

The Tripartite Influence model of body image and eating disturbance

A covariance structure modeling investigation testing the mediational role of appearance comparison

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Abstract

Recent theoretical approaches to the etiology of eating disorders and body image disturbances have begun to focus on multifactorial models. In the current study, the Tripartite Influence model was examined in a large sample of college females (ages 18–22). This model proposes that three primary core sources of influence—parents, peers and media—contribute to the development of body image and eating disturbances. Additionally, the model suggests that at least two factors mediate the relationship between influences and disturbance—appearance comparison and internalization of media information. In this study, appearance comparison was examined as a mediational link between peer, family and media influence variables and the outcome disturbance measures of eating dysfunction and body image dissatisfaction.

Covariance structure modeling (CSM) was used to test the proposed pathways. The results indicated that appearance comparison mediated the effects of family and media influences on body dissatisfaction, which in turn influenced restrictive and bulimic behaviors. In addition, peer influences had a direct influence on restriction. Perfectionism was hypothesized to relate to body dissatisfaction, but was in fact found to influence appearance comparison. The findings were limited by the necessity of several modifications to the originally proposed models, yet offer replication and extension of previous work with appearance comparison and support for further testing of the Tripartite Influence model. © 2002 Elsevier Science Inc. All rights reserved.

Keywords: Body image; Eating disturbance; Appearance comparison; Psychological functioning; Developmental influences

Introduction

In recent years, a great deal of research effort has been directed toward understanding the formative factors that play a role in the development and maintenance of body image disturbance and eating disorders [1]. A variety of social, interpersonal and biological factors have received attention and empirical support as potential causal factors, including internalization of media ideals [2], negative verbal feedback (i.e., teasing), early physical maturation, sexual abuse, low self-esteem and elevated appearance comparison tendencies [3]. Although interest and activity in this area of eating disorders research is quite high, few studies have actually evaluated risk factors within established theoretical models. For instance, Stice [4] recently reviewed the area of risk factors and concluded that there were actually a limited

number (five) of specific theoretical models of eating disturbance that have been postulated. One of the models he reviewed was the Tripartite Influence model, proposed by Thompson et al. [5]. This model suggests that there are three primary influence variables that form the basis for later development of body image and eating dysfunction: peers, parents and media. In addition, the model contains two mediational links connecting influences to disturbed body image and eating problems: internalization of societal ideals of appearance and heightened appearance comparison tendencies. These mediating variables are hypothesized to lead to body image and eating outcomes. The current study is a test of a portion of the Tripartite Influence model, with several additional variables added.

Numerous studies have been conducted on peers' influence on eating and body image. For instance, Paxton et al. [6] found that high school girls who reported higher levels of dieting had been teased more by friends about their weight and shape, stated that friends influenced their decisions to diet, and rated their friends as more preoccupied

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with eating and weight-related issues. Thompson et al. [7] found that reported level of weight-related teasing (WT) was related to body image dissatisfaction in a sample of adult women. Stormer and Thompson [8] also found that teasing was a fairly consistent predictor of a variety of body image and eating disturbance measures in college women. Stice et al. [9] reported that high school and college-aged participants diagnosed with full or subclinical bulimia reported greater pressure to be thin from friends than did control participants. Thus, there is support across several studies for the role of peers in eating and weight-related behaviors. However, it is unclear how peer influence may relate to other sources of influence on those behaviors.

Although the findings are not unanimous, there have also been numerous studies documenting the relationship between family members' attitudes and behaviors and girls' eating and weight-related behaviors. For instance, studying middle school girls in the Midwest, Levine et al. [10] found that perceived parental pressure to be thin predicted eating disturbances. Pike and Rodin [11] found that mothers of bulimic adolescents evaluated their daughters' weight and appearance less favorably than mothers of girls who were not bulimic. Among a sample of college age women, Kanakis and Thelen [12] found that bulimics and those with subclinical eating behavior reported being teased by their family more often than controls. Rieves and Cash [13], in a study of college females, also found that participants' body image dissatisfaction was significantly related to participants' perception of their mothers' body dissatisfaction. While the Tripartite Influence model specifies parental influence, in the current study, we more broadly conceptualized this variable as family influence, since research has pointed toward a role for other family members as well in influencing body and eating behaviors and attitudes (see, for instance, Ref. [14]).

Support for the role of the media in the development of eating and weight disorders is also substantial. Harrison and Cantor [15] conducted a study of female undergraduate students in the field of communications, and found that overall magazine reading (defined by the authors as a compilation of the number of different types of magazines read in the last month) was related to scores on an inventory of eating disordered behavior. In an experimental study of the print media, Irving [16] showed participants slides of thin, average or "oversize" women, finding that dissatisfaction increased as the size of the models decreased. Others have obtained similar results in laboratory investigations of exposure to the print media [17,18].

Researchers have also studied television viewing. Tigge-mann and Pickering [19] studied television viewing habits in high school aged girls in Australia. They found that overall amount of television watched did not predict body image or drive for thinness, but that watching soap operas positively predicted body dissatisfaction, watching sports shows negatively predicted body dissatisfaction and amount of time spent watching music videos positively predicted drive for thinness. Harrison and Cantor [15], in the study

mentioned previously, also found that overall television viewing was a significant predictor of body dissatisfaction. In a laboratory study of the broadcast media, Heinberg and Thompson [20] exposed participants to videotapes containing thin-ideal or no appearance-related images. Their results indicated a significant increase in body image disturbance in those participants with constitutionally high body image dissatisfaction in the thin-ideal condition.

Other researchers have not found a relationship between media consumption and body image or eating behavior. For instance, Cusumano and Thompson [21] did not find any significant relationship between their index of media exposure (magazine reading) and either body satisfaction or eating disordered behavior. However, a recent meta-analysis by Groesz et al. [22] demonstrated that overall the literature does show support for the detrimental impact of viewing depictions of ideal images on women's body image.

To date, only a few studies have assessed the role of social appearance comparison as a potential risk factor for eating disturbance and body image dysfunction. Social comparison has a long and rich theoretical history in psychology [23] and is the tendency to examine others in the environment and compare the self to others on specific attributes. In an early study on body image and appearance comparison, Striegel-Moore et al. [24] included a single item about social comparison in a study of undergraduates and found that it was positively correlated with "feeling fat." In another early and influential investigation, Cash et al. [25] had women look at one of three types of magazine pictures: photos of physically attractive women, photos of physically attractive women who were identified as professional models and photos of women who were not physically attractive. Cash et al. [25] found that participants in the physically attractive only condition had poorer self-ratings of attractiveness than the other conditions, indicating the superior importance of peers, as opposed to fashion models, as appearance comparison targets. Stormer and Thompson [8] found that social comparison tendencies predicted body image dissatisfaction in college women, above and beyond body mass index (BMI) and self-esteem. Relating comparison to eating behavior, Muir et al. [26] found that comparison to others' appearance or one's own self-ideal was cited by adolescent girls as the most frequent trigger for first diets.

