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An Ecological Momentary Assessment of the Effects of Weight and Shape Social Comparisons on Women With Eating Pathology, High Body Dissatisfaction, and Low Body Dissatisfaction

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Abstract

This research examined the effects of naturally occurring appearance comparisons on women's affect, body satisfaction, and compensatory cognitions and behaviors. Using ecological momentary assessment, women with high body dissatisfaction and eating pathology (EPHB), high body dissatisfaction (HB), or low body dissatisfaction (LB) recorded their reactions to appearance-focused social comparisons. EPHB and HB women made more upward appearance comparisons than LB women. All women experienced negative emotions and cognitions after upward comparisons, including increased guilt, body dissatisfaction, and thoughts of dieting. EPHB women were most negatively affected by comparisons; they experienced more intense negative emotions, more thoughts of dieting/exercising, and an increase in eating-disordered behavior after upward comparisons. HB women experienced more negative affective consequences and thoughts of dieting than LB women. Results are consistent with social comparison theory and provide important information that may be used to inform eating disorder treatment and prevention efforts.

Body dissatisfaction, defined as displeasure with some aspect of one's appearance (Cash & Pruzinsky, 2002), is common among women in our society. Women with body dissatisfaction experience frequent dysfunctional cognitions triggered by weight- and shape-related stimuli in the environment. These dysfunctional thoughts are theorized to trigger the occurrence of reasoning and information processing errors that (a) maintain the dysfunctional beliefs (e.g., confirmatory bias, selective attention, and cognitive rigidity), (b) augment the frequency of the dysfunctional beliefs (via selective attention to weight- and shape-related stimuli in the environment), and (c) enhance the development of complex maladaptive body-focused cognitive schemata (Cash & Pruzinsky, 2002; Vitousek & Hollon, 1990).

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Women with eating pathology are thought to experience higher levels of body dissatisfaction than women without eating pathology for three primary reasons: (a) their self-evaluation is based primarily on weight and shape (American Psychiatric Association (APA), 1994; Cash & Deagle, 1990); (b) they strive to achieve an unrealistic, or "thin-ideal" body weight; and (c) they attend more frequently to body-focused, particularly thin-ideal, stimuli in their environment (Vitousek & Hollon, 1990). Furthermore, selective attention to the thin ideal is thought to reinforce and maintain body dissatisfaction among women with eating disorders.

Body dissatisfaction and associated cognitive processing errors have been theorized to lead to eating disorders via two pathways (Stice, 2002). In the first pathway, body dissatisfaction, as a result of attending to the thin ideal, is thought to motivate women with eating disorders to restrict their food intake in order to attain the ideal body. This restriction of food intake is proposed to increase the likelihood of binge eating, which then triggers purging behaviors (e.g., vomiting, laxative use) to counteract the possible weight gain effects associated with binge eating (Stice, 2001, 2002). In the second pathway, attending to the thin ideal is thought to increase body dissatisfaction and heighten levels of negative affect in women with eating disorders. In an effort to cope with their negative mood, it is proposed that women binge and purge to escape these otherwise overwhelming emotions (Stice, 2002). Because of the role body dissatisfaction plays in the development and maintenance of eating pathology, whether it be through increasing motivation to restrict caloric intake or enhancing the likelihood of maladaptive eating behavior in response to negative emotions, further understanding of the mechanisms underlying the development and maintenance of body dissatisfaction and related cognitive, emotional, and behavioral sequelae is imperative.

Social comparison theory has been used to better understand how exposure to appearance-focused stimuli leads to increased body dissatisfaction and its cognitive, emotional, and behavioral consequences. Festinger (1954) proposed that individuals compare themselves to others in order to obtain information regarding where they stand on a particular attribute. Upward comparisons are those in which an individual compares him- or herself with someone believed to be better off, and downward comparisons are those in which someone compares him- or herself with someone believed to be worse off. In the original theory, social comparisons were thought to convey certain information depending on their direction; specifically, Festinger proposed that upward comparisons indicate that improvement is possible thereby enhancing self-improvement motivation, whereas downward comparisons communicate that one is performing well but has the potential to be doing worse.

Contemporary theories have expanded on Festinger's (1954) original social comparison theory and suggest that upward and downward comparisons can lead to positive or negative consequences depending on an individual's perceived *similarity* to the comparison target. Collins (1996) and Buunk and Ybema (1997) suggest that upward comparisons with *dissimilar* targets suggest that one is not doing well and, because he or she is unlike the comparison target, he or she will not be able to achieve the status of the target. Thus, upward comparisons with dissimilar targets lead to contrast effects and associated feelings of inferiority and negative self-appraisal. Conversely, upward comparisons with *similar* targets may lead to feelings of identification with the comparison target and, therefore, feelings of inspiration, motivation, and self-worth. While upward comparisons may lead to contrast or identification effects depending on perceived similarity to the comparison target, the effects of downward comparisons have shown to be consistently associated with positive affective consequences (Collins, 1996). Consistent with these contemporary social comparison theories, research findings have demonstrated the negative effects of upward comparisons and the positive effects of downward comparisons (Amoroso & Walters, 1969; Gibbons,

1986; Leahey, Crowther, & Mickelson, 2007; Tesser, Millar, & Moore, 1988; Testa & Major, 1990).

