented high internal consistency ($\alpha = .96$) as well as sound convergent and divergent validity (Matos et al. 2010). Within the present study, the scale demonstrated excellent internal consistency ($\alpha_s = .96$ for women and $.96$ for men).

In the current study, the instructions of the measure were adapted to measure the centrality of shame memories involving an experience related to body image that occurred in childhood or adolescence, that is, a situation in which one has negatively evaluated oneself or felt that others were criticizing, judging or devaluing the self because of one's physical appearance.

Shame is a frequent emotion in humans. Almost everyone goes through, throughout their lives, experiences of shame. In this study, we are interested in your experiences of shame related to the body (for example, weight, body size or body shape). By shame we mean the negative emotion associated with a sense of personal inferiority and devaluation. We feel ashamed when, in a situation, we evaluate ourselves (due to an action or characteristic) as awkward, different, inadequate, inferior, weak, disgusting or bad, but also when we have the idea that others see us as inferior, defective, inadequate, weak or disgusting. When we feel ashamed, we often have other feelings simultaneously, such as anxiety, anger, disgust, and we experience an overwhelming desire to disappear, to hide or to flee.

Next, try to remember a (significant) situation or experience in your childhood or adolescence where you think you have felt shame about your body. That is, a situation in which you have judged yourself negatively, or you have thought or felt that others were judging you, criticizing you or devaluing you, because of your physical appearance.

[A experiência da emoção de vergonha é frequente nos humanos. Quase toda a gente vivencia, ao longo da sua vida, experiências de vergonha. Neste estudo estamos interessados nas suas experiências de vergonha relacionadas com o corpo (por exemplo, peso, tamanho do corpo ou forma corporal). Por vergonha entende-se a emoção negativa associada a um sentido de diminuição e desvalorização pessoal. Sentimos vergonha quando, numa situação, nos avaliamos (devido a uma ação ou característica) de forma global como desajeitados, diferentes, inadequados, inferiores, fracos, repugnantes ou maus, mas também quando temos ideia de que os outros nos veem como inferiores, defeituosos, inaptos, fracos ou repugnantes. Quando sentimos vergonha, temos muitas vezes outros sentimentos em simultâneo, como ansiedade, raiva, repugnância e somos assaltados por uma enorme vontade de desaparecer dali, nos escondermos ou fugimos.

De seguida tente recordar-se de uma situação ou experiência (marcante) pela qual passou em que acha ter sentido vergonha em relação ao seu corpo, durante a sua infância ou adolescência. Ou seja, uma situação na qual se tenha avaliado negativamente a si mesmo(a), ou tenha pensado ou sentido que os outros a(o) estavam a julgar, a criticar ou a desvalorizar, devido à sua aparência física.]

Binge Eating Scale

The BES (Gormally et al. 1982; Portuguese version by Duarte et al. 2015b) is a 16-item scale designed to measure the behavioural emotional and cognitive dimensions of binge eating. Each item presents three to four statements, and participants are asked to choose the one that best describes their eating behaviour (e.g., "I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily"). Each response option reflects a rating of severity ranging from 0 (reflecting no difficulties with binge eating) to 3 (severe problems with binge eating). The responses are totalled to obtain a total score that may range from 0 to 46. Higher scores indicate higher binge eating symptomatology severity. The scale revealed good internal consistency in the original study ($\alpha = .85$; Gormally et al. 1982). In the Portuguese validation study conducted in the general community, the scale presented good construct validity, test-retest reliability, discriminant

validity, and high internal consistency ($\alpha = .88$; Duarte et al., 2015b). BES revealed a very good internal consistency ($\alpha_s = .89$ for women and $.85$ for men) in the current study.

