Body Dissatisfaction Mediates the Relationship between Self-Esteem and Restrained Eating in Female Undergraduates

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Abstract

The purpose of the current study was to examine the eating behavior, self-esteem, and social anxiety of restrained and non-restrained eaters exposed to an interpersonal stressor. Sixty female undergraduate students completed questionnaires and took part in a stressor and taste test. Results indicated that self-esteem was not predictive of eating behavior during the taste test, but was predictive of a chronic pattern of restricted eating and diet-breaking behavior ($p<.01$). The relationship between self-esteem and restrained eating was fully mediated by a measure of body image dissatisfaction. Social anxiety was also predictive of restrained eating behavior ($p<.05$), and this relationship was fully mediated by body image dissatisfaction as well. These results support the cognitive-behavioral model of bulimia nervosa in suggesting that low self-esteem is a risk factor for restrained eating behavior.
Keywords: restrained eating, body image, self-esteem, social anxiety.

Introduction

Restrained eating is generally defined as a persistent fixation on dieting, weight, and food, such that the type and amount of food eaten is restricted for the purpose of weight loss or maintenance (Ruderman, 1985). Much to their dismay, restrained eaters commonly experience weight fluctuations, due to alternations between dieting and pronounced lapses in dietary adherence (Ruderman, 1985). Dietary restriction has been implicated as a risk factor in the development of obesity, binge-eating, and clinically diagnosable eating disorders, such as bulimia nervosa (Stice, Presnell, & Spangler, 2002). Although there are several qualitative differences in the psychological characteristics of restrained eaters and individuals with bulimia nervosa, there is evidence of similarities, including a willingness to describe oneself in negative terms, low self-esteem, heightened social anxiety, and body dissatisfaction (Striegel-Moore, Silberstein, & Rodin, 1993). Ruderman and Besbeas (1992) concluded that while dieting may not be the sole cause of bulimia nervosa, dietary restriction and lapses may be necessary for its development. Consequently, restricted eating and dietary lapses among restrained eaters should be studied with the ultimate goal of preventing eating disorders.

Although preventing eating disorders is a key objective in researching restrained eaters, the restrained eating lifestyle also should be studied because of the distress it causes individuals in its own right. Much research indicates that when exposed to personally-relevant stressors, restrained eaters' eating becomes disinhibited, resulting in the consumption of significantly larger quantities of food than when not distressed (Heatherton, Striepe, & Wittenberg, 1998; Oliver, Huon, Zadro, & Williams, 2001; Tanofsky-Kraff, Wilfley, & Spurrell, 2000). Disinhibition itself is then an additional stressor, not only due to the potential weight gain caused by the overeating, but also because the disinhibited eating is perceived by restrained eaters as a reflection of their inability to control their eating. In turn, this may generalize to a broader feeling of personal inefficacy and low self-esteem (Polivy, Heatherton, & Herman, 1988). Interestingly, *non*-restrained eaters tend to eat less when distressed than when they are not distressed, albeit these findings are not quite as robust (Heatherton et al., 1998). Researchers have hypothesized that non-restrainers' appetites are suppressed as a result of stress.

Restrained eating is a widespread problem with approximately 25% of college women describing themselves as restrainers (Rand & Kuldau, 1991). Thus, further study of the mechanisms and causes of the dietary disinhibition component is warranted. Evidence suggests that several factors may play an important role in the disinhibition effect, and yet there are many unknowns due to mixed findings across studies.

One factor that may contribute to dietary disinhibition is self-esteem. The "spiral model" explains the relationship between self-esteem and dietary restraint by suggesting that lowered self-esteem is caused by failed dietary restraint. Specifically, when restrainers consume more than they deem acceptable, they view themselves as failures with limited self-discipline. Such beliefs develop into general feelings of inefficacy and low self-esteem (Heatherton & Polivy, 1992; Polivy, et al., 1988). Lower self-esteem and feelings of inefficacy may lead to further lapses in dietary restraint, leading to even lower self-esteem. Thus, self-esteem "spirals" downwards as a function of restraint failure. A second model explaining the relationship between self-esteem and dietary restraint is the cognitive-behavioral model of bulimia nervosa (Vitousek, 1996). This model proposes that the link between self-esteem and dietary restraint is not direct, but is instead mediated by overconcern with weight and shape (Byrne & McLean, 2002). Specifically, low self-esteem is an important risk factor for overconcern with weight and shape, which in turn is a risk factor for increased dietary restraint. However, low self-esteem in-and-of-itself does not directly lead to increased dietary restraint.