In perhaps the most relevant previous investigation, Thompson et al. [27] conducted a covariance structure modeling (CSM) study involving maturational timing, childhood teasing, appearance comparison processes, self-esteem, body image disturbance and eating disturbance. Their findings emphasized the potential importance of comparison as a mediator between influences (i.e., teasing) and body image/eating problems. However, the indicator of influence in this study was quite narrowly defined and not stratified by source of negative feedback (peers and family). Also, no media measure was included. Therefore, the study was not a true test of the Tripartite Influence model.

Given the “achievement” orientation inherent in eating and body image problems, researchers have proposed that perfectionism may be related to the development of eating disordered behavior and body dissatisfaction. This trait or tendency has most often been associated with anorexia nervosa [28–30], but researchers have also begun to evaluate the role of perfectionism in bulimia and subclinical levels of problematic eating. For instance, female college students diagnosed with bulimia were found to score higher on measures of perfectionism than either normal controls or general psychotherapy patients [31]. Addressing perfectionism’s relationship to subclinical levels of eating disturbance, Hewitt et al. [32] found significant correlations between subscales of a perfectionism measure and scores on a scale measuring disordered eating in a sample of 81 psychology students. Using path analysis in a sample of undergraduate women, Davis et al. [33] found that neurotic perfectionism predicted a composite variable consisting of body dissatisfaction, drive for thinness and bulimic behaviors. Minarik and Ahrens [34] also studied a sample of undergraduate women and obtained similar results. They proposed that generalized perfectionism (and especially a concern about making mistakes) may be focused by societal influences toward a fear of not meeting sociocultural appearance ideals, which may then result in the adoption of disturbed eating patterns.

Most recently, researchers have investigated the interactions between perfectionism and other variables. In a study of college women with diagnoses of bulimia, Joiner et al. [35] found that perfectionism predicted bulimic symptoms in those women who had self-perceptions of overweight, but did not predict symptoms in those women who perceived themselves as not overweight. In a later study by this same group, Vohs et al. [36] found that the interaction between self-esteem, body dissatisfaction and perfectionism predicted bulimic symptoms 5 weeks later. It does not appear, however, that there has been much research conducted on perfectionism’s ability to predict body dissatisfaction. Nor have the studies on perfectionism to date evaluated its influence relative to other sources of influence specific to body dissatisfaction and eating disorders, such as sociocultural factors.

A great deal of previous research has examined the relationship between body image and eating behavior. Body image disturbance is a well-known risk factor for clinical and subclinical levels of eating disturbance [5]. Not all studies have distinguished between bulimic and restrictive categories of eating disturbance, but among those that have, body image disturbance seems to be more closely related to restriction and global psychological functioning (GPF) seems more closely related to bulimia [27,37,38]. Further, prior research has also shown that body image disturbance and eating disordered behavior are related to other indices of GPF, such as self-esteem, anxiety, depression and negative affectivity, both cross-sectionally and longitudinally [27,38,39]. Stice and colleagues have conducted a great deal of work on their dual pathway model of the development of bulimia, finding strong support for the role of negative affect

in the development of bulimia [37,39,40], and for the role of depression and negative affect in binge eating [41,42]. Other researchers have found support for an influence of bulimic behaviors on GPF, or for a reciprocal relationship between the two constructs [38].

A major aim of the current study was to extend and replicate earlier work that has investigated the role of appearance comparison as a potential risk factor for eating and shape-related problems. We also wished to investigate the role of perfectionism in relation to body image and eating behaviors. In addition, the current study is a further test of the Tripartite Influence model of eating and weight-related attitudes and behaviors. Previous work on this model includes a CSM study by Thompson et al. [38], after which the current study is modeled. Thompson and colleagues conducted three studies, each including BMI, teasing history, GPF, body image and either eating disturbance (Study 1) or both restricting and bulimic eating behaviors (Studies 2 and 3). Their investigation provided support for the influence of teasing on body image, above and beyond the influence of overweight. They also found that the relationship between body image and bulimic symptoms was mediated by restricting. Also, they found support for a reciprocal relationship between bulimic symptoms and overall psychological functioning (whose indicators were measures of self-esteem, depression and anxiety). The authors further noted that there was residual variance unaccounted for in several of the variables, indicating that perhaps all of the relevant variables were not included in their models. In the current study, we attempted to address some of the shortcomings of the Thompson et al. [38] article, making changes informed by the research that has been conducted since its publication. We broadened the construct of teasing to one of “influence,” which includes teasing, modeling, general attitudes regarding weight and appearance, and perceived pressure to meet appearance ideals. We also distinguished between different sources of influence: family, media and peers. Further, we attempted to replicate Thompson et al.’s findings that body image influences restrictive eating behavior more than bulimic behavior and that restriction influences bulimic behavior. As Thompson and colleagues did, we included GPF in our models. Finally, we expanded on their study by including appearance comparison as a mediator and by including perfectionism.

In the current investigation, the Tripartite Influence model was tested using CSM, somewhat modified by the broadening of the construct of “parental” to “family influence.” Appearance comparison was hypothesized to play a mediational role between influence (peer, family and media) and body image and eating disturbances. In all, we examined nine latent variables including: recalled family influences, media influences, recalled peer influences, social comparison processes, perfectionism, GPF, body dissatisfaction, restrictive eating behaviors and bulimic behaviors. Family, media and peer influences were considered to be more distal influences, while comparison, perfectionism and GPF were considered to

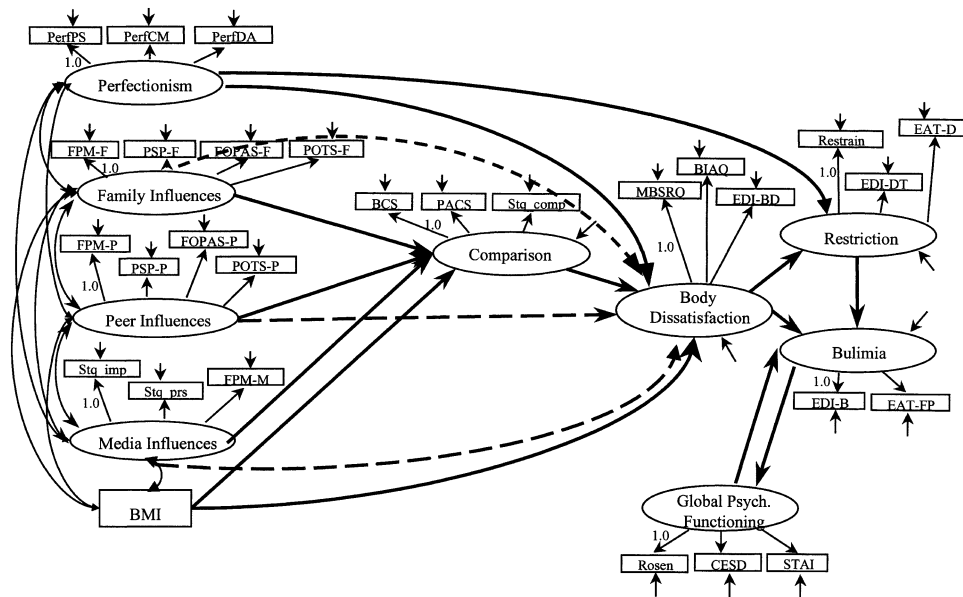


Fig. 1. Models 1 and 2. Note: Dashed lines represent paths added in Model 2.

be more proximal influences. BMI, a measure of body size, was also included in the models because it has historically been strongly related to body image and eating disturbance and has also been tested in previous models (e.g., Ref. [38]).

