



Body image flexibility as a protective factor against disordered eating behavior for women with lower body mass index



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ABSTRACT

The purpose of the current study was to examine whether body dissatisfaction and body image flexibility would be uniquely and significantly associated with disordered eating behavior. In addition, the study examined if body mass index (BMI) moderated the relationships between each of the body image related variables and disordered eating. Two-hundred-fifty-eight female participants completed the web-based survey. Body dissatisfaction and body image flexibility were significantly related to disordered eating behavior, after controlling for ethnicity and BMI, and BMI moderated the relation between body image flexibility and disordered eating. Specifically, for those with low BMI, greater body image flexibility was associated with reduced disordered eating behavior. Body image flexibility was not associated with disordered eating behavior among those with average or high BMI. These results suggest that greater body image flexibility may serve as a protective factor against disordered eating behaviors for those with low BMI.

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1. Introduction

Disordered eating is a significant concern for females that impacts many aspects of life (Hudson, Hiripi, Pope, & Kessler, 2007). It is a multifaceted phenomenon that has been linked to low self-esteem (Fairburn, 2008), depression (Pallister & Waller, 2008), anxiety (Pallister & Waller, 2008), and a range of medical concerns, such as menstrual irregularities, esophageal complications, and other gastrointestinal problems (Fairburn, 2008). The symptoms of disordered eating can be grouped into two categories: disordered eating cognitions and disordered eating behaviors Miller, Vaillancourt, & Hanna, 2009). Disordered eating cognitions include thoughts reflecting the perceived need to exert self-discipline through diet and weight restriction, beliefs that thinness will lead to social acceptance, and body dissatisfaction (Fairburn, Cooper, & Shafran, 2003). Disordered eating behaviors include avoiding eating when hungry, binge eating, avoiding food with high levels of fat, sugar, and/or calories, excessive dieting and/or exercise, and vomiting after eating. Of the two, disordered eating behaviors are particularly relevant to greater psychopathology and distress (Miller et al., 2009). Research has also shown that 49% of college females engaged in at least one disordered eating behavior at least once a week (Berg, Frazier, & Sherr, 2009).

There are several factors associated with disordered eating behavior, including body dissatisfaction, body image flexibility, and body mass index (BMI). The current study investigates whether body

dissatisfaction and body image flexibility are uniquely and significantly associated with disordered eating behavior and if BMI moderates these associations within a non-clinical sample of adult females.

1.1. Body dissatisfaction

A number of studies have investigated personal, sociocultural, and relational correlates that better predict disordered eating behaviors. To date, these correlates include being female (Piran & Cormier, 2005), negative affect (Pallister & Waller, 2008), perfectionism (Cassin & von Ranson, 2005), ethnic and cultural background (Franko, Becker, Thomas, & Herzog, 2007), body dissatisfaction (Stice, Marti, & Durant, 2011), and BMI (Rø, Reas, & Rosenvinge, 2012). Body dissatisfaction, a salient example of disordered eating cognitions and attitude, is generally defined as the negative evaluation of one's physical appearance; specifically, the discrepancy between ideal and perceived body size and shape (Canpolat, Orsel, Akdemir, & Ozbay, 2005; Phelp, Johnston, & Augustyniak, 1999). Well-recognized cognitive behavioral models of disordered eating (e.g., Fairburn, 2008) postulate that body dissatisfaction is a defining feature of an eating disorder as well as a maintaining factor of disordered eating behaviors. Stice et al. (2011) found that body dissatisfaction was the strongest predictor of eating disorder development, and, among those with low body dissatisfaction, higher dietary restraint predicted increased incidence of eating disorder development compared to those with lower levels of dieting.

Research also suggests that not everyone with body dissatisfaction engages in disordered eating behaviors (Miller et al., 2009). In fact, body dissatisfaction is common among females (Cash & Henry,

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1995), and yet severe disordered eating behaviors occur only in a small number of individuals (Hilbert, de Zwaan, & Braehler, 2012). These findings suggest that simply having unpleasant thoughts about one's body is not necessarily detrimental to one's well-being and that other factors are involved in the onset and maintenance of disordered eating behaviors.

1.2. Body image flexibility

Recently, there has been a growing body of research focusing on emotion and behavior regulation strategies in disordered eating (Anestis, Selby, Fink, & Joiner, 2007). A major finding in this line of research is that the way an individual interprets, relates, and reacts to difficult private events, such as negative affect and body dissatisfaction, plays a crucial role in the onset and maintenance of disordered eating (Anestis et al., 2007; Corstorphine, 2006). For example, maladaptive regulation strategies, such as avoidance, thought suppression, and rumination, are associated with disordered eating (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Similarly, new wave cognitive and behavioral therapies (CBTs), such as Acceptance and Commitment Therapy (ACT; Berman, Boutelle, & Crow, 2009), Dialectical Behavior Therapy (DBT; Safer, Telch, & Agras, 2001), and Mindfulness-Based Cognitive Therapy (MBCT; Baer, Fischer, & Huss, 2005), explicitly target the reduction of maladaptive regulation strategies and the promotion of alternative and adaptive regulation strategies (e.g., acceptance, mindfulness) in the treatment of disordered eating. These treatment models theorize that clinical improvement is achieved not through the elimination of negative thoughts and feelings about body size, shape, and appearance, but through increased adaptive regulation processes and the promotion of value-consistent behaviors (Hayes, Villatte, Levin, & Hildebrandt, 2011).