Evidence has been found supporting both of these models. Polivy and colleagues (1988) tested the spiral model by examining the relationship between self-esteem and dietary disinhibition. They used a "milkshake preload," which is a standard technique that entails having participants consume a high-calorie milkshake prior to a taste test. The premise is that this preload will lead to disinhibition among restrained eaters, who believe that this milkshake has "blown" their diet. Polivy found that among restrained eaters, only those with low self-esteem exhibited the characteristic pattern of dietary disinhibition after the milkshake preload. Restrainers with high self-esteem ate about the same amount in both preload and non-preload conditions (Polivy et al., 1988). Regardless of self-esteem, non-restrained participants tended to eat less when preloaded than when not. Importantly, one should note that this experiment did not examine the potential influence of body dissatisfaction on the relationship between self-esteem and dietary restraint. Additionally, the authors did not measure feelings of ineffectiveness, which according to the spiral model leads to both lowered self-esteem following dietary disinhibition, as well as dietary disinhibition following lowered self-esteem.

In support of the cognitive-behavioral model of bulimia nervosa, Ross and Wade (2004) found that self-esteem predicted dietary restraint among a sample of restrainers and non-restrainers, but this relationship was fully mediated by weight and shape concern. Furthermore, Byrne and McLean (2002) found similar results in a sample of male and female athletes and non-athletes. Evidence from studies not specifically testing this cognitive-behavioral model also has detected a strong relationship between low self-esteem and body dissatisfaction, as well as between body dissatisfaction and dietary restraint (Button, Loan, Davies, & Sonuga-Barke, 1997; Fabian & Thompson, 1989; Grant & Fodor, 1986). Still, these studies have not examined whether particular facets of self-esteem (e.g., those having to do with appearance or academic performance) may have a different relationship with body dissatisfaction and restrained eating. Therefore, it is possible that certain components of self-esteem are driving the significant relationships found in previous studies. If this is so, a more specific model could potentially be devised to describe these relationships, which may in turn help with designing more effective treatments. In sum, given that the research has been inconclusive regarding whether the spiral model or the cognitive-behavioral model better explains the relationship between self-esteem and dietary restraint, further study is required so that this relationship can be clarified and eventually more effective intervention and prevention programs can be designed.

Although various types of stressors can trigger dietary disinhibition, interpersonal stressors may be of particular significance to restrained eaters. Experimental manipulations of interpersonal stressors showed that dietary disinhibition occurred when restrained eaters were the targets of negative interpersonal interactions, argument, and ostracism (Oliver et al., 2001). Additionally, interpersonal stressors were more potent predictors of disinhibition than other types of ego-threatening stressors, such as task failure (Tanofsky-Kraff et al., 2000). Tanofsky-Kraff and colleagues (2000) concluded that restrained eaters wrestle with interpersonal problems, and that restrained eating may be a mechanism employed to cope with interpersonal deficits.

The findings from these experiments containing stress manipulations are bolstered by other research that provides strong evidence of a relationship between social anxiety, body dissatisfaction, and restrained eating. Striegel-Moore and colleagues (1993) found that discomfort in the presence of others and an elevated awareness of the reaction of others to the self were associated with lower body esteem in a nonclinical sample of women. In a separate nonclinical sample, females' restrictive attitudes regarding food and weight were associated with intensified social anxiety (Gilbert & Meyer, 2003). Cash and Fleming (2002) also found that heightened social anxiety was positively related to negative body image evaluation, while other evidence suggested that body dissatisfaction was positively correlated with social anxiety and self-consciousness (Theron, Nel, & Lubbe, 1991).