Three competing models were proposed and tested using CSM techniques. In the first and second models (see Fig. 1), peer, family and media influences, as well as perfectionism and BMI, were exogenous latent variables. Peer, family and media influences and BMI were all hypothesized to have a directional influence on comparison. Comparison was hypothesized to influence body dissatisfaction. Perfectionism was hypothesized to influence both body dissatisfaction and restriction, while BMI had a path to body dissatisfaction

in addition to the already mentioned path to comparison. Body dissatisfaction was hypothesized to influence bulimia both directly and indirectly through restriction. Finally, GPF was initially hypothesized to have a reciprocal relationship with bulimia. Model 2 is identical to Model 1, except that, in Model 2, three paths from family, peer and media influences directly to body dissatisfaction were added. Thus, Models 1 and 2 tested whether comparison completely mediated the relationship between the influences and body dissatisfaction.

Model 3 addressed a possible mediating role for GPF (see Fig. 2). Instead of influencing comparison directly, parental, peer and media influences were all hypothesized to influence GPF, which mediated between influences and

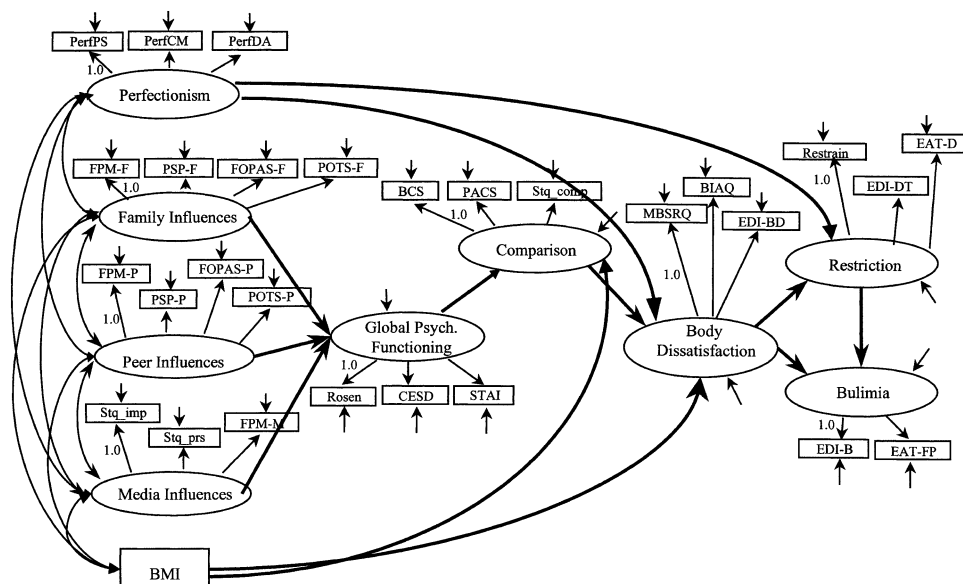


Fig. 2. Model 3.

comparison. The rest of the model remained the same, with the exception that GPF did not have any direct paths to either body dissatisfaction, restriction or bulimia.

Method

Participants

Data were collected from 196 female undergraduate psychology students between the ages of 18 and 22 at the University of South Florida. The mean age of the participants was 19.5 years. This age group was chosen in order to allow greater temporal proximity to the distal influences (family, media and peers). Listwise deletion of missing data was conducted, resulting in a final sample size of 150. Sixty percent of the sample was Caucasian, 15% was African–American, 13% was Hispanic/Latino, 5% was Asian American and 6% classified themselves as “other.” The participants received extra credit in their psychology course for participation in the study.

Measures¹

Family influence

For all measures assessing family influence, the questions were prefaced by written instructions to the participants to answer the questions with regard to the time period when they were between 8 and 18 years of age. Confining the period of retrospective recall to a circumscribed time is a strategy that we have used previously [27] and was used in an attempt to index the level of influence during the formative years of childhood through late adolescence.

Perception of Teasing Scale (POTS-F). This is a scale developed to assess the frequency of remembered childhood teasing and its effect on the participant [7]. The measure has two factors, WT and teasing about abilities/competencies (competency teasing, CT). Only the WT subscale was used in the current study. It includes six Likert items rated on a scale from 1 to 5. The POTS has demonstrated good reliability ($\alpha = .94$) and validity in samples of college women [38]. The original POTS was altered to assess teasing by family by replacing “people” with “members of your family.” The Cronbach’s α for the family version used in this study was found to be .87.

Feedback on Physical Appearance Scale (FOPAS-F). The FOPAS was developed and validated by Tantleff-Dunn et al. [43]. It is a factor-analytically derived, eight-item scale, which assesses comments or behaviors, which could be interpreted as negative feedback on one’s weight or other aspects of physical appearance. The inventory has adequate

reliability (Cronbach’s $\alpha = .84$; test–retest coefficient = .82), and has demonstrated convergent and divergent validity [43]. While in the original scale all items begin with “someone,” for the current study the wording was modified to state “someone in your family.” The Cronbach’s α for this scale was .89 in the current study.

Perceived Sociocultural Pressures—Family subscale (PSP-F). This measure consists of two items from Stice et al. [9] scale assessing participants’ perceptions of pressure from various sources to be thin or lose weight. In previous research, this two-item Family subscale had a 2-week test–retest coefficient of .96 and an α of .91 [9]. In the current study, the correlation between the two items was .84.

Family, Peers and Media Influence Scale—Family subscale (FPM-F). This scale is an adaptation of a three-item scale first developed by Levine et al. [44]. The full scale includes three parallel items each assessing participant’s recollection of a particular source of influence (family, peer or media) on weight and appearance. The Cronbach’s α for the FPM-F was .69 for the current sample.

Peer influence

As with the family measures, the peer questions were prefaced by written instructions to the participants to answer whether these events occurred between the ages of 8 and 18 years old.

Perception of Teasing Scale—Peers (POTS-P). See above for description. “People” in the original scale was replaced with “Peers.” The Cronbach’s α for the Peer subscale was .90 for the current sample.

Feedback on Physical Appearance Scale—Peers (FOPAS-P). See above for description. The original scale was modified to indicate feedback from peers. The Cronbach’s α for this scale was found to be .82.

Perceived Sociocultural Pressure Scale—Peers (PSP-P). See above for description of the full scale. The Friends subscale consists of two items, which assess perceptions of pressure from friends to diet or be thin. The subscale demonstrated a test–retest coefficient of .91 and a Cronbach’s α of .72 in a previous study [9]. In the current study, the correlation between the two items was .64.

Family, Peers and Media Influence Scale—Peers subscale (FPM-P). This full scale is described above. The items pertaining to peers were used as a measured variable for peer influences. The α for this scale was .83 for the current sample.