Body image flexibility is a construct developed to reflect adaptive regulation strategies in the context of experiencing body dissatisfaction and disordered eating (Sandoz, Wilson, & Merwin, 2013). Body image flexibility has been conceptualized as the ability to experience body dissatisfaction and other relevant internal experiences fully and openly in order to engage in value-consistent behaviors (Sandoz et al., 2013). For example, an individual could have the thought that her thighs are too large and experience body dissatisfaction and still choose to eat a balanced meal because it is consistent with her valuing physical health. Research has shown that body image flexibility is associated with general psychological flexibility (Sandoz et al., 2013), body dissatisfaction (Sandoz et al., 2013), and disordered eating (Sandoz et al., 2013; Wendell, Masuda, & Le, 2012). In fact, body image flexibility has been identified as a significant predictor of disordered eating, and individuals with low body image flexibility and high body dissatisfaction endorsed the importance of being thin and more disordered eating behaviors (Ferreira, Pinto-Gouveia, & Duarte, 2011). Given the importance of better understanding the correlates of disordered eating behaviors, the role of body image flexibility in disordered eating behaviors deserves further investigation.

Some important questions remain unanswered. Previous studies (e.g., Wendell et al., 2012) revealed a unique and large association between body image flexibility and general disordered eating symptoms such as concerns about eating, body shape, and weight; however, these studies did not focus specifically on disordered eating behaviors. Targeting disordered behaviors is crucial because they have been found to be particularly relevant to severe psychopathology (Miller et al., 2009). In addition, it is important to investigate whether the associations among body dissatisfaction, body image flexibility, and disordered eating behaviors vary across levels of BMI because disordered eating problems are found to be more problematic at the two extreme ends of BMI (Darby, Hay, Mond, Rodgers, & Owen, 2007; McLaren, Hardy, & Kuh, 2003; Rø et al., 2012). Specifically, high BMI has been shown to be directly related to body dissatisfaction (Lu & Hou, 2009;

Stice & Whitenton, 2002). However, individuals diagnosed with either anorexia or bulimia have greater body dissatisfaction than those without an eating disorder diagnosis (Cash & Deagle, 1997), and, particularly in the case of anorexia, these individuals have low BMI. Furthermore, Ro and colleagues (2011) found a U-shaped relationship between BMI and disordered eating behavior in a community sample of females. That is, underweight and obese individuals were more likely to engage in binge eating than those who fell within the normal and overweight ranges. It is possible that a different mechanism underlies disordered eating symptoms in underweight individuals with eating disorders versus those with normal BMIs diagnosed with eating disorders, suggesting that one's actual size and shape may influence problematic eating (Geller, Cassin, Brown, & Srikaneswaran, 2009). Given these findings, it is reasonable to speculate that the extent or direction of associations among body dissatisfaction, body image flexibility, and disordered eating behaviors may vary across levels of BMI.

1.3. Current study

The purpose of the present study was to investigate whether body dissatisfaction and body image flexibility would be uniquely and significantly associated with disordered eating behavior and if BMI would moderate these associations within a non-clinical sample of adult females. Given previous findings (Stice & Shaw, 2002; Tylka, 2004; Wendell et al., 2012), it was hypothesized that both body dissatisfaction and body image flexibility would be uniquely and significantly related to disordered eating behavior after controlling for BMI and ethnic background. In addition, BMI was hypothesized to moderate the relationships between each of the body image related variables and disordered eating behavior. Specifically, given previous findings that greater body dissatisfaction is associated with both high BMI and low BMI (e.g., Lu & Hou, 2009), it was predicted that higher levels of body dissatisfaction would be associated with greater disordered eating behaviors for both low and high levels of BMI. Similarly, we hypothesized that higher levels of body image flexibility would predict fewer disordered eating behaviors for both low and high levels of BMI.

2. Method

2.1. Participants

Participants were recruited for the present study in three ways. First, students were recruited through an online research participant pool at a mid-size university in a metropolitan area of southeast Texas. Second, information about the study and a link to the study's website were sent out via "snow-ball" emailing methods (where individuals forward the email to individuals they know, who will then forward the email to others). Finally, internet announcements were placed on a social media website (i.e., facebook.com) along with a link to the study's website. Online surveys have been shown to be a beneficial way of collecting data when asking about sensitive topics (Kraut et al., 2004). Participants recruited through the second or third method had the opportunity to enter a drawing for a \$50 prize, and student participants recruited through the first method could either receive research credit in their psychology courses or participate in the raffle.