Social comparison theory provides a rich theoretical basis for understanding the nature and effects of the appearance-focused social comparison process. Survey research has found that the tendency to engage in appearance-focused comparisons predicts body image and eating disturbances (Stormer & Thompson, 1996; Thompson, Coovert, & Stormer, 1999); however, the cross-sectional nature of these studies does not allow causal conclusions to be drawn. Although laboratory research indicates that viewing thin media images negatively impacts body satisfaction and eating behaviors and beliefs (Grabe, Ward, & Hyde, 2008; Groesz, Levine, & Murnen, 2002), only one laboratory study (Lin & Kulik, 2002) has directly examined the effects of upward and downward comparisons on affect and cognitions (most studies assume directionality of the comparison based on stimuli provided [Leahey & Crowther, 2008]). Lin and Kulik (2002) exposed female undergraduates to pictures of thin peers, overweight peers, or no photo at all (control condition) and asked participants to determine the attractiveness of themselves and the individual in the picture they viewed. They found that upward comparisons (comparing themselves to a more attractive peer) reduced body satisfaction and increased negative affect, whereas downward comparisons (comparing themselves to a less attractive peer) had no effect on body satisfaction and affect. While this laboratory study provides important information on the effects of appearance comparisons on affect and body dissatisfaction, it did not examine the effects of upward comparisons on women with eating pathology. Moreover, given that participants were not able to choose their comparison target, this laboratory paradigm may be less reflective of real-life comparison processes, thereby potentially reducing the generalizability of these results to naturally occurring appearance-focused social comparisons.

In a naturalistic study using ecological momentary assessment (EMA; Leahey et al., 2007), women with either high or low levels of body dissatisfaction recorded the frequency and effects of body-focused comparisons during their daily routine. Results indicated that women who reported being dissatisfied with their bodies engaged in more appearance comparisons and more upward comparisons than women who reported being satisfied with their bodies. In addition, naturally occurring upward appearance comparisons were associated with more negative affect, body dissatisfaction, and thoughts of dieting and exercising than downward appearance-focused comparisons for both groups of women. Finally, women with high body dissatisfaction (HB) experienced a greater increase in thoughts of dieting following an upward comparison than women with low levels of body dissatisfaction. Contrary to Lin and Kulik's (2002) findings, however, participants had lower levels of negative affect, guilt, and body dissatisfaction following a downward comparison than at baseline. The potent effects of upward comparisons demonstrated in these studies highlight the importance of social comparisons as a contributor to body dissatisfaction, negative affect, and thoughts of dieting and exercising among women. Although these findings provide ecologically valid evidence of the effects of social comparisons on women and have enriched our understanding of social comparison processes, these studies did not examine the effects of comparisons on women with eating pathology nor did they examine the effects of comparisons on eating-disordered behavior.

Smyth, Wonderlich, and their colleagues (Smyth et al., 2007, 2009) have utilized ecological momentary assessment to examine stress, mood, and bulimic behavior among a large sample of individuals with bulimia nervosa (BN). They found that in this population the greatest number of work-related stressors occurred in late afternoon, and interpersonal stressors occurred with increased frequency as the day progressed. Similarly, negative affect increased and positive affect decreased across the day (Smyth et al., 2009). In another study, Smyth and colleagues (2007) showed that participants reported greater stress, greater

negative affect, including anger and hostility, and lower positive affect on days characterized by a bulimic event, with the trajectory of these changes increasing prior to the event. This research demonstrates that ecological momentary assessment can be utilized successfully to assess affect among individuals with BN. Additionally, whereby items from the Daily Stress Inventory (Brantley, Waggoner, Jones, & Rappaport, 1987) were used to assess stress, including an item measuring concern over personal appearance, appearance-focused social comparisons were not examined.

The current study examined the frequency, nature, and effects of naturally occurring appearance-focused social comparisons in three groups of women: women with eating pathology and high levels of body dissatisfaction, women with high levels of body dissatisfaction but no eating pathology, and women with low levels of body dissatisfaction and no eating pathology. The latter two groups were included to provide a context by which to understand the effects of appearance comparisons on women with eating pathology and body dissatisfaction. That is, body dissatisfaction has been conceptualized as a normative experience among women in Western societies (Rodin, Silberstein, & Striegel-Moore, 1984). Thus, the inclusion of body-dissatisfied women allowed for the examination of the effects of appearance comparisons on women with eating pathology, above and beyond body dissatisfaction. Likewise, women with low levels of body dissatisfaction were included to understand whether the effects of appearance comparisons among women with high levels of body dissatisfaction differ from women who are generally satisfied with their body.