Body Image Shame Scale

The BISS (Duarte et al. 2015c) measures the experience and phenomenology of body image shame, that is, perceptions that one is negatively evaluated or judged by others because one's physical appearance (external dimension of body image shame) and negative self-evaluations due to one's physical appearance (internal dimension). It includes 14 items (e.g., "My physical appearance makes me feel inferior in relation to others"), and a composite score of body image shame is derived as the mean of the items. Respondents rated each item according to the frequency they experience body image shame, using a 5-point rating scale from 0 (*Never*) to 4 (*Almost always*). The scale's mean score ranges from 0 to 4, with higher scores representing greater body image shame. The BISS has good construct validity, test-retest reliability, and high internal consistency with a Cronbach's alpha of .92 (Duarte et al. 2015c). In the current study we used the mean score of the measure, which also revealed very good internal consistency ($\alpha_s = .94$ for women and $.95$ for men).

Forms of Self-Criticizing and Self-Reassuring Scale

The FSCRS (Gilbert et al. 2004; Portuguese version by Castilho et al. 2015) includes 22 items and measures how individuals typically think and react when facing setbacks or failures. The scale assesses two forms of self-criticism: inadequate-self, which involves feelings of inadequacy and inferiority (9 items; e.g., "There is a part of me that feels I am not good enough"), and hated-self, which entails feelings of self-disgust, hatred, and contempt with desires to hurt and persecute the self (5 items; e.g., "I have a sense of disgust with myself"). The FSCRS also measures the ability to self-soothe (reassured self). Respondents answer the items on a 5-point rating scale from 0 (*Not at all like me*) to 4 (*Extremely like me*). The subscales scores correspond to the mean items' scores. Higher scores indicate greater self-criticism (for the inadequate and hated-self subscale) or greater self-reassurance (for the reassured-self subscale). The scale has good construct validity and was found to present good internal consistency ($\alpha_s = .86$ for hated-self and $.90$ for inadequate-self; Gilbert et al. 2004). The Portuguese version of the scale also revealed good construct validity and presented high internal consistency in the general population ($\alpha_s = .72$ for hated-self and $.89$ for inadequate-self; Castilho et al. 2015). In the current study we focused on the two forms of self-criticism assessed through the FSCRS, which yielded good internal consistency ($\alpha = .93$ for women and $.92$ for men for inadequate-self, $.80$ for women and $.84$ for men for hated-self).

Depression Anxiety and Stress Scales

The DASS21 (Lovibond and Lovibond 1995; Portuguese version by Pais-Ribeiro et al. 2004) includes 21 items measuring levels of depression, anxiety, and stress symptoms. Respondents are asked to indicate the frequency at which they experienced each symptom over the past week using a 5-point rating scale ranging from 0 (*Did not apply to me at all*) to 4 (*Applied to me very much, or most of the time*). In the current study, we used the depression subscale of seven items to measure depressive symptoms (e.g., "I couldn't seem to experience any positive feeling at all"). Items are summed to obtain the subscale score, which range from 0 to 21. Higher scores indicate more depressive symptoms. The original and the Portuguese versions of the scale reveal good internal consistency (with the subscale depression presenting $\alpha_s = .88$ and $.85$, respectively). In the current study, this subscale also presented good internal consistency ($\alpha_s = .89$ for women and $.88$ for men).

Data Analysis

Data analyses were conducted using the SPSS software (v.21 SPSS; Armonk, NY: IBM Corp.), and the path analysis was performed using the AMOS software (v.21 SPSS; Armonk, NY: IBM Corp.). Descriptive statistics were tested and gender differences were examined through a MANOVA. Product-moment Pearson correlation coefficients were calculated to examine the relationships among centrality of shame memories related to body image, body image shame, depressive symptoms, self-criticism, binge eating symptoms, BMI, and age (Cohen et al. 2003).