Three hundred ten participants completed the online survey. One participant was excluded from the study because she was under 18 years old. Because the present study focused on women, male participants ($n = 50$) were excluded from the analysis. One additional participant was removed from the analysis due to the outlier analysis on BMI. The final sample consisted of 258 female participants. The age of participants ranged from 18 to 76 years old ($M = 28.6$, $SD = 9.0$). The current sample included females from a wide age range because research has shown that women of all ages struggle with disordered

eating and body dissatisfaction (Perez, Hernandez, Clarke, & Joiner, 2007). Sixty percent ($n = 154$) of the current sample self-identified as “Caucasian/White,” 24% ($n = 62$) identified as “Latina,” 10% ($n = 27$) identified as “African American/Black,” and 6% ($n = 15$) identified as “other.” BMI scores for the current sample ranged from 14.5 to 39.7, with a mean score of 26.1 ($SD = 6.7$), which falls in the “overweight” range (BMI between 25 and 29.9). These demographic variables are similar to sample characteristics of other psychological research conducted using similar recruitment methods in this demographic region (Wetterneck, Burgess, Short, Smith, & Cervantes, 2012).

2.2. Procedure

The present study was approved by the university's Institutional Review Board. The measures for the study and a consent form were placed on a secure website, and interested participants visited the study's website, reviewed the consent form, and acknowledged consent to participate before completing the online questionnaires. Participants anonymously provided demographic information and completed the survey instruments. Demographic information, including age, height, weight, and ethnicity, were collected from participants. BMI scores were calculated using participants' self-report of height and weight ($\text{weight (lb)} / [\text{height (in)}]^2 \times 703$). The following measures were used to assess body dissatisfaction, body image flexibility, and disordered eating behavior.

2.3. Measures

2.3.1. Body image flexibility

The Body Image Acceptance and Action Questionnaire (BI-AAQ; Sandoz et al., 2013) is a 12-item scale designed to measure psychological flexibility in the context of body dissatisfaction. The BI-AAQ includes items adapted from the original Acceptance and Action Questionnaire (AAQ; Bond & Bruce, 2003), but these items focus on body image issues related to weight and shape and the extent to which the participants' attempts to control and avoid these negative private events and the extent to which body dissatisfaction interfere their daily functioning. Participants are asked to rate to what degree each statement applies to them using a 7-point Likert-like scale, ranging from 1 (*never true*) to 7 (*always true*). All items are reverse scored so that higher scores on this measure indicate greater body image acceptance and flexibility. Possible scores range from 7 to 84. The scale has been shown to have an adequate internal consistency with a Cronbach's alpha coefficient of .93. The measure also demonstrated good construct validity in an undergraduate sample ($n = 183$) and good concurrent validity with measures of mindfulness and acceptance as well as self-report measures of disordered eating behavior and body image concerns (Sandoz et al., 2013). Additionally, the BI-AAQ has been able to successfully discriminate between patients with eating disorders and a convenience sample (Ferreira et al., 2011). In the present study, Cronbach's alpha of the measure was .94.

2.3.2. Body dissatisfaction

The Body Shape Questionnaire (Cooper, Taylor, Cooper, & Fairburn, 1987) is a 34-item scale designed to measure individuals' concerns about body shape. The items are rated on a 6-point Likert-like scale ranging from 1 (*never*) to 6 (*always*). Possible scores range from 34 to 204, with lower scores indicating lower dissatisfaction with body shape and higher scores reflecting more dissatisfaction. The items of the BSQ exhibit good test–retest reliability (.88; Rosen, Jones, Ramirez, & Waxman, 1996), as well as high internal consistency (Cronbach's alpha = .92; McLean, Paxton, & Wertheim, 2011; alpha = .97; Pook, Tuschen-Caffier, & Braehler, 2008). Cronbach's alpha was .97 in the current study. This high alpha value suggests that, for the current sample, this measure captured a narrow aspect of body dissatisfaction.

2.3.3. Disordered eating behavior

The Eating Attitudes Test – 26 (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982) is a measure of eating disorder symptomology. Based on previous research from Anderson-Fye and Lin (2009) and Miller et al. (2009), nine behavioral items from the 26-item version of the EAT were used to measure disordered eating behaviors (items 2, 4, 5, 7, 9, 15, 16, 17, and 23). Items are rated as 0 (*rarely, sometimes, often*), 2 (*very often*), or 3 (*always*). The total scores of the behavioral scale range from 0 to 27, with higher scores indicating more problematic eating behaviors. The mean score for the scale was 1.63 ($SD = 2.82$) in a previous study with 401 college undergraduates ($n_{\text{female}} = 284$; Masuda, Price, & Latzman, 2012). In the current sample, the mean score for disordered eating behaviors was 2.7 ($SD = 3.7$). Finally, a previous study using this behavioral scale reported a Cronbach's alpha of .72 (Masuda et al., 2012). In the present study, Cronbach's alpha was .76.