Because it is believed that women with eating pathology are more focused on weight- and shape-related stimuli and more affected by appearance information (Cash & Pruzinsky, 2002; Vitousek & Hollon, 1990), and that previous findings will hold true in a natural environment, it was hypothesized that (a) women with eating pathology and body dissatisfaction would engage in more body-focused comparisons and more upward comparisons than body-dissatisfied women without eating pathology, and body-dissatisfied women without eating pathology would engage in more comparisons and more upward comparisons than body-satisfied women; (b) upward appearance comparisons would increase negative affect, guilt, and thoughts and frequency of dieting and exercising, and decrease positive affect and body and social esteem for all groups; (c) women with eating pathology and body dissatisfaction would be more negatively affected by upward appearance-focused comparisons than body-dissatisfied women; however, because of their already high levels of body dissatisfaction compared to their body-satisfied counterparts, body-dissatisfied women without eating pathology would be more negatively affected by upward comparisons than body-satisfied women; (d) downward appearance comparisons would decrease negative affect, guilt, and thoughts and frequency of dieting and exercising, and increase positive affect and body and social esteem for all groups; and (e) in an effort to attain the thin ideal and cope with the potential negative effects of upward appearance-focused comparisons (Leahey et al., 2007; Stice, 2002), women with eating pathology and body dissatisfaction would experience an increase in thoughts and frequency of extreme compensatory behaviors (e.g., vomiting) following upward appearance comparisons compared to general (i.e., no comparison) levels.

Method

Study procedures were approved by a local institutional review board and informed consent was obtained from all participants. Participants received credit toward their research participation requirement in General Psychology.

Participants

During a large mass screening, 981 female participants completed the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987) and the Eating Disorder Diagnostic Scale (EDDS; Stice, Telch, & Rizvi, 2000). Those who scored in the upper tertile on the BSQ and endorsed items on the EDDS consistent with a diagnosis of either BN or eating disorder not otherwise specified (EDNOS) based on published EDDS algorithms (Stice et al., 2000) were eligible to participate in the eating pathology, high body-dissatisfied condition (EPHB; $n = 90$); those who scored in the upper tertile on the BSQ and endorsed no eating disordered behavior on the EDDS were eligible to participate in the HB condition ($n = 213$); and those who scored in the lower tertile on the BSQ and endorsed no eating disordered behavior were eligible to participate in the low body-dissatisfied condition (LB; $n = 303$). Of these women, 55 EPHB individuals, 45 HB individuals, and 60 LB individuals agreed to participate. Participant Body Mass Index (BMI) was calculated based on self-reported height and weight. All women in the EPHB group reported weekly compensatory behavior and met criteria for either BN (35%) or EDNOS (65%). (See Table 1 for participant characteristics.)

Apparatus

Royal Personal Data Assistant (PDA); model DM3070: All participants were given a Royal brand PDA that sounds an alarm whenever they are to complete a diary.

Measures

Preselection Measures

Eating disorder symptomatology: The EDDS (Stice et al., 2000) is comprised of 22 items that measure symptoms of anorexia nervosa (AN), BN, and EDNOS as outlined in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; APA, 1994). Items were adapted from structured psychiatric interviews such as the Eating Disorders Examination (Fairburn & Cooper, 1993) and the eating disorder module of the Structured Clinical Interview for DSM-III-R (Spitzer, Williams, Gibbon, & First, 1992). Items assess cognitive and behavioral eating disorder symptoms. The response format varies by item; participants are either asked to provide dichotomous (yes/no) responses, indicate the number of days or times per week a particular behavior has occurred, or indicate their endorsement of cognitive symptoms using a 7-point Likert scale. This questionnaire also ascertains self-reported height and weight, from which BMI scores were calculated. Using a computer-based algorithm, the EDDS generates diagnoses for AN, BN, and EDNOS (for specific algorithm information, see Stice, 2000). Eating disorder diagnoses generated by the EDDS have been shown to be highly concordant with diagnoses generated by structured interviews (range: 93–99%), suggesting excellent criterion validity. Furthermore, the EDDS has demonstrated adequate test–retest reliability, $r = .87$, acceptable internal consistency, $\alpha = .89$, and good convergent and predictive validity (Stice et al., 2000; Stice, Fisher, & Martinez, 2004).

Body dissatisfaction: The BSQ (Cooper et al., 1987) is a 34-item self-report instrument that measures concerns about body shape. Respondents are asked to indicate the frequency with which they experience cognitive, affective, and behavioral indices of body dissatisfaction. Higher scores indicate greater body dissatisfaction. The BSQ has been shown to have good test–retest reliability in a nonclinical sample and acceptable validity (Cooper et al., 1987; Rosen, Jones, Ramirez, & Waxman, 1996).

Diary Measures

Diary: opening questions: Participants recorded the date and time they completed the diary, were asked whether they had thoughts about their shape/weight since the last alarm, and indicated whether these thoughts involved comparisons of their shape/weight to that of another individual. If participants responded yes to the latter question, they completed a "Social Comparison Diary." If participants responded no to this question, they completed a "No Comparison Diary."

Social comparison diary: This diary assessed the frequency, nature, and effects of appearance-focused social comparisons. Participants were asked how many comparisons they made ("How many comparisons did you engage in?") and, keeping in mind their last comparison, whether it was an upward or downward comparison ("Did you think that compared to the other individual you looked: Much worse, Worse, Same, Better, Much better?"). "Worse" and "Much worse" were coded as an upward comparison and "Better" and "Much better" were coded as a downward comparison.