Evidence from eating-disordered populations suggests that clinical groups also possess significant social anxiety. Specifically, women with bulimia reported more negative social perceptions and greater self-consciousness in social interactions than either formerly bulimic or non-eating-disordered controls, while both bulimic and formerly bulimic women experienced larger increases than controls in self-critical thoughts following negative social interactions (Steiger, Gauvin, Jabalpurwala, Séguin, & Stotl, 1999). Additionally, bulimic participants and individuals who scored high on the Eating Attitudes Test (EAT) showed more intense public self-consciousness and higher social anxiety than controls (Striegel-Moore et al., 1993). Furthermore, binge episodes among bulimic participants were pronounced after negative social interactions (Okon, Greene, & Smith, 2003).

In terms of selecting an appropriate social stressor for the current study, public speaking appeared to be a logical choice given its known propensity to be a particularly stressful social situation for all individuals (Richmond & McCroskey, 1995). Furthermore, social phobia is one of the most common comorbid anxiety disorders among women with anorexia nervosa or bulimia nervosa (Kaye, Bulik, Thornton, Barbarich, & Masters, 2004), and public speaking is among the most common manifestations of social phobia (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision, 2000).

In summary, given that the social functioning of eating disordered women and restrained eaters appears to be particularly impaired, further investigation of interpersonal stressors and social anxiety and their link to body dissatisfaction and dietary disinhibition is warranted. The purpose of the current study was to examine the eating behavior, self-esteem, and social anxiety of restrained and non-restrained eaters exposed to an interpersonal stressor. We hypothesized the following: (1) the number of cookies consumed in a taste-test (described below), would be predicted by level of dietary restraint, with greater levels of restraint predicting a larger number of cookies eaten, (2) self-esteem would predict immediate diet-breaking behaviors in a taste-test such that low self esteem would be associated with a greater number of cookies eaten. We further expected that this relationship would be fully mediated by body dissatisfaction, (3) self-esteem would predict a restrained eating style more generally, such that low self-esteem would be associated with heightened dietary restraint. We again expected that this relationship would be fully mediated by body dissatisfaction, and (4) social anxiety would be positively associated with body dissatisfaction and dietary restraint.

Method

Participants

The final sample consisted of 60 female undergraduates ages 18 and older who were recruited from psychology classes at a large southwestern university. We were interested in having fairly equal representation of restrained and non-restrained eaters in our sample, and yet restrained eaters typically comprise only about 25% of a female college population. Thus, we continued recruitment until we had obtained 30 individuals who scored above the established cutoff for restrained eaters; namely a score of 15 or more on the Revised Restraint Scale (Heatherton et al., 1998; Ruderman, 1985). This resulted in eliminating 78 non-restrained eaters in the process. The restraint scores of the final sample were normally distributed.

Participants were within 15% of the normal weight range, wherein normal weight was defined as a Body Mass Index [BMI: weight(kg)/height(m^2)] between 18.5 and 24.99 (WHO, 1998). In terms of outright exclusionary criteria, 54 out of the 296 originally screened participants were excluded from the primary experiment because their weight was more than 15% outside of the normal weight range for their height. Women who met current or lifetime criteria for an eating disorder were excluded because the study involved an eating task which might have been experienced as particularly distressing for them. A screening questionnaire asked participants if they had ever been diagnosed with an eating disorder, and if not, whether they were concerned that they might have an eating disorder. In the latter case, participants answered follow-up questions that inquired about specific diagnostic criteria. This resulted in excluding women with Anorexia Nervosa (n = 2), Bulimia Nervosa (n = 3), and Binge Eating Disorder (n= 1). Additionally, women who were allergic to nuts (an ingredient for the cookie taste test; n= 2) were excluded. Of the remaining eligible women, 93 were not interested in participating in Phase 2, two women served as pilot subjects, and one additional woman participated in Phase 2 but her data were excluded from analyses because she determined the purpose of the study.

Measures

Demographics Questionnaire. Information regarding participants' age, ethnicity, height and weight was gathered.

Revised Restraint Scale (RRS; Herman and Polivy, 1980). The RRS is a self-report measure composed of 10 items assessing degree and frequency of dieting, weight fluctuation, and attitudes towards eating. Each item is scored on a scale of 0 to 4. Although these numbers denote different responses from question to question, high scores reflect restrained eating patterns wherein subjects are recurrently unsuccessful in restricting their food intake. The scale is valid in normal-weight samples (Heatherton, Herman, Polivy, King, & McGree, 1988). Its test-retest reliability is high, and internal consistency is good (see Ruderman et al., 1992). Cronbach's alpha for the current sample=0.84.