2.4. Data analysis

Pearson's product–moment correlation coefficients were calculated among all variables. To determine the relative contributions of body dissatisfaction and body image flexibility in predicting disordered eating behavior, a hierarchical linear regression was conducted. In addition, interaction terms for BMI \times body dissatisfaction and BMI \times body image flexibility were included to determine the impact of BMI on the relationships between the two body image variables and disordered eating. Because of the high correlation between body dissatisfaction and body image flexibility ($r = -.81$), body image flexibility was regressed on body dissatisfaction and then body dissatisfaction on body image flexibility, and the standardized residuals were used in the regression analysis. A previous study using the two body image measures with an undergraduate sample found a similarly high correlation ($-.80$; Sandoz, 2010). Residuals were used to avoid problems of multicollinearity and to explore to what degree the unique aspects of each body image construct predicted disordered eating behavior.

The first step of the regression included ethnicity (dummy coded as 1 = Caucasian/White and 2 = ethnic minority) and BMI. The second step included the residuals of body dissatisfaction (BSQ) and body image flexibility (BI-AAQ). In the third step, the interactions of BMI \times body dissatisfaction residual and BMI \times body image flexibility residual were entered. The two interaction terms were included together to determine what, if any, additive value body image flexibility has in explaining disordered eating behavior when taking BMI into account.

Because disordered eating behavior scores were positively skewed and contained the minimum score of 0 (i.e., no endorsement of disordered eating behavior), these scores were log 10 transformed after adding a constant (i.e., 1; Howell, 2007). The transformed scores closely approximated a normal distribution and no longer violated assumptions of normality. Similarly, BMI, body dissatisfaction, and body image flexibility scores were standardized (i.e., z-scored). Finally, a simple slope analysis was conducted to probe the moderation effects of significant interactions.

3. Results

3.1. Associations among study variables

Descriptive statistics and correlations among variables are shown in Table 1. Body dissatisfaction was positively associated with disordered eating behavior ($r = .43, p < .01$), and body image flexibility was negatively associated with disordered eating behavior ($r = -.41, p < .01$). Body image flexibility was negatively related to BMI ($r = -.13, p < .05$) and body dissatisfaction ($r = -.81, p < .01$), and body dissatisfaction was positively associated with BMI ($r = .19, p < .01$).

3.2. Roles of body dissatisfaction and body image flexibility on disordered eating behavior

Results of the hierarchical regression suggested that, after statistically controlling for the effects of BMI and ethnicity, unique aspects of body dissatisfaction ($\beta = .74, p < .001$) and body image flexibility ($\beta = .70, p < .001$) were each uniquely associated with disordered eating behavior. The final step of the regression analysis revealed a significant interaction effect for BMI \times body image flexibility, but not the relationship between BMI \times body dissatisfaction (see Table 2). Subsequently, the significant interaction between BMI \times body image flexibility was probed to determine the relationship between disordered eating behavior and body image flexibility at low (-1 SD), average (M), and high ($+1$ SD) levels of BMI. For those with low BMIs, body image flexibility was associated with reduced disordered eating behavior ($\beta = -.27, p = .01$); however, for those with high ($\beta = .00, p = .99$) and average ($\beta = -.15, p = .11$) BMIs, body image flexibility was not related to disordered eating behavior (see Figure 1).

4. Discussion

The purpose of this study was to examine whether body dissatisfaction and body image flexibility are uniquely and significantly associated with disordered eating behavior and whether BMI moderates the relationship between body dissatisfaction and disordered eating behavior as well as the relationship between body image flexibility and disordered eating behavior. Consistent with previous findings (Stice & Shaw, 2002; Tylka, 2004), the current study found that body dissatisfaction was significantly and uniquely related to disordered eating behavior when controlling for ethnic background, BMI, and unique aspects of body image flexibility in the present sample of adult females. Contrary to our hypothesis, however, BMI did not moderate the association between body dissatisfaction and disordered eating behavior. That is, our finding suggests that body dissatisfaction is positively associated with disordered eating behavior regardless of BMI. This is consistent with the theory of normative discontent which suggests that it is common for females to be dissatisfied with their body size and weight regardless of their BMI (Cash & Henry, 1995).

Also consistent with our hypothesis, our findings revealed that greater body image flexibility was significantly associated with lower disordered eating behavior after controlling for ethnic background and unique qualities of body dissatisfaction. In addition, BMI was found to moderate the association between body image flexibility and disordered eating behavior. That is, body image flexibility was significantly and negatively associated with disordered eating only among those with lower BMI (i.e., <20). No significant associations were

Table 1
Means, standard deviations, coefficient alphas, and zero-order relations among variables.