A multigroup path analysis was conducted to estimate whether body image shame and self-criticism (mediator variables), would mediate the relationship between the centrality of shame memories related to body image and BMI (independent, exogenous variables) and binge eating symptoms (dependent, endogenous variable). Depressive symptoms were considered as a covariate to account for the effect of overall negative affectivity, given their known association with binge eating symptoms (Duarte et al. 2014; Stice et al. 2002) as well as shame and self-criticism (Pinto-Gouveia et al. 2013; Pinto-Gouveia and Matos 2011). Path analysis is a specific case of Structural Equation Modelling (SEM) that allows for the simultaneous examination of hypothesised direct and indirect effects between multiple exogenous and endogenous variables, while controlling for error (Kline 2005). The Maximum Likelihood estimation method was used to calculate the significance of the regression coefficients and the model fit statistics. The following goodness of fit indices were considered to assess model fit: Chi-square (χ^2) with a nonsignificant value indicating a very good model fit; the Tucker Lewis Index (TLI) and the Comparative Fit Index (CFI), with

values above .95 suggesting very good fit; the Root-Mean Square Error of Approximation (RMSEA; with 90% confidence intervals), with values below .05, and $p > .05$ indicating reasonable error and very good fit; and the Standardised Root Mean Square Residual (SRMR), with values as high as .08 suggesting acceptable model fit (Hu and Bentler 1999; Kline 2005).

We followed the following steps to examine the model invariance between men and women. First, the hypothesised model was tested in both groups combined to determine whether the model was viable. Next, the model fit was examined for both groups separately. Then, we examined the model fit of the unconstrained model (i.e., the model in which the paths were free to vary between groups) and assessed the differences in significant/nonsignificant pathways between the groups. Then, we assessed the model fit for the constrained model (i.e., the model in which the paths were constrained to be equal across the groups). The unconstrained and constrained model were compared through the Chi-square difference test. The critical ratio differences were calculated to examine the statistical significance of the differences between both groups. Finally, we compared the constrained model and a partially constrained model in which all paths were constrained to be equal, except for the ones that were significantly different across groups (Byrne 2010; Kline 2005; Tabachnick and Fidell 2013).

The significance of the mediational paths was examined through the Bootstrap resampling method, with 5000 Bootstrap samples and 95% bias-corrected confidence intervals (CI). The effects were considered significant ($p < .050$) when zero was not included between the lower and the upper limits of the CI range (Kline 2005).

Results

Preliminary Analyses

Prior to conducting the analyses, data were screened for missing data, univariate and multivariate normality, and multicollinearity. Preliminary analysis indicated that of the 331 participants, no more than 3.3% presented missing data, which was found to be missing completely at random (Little's MCAR test $p > .050$). The regression imputation method was used to impute missing data. The Mahalanobis distance analysis indicated two multivariate outliers. Nonetheless, these were not extreme outliers and were kept in the analysis because they represent the variability of the constructs under examination. Moreover, the analysis of the coefficients of skewness and kurtosis indicated that there was no severe violation of uni- and multi-variate normality, with skewness values ranging from .48 (inadequate-self form of self-criticism) to 1.50 (binge eating) and with kurtosis values ranging from -0.51 (inadequate-

self form of self-criticism) to 2.29 (binge eating; Kline 2005). There was no evidence of multicollinearity.

The means and standard deviations of the study variables are reported in Table 1. The means and standard deviations for the variables are similar to those obtained in previous studies with community samples (Duarte et al. 2014; Matos et al. 2012; Pinto-Gouveia et al. 2013). The results of the MANOVA indicated significant overall effects: $F(7, 323) = 9.95, p < .001$, Pillai's trace = .18; $\eta_p^2 = .18$. Results indicated no significant gender differences regarding the centrality of shame memories related to body image, $F(1, 329) = 2.91, p = .089, \eta_p^2 = .01$; inadequate-self form of self-criticism, $F(1, 329) = 2.20, p = .139, \eta_p^2 = .01$; the hated-self form of self-criticism, $F(1, 329) = .28, p = .595, \eta_p^2 = .00$; and depressive symptoms, $F(1, 329) = .10, p = .751, \eta_p^2 = .00$. Women presented significantly higher body image shame, $F(1, 329) = 23.29, p < .001, \eta_p^2 = .07$, and binge eating symptoms, $F(1, 329) = 6.48, p = .011, \eta_p^2 = .02$, as well as lower BMI, $F(1, 329) = 17.05, p < .001, \eta_p^2 = .05$, than men did.