Social Phobia Inventory (SPIN; Connor, Davidson, Churchill, Sherwood, Foa & Weisler, 2000). The SPIN is a self-report measure of social fear, avoidance, and physiological discomfort. Participants were asked to endorse 17 statements on a scale of 0 (not at all) to 4 (extremely). A score of 19 has been shown to distinguish between social phobia subjects and controls. This scale shows good test-retest reliability, internal consistency, and both convergent and divergent validity (Connor et al., 2000). This scale was administered to gather a baseline measure of participants' social anxiety so that its relationship with dietary restraint and self-esteem could be analyzed. Cronbach's alpha for the current sample was .76.

Body Dissatisfaction Subscale of the Eating Disorder Inventory (BD Scale; Garner, Olmsted, Polivy, 1983). The Body Dissatisfaction subscale of the Eating Disorder Inventory (EDI) contains nine

statements about specific body parts (waist, hips, thighs, buttocks), such as "I think my hips are too big." Participants are asked to rate how true these statements are for them on a scale from Always to Never. Four items are scored such that "always" is 3 points, "usually" is 2 points, "often" is 1 point, and "sometimes," "rarely," and "never" are 0 points. Higher total scores indicate greater body dissatisfaction. This subscale has been used as a stand-alone measure of body dissatisfaction in previous research (Tsiantas & King, 2001). The EDI has adequate psychometric properties and has shown to be internally consistent (Raciti & Norcross, 1987). The scale was administered during the screening session and after the speech stressor in order to measure potential changes in body image. Cronbach's alpha for the current sample was .93.

State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991). The 20-item SSES has the capacity to measure temporary changes in self-esteem. It yields three subscales in addition to a total score: Academic Performance self-esteem, Social Evaluation self-esteem, and Appearance self-esteem. Participants were asked to indicate how true certain feelings were for them "right now" on a scale from 1 (not at all) to 5 (extremely). Higher scores indicate higher self-esteem. Excellent internal consistency has been demonstrated with an alpha coefficient of .92 (Heatherton et al., 1991). The scale was administered before and after the speech stressor. Cronbach's alpha for the current sample was .95.

Tasks and Manipulations

Impromptu Speech Stressor. The participant was told that the experiment was looking at the effects of arousal from a speech on taste perception in a cookie taste test to follow. Each participant was instructed to deliver an impromptu speech, which was videotaped in an effort to elevate the anxiety of participants. The experimenter told the participant that she had five minutes to prepare a five minute speech on the topic, "Do you consider education to be a right or a privilege?". The experimenter also stated that she would hold up the appropriate number of fingers to indicate the number of minutes out of the 5 required that the participant had talked (at minutes 2 and 4). If the participant finished prior to the 5 minute cut-off, she was encouraged to think of more to say. If she did not immediately continue, she was given another 30 seconds before the experimenter ended the task. The speech was delivered to the experimenter and two research assistants. These normal weight undergraduates had been trained by the experimenter to maintain neutral expressions during the speech (e.g., no smiling or nodding in agreement), so that the participant's self-evaluation of her performance would not be biased by reactions from her audience (Westmaas & Jamner, 2006). The research assistants were also involved in the debriefing process wherein they described their roles in the study to the participant.

Cookie Taste Test. All participants were given three plates of 30 bite size cookies (approximately 10 ounces per plate), each stacked with a different variety of cookie. Large numbers of bite size cookies were given to minimize the participant's ability to gauge how much she had eaten (Sheppard-Sawyer, McNally, & Harnden-Fischer, 2000). The participant was told she had 15 minutes to taste and rate each variety of cookie using a Taste-Rating Questionnaire. She was informed that the experimenter was exploring the effect of arousal on taste perception. As is standard practice for taste tests (Polivy et al., 1988), when the experimenter left the taste testing room she told the participant, "You are the last participant today. Feel free to eat as many cookies as you want during the taste test, since I'll be throwing the rest out when you leave." Participants were asked to leave their bags in a separate office and they were not given napkins while eating the cookies in order to reduce the likelihood that they would take extra cookies with them in their bags or in their pockets. It was important to get a precise count of how many cookies each participant ate so that eating behavior following the stressor could be accurately gauged. When the participant left, the remaining cookies were counted (Tanofsky-Kraff et al., 2000).