Social comparison diary: affect: The negative affect (NA), positive affect (PA), and guilt subscales of the Positive and Negative Affect Schedule—Expanded Form (PANAS-X; Watson 5& Clark, 1994) were embedded in the diary to assess participants' reactions to comparison information. Participants were instructed to keep in mind their feelings immediately following the most recent incident in which they compared their shape/weight to another individual. The NA, PA, and guilt subscales are broad measures of subjective distress, pleasurable feelings, and self-disgust, respectively. Higher scores indicate greater levels of the measured affect. The NA, PA, and guilt subscales have been shown to have good internal consistency and acceptable test–retest reliabilities but are sensitive to fluctuations in affect (Watson & Clark, 1994).

Social comparison diary: body esteem and social esteem: The State Self-Esteem Scale's (SSES; Heatherton & Polivy, 1991) appearance and social subscales were embedded in the diary to assess participants' feelings of body satisfaction and interpersonal self-confidence following a comparison. Participants completed these two subscales with instructions to keep in mind their thoughts and feelings immediately following the most recent incident in which they compared their appearance. Higher scores indicate higher levels of self-esteem. The SSES has excellent internal consistency and demonstrates reactivity to environmental stimuli (Heatherton & Polivy, 1991).

Social comparison diary: thoughts and frequency of compensatory behavior: Embedded in the diary were questions assessing thoughts of dieting, exercising, and "other" compensatory behaviors and questions assessing the occurrence of compensatory behaviors. These questions were adapted from the Eating Disorders Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) and two of the questions were used successfully in previous diary research (Leahey et al., 2007). The dieting question was "Since making the comparison, have you thought about trying to restrict the amount of food you eat in order to influence your shape or weight?" The exercise question was "Since making the comparison, have you thought about exercising as a means of controlling your weight, altering your shape or amount of fat, or burning off calories?" The compensatory behaviors question was "Since making the comparison, have you thought about other means of trying to control your shape or weight?" These questions were answered using a 7-point Likert scale ranging from 0 (*not at all*) to 6 (*very much*). They then were asked whether they actually had restricted their food intake, exercised, or engaged in any "other" behaviors since the alarm sounded. If participants endorsed thinking about "other" behaviors or engaging in "other"

behaviors to control their weight or shape, they were asked to indicate specifically what those "other" behaviors were.

No comparison diary: This diary was used to assess participants' thoughts, feelings, and behaviors when they did not engage in a body-focused comparison. Participants were asked to rate how they have been generally feeling since the last alarm using the PANAS-X NA, PA, and guilt subscales (Watson & Clark, 1994) and the SSES appearance and social subscales (Heatherton & Polivy, 1991). Participants also answered questions assessing how much they have been thinking of dieting, exercising, and "other" compensatory behavior and whether they engaged in these behaviors since the last alarm using the questions adapted from the EDE-Q (Fairburn & Beglin, 1994).

Poststudy measure: A similar diary and methodology were used in previous research, and to assess for reactivity participants completed measures of the dependent variables (e.g., PANAS; modified EDE-Q) before and after the EMA sampling period. The authors found no evidence of reactivity to diary completion (Leahey et al., 2007). However, to be conservative, the present study included a measure of reactivity. After diary completion, participants were asked to rate how much they thought recording appearance comparisons made them more aware of how often they engaged in such comparisons.

Design and Procedure

The EMA methodology used for this study was stratified random sampling. This approach was chosen over others for the following reasons: (a) fixed interval time sampling assumes that phenomena occur at certain time points, which is not a reasonable assumption for appearance-focused comparisons; (b) pure random sampling does not allow for an equal distribution of assessments across the sampling period and could result in missing crucial time intervals during which appearance comparisons occur; and (c) given that appearance comparisons are proposed to occur quite frequently among young women, particularly women with EPHB, there were concerns about potential fatigue effects associated with the use of event-based sampling.

Following preselection, participants provided informed consent and received diary completion instructions. Participants were asked to complete six paper-and-pencil diaries per day for 5 days whenever an alarm from a preprogrammed PDA sounded. Alarms went off during three weekdays and two weekend days, during normal waking hours, at randomly selected times within the following time blocks: 9 a.m.–12 p.m., 12–3 p.m., 3–5 p.m., 5–7 p.m., 7–9 p.m., and 9–11 p.m. While participants were instructed to complete their diaries as soon as the alarm sounded, if they were in a situation in which they were unable to do so (e.g., driving), they were told to complete the diary as soon as possible within 1 hour of the alarm. After the sampling period, participants returned their diaries and completed the reactivity questionnaire. In order to encourage compliance, the amount of course credit received was dependent on the number of diaries completed.

Results

Preliminary Analyses

There were significant group differences in BMI, $F(2, 162) = 18.29$, $p < .001$; posthoc analyses revealed that LB individuals had significantly lower BMIs than HB and EPHB individuals, $t(53) = 2.34$, $p < .001$; $t(71) = -5.29$, $p < .01$, respectively (see Table 1). BMI was also correlated with several of the dependent variables. As such, to test the effects of appearance comparisons on eating pathology and body dissatisfaction above and beyond BMI, BMI was entered as a covariate in all analyses.