Product moment Pearson correlation coefficients (see Table 1) indicated that significant correlations between the centrality of body image-related shame memories and current body image shame, the forms of self-criticism, depressive symptoms, and binge eating symptoms were in the expected directions for both men and women. In women, the correlation between inadequate self and centrality of shame memory ($z = -2.49, p = .013$) and body image shame ($z = -2.29, p = .022$), as well as the correlation between hated self and binge eating symptoms ($z = -2.7, p = .007$), were stronger than in men. In men, the correlation between hated self and depressive symptoms were stronger than in women ($z = -2.7, p = .007$). In women, BMI was positively associated with centrality of shame memories related to body image, body image shame, hated-self, depressive symptoms, and binge eating symptoms. In men, the associations between BMI and the study variables were nonsignificant. In both women and men no significant associations were found among age and the study variables and thus this variable was not considered in the path model examined.

Path Analysis

Results of the model examined for both genders combined indicated that the model accounted for a total of 43% of the variance in binge eating symptoms. The following path coefficients were nonsignificant: the paths from BMI to depressive symptoms and to hated self, the path from centrality of shame memories related to body image to binge eating symptoms, and the path from depressive symptoms to binge eating symptoms. The nested model, examined without these nonsignificant paths, indicated an excellent fit to the data: $\chi^2(4) = 2.54, p = .640$; CFI = 1.00; TLI = 1.01; RMSEA = .00, 90% CI [.00, .07], $p = .877$; SRMR = .01.

Table 1 Descriptive statistics and correlations for all study variables

Variables	Men <i>M (SD)</i>	Women <i>M (SD)</i>	Correlations										
			CESBI	BISS	Depression	Hated-self	Inadequate-self	BES	BMI	Age			
CESBI	1.98 (.79) _a	2.15 (.88) _a	--										
BISS	.57 (.76) _a	1.03 (.83) _b	.46***										
Depression	3.77 (4.10) _a	3.92 (4.11) _a	.21*	.36***									
Hated-self	.55 (.72) _a	.51 (.66) _a	.28***	.43***	.66***								
Inadequate-self	1.39 (.93) _a	1.56 (1.00) _a	.20*	.36***	.72***	.64***							
BES	5.63 (5.68) _a	7.59 (6.99) _b	.33***	.52***	.34***	.29**	.47***						
BMI	23.00 (2.94) _b	21.64 (2.73) _a	.02	.14	-.04	.00	-.06	.14					
Age	22.83 (6.98) _a	22.10 (5.80) _a	.00	.04	.06	.10	.08	.06	.14	.06	.33***	.17*	.03

Means for women and men with different subscripts indicate a significant difference ($p < .05$). Correlations for men ($n = 109$) are reported below the diagonal; for women ($n = 222$), above. CESBI = Centrality of Event Scale - Body Image, BISS = Body Image Shame Scale, Depression = Depression subscale of the Depression Anxiety and Stress Scales, Hated-self and Inadequate-Self = subscales of the Forms of Self-Criticizing and Self-Reassuring Scale, BES = Binge Eating Scale, BMI = Body Mass Index

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

Then, the model was tested for women and men separately. The model tested for women accounted for 50% of variance in binge eating symptoms and presented an excellent model fit: $\chi^2(4) = 1.88, p = .759$; CFI = 1.00; TLI = 1.02; RMSEA = .00, 90% CI [.00, .07], $p = .891$; SRMR = .01. The model tested for men accounted for 33% of variance in binge eating symptoms and also presented an excellent model fit: $\chi^2(4) = 2.80, p = .592$; CFI = 1.00; TLI = 1.03; RMSEA = .00, 90% CI [.00, .12], $p = .705$; SRMR = .03.