Procedure

Phase 1 entailed having interested undergraduate psychology students complete the RRS, the BD scale, the SPIN, and a Demographics Questionnaire. This phase of the study took place on a different day than Phase 2 so that questions regarding eating behavior and body image would be unlikely to influence eating behavior during Phase 2 of the study (Jansen, Louwerse, Leemans, & Schouten, 1998). Upon completion of the Phase 1 questionnaire packet, participants were told whether they were eligible for Phase 2 of the experiment. Eligible and interested individuals were signed up for this second portion of the study, for which they could receive either course credit or $10 for their participation. Regardless, all participants who completed Phase 1 were awarded one research credit.

The 60 eligible and interested female participants from Phase 1 were instructed to arrive at the laboratory having eaten a normal-sized meal 2.5 hours prior, and to abstain from further eating two hours before the experiment (Polivy et al., 1988). Upon arrival, participants signed an informed consent form. Testing began with participants being given the SSES. They then prepared and delivered their speech. Participants were told that their videotaped speeches could be erased and their data withdrawn from the study without any penalty. One participant asked that her tape be erased but allowed the rest of her data to be included in the study. At the conclusion of the speech all participants filled out a form assessing their speech performance, and then completed a cookie taste test. In an effort to measure any changes that may have resulted following the experimental manipulations, participants next completed a second SSES, as well as a second BD scale. Finally, participants completed a manipulation check, were debriefed, and then were awarded their choice of course credit (n=57) or $10 (n=6).

Results

Participant Characteristics

The majority of participants were either non-Hispanic, White (58.3%) or Hispanic (23.3%). Mean age for the total sample was 20.23 (SD= 2.95; range = 18 - 30). Mean BMI for the total sample was 22.27 (SD= 2.22; range = 17.90 - 27.50). In line with inclusion criteria, these values fall within 15% of the normal weight range for participants.

Dietary Disinhibition and Restraint Score

Contrary to hypothesis 1, linear regression analyses revealed that degree of restraint did not predict the number of cookies eaten after the stressor.

Self-Esteem and Restrained Eating

Self-Esteem, Body Image, and Cookies Consumed. In order to address hypothesis 2, mediation models examining the relationship between self-esteem, body image, and cookies consumed were tested. Mediation models must satisfy three criteria. First, the correlation between the independent variable (SSES total) and the mediator variable (BD scale score) must be significant. Second, the correlation between the independent variable and the dependent variable (number of cookies consumed) must also be significant. Third, the correlation between the independent and dependent variables should become nonsignificant or be reduced when the mediating variable is introduced into the model (Baron & Kenny, 1986). Several models were planned to test the potential mediating effects of the body image measure on the relationship between the various SSES self-esteem scales and cookie consumption. First, a model was tested wherein the total SSES score was entered as the independent variable, number of cookies consumed as the dependent variable, and BD Scale score was entered as a mediator. This model was not significant. Because this first model with the SSES total score as the independent variable was not

significant, further models testing the individual scales of the SSES as independent variables were not conducted. Thus, hypothesis 2 was not supported.

Total Self-Esteem, Body Image, and Restraint Score. To test hypothesis 3, a mediation model was tested with the SSES total score as the independent variable (IV), BD scale score as the mediator, and Restraint Scale score as the dependent variable (DV). Listed in Table 1 are the regression coefficients for steps one and two of the mediation process. The amount of variance accounted for by SSES total score was reduced from 17% to 5% when BD Scale score was controlled for (ß = -.225, p=.098). Thus, the relationship between SSES total score and Restraint Scale score was fully mediated by the BD scale score. Since the plan was to conduct further model testing using the individual SSES scale scores as the independent variables if the model using the SSES total score was significant, these analyses are presented below. Results from steps one and two of the mediation process can be found for these models on Table 1 as well.

Table 1: Beta Weights from Linear Regression Analyses.