Media influence

All media questions were prefaced by the same written instructions as the Peer and Family subscales.

¹ Means, standard deviations and correlations of the variables are available from the corresponding author.

Sociocultural Attitudes Towards Appearance Questionnaire III—Importance subscale (SATAQ-Imp) and Pressures subscale (SATAQ-P). The original SATAQ [45] consisted of 14 items and had a Cronbach's α of .88. The SATAQ II was a revision of the SATAQ, developed by Cusumano and Thompson [21] that consisted of 21 items and had an α of .89. Further revisions were recently performed and a new scale, the SATAQ III, was developed. While previous versions of the SATAQ had two subscales (Awareness of Sociocultural Ideals and Internalization of those Ideals); the SATAQ III added three new subscales, two of which were used to assess media influences. The Importance subscale has nine items assessing the importance of the media as a source of information on attractiveness and had an α of .93 in this sample. The Pressures subscale has seven items assessing perceived pressures from the media to achieve the sociocultural ideal and engage in appearance-enhancing activities. The α for the Pressures subscale was .94.

Family, Peers and Media Influence Scale—Media subscale (FPM-M). The full scale is described above. Those items pertaining to media influences (television and magazines) were used here as a measured variable. The scale had a Cronbach's α of .87 in the current sample.

Comparison measures

Body Comparison Scale (BCS). The BCS is a revision and extension of the Physical Appearance Comparison Scale developed by Thompson et al. [46]. Developed by Fisher and Thompson [47], it consists of 36 items divided into three subscales: Weight, Muscularity and General Appearance (nonweight) comparison processes. The α obtained in this sample for the BCS was .91.

Physical Appearance Comparison Scale (PACS). The PACS [46] consists of five items, which assess the tendency to compare oneself to others on different aspects of appearance. Respondents rate the items from 1 (*never*) to 5 (*always*). The scale has adequate reliability, with an α of .76. The α for this sample was .78.

Sociocultural Attitudes Towards Appearance Questionnaire III—Comparison subscale (SATAQ-C). See above for a description of the full scale. The Comparison subscale of the SATAQ-III is a six-item scale, which assesses the tendency to compare one's appearance and body to those in the media. It had a coefficient α of .91.

Body dissatisfaction

Multidimensional Body–Self-Relations Questionnaire—Physical Appearance Evaluation Scale (MBSRQ). The MBSRQ [48] is a 69-item Likert scale questionnaire measure, which assesses attitudes toward the body and body image. The seven-item Physical Appearance Evaluation

subscale taps into the respondent's satisfaction with the appearance of her body. The original 54-item version of this scale demonstrated good internal consistency, with an α of .88 in a sample of 1064 women. The α for this scale in the current study was .89.

Eating Disorder Inventory—Body Dissatisfaction subscale (EDI-BD). The EDI-BD is a seven-item scale, which assesses overall satisfaction with appearance and with the body [49]. It has demonstrated good reliability (α 's above .80) across varied samples in previous studies [50,51]. Its α in this sample was .90.

Body Image Avoidance Questionnaire (BIAQ). Composed of 19 items which tap the four domains of clothing, social activities, eating restraint and grooming and weighing, the BIAQ is a self-report questionnaire of behaviors related to negative body image [52]. In a sample of 353 female college students, the measure demonstrated good reliability (Cronbach's α = .89 and test–retest coefficient = .87), as well as convergent validity with existing eating disorder and body image questionnaires. The Cronbach's α for the BIAQ in the current study was .85.

Bulimic behaviors

Eating Disorders Inventory—Bulimia subscale (EDI-B). The EDI-B assesses participants' bulimic behaviors, such as bingeing, purging and vomiting. It has demonstrated adequate reliability in past studies, with an α of .90 for an eating disordered sample and an α of .83 for a non-eating disordered sample [49]. The α in this sample was .83.

Eating Attitudes Test—26 Bulimia and Food Preoccupation subscale (EAT-FP). The EAT-26 is a factor analytically derived scale that was validated on a sample of 160 women with eating disorders and 140 female nonclinical controls [53]. The Food Preoccupation subscale consists of six items assessing bingeing, vomiting and preoccupation with food. It was found to distinguish not only eating disordered from control subjects, but also women with a primarily restricting type eating disorder from women with a bulimic subtype. The α for the EAT-FP was .86.²

Restriction

Eating Disorders Inventory—Drive for Thinness subscale (EDI-DT). The EDI-DT assesses restriction of intake,

² The EAT questionnaire was accidentally mistyped in the questionnaire packet. The original scale has six response options ranging from *always* to *never*, whereas the scale used in the current study had only five response options. To ensure the equivalence of this form to the original EAT, a sample of 50 undergraduate women between 18 and 22 years old was recruited and administered both versions of the scale in counterbalanced order. The original and modified versions of the EAT correlated .98.

desire to be thin and fear of gaining weight. It has demonstrated adequate reliability in nonpatient and eating disordered samples (Cronbach's $\alpha = .85$ [49]). In this sample, the EDI-DT had a Cronbach's α of .93.

EAT—26 Dieting subscale (EAT-D). See description above of the full scale. The EAT-D includes items tapping restrictive and associated behaviors such as reducing intake for weight loss, feeling guilt after eating, liking one's stomach to be empty and preoccupation with thinness and weight loss [53]. It has demonstrated adequate reliability ($\alpha = .94$). The α in the current study was .94.

Restraint Scale (Restrain). The Restraint Scale is a 10-item scale, which assesses a respondent's weight control behaviors, attention given to food and eating, and weight loss and gain [54]. In this sample, an α of .82 was obtained.

GPF

Rosenberg Self-Esteem Scale (Rosen). This is a 10-item scale measuring general self-esteem [55]. It has adequate reliability (test–retest=.85) and it correlates with peer ratings of self-esteem [56]. The α for this scale was .89.

Center for Epidemiological Studies—Depression Scale (CES-D). The CES-D is a 20-item scale assessing depressive thoughts, feelings and behaviors. It has shown convergent and divergent validity and internal consistency and test–retest reliability in previous research [57]. The Cronbach's α for this sample was .94.

State-Trait Anxiety Inventory—Trait Scale (STAI). The STAI is a widely used 40-item measure of individual differences in anxiety-proneness and temporary feelings of anxiety developed by Spielberger [58]. It has been normed on working adults as well as 855 college students and the α 's for male and female college students on the State and Trait subscales range from .90 to .93 [58]. The Trait subscale was used in the current study and it had an α of .94.

Perfectionism

Frost Multidimensional Perfectionism Scale—Personal Standards, Concern Over Mistakes and Doubting of Actions subscales (Perf-PS, Perf-CM, Perf-DA). The full Frost Multidimensional Perfectionism Scale is a 35-item questionnaire assessing various aspects of the tendency to be perfectionistic [59]. The Personal Standards subscale contains items about the setting of standards and goals for oneself. Concern Over Mistakes concerns such issues as worry about making a mistake and interpreting mistakes as a failure. The Doubting of Actions subscale consists of items assessing respondent's doubts about the completeness or quality of tasks they perform. The subscales have demonstrated good validity and reliability in previous research [59], with Cronbach's

coefficients of .83, .88 and .77 for the Personal Standards, Concern Over Mistakes and Doubting of Actions subscales, respectively. The α 's for the three subscales in the current study were .81 (Personal Standards subscale), .92 (Concern Over Mistakes) and .84 (Doubting of Actions). Each subscale was used as an indicator of Perfectionism.