Next, we tested an unconstrained model in which all paths were allowed to vary between the two groups. Results showed that the data presented an excellent model fit: $\chi^2(8) = 4.76, p = .783$; CFI = 1.00; TLI = 1.02; RMSEA = .00, 90% CI [.00, .04], $p = .970$; SRMR = .01. For men, the following paths were nonsignificant: the paths from BMI to body image shame, to inadequate-self, to hated-self, and to binge eating symptoms; the paths from centrality of shame memories related to body image to hated-self, to inadequate-self, and to depressive symptoms; and the path from hated-self to binge eating symptoms. For women, the path from inadequate-self to binge eating symptoms was nonsignificant.

We then tested a constrained model (i.e., a model in which the direct path coefficients was constrained to be equal across both groups) and results indicated a very good model fit: $\chi^2(21) = 35.00, p = .028$; CFI = .98; TLI = .96; RMSEA = .05, 90% CI [.02, .07], $p = .592$; SRMR = .03. The unconstrained and constrained models were then compared, and results indicated that there were significant differences across the groups: $\Delta\chi^2(13) = 30.25, p = .004$. Next, we analysed critical ratio differences to test for the significance of the differences between both groups among the parameter estimates. Results showed that the parameters coefficients in the path between hated-self and binge eating symptoms had a statistically significant difference ($Z = -3.70, p < .001$); for women this was a significant path ($b = 3.23, p < .001$), whereas for men it was not ($b = -.54, p = .504$). The path from BMI to binge eating symptoms also revealed a statistically significant difference ($Z = -2.14, p < .001$); for women this was a significant path ($b = .63, p < .001$), whereas for men it was not ($b = .19, p = .209$).

Finally, we compared the fit of the constrained model to a model where all paths were constrained to be equal except for the paths that were significantly different between the groups: the path from hated-self to binge eating symptoms as well as the path from BMI to binge eating symptoms. The partially constrained model presented an excellent model fit $\chi^2(21) = 35.00, p = .028$; CFI = .98; TLI = .96; RMSEA = .05, 90% CI [.02, .07], $p = .592$; SRMR = .03, and was also significantly different from the constrained model, $\Delta\chi^2(2) = 16.601, p < .001$. Thus, the partially constrained model was the one that was retained.

The indirect effects were also examined for both groups. The parameter estimates for each group are presented in

Fig. 1. Results revealed that, for women (Fig. 1a), the centrality of shame memories related to body image revealed an indirect effect on binge eating symptoms of .30, fully mediated by body image shame and the two forms of self-criticism, 95% CI [.22, .38], $p < .001$. BMI had an indirect effect on binge eating symptoms of .11, mediated by body image shame and by self-criticism, 95% CI [.04, .20], $p = .003$. Body image shame had a significant indirect effect of .14 on binge eating symptoms, indirectly mediated by self-criticism (CI = .06 to .23, $p = .001$). For men (Fig. 1b), results revealed that the centrality of shame memories related to body image had an indirect effect on binge eating symptoms of .24, mediated by body image shame and the inadequate-self form of self-criticism, 95% CI [.10, .40], $p = .001$. Also, body image shame had an indirect effect of .15 on binge eating symptoms, mediated by the inadequate-self form of self-criticism 95% CI [.06, .29], $p = .005$).

Results supported the hypothesis that, for both men and women, the centrality of shame memories related to body image experiences on binge eating symptoms is mediated by current body image shame. The effect of current body image shame on binge eating symptoms, in turn, was confirmed to be mediated by self-criticism. Results also supported the hypothesis that, in women, the more severe self-hating form of self-criticism is a significant mediator of the association between body image shame and binge eating symptoms. In men this association is mediated by the inadequate-self form of self-criticism.

Discussion

The current study aimed at understanding the role of early body image shame-related experiences on binge eating symptoms and the pathways influencing this association. A mediational model was tested and suggested that the centrality of shame memories related to body image is associated with current levels of body image shame and elevated self-criticism, which, in turn, is associated with the severity of binge eating symptoms. Because prior evidence was limited to women, these associations were tested in both men and women from the general and college communities through a multi-group path analysis.