Measure	BD Scale Score	Restraint Scale Score
SSES Total	-.529***	-.418***
SSES Academic Performance	-.287*	-.345**
SSES Social Evaluation	-.370**	-.361**
SSES Appearance	-.686***	-.395**

*p<.05, **p<.01, ***p<.001

Academic Performance Self-esteem, Body Image, and Restraint Score. The relationship between the Academic Performance subscale of the SSES (IV), Restraint Scale score (DV), and BD scale score (mediator) was examined in the same manner as outlined above (see Table 1 again for steps one and two of the mediation process). When BD scale score was controlled for, the amount of variance accounted for by Academic Performance self-esteem was reduced from 12% to 6% (ß= -.249, p= .065). BD scale score fully mediated the relationship between Academic Performance self-esteem and Restraint Scale score.

Social Evaluation Self-esteem, Body Image, and Restraint Score. An exploration of the relationship between Social Evaluation SSES subscale (IV), Restraint Scale score (DV) and BD scale score (mediator), was also conducted (see Table 1). When BD scale score was controlled for, the amount of variance accounted for by Social Evaluation self-esteem was reduced from 13% to 5% (ß= -.217, p= .104). BD scale score fully mediated the relationship between Social Evaluation self-esteem and Restraint Scale score.

Appearance Self-esteem, Body Image, and Restraint Score. Finally, the relationship between Appearance SSES subscale (IV), Restraint Scale score (DV) and BD scale score (mediator) was examined (see Table 1). When BD scale score was controlled for, the amount of variance accounted for by Appearance self-esteem was reduced from 16% to 0.4% (ß= -.061, p=.655). As such, BD scale score fully mediated the relationship between Appearance self-esteem and Restraint Scale score. Thus, hypothesis 3 was fully supported as self-esteem predicted restrained eating behavior and this relationship was fully mediated by body image dissatisfaction.

Social Anxiety and Restrained Eating

As predicted in hypothesis 4, linear regression analyses indicated that social anxiety, as measured by the SPIN total score, significantly predicted Restraint Scale score, and accounted for 7% of the variance (ß= .257, p<.05). Greater social anxiety was associated with heightened dietary restraint. Social Evaluation self-esteem as measured by the SSES, and social anxiety as measured by the SPIN, have been described as measuring similar, but not identical constructs (Connor et al., 2000; Heatherton & Polivy, 1991). Given that the BD scale score was shown to be a mediator of the relationship between Restraint Scale Score and Social Evaluation self-esteem, a mediation model was also tested in which BD scale score was examined as a potential mediator in the relationship between SPIN score and Restraint Scale score. Within this model, SPIN score significantly predicted BD scale score and accounted for 12% of the variance (ß= .350, p<.01). Greater social anxiety was associated with greater body dissatisfaction. As noted above, SPIN score significantly predicted Restraint Scale score and accounted for 7% of the variance. When BD scale score was controlled for, the amount of variance accounted for by SPIN score was reduced from 7% to 0.6% (ß= .074, p= .586). Thus, BD scale score fully mediated the relationship between SPIN score and Restraint Scale score.

Discussion

The current study contributes to the literature by further clarifying the relationship between self-esteem and restrained eating behavior. Results which indicated that self-esteem scores were negatively correlated with level of restraint are consistent with the existing research which suggests that restrainers have lower self-esteem than non-restrainers (Dykens & Gerard, 1986; Pesa, 1999). As mentioned, Byrne and McLean (2002) reported that low self-esteem predicted dietary restraint, and that this relationship was fully mediated by poor body image. While the BD scale score did not mediate the relationship between self-esteem and the number of cookies consumed during the experiment (hypothesis 2), it did mediate the relationship between self-esteem and Restraint Scale Score (hypothesis 3). Thus, immediate diet-breaking behavior was not predicted by body dissatisfaction and low self-esteem, but a chronic pattern of restricted eating and diet-breaking behavior *was* predicted by these variables. Importantly, this study expanded upon earlier findings by demonstrating that these mediation models are significant not only for a general measure of self-esteem, but also for aspects of self-esteem (e.g., Academic Performance) that do not seem inherently related to body image or restrained eating behavior. These findings suggest that treatment programs addressing general problems with self-esteem and not just those related to body image may be helpful in subsequent body image improvement.