Data Quality

To assess for reactivity to diary completion, upon returning their diaries, participants reported the extent to which recording appearance-focused comparisons increased their awareness of how often they engaged in such comparisons on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*definitely*). Average self-reported reactivity was 2.34 ± 0.75, and reactivity did not differ by group membership, LB: 2.20 ± 0.66, HB: 2.41 ± 0.84, EPHB: 2.44 ± 0.73; $F(2, 162) = 1.41$, $p = .25$.

To further examine reactivity, the number of social comparisons made during the first 2 days of diary completion were summed for each individual and compared to the number of social comparisons made during the last 2 days of diary completion. There was a significant time effect, $F(1, 159) = 6.52$, $p = .01$; participants reported making more appearance comparisons during the first 2 days of diary completion compared to the last 2 days (4.56 ± 3.95 vs. 3.93 ± 3.86). For all dependent variables, a mean aggregate was computed for the first 2 days of diary completion and the last 2 days of diary completion and compared. Results from a repeated measure MANOVA indicated that there were no significant differences on any of the dependent variables from the first 2 days to the last 2 days of diary completion (all p's > .05), suggesting that study participation did not significantly affect state levels of mood, body dissatisfaction, and dieting and exercising cognitions and behaviors.

To assess compliance and group difference in compliance, we examined whether the three groups differed on (a) percentage of completed diaries, (b) average number of daily diaries completed, and (c) number of diaries completed the first 2 days compared to the last 2 days. All analyses were nonsignificant[1], $F(2, 159) = 1.19$, $p = .29$; $F(2, 159) = 1.30$, $p = .32$; $F(2, 159 = 0.03$, $p = .91$. These findings suggest that the three groups were comparably compliant with diary completion. To determine whether participants completed diaries within the prompted time frames, the amount of time between diary completions was also examined. On average, participants completed a diary once every 2 hours and 41 minutes, and there were no significant differences by group, $F(2, 159) = 0.65$, $p = .72$. This amount of time lapse between diary completions is consistent with the programmed PDAs' stratified random prompting scheme, suggesting that participants were compliant with the instructions to complete diaries in a timely manner after being prompted.

Primary Analyses: Hierarchical Linear Modeling

Hierarchical linear modeling (HLM; Bryk & Raudenbush, 1992) was used to examine the frequency and effects of appearance comparisons among women and whether eating pathology and body dissatisfaction moderated these effects. HLM is preferred for EMA data, in which time is nested within person. The nested nature of this data was also empirically confirmed by fitting unconditional Level 2 models, with each of our variables as the outcome variable. With dichotomous variables (e.g., whether an upward comparison was made), Bernouli models were used. In every case except one (thoughts of dieting), the Level 1 variance components were significant (all p's < .001; see Table 2), validating the nested nature of the data and the need for HLM analyses. Two assumptions of HLM are that of normality and equivalent error variance among predictors; exploratory data analyses were conducted and data met these assumptions.

Frequency of Appearance Comparisons and Frequency of Upward Comparisons—

To determine whether the probability of making a social comparison or upward comparison at each assessment differed depending on group membership, the

[1]LB, HB, and EPHB completed 83%, 87%, and 82% of their diaries, respectively. Furthermore, the three groups completed an average of 4.70 ± 1.10 diaries (out of a possible six) per day.

following Bernoulli model was tested. No predictors were entered in Level 1 and group membership was added as a predictor in Level 2, with LB as the reference group. A second analysis was done that omitted the HB group to make the final comparison between the HB and EPHB groups.

$$\text{Level 1:} \log[P_{comparison}/1-P_{comparison}]=\beta_{0j}$$
$$\text{Level 2:} \beta_{0j}=\gamma_{00}+\gamma_{01}HB_j+\gamma_{02}EPHB_j+\mu_{0j}$$
$$\text{Full model:} \log[P_{comparison}/1-P_{comparison}]=\gamma_{00}+\gamma_{01}HB_j+\gamma_{02}EPHB_j+\mu_{0j}$$

Contrary to our hypothesis, EPHB women were not significantly more likely to engage in body-focused comparisons than HB women and HB women were not significantly more likely to make appearance comparisons than LB women (γ_{02} = .28, *SE* = .21, *t* = 1.38, *p* = .17; γ_{01} = .21, *SE* = .21, *t* = 1.00, *p* = .32). However, EPHB women were more likely to make appearance comparisons than LB women (γ_{02} = .50, *SE* = .14, *t* = 3.48, *p* = .001). With regard to upward comparisons, whereby EPHB and HB women did not differ in their probability of making upward comparisons at each assessment point (γ_{02} = .33, *SE* = .18, *t* = 1.84, *p* = .067), both groups were significantly more likely to engage in upward appearance comparisons than LB women (γ_{02} = 1.00, *SE* = .19, *t* = 5.30, *p* < .001; γ_{01} = 0.60, *SE* = .22, *t* = 2.72, *p* = .008, respectively). Specifically, 48% of comparisons made by LB women were upward, whereas 78% and 83% of comparisons made by EPHB and HB women, respectively, were upward.