Consistent with other studies, which show that women present significantly higher levels of body image difficulties and disordered eating behaviours compared to men (Kessler et al. 2013; Pila et al. 2016; Striegel-Moore et al. 2009), the results of the current study showed that women reported increased levels of body image shame and binge eating symptoms. Nonetheless, men and women included in the present study did not present differences regarding depressive symptoms and forms of self-criticism. No gender differences were found regarding the centrality of memories of body image-related shame experiences.

Moreover, results suggested that early negative experiences specifically related to the physical appearance dimension may play an important role in how one comes to evaluate the self based on this dimension (e.g., as an inferior, defective or flawed person) and that this association is relevant for binge eating symptoms in both genders. In fact, our results build and expand prior studies that identified that memories of shame that become central to identity are associated with increased shame feelings in adulthood, difficulties in emotion regulation, and several psychopathological indicators—namely elevated severity of eating psychopathology (Ferreira et al. 2014; Matos et al. 2015; Matos and Pinto-Gouveia 2010; Matos et al. 2012; Pinto-Gouveia and Matos 2011). Moreover, our results supported the assumption that body image is an important dimension associated with binge eating symptoms (Dakanalis et al. 2016; Duarte et al. 2014, 2015a, 2016). Indeed, our findings revealed that memories related with the experience of perceiving that one's physical appearance is at the root of criticism, belittlement, rejection or attacks from others were linked with increased current levels of body image shame. Body image shame, in turn, was found to be associated with an internalization of these negative evaluations of the self in the form of self-criticism, which was found to be an important contributor to binge eating symptoms. As previously noted (Dakanalis et al. 2014b; Duarte et al. 2014, 2015a; Goss and Gilbert 2002; Heatherton and Baumeister 1991; Stice et al. 2002; Striegel-Moore et al. 2009), binge eating symptoms can be understood as a maladaptive strategy to momentarily avoid undesirable thoughts and emotional states. Noteworthy, results from the current study corroborated that shame feelings related to body image have a distinctive association with binge eating symptoms (beyond the effect of overall negative affect) in both men and women.

Nonetheless, important gender differences were identified in the structural relationships among the examined variables. Whereas in women the associations between the centrality of shame memories related to body image experiences and current body image shame on binge eating symptoms were further mediated by the inadequate-self and the hated-self forms of self-criticism, in men only the inadequate-self form was a significant mediator. In fact, results suggested that women whose shame memories focused on body image function as key components of their identity tend to present higher levels of binge eating symptoms. This link seems to be strengthened by the association that these shame memories have with current levels of shame about one's body and, consequently, on the tendency to engage in self-criticism, namely in its more severe self-hating form. These associations persisted while accounting for the effect of BMI, which, for women only, also presented a significant association with binge eating symptoms, indirectly mediated by body image shame and self-criticism. Although issues of self-objectification are rising among