BMI

Participants reported their weight and height, and BMI [weight (kg)/height² (m)] was calculated [60].

Procedure

Questionnaire measures were administered in groups, during 1-h sessions after regularly scheduled psychology classes. Full informed consent was obtained prior to administration of the questionnaire packet. The participants were told that the study concerned their thoughts and feelings about themselves and their body, and their eating behaviors. They were instructed to note that the first several questionnaires directed them to answer from their memories of the time when they were between 8 and 18 years old.

Power analysis

A power analysis was completed using a program written by MacCallum et al. [61]. This program estimates the minimum sample size needed, based on the degrees of freedom, to have a specified level of power in a test of close fit for RMSEA. The results indicated that minimum sample size for the initial model with power of .95 is 101 participants. For power of .99, 128 participants were required. Therefore, the current sample size was more than sufficient for the planned CSM analyses.

Results

Several of the variables in the model were found to be non-normally distributed. The EQS computer program [62] provides several measures of fit that have been adjusted for non-normality and have been found to perform better than the equivalent procedures in Lisrel, such as ADF estimation [63]. Therefore, EQS was chosen to analyze the data. The adjusted fit indices used included the Satorra–Bentler Scaled chi-square (SCALED χ^2), robust standard errors and *t* values, and a robust version of the comparative fit index (*CFI). We followed a two-step approach to evaluating the models, in which first the measurement model is tested and refined, and then the structural model is tested [64].

Measurement model

Since the Family, Peer and Media Scale is a scale developed specifically for this study, its factor structure

was unknown. Therefore, before using its subscales as indicators for the family, peer and media latent variables, confirmatory factor analysis was conducted on the items. A three factor structure for the items was hypothesized a priori and its fit was found to be adequate, $\chi^2(24) = 55.61$, $P < .05$, RMSEA = .085, *CFI = .95, AGFI = .88.

Evaluation of the measurement model proceeded in a series of steps, from testing latent variables and their indicators in isolation, to testing latent variables in rationally identifiable “sections” of the model (for instance, the three influence latent variables tested together or the three outcome variables—body dissatisfaction, restricting and bulimic behaviors—tested together), and finally combining these “sections” of the model. At each step of the way, the simple correlations between the variables were examined and the measurement models were tested for goodness of fit using SCALED χ^2 , *CFI, root mean square error of approximation (RMSEA) and the adjusted goodness of fit index (AGFI). Standardized residuals, the Wald test for dropping parameters and the Lagrange Multiplier test for adding parameters were all inspected if the hypothesized models did not fit the data, and modifications were made if they were theoretically plausible.

For most of the latent variables, evaluation and modification involved simple elimination of variables that: (a) correlated highly with variables tapping other latent constructs (to the point where this affected the goodness of fit of the measurement model) or (b) demonstrated multicollinearity with variables tapping the same latent variable. Also, when theoretically plausible, limited cross loading of a few variables was allowed.

Initial changes made to the measurement model involved elimination of the POTS-F and the FPM-P, due to high intercorrelations between the measures. In addition, several of the scales for the Influences latent variables were essentially the same scales with only one or two words in the question stems changed. Therefore, two models with these variables, including uncorrelated and correlated errors, were tested. The model with correlated errors was found to have better fit to the data and was retained, with modifications, such that the final measurement model used with these variables allowed the errors between PSP-P and PSP-F, as well as those between FOPAS-P and FOPAS-F, to correlate (SCALED $\chi^2(22) = 45.8$, $P < .05$, RMSEA = .090, *CFI = .95, AGFI = .87).

A high correlation was noted between the SATAQ-Comp subscale (an indicator of Comparison) and the SATAQ-Press subscale (an indicator of media influences), so we eliminated these scales. In order to retain three indicators for the Comparison latent variable, the BCS was split into its Weight and General Appearance Comparison subscales, resulting in the BCSWT and BCSGA variables.

Several attempts were made to arrive at an adequately fitting model of the body dissatisfaction, restriction, and bulimic behaviors variables: several different combinations of latent variables were tested and plausible cross-loadings

of measured variables were allowed; variables that seemed to be causing lack of fit in the model were eliminated (for example, the model was run without the Restraint Scale, which cross-loaded strongly). However, even after trying several modifications and eliminating different variables, no model was found to be a good fit to the data (RMSEAs for the differing models ranged from .16 to .20).

When the items were examined, it became apparent that several of the scales included questions assessing more than one latent construct. For instance, the Body Image Avoidance Questionnaire includes questions primarily about body image, but also includes several questions about restrictive eating practices (for example, “I restrict the amount of food I eat”). Also, several items appeared on some of the scales that rationally could be associated with both bulimic and restrictive behavior, for instance, “I am terrified of gaining weight.” Because of items like these, we decided to specify a priori which items tapped which constructs, without regard to which scales they belonged to, and test that structure against the data. In fact, two competing models were tested. The first model does not include the questions asking about vomiting, because it seemed plausible that these items would cross-load heavily on restraint as well as bulimic behaviors. The second model does include the vomiting items, loading on the bulimic factor. The first model, without the vomiting items, was a slightly better fit to the data, SCALED $\chi^2(1221) = 2393.82$, $P < .05$, RMSEA = .091, *CFI = .73, AGFI = .53). Therefore, the first model, without the vomiting items, was chosen.

Items from the CFA were formed into parcels, which were used as indicators of the latent variables upon which they had loaded. The EDI-BD and the MBSRQ-PAE remained intact, and several items from the BIAQ were summed into a BD parcel (BDParc). For the Restraint latent variable, there were sufficient items to form 3 parcels of six to eight items each. For the two parcels that consisted of items from different scales, the responses were converted to z-scores, summed and transformed by adding a constant, in order to bring the range of values above zero. The first parcel (ReParc1) consists of items from the Restraint Scale and the BIAQ. The second restriction parcel (ReParc2) consists of items from the EDI-DT and the EAT-Dieting scales. Finally, the third parcel consists of more items from the EAT scale. There were only seven bulimia items retained, so only two parcels were formed from them. The first parcel consists of items from the EDI-B and the second parcel consists of additional items from the EDI-B, as well as two items from the EAT-Food Preoccupation and Bulimia subscale.

The scales and item parcels were then subjected to a further confirmatory factor analysis. The model was still not found to have acceptable fit to the data, but it was somewhat better than all of the previous analyses with the intact scales. Lagrange Multiplier (LM) tests were examined to determine if freeing any theoretically plausible

paths would improve the fit of the model. Of the paths indicated by the LM tests, the most plausible one was a negative path from the latent variable Restrict to BuParc1. Because it seemed theoretically and clinically supported that bulimic behavior may result from failed restricting, this path appeared justified. The model with this path added (SCALED χ^2 (16)=44.68, RMSEA=.117, *CFI=.95, AGFI=.85) is an improvement, as indicated by a significant change in χ^2 (1)=12.2, $P<.05$. While the RMSEA of the resulting model does not indicate good fit to the data, it is an improvement over the fit provided by the original scales. Furthermore, LM tests did not include any further substantively and theoretically meaningful paths to be free.