	1	2	3	4
1. Disordered Eating Behavior (EAT-26 Behavioral)	–			
2. Body Dissatisfaction (BSQ)	.43**	–		
3. Body Image Flexibility (BIAAQ)	–.41**	–.81**	–	
4. Body Mass Index (BMI)	–.09	.19**	–.13*	–
5. Ethnicity	–.07	–.03	.06	.18**
<i>M</i>	2.7	95.3	57.5	26.1
<i>SD</i>	3.7	39.9	17.7	6.7

Note. EAT-26 Behavioral = Eating Attitudes Test behavioral items, BSQ = Body Shape Questionnaire, BIAAQ = Body Image Acceptance and Action Questionnaire.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2
Hierarchical regression analyses predicting disordered eating behavior.

Predictor	ΔR^2	β
Step 1 Control variables ^a	.10	
Step 2	.22***	
Body Dissatisfaction (BSQ)		.74***
Body Image Flexibility (BIAAQ)		.69***
Step 3	.02*	
BIAAQ \times BMI		–.25**
BSQ \times BMI		–.14

Note. EAT-26 Behavioral = Eating Attitudes Test behavioral items, BSQ = Body Shape Questionnaire, BIAAQ = Body Image Acceptance and Action Questionnaire.

^a Control variables included dichotomized ethnicity and BMI.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

found in subsamples of average and high BMIs. These findings suggest that body image flexibility may function as a protective factor against disordered eating behavior only for those with lower BMI.

These findings have important theoretical implications. Consistent with extant literature (Fairburn et al., 2003; Stice & Shaw, 2002), the present study suggests that body dissatisfaction is important in understanding and perhaps treating disordered eating behavior. The present study extends the extant literature by suggesting that openly experiencing difficult body image without trying to control or down-regulate it while pursuing value-consistent actions (i.e., body image flexibility) is also useful for understanding disordered eating behavior for those with lower BMI (e.g., <20).

The current study's findings also have important clinical implications. Body dissatisfaction may be a useful concept in understanding problematic eating across levels of BMI. When working with those with disordered eating behaviors, clinicians may find it worthwhile to assess and target an individual's body dissatisfaction. With regard to the role of body image flexibility among women low in BMI (e.g., <20), the findings are consistent with theories and practices of mindfulness- and acceptance-based CBTs for disordered eating (Baer et al., 2005), which have been widely investigated and practiced recently. A growing body of evidence has demonstrated that these therapies promote positive clinical outcomes by improving the process of openness and flexibility toward challenging internal experiences (Hayes et al., 2011). Our findings suggest that acceptance- and mindfulness-based psychotherapies may be useful when working with women low in BMI who engage in disordered eating behaviors. Although evidence is still limited, acceptance- and mindfulness-based CBTs, such as ACT (Berman et al., 2009), DBT (Safer et al., 2001), and MBCT (Baer et al., 2005) may be valuable treatment choices for disordered eating and problematic body image.

The present investigation has several notable limitations. First, the study employed a cross-sectional method, which precludes drawing directional and causal inferences about the functional associations among the constructs of interest. Second, the psychological constructs of interest are bound to the self-report measures used. In addition, the generalizability of the present findings is also limited given that participant characteristics were somewhat unknown due to the recruitment methods employed (e.g., "snowballing" recruitment method). Specifically, it is unknown what percentage of participants were students at the university or members of the community who participating after receiving an email or seeing the advertisement online. Furthermore, the present recruitment method may have led to a biased sample. It is possible that those with body image and disordered eating concerns were more likely to participate and then forward the study information to others who were struggling with these issues than those who did not have body image or disordered eating concerns. While the current sample had some diversity, with about 25% identifying as "Latina," it was largely made up of Caucasian females (60%). As such, our findings

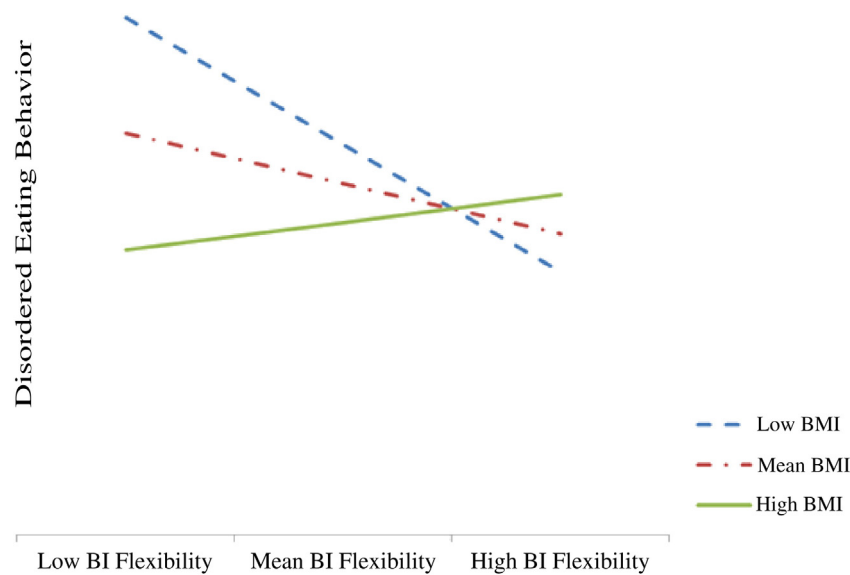


Fig. 1. Body mass index scores (BMI) moderates the association between disordered eating behaviors and body image (BI) flexibility. Note. High and low values correspond to ± 1 SD from the mean.

may not be generalizable to males or more ethnically diverse samples of females (Yates, Edman, & Aruguete, 2004).