Effects of Comparisons on Mood, Esteem, and Weight-Related Thoughts and Behaviors—To examine whether direction of comparison predicted mood, body and social esteem, and weight-related cognitions and behaviors, the following equation was used in Level 1. Note, to ensure that the amount of time between assessments did not affect our results, time lag between assessments was included as a covariate in the Level 1 equation.[2]

$$\text{Level 1:} Y_{ij}=\beta_{0j}+\beta_{1j}\,(\text{upward comparison})_{ij}+\beta_{2j}\,(\text{downward comparison})_{ij}+\beta_{3j}\,(\text{time lag})_{ij}+r_{ij}$$

The relationship between comparison direction and each of the dependent variables (NA, PA, guilt, appearance esteem, social esteem, and dieting and exercising thoughts and behaviors) became the dependent variable in Level 2. To test for moderation, group was entered as a predictor of each of the Level 1 comparison direction-dependent variable slopes. To test for group effects at Level 2, dummy codes were used (Cohen, Cohen, West, & Aiken, 2002). For example, if a participant was a member of the HB group, she would receive a code of “1” for this variable, and a code of “0” for LB and EPHB. In the equations presented below, the LB group was omitted as a predictor, thereby becoming the reference group to which HB and EPHB groups were compared. A second analysis then omitted the HB group to make the final comparison between the HB and EPHB groups. To control for BMI status, BMI was also included in the Level 2 analyses.

[2]Of note, including or excluding the time lag variable did not change the effects of comparisons on any of the dependent measures. Moreover, we found no significant differences in amount of time between prompts across participants (*p* =.50).

$$\text{Level 2: } \beta_{0j}=\gamma_{00j}+\gamma_{01}\,HB_j+\gamma_{02}\,EPHB_j+\gamma_{03}\,BMI_j+\mu_{0j}$$
$$\beta_{1j}=\gamma_{10j}+\gamma_{11}\,HB_j+\gamma_{12}\,EPHB_j+\gamma_{13}\,BMI_j$$
$$\beta_{2j}=\gamma_{20j}+\gamma_{21}\,HB_j+\gamma_{22}\,EPHB_j+\gamma_{23}\,BMI_j$$

To illustrate the full model and the terms used to test for moderation, the Level 1 and Level 2 combined model is presented below.

$$Y_{ij}=\gamma_{00}+\gamma_{10}\,(\text{upward comparison})_{ij}+\gamma_{20}\,(\text{downward comparison})_{ij}+\gamma_{01}\,HB_j+\gamma_{02}\,EPHB_j+\gamma_{03}\,BMI_j+\gamma_{11}\,(\text{upward comparison})_{ij}*HB_j+\gamma_{12}\,(\text{upward comparison})_{ij}*EPHB_j+\gamma_{13}\,(\text{upward comparison})_{ij}*BMI_j+\gamma_{21}\,(\text{downward comparison})_{ij}*HB_j+\gamma_{22}\,(\text{downward comparison})_{ij}*EPHB_j+\gamma_{23}\,(\text{downward comparison})_{ij}*BMI_j+\mu_{0j}+r_{ij}$$

Note the interaction terms between the Level 1 and Level 2 variables (e.g., upward comparison*HB); such terms test for cross-level moderation. Moderation is considered present when a Level 2 variable (e.g., HB) affects the relationship between a Level 1 predictor (e.g., upward comparison) and a dependent variable (e.g., negative affect).

Results indicated that all women experienced an increase in guilt, thoughts of dieting, and a decrease in appearance and social esteem following an upward comparison relative to their no comparison, or general scores, on these variables. EPHB and HB women experienced an increase in NA following upward comparisons relative to their no comparison levels, but only EPHB women experienced an increase in thoughts of exercising following an upward comparison relative to general levels. All other effects of group on upward comparison consequences were nonsignificant (see Table 3).[3]

Results also indicated that all women experienced an increase in appearance esteem after a downward comparison. Only HB women experienced a significant decrease in negative affect and guilt after a downward comparison and only EPHB women experienced an increase in PA following a downward comparison. All other effects of group on downward comparison consequences were nonsignificant (see Table 3).[2]

To determine whether the effects of upward and downward comparisons varied by group, cross-level interactions were examined. Specification of interaction terms allows for the slopes between comparison direction and outcome measures to vary across group; the resulting sign of the coefficient indicates the direction of group difference. Table 3 reports the slopes of social comparisons on outcome variables for each group separately, with a summary of significant interactions in the last column. After an upward comparison, EPHB women experienced a significantly greater increase in NA, guilt, thoughts of dieting, and thoughts of exercising compared to HB women and a greater decrease in social esteem (γ = 1.05, p = .04; γ = 1.71, p < .001; γ = 4.09, p = .02; γ = 0.44, p = .005; γ = −1.40, p = .002, respectively). HB women reported a greater increase in thoughts of dieting and a greater decrease in social esteem than LB women following an upward comparison, relative to baseline levels (γ = 0.33, p = .046; γ = 1.13, p = .03) Furthermore, whereas HB women experienced a decrease in PA following an upward comparison, LB women experienced an increase (γ = −2.46, p = .004).