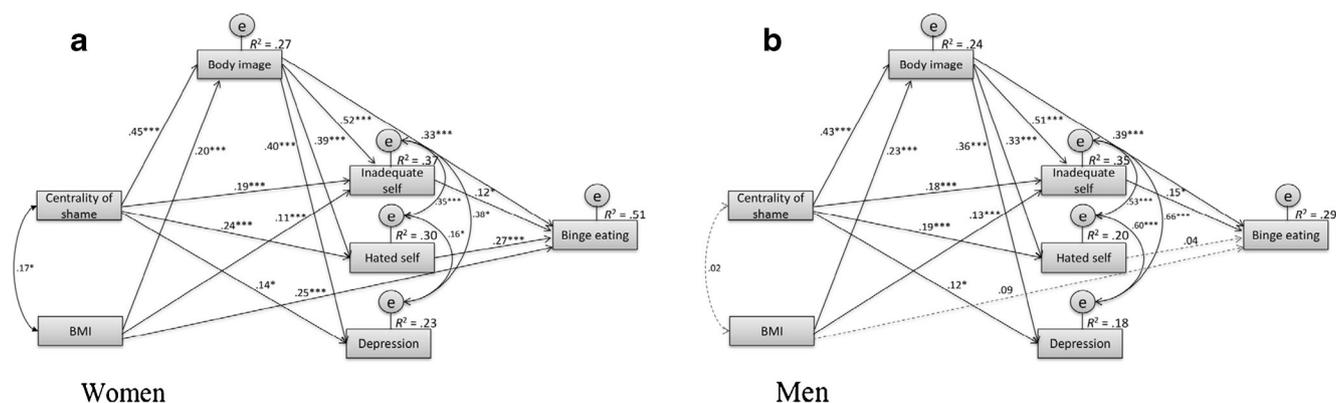


Fig. 1 Parameter estimates for the multi-group path analysis, with direct paths constrained to be equal except for the paths from hated-self to binge eating symptoms and BMI to binge eating symptoms. Standardized

regression weights and squared multiple correlations for female participants are represented in Fig. 1a ($n = 222$); for male participants, in Fig. 1b ($n = 109$). * $p < .05$. *** $p < .001$

men (Dakanalis et al. 2014a), women may be more vulnerable to the deleterious impact of the sociocultural messages that equate physical attractiveness with social attractiveness and acceptance (Buote et al. 2011). In fact, our study suggests that for women, experiences where they felt that due to their physical appearance they were negatively seen by others (e.g., as unattractive, inferior or defective as a social agent) may become associated with their self-evaluation and with a sense of self-inadequacy, as well as with self-directed anger and contempt and with desires to persecute or harm the self when facing setbacks or failures.

In the case of men, our findings suggested that memories of being shamed about body image may become related to current body image shame, which, in turn, can become associated with perceptions of inadequacy and binge eating symptoms. These findings extend prior studies conducted with men which identified that the potential pathogenic effect of negative body image-related experiences depends on the extent to which these experiences relate to the sense of one's value within the social group (Adams et al. 2005; Calogero 2009; Dakanalis et al. 2012; Dakanalis and Riva 2013; Fitzsimmons-Craft 2011; Grogan and Richards 2002; McCabe and Ricciardelli 2003; McCreary and Sasse 2002). These findings also add to recent evidence that highlighted the roles that body image dissatisfaction and shame play in binge eating symptoms in men (Dakanalis et al. 2016). Our findings corroborated that these negative memories related to body image may also have negative consequences for men. Nonetheless, their association with binge eating symptomatology was not mediated by the self-hating form of relating with the self when facing difficulties as was the case for women, but by a less severe form of self-criticism focused on feelings of inadequacy and inferiority, and in specific aspects of the self that need to be corrected (Gilbert et al. 2004).

Overall, the current study suggests that, in women, negative experiences related to body image seem to be internalized in a

form of self-relating characterized by a sense of inadequacy and also by an overall sense of self-hatred and self-disgust, which seems to further fuel binge eating. This finding may be understood by considering the great sociocultural pressures that women face regarding the need to display an attractive physical appearance, which can become associated with disordered eating (Pinto-Gouveia et al. 2014). These pressures are less pronounced for men, but results suggest that when boys and male adolescents are the targets of shame experiences related to their physical appearance, this too may have an impact on the way they relate with themselves. These experiences may become associated with feelings of inadequacy and inferiority, which in turn may influence binge eating symptoms.

Limitations and Future Research Directions

The present study has some important limitations that we should note. The cross-sectional design of our study hinders the possibility of determining temporal causality between the examined variables (Maxwell and Cole 2007). Our study aim was to examine the plausibility and significance of a hypothesized theoretical model testing the structural links among our variables of interest. Nonetheless, a longitudinal examination of these associations would be necessary to determine the temporal association between body image-related shame experiences in childhood or adolescence, negative affective and self-evaluative experiences, and disordered eating behaviours in adult life. Moreover, the assessment of the shame memory was based on a self-report measure and relied on retrospective memories, which may raise some concerns regarding the reliability of such recollections. Even though it has been suggested that retrospective data is generally accurate, stable over time, and not distorted by current emotional states (Brewin et al. 1993; Matos and Pinto-Gouveia 2010), future research should expand the current findings using other assessment methodologies (e.g., structured interviews). However, accuracies of

memories may not be what is driving our findings but rather it is how experiences are remembered that is important.