In addition, nearly half of participants in the current sample were overweight (47%). While this is typical for this demographic region, this may have impacted findings related to disordered eating behavior. The average for disordered eating behaviors among participants was low ($M = 2.7$, $SD = 3.7$), indicating that the current sample did not endorse clinically significant levels of disordered eating. Although it is beyond the scope of the present study, the low mean score of disordered eating behaviors may have been subject to the scoring system used for the present study (e.g., answering “sometimes” to disordered eating behavior questions is scored as 0), as such this measure of disordered eating behavior may not have been sensitive enough to capture the nuances of the disordered eating behaviors endorsed by participants. Future studies should investigate the relationships among these variables with a sample of females with a range of disordered eating behaviors using a more sensitive scoring system.

Finally, because the current study used a non-clinical sample, it is not meant to reflect on eating disorders or other pathological issues. While subclinical disordered eating is an area of importance, particularly among college students, future research is needed to explore the areas of BMI, body dissatisfaction, body image flexibility, and disordered eating behavior in clinical populations. It is also important to further investigate body image flexibility as a protective factor for eating behaviors.

These limitations notwithstanding, the present study extends the existing literature on disordered eating behaviors of adult females by identifying body image inflexibility as a useful concept for understanding disordered eating behaviors in women with low BMI (e.g., <20). The study also suggests interventions that target body dissatisfaction and body image flexibility may be important when addressing disordered eating behaviors of women.

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There were no funding sources for this study.

Contributors

The first author designed the study, collected the data, conducted the literature review, conducted the statistical analysis, and wrote and revised the manuscript. The second and third authors mentored the first author, helping her in the areas of developing research questions, conducting statistical analysis, revising and finalizing the manuscript. All authors have approved the final manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

References

- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, 30(2), 217–237. <http://dx.doi.org/10.1016/j.cpr.2009.11.004>.
- Anderson-Fye, E. P., & Lin, J. (2009). Belief and behavior aspects of the EAT-26: The case of schoolgirls in Belize. *Culture, Medicine and Psychiatry*, 33(4), 623–638. <http://dx.doi.org/10.1007/s11013-009-9154-2>.
- Anestis, M. D., Selby, E. A., Fink, E. L., & Joiner, T. E. (2007). The multifaceted role of distress tolerance in dysregulated eating behaviors. *International Journal of Eating Disorders*, 40(8), 718–726. <http://dx.doi.org/10.1002/eat.20471>.
- Baer, R. A., Fischer, S., & Huss, D. B. (2005). Mindfulness and acceptance in the treatment of disordered eating. *Journal of Rational-Emotive & Cognitive Behavior Therapy*, 23(4), 281–300. <http://dx.doi.org/10.1007/s10942-005-0015-9>.
- Berg, K. C., Frazier, P., & Sherr, L. (2009). Change in eating disorder attitudes and behavior in college women: Prevalence and predictors. *Eating Behaviors*, 10(3), 137–142. <http://dx.doi.org/10.1016/j.eatbeh.2009.03.003>.
- Berman, M. I., Boutelle, K. N., & Crow, S. J. (2009). A case series investigating acceptance and commitment therapy as a treatment for previously treated, unremitted patients with anorexia nervosa. *European Eating Disorders Review*, 17(6), 426–434. <http://dx.doi.org/10.1002/erv.962>.
- Bond, F. W., & Bruce, D. (2003). The role of acceptance and job control in mental health, job satisfaction, and work performance. *Journal of Applied Psychology*, 88(6), 1057–1067. <http://dx.doi.org/10.1037/0021-9010.88.6.1057>.
- Canpolat, B. I., Orsel, S., Akdemir, A., & Ozbay, M. H. (2005). The relationship between dieting and body image, body ideal, self-perception, and body mass index in Turkish adolescents. *International Journal of Eating Disorders*, 37, 150–155.
- Cash, T. F., & Deagle, E. A. (1997). The nature and extent of body-image disturbances in anorexia nervosa and bulimia nervosa: A meta analysis. *International Journal of Eating Disorders*, 22, 107–125.
- Cash, T. F., & Henry, P. E. (1995). Women's body images: The results of a national survey in the U.S.A. *Sex Roles*, 33, 19–28. <http://dx.doi.org/10.1007/BF01547933>.
- Cassin, S. E., & von Ranson, K. M. (2005). Personality and eating disorders: A decade in review. *Clinical Psychology Review*, 25(7), 895–916. <http://dx.doi.org/10.1016/j.cpr.2005.04.012>.
- Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C. G. (1987). The development and validation of the Body Shape Questionnaire. *International Journal of Eating Disorders*, 6(4), 485–494. [http://dx.doi.org/10.1002/1098-108x\(198707\)6:4<485::aid-eat2260060405>3.0.co;2-o](http://dx.doi.org/10.1002/1098-108x(198707)6:4<485::aid-eat2260060405>3.0.co;2-o).
- Corstorphine, E. (2006). Cognitive-emotional-behavioural therapy for the eating disorders: Working with beliefs about emotions. *European Eating Disorders Review*, 14(6), 448–461. <http://dx.doi.org/10.1002/erv.747>.
- Darby, A., Hay, P., Mond, J., Rodgers, B., & Owen, C. (2007). Disordered eating behaviours and cognitions in young women with obesity: Relationship with psychological status. *International Journal of Obesity*, 31(5), 876–882.
- Fairburn, C. G. (2008). *Cognitive behavior therapy and eating disorders*. New York, NY US: Guilford Press.
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A “transdiagnostic” theory and treatment. *Behaviour Research and Therapy*, 41(5), 509–528. [http://dx.doi.org/10.1016/s0005-7967\(02\)00088-8](http://dx.doi.org/10.1016/s0005-7967(02)00088-8).
- Ferreira, C., Pinto-Gouveia, J., & Duarte, C. (2011). The validation of the Body Image Acceptance and Action Questionnaire: Exploring the moderator effect of acceptance