[3]BMI did not moderate the effects of upward comparisons, suggesting that women, regardless of weight status, experience similarly the negative emotional, cognitive, and behavioral consequences of upward comparisons. Women with higher BMIs, however, had less appearance esteem after a downward comparison than women with lower BMIs.

After a downward comparison, EPHB women experienced a significantly greater increase in PA compared to HB women ($\gamma = 2.93$, $p = .02$). However, they did not experience as great of a decrease in guilt as HB women ($\gamma = 1.26$, $p = .046$). Furthermore, EPHB women experienced nearly no change in social esteem, whereas HB women experienced an increase ($\gamma = -2.46$, $p = .002$). After a downward comparison, HB women had a greater decrease in NA and guilt, and a greater increase in appearance esteem compared to LB women ($\gamma = 1.85$, $p = .02$; $\gamma = 1.94$, $p = .001$; $\gamma = -2.43$, $p < .001$, respectively). Moreover, HB women experienced an increase in social esteem after a downward comparison, whereas LB women reported a decrease, and HB women engaged in less exercise behavior after a downward comparison than LB women ($\gamma = -3.01$, $p < .001$; $\gamma = 1.31$, $p = .02$). Remaining comparisons between EPHB versus HB groups and HB versus LB groups were nonsignificant (see Table 3).

The Effects of Appearance Comparisons on Extreme Compensatory Behaviors—To determine whether EPHB women had increased thoughts of extreme compensatory behaviors following an upward comparison and decreased thoughts of extreme compensatory behaviors following a downward comparison relative to their no comparison ratings, mean scores were calculated for each EPHB participant for thoughts of extreme compensatory behavior following an upward or downward comparison and compared to mean scores of these variables during the absence of an appearance-focused social comparison using paired samples *t*-tests. Results indicated that EPHB women reported thinking more frequently about engaging in extreme compensatory behavior (e.g., vomiting, laxative use) after an upward body-focused comparison than they did generally, $t(54) = -3.47$, $p = .001$, $d = -.44$, but did not experience a significant decrease in such thoughts following a downward appearance-focused comparison relative to their no comparison scores, $t(36) = 1.27$, $p = .21$ (see Table 4). Most common compensatory behaviors reported were use of laxatives (37%), vomiting (31%), and fasting (23%).

To determine whether EPHB women had an increase in frequency of compensatory behavior following an upward comparison and a decrease in frequency of compensatory behavior following a downward comparison relative to no comparison ratings, data were reduced as follows. For each participant, the number of compensatory behaviors that occurred following an upward or downward comparison and in the absence of a comparison was summed and divided by the total number of upward, downward, or no comparison diaries completed, respectively. The no comparison proportion was then compared to the upward and downward proportions using paired samples *t*-tests. Results indicated that EPHB women were significantly more likely to engage in extreme compensatory behaviors (e.g., vomiting, diuretic use, fasting) following an upward comparison than during general (i.e., no comparison) sampling periods, $t(54) = 2.30$, $p = 0.02$, $d = 0.32$. EPHB women did not engage in significantly fewer extreme compensatory behaviors following a downward comparison than they did generally, $t(36) = 1.08$, $p = .29$ (see Table 4).

Discussion

The present study explored the frequency, nature, and effects of naturally occurring appearance comparisons on women with eating pathology and high or low body dissatisfaction. This study revealed that not only are appearance comparisons associated with negative cognitive and emotional reactions from all women, but that such comparisons are related to more negative consequences for women with eating pathology. Using principles from social comparison theory to explore how appearance comparisons affect clinical phenomenon, specifically eating pathology, the present study expands the theoretical understandings of social comparison processes and contributes clinically useful information regarding appearance-focused social comparisons.

The Effects of Social Comparisons on Women With Eating Pathology

These results suggest that upward appearance comparisons are most detrimental to women with eating pathology. Compared to the effects of upward comparisons among women with HB, upward comparisons in women with eating pathology were associated with a *greater* increase in negative affect, guilt, and thoughts of dieting and a *greater* decrease in social esteem. Moreover, whereas both groups of women reported more thoughts of dieting following an upward comparison, women with eating pathology also reported more thoughts of exercising and extreme compensatory behaviors and *engaged* in more extreme compensatory behaviors (e.g., vomiting) at the time of an upward comparison relative to general levels. This is a new and unique finding as this is the first study to link appearance comparisons to eating-disordered thoughts and behavior in the naturalistic environment.

The increased intensity of negative effects associated with upward appearance comparisons for women with eating pathology is likely related to the notion that women with eating disorders have heightened awareness of body-focused stimuli and attend to more body-focused information (Vitousek & Hollon, 1990), and this information is more heavily weighted in their self-esteem (APA, 1994). As such, when women with eating pathology find themselves to be “less attractive” than others, they experience more negative consequences, including more thoughts and frequency of purging behaviors, than women not engaging in eating-disordered behavior.