Next, the GPF and perfectionism portion of the model was tested. Two a priori models of the relationships between these two variables were hypothesized to fit the data. In the first model, the perfectionism measures were all treated as indicators of GPF, reflecting the view that perfectionism may be an indicator of a more general construct of psychological functioning. In the second model, the perfectionism measures were indicators of perfectionism and the GPF indicators loaded on GPF. The second model was found to be better fitting. However, it was still not an adequate fit to the data and modifications were made. The LM test suggested freeing a path from GPF to the Perfectionism—Doubts about Actions subscale. This makes substantive sense, as this subscale consists of items measuring worry and doubts, which are constructs assessed by the STAI-T. The path was freed, and the model rerun. The resulting model demonstrated excellent fit to the data according to χ^2 , which was nonsignificant (SCALED χ^2 =13.84, ns). The other indices also reflected adequate to excellent fit

(RMSEA=.099, *CFI=.98, AGFI=.90). Thus, the model was retained.

Finally, the full measurement model with all the modifications listed above was tested. It demonstrated adequate fit, with SCALED χ^2 (235)=438.14, $P<.05$, RMSEA=.081, *CFI=.89, AGFI=.73.

Structural model

Model 1, without direct paths from family, peer and media influences to body dissatisfaction, was the first model tested. Immediately it became apparent that the reciprocal path between bulimia and GPF would preclude the model from converging, so it was replaced with a single path from GPF to bulimia (see Fig. 3 for Models 1 and 2 with the new measurement model and the reciprocal path removed). This modified Model 1 demonstrated mediocre fit to the data overall, with SCALED χ^2 (269)=498.34, RMSEA=.081, *CFI=.881, AGFI=.72 (see Table 1 for the fit indices of the structural models). Model 2 also demonstrated mediocre fit (SCALED χ^2 (266)=488.22, RMSEA=.080, *CFI=.885, AGFI=.72). Model 3, in which GPF mediates the relationship between the influences and comparison, demonstrated even poorer fit: SCALED χ^2 (274)=554.90, RMSEA=.088, *CFI=.854, AGFI=.69. Model 3 was rejected and the χ^2 difference between Model 1 and Model 2 was computed. The difference in χ^2 was significant, $\Delta\chi^2$ (3)=10.16, $P<.05$, indicating that Model 2 had significantly better fit than Model 1. However, the other fit indices did not indicate a great deal of difference between the two models. Further, Model 1 had fewer paths and so was more parsimonious. Of the three additional paths added in Model 2, only one was significant. In addition, two of the

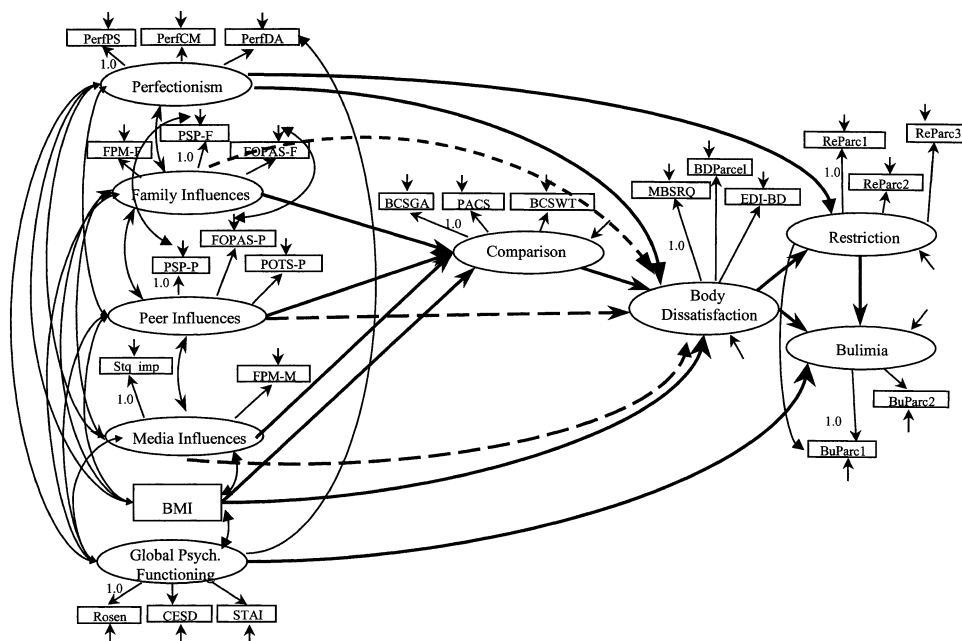


Fig. 3. Models 1 and 2, modified measurement model.

Table 1
Fit indices of the original and modified models

Model	χ^2 (df)	RMSEA	CI for RMSEA	CFI ^a	AGFI
1	498.34 (269)	.081	.071–.091	.88	.72
2	488.22 (266)	.080	.069–.090	.88	.72
3	554.90 (274)	.088	.078–.097	.86	.69
<i>Modified model 1</i>					
Adding GPF to BD	483.56 (268)	.079	.068–.088	.89	.73
Adding perfect to comparison	475.64 (267)	.078	.067–.087	.89	.73
Adding peers to restriction	470.50 (266)	.077	.066–.087	.89	.73
Dropping all n.s. paths (except restrict to bulimic behaviors)	474.54 (273)	.076	.065–.085	.90	.74

CI=confidence interval.

^a CFI=Robust Comparative Fit Index, AGFI=Adjusted Goodness of Fit Index.

additional paths in Model 2 had standardized path coefficients greater than one, indicating problems with lack of fit. Therefore, in the interest of parsimony, Model 1 was retained.

Though it was the preferred model of the three a priori models tested, Model 1 nonetheless demonstrated less than optimal fit, as seen in the fit indices, and as indicated by an out of bound variance for the disturbance term for body dissatisfaction. Thus, specification searches were undertaken.

The LM test indicated that the addition of a path from GPF to body dissatisfaction would improve model fit.

This modification was theoretically plausible, given previous research with these variables [27] and thus was performed. The modified model demonstrated improved fit, with SCALED χ^2 (268)=483.56, RMSEA=.079, *CFI=.89, AGFI=.73. Next, a path from perfectionism to comparison was freed, as it seemed plausible that having a tendency to maintain a certain high level of performance (i.e., perfectionism) could lead to engaging in comparisons processes in order to gauge ones' relative performance. The model with this path added had SCALED χ^2 (267)=475.64, RMSEA=.078, *CFI=.89, AGFI=.73. One final path was added. The LM test indicated that freeing a path from peer influences directly to restriction would significantly improve model fit. This path also seemed plausible in light of research relating peer influences and dieting behavior [1]. The resulting model had SCALED χ^2 (266)=470.50, RMSEA=.077, *CFI=.89, AGFI=.73.