- on disordered eating. *International Journal of Psychology and Psychological Therapy*, 11(3), 327–345.
- Franko, D. L., Becker, A. E., Thomas, J. J., & Herzog, D. B. (2007). Cross-ethnic differences in eating disorder symptoms and related distress. *International Journal of Eating Disorders*, 40, 156–164. <http://dx.doi.org/10.1002/eat.20341>.
- Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The Eating Attitudes Test: Psychometric features and clinical correlates. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences*, 12(4), 871–878. <http://dx.doi.org/10.1017/s0033291700049163>.
- Geller, J., Cassin, S. E., Brown, K. E., & Srikaneswaran, S. (2009). Factors associated with improvements in readiness for change: Low vs. normal BMI eating disorders. *International Journal of Eating Disorders*, 42(1), 40–46. <http://dx.doi.org/10.1002/eat.20574>.
- Hayes, S. C., Villatte, M., Levin, M., & Hildebrandt, M. (2011). Open, aware, and active: contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology*, 7, 141–168. <http://dx.doi.org/10.1146/annurev-clinpsy-032210-104449>.
- Hilbert, A., de Zwaan, M., & Braehler, E. (2012). How frequent are eating disturbances in the population? Norms of the Eating Disorder Examination-Questionnaire. *PLoS One*, 7(1). <http://dx.doi.org/10.1371/journal.pone.0029125>.
- Howell, D. C. (2007). *Statistical methods for psychology* (6th ed.) Boston, MA US: PWS-Kent Publishing Co.
- Hudson, J. I., Hiripi, E., Pope, H. G., Jr., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry*, 61(3), 348–358. <http://dx.doi.org/10.1016/j.biopsych.2006.03.040>.
- Kraut, R., Olson, J., Banaji, M. R., Bruckman, A., Cohen, J., & Couper, M. (2004). *Psychological research online: Opportunities and challenges*. (APA Internet), 1–36 (Retrieved from <http://www.apa.org/science/apainternetresearch.pdf>). doi: 10.1.1.113.7546).
- Lu, H. -Y., & Hou, H. -Y. (2009). Testing a model of the predictors and consequences of body dissatisfaction. *Body Image*, 6(1), 19–23. <http://dx.doi.org/10.1016/j.bodyim.2008.08.003>.
- Masuda, A., Price, M., & Lutzman, R. D. (2012). Mindfulness moderates the relationship between disordered eating cognitions and disordered eating behaviors in a non-clinical college sample. *Journal of Psychopathology and Behavioral Assessment*, 34(1), 107–115. <http://dx.doi.org/10.1007/s10862-011-9252-7>.
- McLaren, L., Hardy, R., & Kuh, D. (2003). Women's body satisfaction at midlife and lifetime body size: A prospective study. *Health Psychology*, 22(4), 370–377. <http://dx.doi.org/10.1037/0278-6133.22.4.370>.
- McLean, S. A., Paxton, S. J., & Wertheim, E. H. (2011). A body image and disordered eating intervention for women in midlife: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 79(6), 751–758. <http://dx.doi.org/10.1037/a0026094>.
- Miller, J. L., Vaillancourt, T., & Hanna, S. E. (2009). The measurement of 'eating-disorder-thoughts' and 'eating-disorder-behaviors': Implications for assessment and detection of eating disorders in epidemiological studies. *Eating Behaviors*, 10(2), 89–96. <http://dx.doi.org/10.1016/j.eatbeh.2009.02.002>.
- Pallister, E., & Waller, G. (2008). Anxiety in the eating disorders: Understanding the overlap. *Clinical Psychology Review*, 28, 366–386.
- Perez, M., Hernandez, A., Clarke, A., & Joiner, T. (2007). Analysis of bulimic symptomatology across age and demographic locations. *Eating Behaviors*, 8, 136–142.
- Phelps, L., Johnston, L. S., & Augustyniak, K. (1999). Prevention of eating disorders: Identification of predictor variables. *Eating Disorders*, 7, 99–108.