Also, the model examined in the current study is inherently limited because other variables (e.g., interpersonal, social, biological) may play a determinant role on binge eating symptoms. In fact, in the current study we proposed a parsimonious model and thus the role of other potentially relevant variables on the examined associations should be explored further in future studies. In particular, future research may expand the current model by considering that the multifaceted nature of shame and the externalized and internalized dimensions that this emotion entails (Duarte et al. 2015c; Gilbert 1997, 2002; Goss and Gilbert 2002) may have a differential impact on disordered eating symptomatology. Also, in our study the sexual identity of participants was not assessed. Given the current evidence on the significant role that sexual orientation plays in body dissatisfaction and disordered eating, namely in men (Dakanalis et al. 2012; Yean et al. 2013), it is important that future research replicate our study and examine these relationships considering potential differences regarding these aspects. Another limitation is that the study's sample is not representative of the general population, and thus future research is needed before the current findings can be generalized. Moreover, although a dimensional perspective on disordered eating is currently advocated, the replication of our results with a sample of patients with BED would be informative to further clarify the potential unique impact that body image-related early and current shame experiences have on this problem and the mechanisms that operate in this association that can be targeted in treatment.

Practice Implications

These findings have potential implications for researchers and clinicians working with individuals presenting binge eating symptomatology. Our results support that body image is, for both men and women, a shame-eliciting dimension that is strongly associated with binge eating symptoms, which indicates that this dimension should be considered in the conceptualization and treatment of these disordered eating behaviours. Moreover, our results support the relevance of therapeutically evaluating and addressing shame memories and current experiences of shame, self-criticism, and binge eating, considering their evolved defensive functions against interpersonal and emotional stressors (Gilbert 2006; Gilbert and Irons 2005). In light of the current findings, it is important that clinicians consider the gender differences suggested by the current study. In fact, for women these early negative experiences may influence their overall sense of self-worth and fuel a negative pathogenic form of coping with setbacks or failures (Fredrickson and Roberts 1997; Gilbert et al. 2004). In the case of men, clinicians should be aware of how these experiences may also negatively influence men's eating behaviour

by being associated with feelings of inadequacy and desires to correct specific aspects of the self seen as flawed (Dakanalis et al. 2016; Gilbert et al. 2004).

Early assessment and targeting of these aspects may also have important prevention implications. Treatment and preventive approaches should focus on helping individuals understand these functions, re-evaluate the centrality of body image-focused experiences for their self-identity, and develop more adaptive means to regulate negative internal experiences. Recent studies suggested that having the capacity to relate with the self in a compassionate and balanced way may protect against body image shame in the context of negative early eating-related experiences (Daye et al. 2014) and weight bias (Webb et al. 2016). Thus, interventions that involve the practice and development of this more compassionate and flexible self-to-self relationship may promote a healthier relationship with one's body image, enable effective emotion regulation, and deter engagement in reactive binge eating behaviours (Gilbert 2005; Goss and Allan 2010).

Conclusion

To our knowledge, ours is the first study examining the association between body image-related shame memories and disordered eating in both genders. The current study offers preliminary evidence suggesting that early negative experiences related to body image play a significant role on the severity of binge eating symptoms, through its association with heightened current body image shame and self-criticism, in both men and women from the general and college communities. These findings contribute therefore to the understanding of this problematic eating behaviour and have potential treatment and prevention implications.

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Compliance with Ethical Standards

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Conflict of Interest The authors declare that they have no conflict of interest.

Research Involving Human Participants and/or Animals All procedures were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

This article does not contain any studies with animals performed by any of the authors.

Informed Consent All participants provided their written informed consent to participate in the study.

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