As a last step, nonsignificant paths were eliminated from the model if the Wald test indicated they would result in no decrease in model fit. The covariances between BMI and media influences, GPF and perfectionism were eliminated, as was the path from BMI to comparison. The path from peer influence to comparison was dropped, as were paths from perfectionism to both body dissatisfaction and restriction. While the Wald test suggested dropping the nonsignificant path from restriction to bulimia, we refused to do this as previous research [38] has supported its presence. The final model had SCALED χ^2 (273)=474.54, RMSEA=.076, *CFI=.90, AGFI=.74. The final model with standardized path coefficients can be seen in Fig. 4 and Fig. 5 contains the final

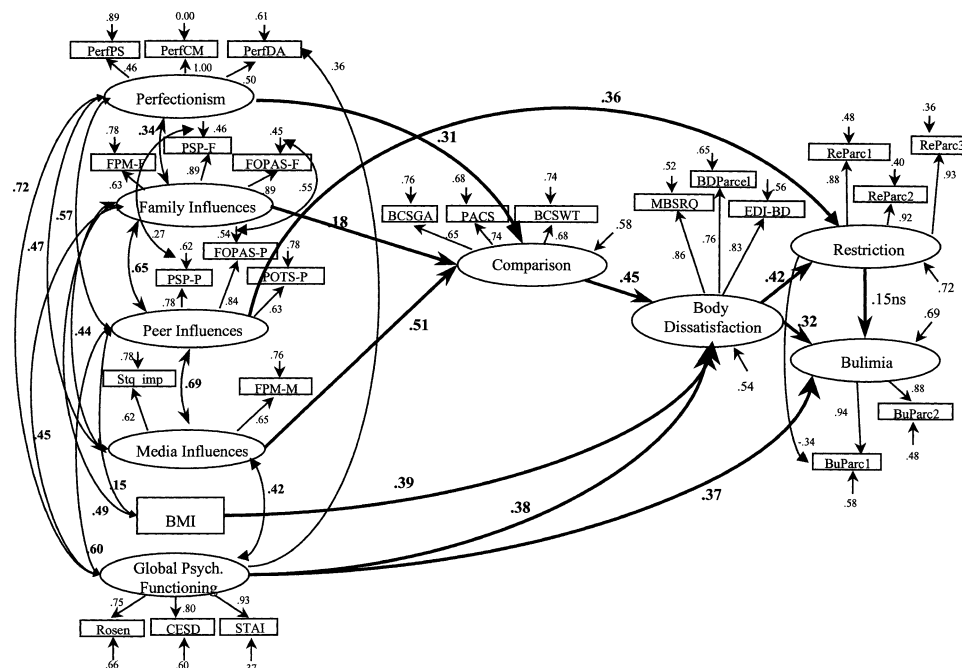


Fig. 4. Final model, standardized path coefficients.

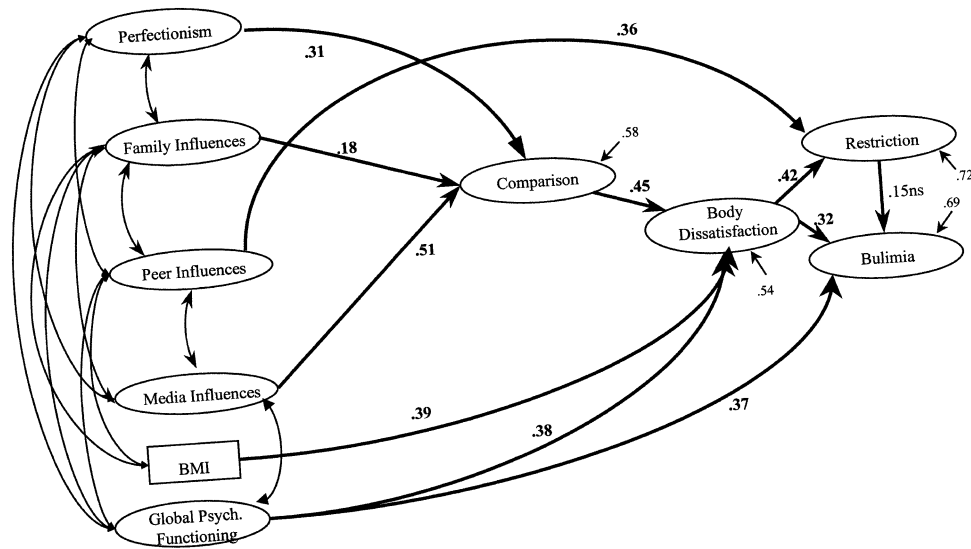


Fig. 5. Final model, standardized path coefficients, structural paths only. Note: The following abbreviations are used on all figures: PerfPS, PerfCM, PerfDA = Perfectionism Scale — Personal Standards, Concern over Mistakes and Doubts About Actions subscales; FPM-F, FPM-P, FPM-M = Family Peer Media scale — Family, Peer and Media subscales; PSP-F, PSP-P = Perceived Sociocultural Pressures Scale — Family and Peer subscales; FOPAS-F, FOPAS-P = Feedback on Physical Appearance Scale — Family and Peer versions; POTS-F, POTS-P = Perception of Teasing Scale — Family and Peer versions; STQ-Imp, STQ-Prs, STQ-Comp = Sociocultural Attitudes Towards Appearance Questionnaire — Importance, Pressures and Comparison subscales; BMI = body mass index; BCS, BCSGA, BCSWT = Body Comparison Scale, BCS-General Appearance subscale, BCS-Weight subscale; PACS = Physical Appearance Comparison Scale; MBSRQ = Multidimensional Body Self-Relations Questionnaire — Physical Appearance Evaluation subscale; BIAQ = Body Image Avoidance Questionnaire; EDI-BD, EDI-DT, EDI-B = Eating Disorders Inventory — Body Dissatisfaction, Drive for Thinness and Bulimia subscales; Restrain = Restraint Scale; EAT-D, EAT-FP = Eating Attitudes Test — Dieting, Bulimia and Food Preoccupation subscales; Rosen = Rosenberg Self-Esteem Scale; CESD = Center for Epidemiological Studies — Depression Scale; STAI = State-Trait Anxiety Inventory, Trait version; BDParc = Body Dissatisfaction Parcel; ReParc1, 2, 3 = Restraint Parcels 1, 2, 3; BuParc1, 2 = Bulimic Behaviors Parcels 1, 2.

structural model without measured variables, for purposes of clarity.

Discussion

The three proposed a priori models tested different hypotheses about the relationships between recalled family, peer and media influences and the outcomes of body dissatisfaction, restrictive eating and bulimic behaviors. In Model 1, the influences of the developmental variables were hypothesized to be solely mediated through the processes of appearance comparison. The directly competing model, Model 2, allowed for direct paths between the family, peer and media influences and the outcome variables. Finally, Model 3 tested a conceptually distinct model in which GPF mediated completely the relationship between the influences and the other variables.