- Piran, N., & Cormier, H. C. (2005). The social construction of women and disordered eating patterns. *Journal of Counseling Psychology*, 52(4), 549–558. <http://dx.doi.org/10.1037/0022-0167.52.4.549>.
- Pook, M., Tuschen-Caffier, B., & Braehler, E. (2008). Evaluation and comparison of different versions of the Body Shape Questionnaire. *Psychiatry Research*, 158, 67–73. <http://dx.doi.org/10.1016/j.psychres.2006.08.002>.
- Rø, Ø., Reas, D. L., & Rosenvinge, J. (2012). The impact of age and BMI on Eating Disorder Examination Questionnaire (EDE-Q) scores in a community sample. *Eating Behaviors*, 13(2), 158–161. <http://dx.doi.org/10.1016/j.eatbeh.2011.12.001>.
- Rosen, J. C., Jones, A., Ramirez, E., & Waxman, S. (1996). Body Shape Questionnaire: Studies of validity and reliability. *International Journal of Eating Disorders*, 20(3), 315–319. [http://dx.doi.org/10.1002/\(sici\)1098-108x\(199611\)20:3<315::aid-eat11>3.0.co;2-z](http://dx.doi.org/10.1002/(sici)1098-108x(199611)20:3<315::aid-eat11>3.0.co;2-z).
- Safer, D. L., Telch, C. F., & Agras, W. S. (2001). Dialectical behavior therapy for bulimia nervosa. *The American Journal of Psychiatry*, 158(4), 632–634. <http://dx.doi.org/10.1176/appi.ajp.158.4.632>.
- Sandoz, E. K. (2010). *Assessment of body image flexibility: An evaluation of the Body Image-Acceptance and Action Questionnaire* (Unpublished doctoral dissertation). Oxford, MS: University of Mississippi.
- Sandoz, E. K., Wilson, K. G., Merwin, R. M., & Kellum, K. K. (2013). Assessment of body image acceptance: the body image-acceptance questionnaire. *Journal of Contextual Behavioral Science*, 2(1–2), 39–48. <http://dx.doi.org/10.1016/j.jcbs.2013.03.002>.
- Stice, E., Marti, C. N., & Durant, S. (2011). Risk factors for onset of eating disorders: Evidence of multiple risk pathways from an 8-year prospective study. *Behaviour Research and Therapy*, 49, 622–627. <http://dx.doi.org/10.1016/j.brat.2011.06.009>.
- Stice, E., & Shaw, H. E. (2002). Role of body dissatisfaction in the onset and maintenance of eating pathology: A synthesis of research findings. *Journal of Psychosomatic Research*, 53(5), 985–993. [http://dx.doi.org/10.1016/s0022-3999\(02\)00488-9](http://dx.doi.org/10.1016/s0022-3999(02)00488-9).
- Stice, E., & Whitenton, K. (2002). Risk factors for body dissatisfaction in adolescent girls: A longitudinal investigation. *Developmental Psychology*, 38(5), 669–678. <http://dx.doi.org/10.1037/0012-2649.38.5.669>.
- Tylka, T. L. (2004). The relation between body dissatisfaction and eating disorder symptomatology: An analysis of moderating variables. *Journal of Counseling Psychology*, 51(2), 178–191. <http://dx.doi.org/10.1037/0022-0167.51.2.178>.
- Wendell, J. W., Masuda, A., & Le, J. K. (2012). The role of body image flexibility in the relationship between disordered eating cognitions and disordered eating symptoms among non-clinical college students. *Eating Behaviors*, 13, 240–245. <http://dx.doi.org/10.1016/j.eatbeh.2012.03.006>.
- Wetterneck, C. T., Burgess, A. J., Short, M. B., Smith, A. H., & Cervantes, M. E. (2012). The role of sexual compulsivity, impulsivity, and experiential avoidance in internet pornography use. *Psychological Record*, 62, 3–18.
- Yates, A., Edman, J., & Aruguete, M. (2004). Ethnic differences in BMI and body/self-dissatisfaction among Whites, Asian Subgroups, Pacific Islanders, and African-Americans. *Journal of Adolescent Health*, 34(4), 300–307. <http://dx.doi.org/10.1016/j.jadohealth.2003.07.014>.