The results of these mediation models cannot specify the direction of the relationship between self-esteem, body dissatisfaction, and dietary restraint, but they can be seen as lending support to the cognitive-behavioral model of bulimia nervosa among restrainers. Specifically, these results suggest that it is not self-esteem in-and-of-itself that is predictive of levels of dietary restraint. Instead, the current study's results illustrate that the relationship between self-esteem and dietary restraint can be fully accounted for by the level of body dissatisfaction an individual experiences (Byrne & McLean, 2002; Ross & Wade, 2004). As a potential explanation of these results, the cognitive-behavioral model posits that low self-esteem is a potent risk factor for developing an overvaluation of one's body shape, which in turn may lead to restrained eating in an attempt to achieve a more satisfactory shape and size (Meijboom, Jansen, Kampman, & Schouten, 1999; Stice, 2001).

The spiral model of self-esteem does not appear to offer a complete explanation of the results from the current study. The spiral model suggests that low self-esteem and feelings of inefficacy may lead to lapses in dietary restraint, resulting in even lower self-esteem (Heatherton & Polivy, 1992; Polivy, et al., 1988). In the current study we did not have a measure of inefficacy to adequately decipher whether the relationship between self-esteem and dietary restraint was linked via this variable. However, given

that the relationship between self-esteem and dietary restraint *was* fully mediated by body image, it seems more likely that cognitive-behavioral model is an accurate representation of the current data.

The final hypothesis predicted that restrainers would report significantly more social anxiety than non-restrainers, as operationalized by the SPIN total score. Our results strongly supported this hypothesis, as well as the existing literature which reports that restrainers are more socially anxious than non-restrainers (Gilbert & Meyer, 2003; Striegel-Moore et al., 1993). This same pattern of results is evident in eating disordered populations, for which dietary restraint is a necessary precursor (Steiger, et al., 1999; Striegel-Moore, et al., 1993).

There is some evidence to suggest that one reason restrainers tend to have greater social anxiety than non-restrainers is that restrainers (but not non-restrainers) tend to attribute social success in thin women to their low body weight, and social failure in overweight women to their high body weight (Jarry, Polivy, Herman, Arrowood, Pliner, 2006). Conceivably, restrainers' heightened social anxiety is predicated by a hesitancy to engage in social interactions for fear that they will be rejected due to their physical appearance. Although research suggests that overweight and obese individuals are indeed stigmatized as a result of their weight (Carr & Friedman, 2005), the individuals in the current study were approximately normal weight, and thus this fear of social rejection seems unwarranted. This interpretation is supported by the current results which show that social anxiety predicted body dissatisfaction, which in turn predicted dietary restraint. Given this relationship, it seems feasible that techniques designed to improve body esteem may consequently also be effective in reducing social anxiety amongst restrainers.

Limitations of the Study

Contrary to our prediction in hypothesis 1, the results of this study showed that immediate dietary disinhibition during a taste-test was *not* related to level of dietary restraint. Conceivably the speech task was experienced as both an interpersonal *and* achievement stressor, and evidence suggests that achievement stressors are not potent predictors of dietary disinhibition among restrainers (Tanofsky-Kraff et al., 2000). A speech task was originally chosen because it is one of the most feared activities of individuals with social anxiety, and might therefore be particularly relevant for restrained eaters. Being college students, these participants are often graded on their public speaking ability in a classroom setting, and thus the current stressor may have been perceived as similar to a graded performance evaluation, and less like a purely interpersonal stressor. Future studies should employ stressors that can be more clearly categorized as achievement or interpersonal in nature. For instance, if a speech task were used again, it would be helpful to make the topic more interpersonally-focused. Additionally, the design of this study did not allow for a complete test of the spiral model, given that we did not have a measure of feelings of ineffectiveness. Thus, results must be interpreted cautiously.

Future Directions and Conclusions

The current study lends further evidence in support of the cognitive-behavioral model of bulimia nervosa, which suggests that body dissatisfaction may account for the relationship between low self-esteem and heightened dietary restraint. Additionally, results from this study add to the extant literature demonstrating a relationship between increased social anxiety and dietary restraint. Future research should investigate both feelings of ineffectiveness and body image and their roles in the relationship between self-esteem and restrained eating behavior so that this relationship can be understood more thoroughly.

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