Model 1, with no direct paths from the influences to body dissatisfaction included, was found to be the best fit to the data. Broadly speaking, this implies that the relationship between the more distal influences was in fact mediated by comparison. However, since the a priori model did not represent a good fit to the data, post-hoc modifications were undertaken to more closely approximate the pattern of variances and covariances in the sample. Additions to the model in order to better approximate the data led to the

inclusion of some interesting relationships that we had not considered, while the deletion of nonsignificant paths clarified other relationships.

The final model confirmed our hypothesis that comparison mediates the influence of family and the media on body dissatisfaction. This was especially true for media, which had a strong path leading to comparison. This result parallels that of Thompson et al. [27], who found that comparison mediated the relationship between teasing and body image and eating disturbance. Social comparison has been found to be a potent predictor of body dissatisfaction in other previous research as well, including experimental studies in which different types of comparison or comparison targets were manipulated. This study, when combined with previous research, points to comparison as an important individual difference variable which serves as a mechanism by which environmental influences (family, peers and media) affect eating and weight-related behavior. These data also highlight the importance of addressing comparison processes in the treatment of body image and eating disturbance. Treatment protocols for body image disturbance developed by both Cash [65] and Rosen [66] include components focused on reducing comparison, and this study confirms the usefulness of such approaches.

Recalled peer influences, however, seem to exert their influence more directly on restricting behaviors. Perhaps, this finding is reflective of the vast array of negative peer

experiences, ranging from teasing to sexual harassment, that have been associated with the onset of eating disturbances [67]. In any case, the results indicate that peer interactions play a significant role in restrictive behavior.

The path from perfectionism to comparison, while unexpected, makes theoretical sense. It is plausible that those who are higher on perfectionism need some way to evaluate their status or performance relative to their goals or standards and appearance comparison is just such a mechanism. As stated previously, very little work has been done in the body image area with the concept of perfectionism. The findings from this study suggest that it may be a more fruitful avenue of research than GPF in the attempt to identify psychological or personality factors that might predispose someone to body image disturbance. While we had hypothesized that perfectionism would influence body dissatisfaction and eating behavior directly, the model seems to indicate that it may work further back in the stream of variables. Another competing hypothesis is provided by Vohs et al. [36], who found that the relationship between perfectionism actually interacted with self-esteem and body dissatisfaction in its effects on eating behavior. Further research using an interactional CSM model would help clarify our finding. In addition, the finding of perfectionism's influence early in the model indicates that it may be a useful construct to include in prevention programs for eating disorders. Furthermore, perfectionism has been found to play a role in several other behavioral disorders in addition to eating disorders [68], suggesting that making perfectionism a target of general mental health preventive efforts could also help reduce the incidence of other disorders.

The finding of significant paths from GPF to both body dissatisfaction and bulimia was in line with previous research. It was unfortunate, however, that the reciprocal path from GPF to bulimia that was originally hypothesized could not be modeled. The issue of the direction of this path has persisted across research studies, as different researchers have found evidence for paths in both directions [27,38]. Perhaps smaller, less complicated models involving bulimia and GPF would allow convergence of models with a reciprocal path. Again, the work of Vohs and colleagues also suggests that further work may need to be done to determine at what step in the process GPF exerts its influence. As with perfectionism, findings with GPF point to the conclusion that interventions and treatments for more general mental health problems may also reduce eating disordered behavior.

In the case of restriction, the direct path from body dissatisfaction was expected and confirms the large amount of previous research (including prospective work) indicating that body dissatisfaction strongly influences dieting and other restrictive eating practices [1]. The significant path from body dissatisfaction to bulimia is notable, however, as two previous CSM studies have not found support for this path [38,69]. The nonsignificant path from restriction to bulimia was also not expected given past

research. It is possible that the problems with the measurement model were manifesting themselves here. The bulimia parcels in the current study consisted only of bingeing items. It could be that the relationship between restriction and bulimia in previous research was driven by the vomiting (or other cross-loading) items in the scales used in the previous studies. Alternatively, this finding could be unique to this sample.

There were several major limitations to the current study. Primary among these was the difficulty in achieving a satisfactory measurement model. There are several possible reasons for this occurrence. First, this may simply be an anomaly of the sample. Alternatively, the measures may not be good indicators of the constructs they purport to measure. Additionally, a few of the measures had lower than ideal reliability coefficients, which may have affected the fit of the model. Also, although the power analysis indicated that the small sample size was adequate to evaluate overall fit, this may nevertheless have contributed to some of the problems with the measurement subsection of the model.

Specifically regarding the problems with the outcome variables (body dissatisfaction, restriction and bulimia), it is not clear why the initially hypothesized measurement model was such a bad fit to the data. One of the aims of the study was to distinguish between predictors of bulimic and restrictive behaviors, and this was made difficult by the fact that the original scales seemed to be a mix of bulimic behaviors (typically thought of as consisting of bingeing and purging), restrictive behaviors (typically thought of as dieting) and body dissatisfaction (typically thought of as subjective dislike of and concern with the size and shape of one's body). The distinction between restrictive and bulimic behaviors is assumed to be, to a certain extent, parallel to the distinction between the clinical syndromes of anorexia nervosa and bulimia nervosa and so measures used to assess "anorexic" and "bulimic" behaviors were chosen, as is common in research in this field. However, scales designed to assess the clinical constructs of anorexia and bulimia may not serve as well in the research setting. It may be that the distinction between restrictive and bulimic behaviors does not necessarily correspond to the clinical syndromes of anorexia and bulimia, and consequently is not captured by measures of anorexia and bulimia. For instance, a diagnosis of bulimia nervosa requires the presence of body image disturbance or overemphasis on weight and shape, in addition to bingeing and purging. A scale designed to assess symptoms of bulimia nervosa could, and actually should in order to be clinically valid, assess these different aspects of the disorder. However, this type of measure would not fit a model with body dissatisfaction, restrictive eating and "bulimic" behaviors as separate constructs. In addition, in past research using CSM, few studies have distinguished between restrictive and bulimic behaviors. In fact, in several studies one "eating disordered behavior" construct with indicators of both restrictive and bulimic behaviors was found to be plausible [27,38,70,71], so in retrospect it is not

a complete surprise to find problems with the measurement model of these variables. Further research should be directed at examining the underlying constructs influencing the measures used here.

Another shortcoming of the current study was the number of modifications necessary to arrive at a satisfactorily fitting model. Since these modifications were informed by the data as well as by theoretical plausibility, the model is subject to any peculiarities existing in this sample. Thus, replication of the model is necessary before firm conclusions can be made about its generalizability. Also, important to note is the fact that the family, peer and media variables were retrospective reports of perceived childhood influences, and as such are susceptible to recall bias. Finally, as with all cross-sectional studies, temporal precedence and causation can not be established. Further prospective and experimental studies need to be conducted to confirm our results.

However, even given these limitations, the current findings offer significant support for the Tripartite Influence model of body image and eating disturbances. Each influence variable was found to have a significant path to the hypothesized mediational link (comparison) or directly impact a disturbance measure (in the case of peers). These findings also offer continued support for the investigation of appearance comparison tendencies as a potentially important mediational factor. Clearly, prospective risk factor work guided by the Tripartite Influence model is indicated and supported by these preliminary findings.

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