These results also support Stice’s (2002) theory that exposure to the thin ideal via social comparison processes leads to decreased appearance esteem and heightened negative affect in women with eating disorders, and, in an effort to cope with these otherwise overwhelming negative emotions, women with eating disorders self-soothe and escape by engaging in eating-disordered behavior. Thus, the present study provides ecologically valid evidence that may demonstrate how cognitive schemata are activated (Vitousek & Hollon, 1990) and lead to emotion dysregulation (Smyth et al., 2009; Stice, 2002), thereby increasing eating-disordered behavior in women with eating pathology. Such information provides support for environmental stimuli, cognitive processing errors, and emotion regulation deficits as pathways to eating disturbances. Specifically, this study helps to clarify the association between environmental events (e.g., an unfavorable appearance-focused comparison) and negative cognitive, affective, and behavioral (e.g., compensatory behavior) experiences among women with eating pathology.

The Frequency and Effects of Upward Appearance Comparisons on Women With HB and Women With LB

These findings suggest that the direction of appearance comparisons differ depending on the level of body dissatisfaction. Consistent with previous research (Leahey et al., 2007), women with high levels of body dissatisfaction, regardless of eating disorder status, engaged in more upward comparisons than women with low levels of body dissatisfaction. One explanation for the absence of significant differences between HB women and EPHB women may be drawn from the literature on eating disorders, body dissatisfaction, and cognitive processes. That is, women who experience body dissatisfaction and eating pathology and women who only experience body dissatisfaction, which is conceptualized as the cognitive–affective component of disordered eating (Rosen, 1992), likely process weight- and shape-related stimuli in similar ways. These shared experiential components lead body-dissatisfied women to engage in more frequent body-focused comparisons and more upward comparisons than body-satisfied women, regardless of whether they are engaging in eating-disordered behavior.

Consistent with contemporary developments in social comparison theory (Buunk & Ybema, 1997; Collins, 1996) and previous findings indicating that upward body-focused comparisons have deleterious effects on women (Leahey et al., 2007), all three groups of women in the present study experienced increases in guilt and thoughts of dieting and decreases in social esteem and body satisfaction around the time of an upward comparison. These findings provide support that environmental stimuli may be linked to negative emotional consequences, thoughts of dieting, and body dissatisfaction, even for women who are body satisfied. This effect elucidates appearance comparison processes as relevant contexts in which all women may experience dissatisfaction with their bodies during regular, daily activities. Additionally, given the focus on the "thin-ideal" importance of appearance in Western culture, and the effects of appearance comparisons, such processes likely have an especially potent impact on young women today. Eating disorder prevention efforts that address comparisons with thinner targets may mitigate women's body dissatisfaction, the primary and necessary precursor to disordered eating (Attie & Brooks-Gunn, 1989).

While both HB and LB women experienced deleterious effects associated with upward appearance comparisons, the two groups of women differed in the intensity, or severity, of these effects. Body-dissatisfied women without eating pathology reported more severe negative reactions to upward comparison information than body-satisfied women; both groups experienced decreased social esteem during the time of upward appearance comparisons. However, women with HB experienced a *greater* decrease in social esteem. This finding is consistent with previous research indicating that women with high levels of body dissatisfaction report less social esteem than women with low levels of body dissatisfaction (Striegel-Moore, Silberstein, & Rodin, 1993). In addition, the current study extends the literature by revealing how naturally occurring social processes affect and potentially perpetuate body-dissatisfied women's low interpersonal self-efficacy. Along with lower social esteem, women with HB also experienced more thoughts of dieting associated with upward appearance comparisons compared to women with LB. It is likely that unfavorable body comparisons are related to more thoughts of dieting among body-dissatisfied women because of their higher weight status and poorer body esteem.

The Effects of Downward Comparisons on Women With Eating Pathology, HB, and Low Body Satisfaction

Not only were upward comparisons associated with differential effects on women depending on eating disorder status and body dissatisfaction, but downward comparisons affected women differently depending on group membership. Consistent with social comparison theory (Buunk & Ybema, 1997; Collins, 1996) and previous findings on the effects of downward appearance-focused comparisons (Irving, 1990), all three groups of women experienced increased appearance esteem associated with downward appearance comparisons. However, only HB women (regardless of eating pathology) reported that downward appearance comparisons were linked to positive affective consequences. Again, these results suggest that body dissatisfaction and eating pathology influence the effects of appearance comparisons. However, unlike upward comparisons that were associated with additional *detrimental* effects on EPHB and HB women (relative to LB women), downward comparisons may have added *beneficial* effects on women with high levels of body dissatisfaction or eating pathology.

Contrary to what was expected, body-dissatisfied women with eating pathology did not report decreased thoughts or frequency of extreme compensatory behaviors following a downward comparison. One potential explanation for these findings is that, because women with eating disorders have difficulty processing information that is inconsistent with their self-views of unattractiveness (Vitousek & Hollon, 1990), any effects of downward comparisons are attenuated, or short-lived. Specifically, while downward appearance-

focused comparisons communicate that one is "better off" than the comparison target and lead to at least a temporary improvement in positive affect and appearance esteem, individuals with eating-disordered symptomatology may have difficulty internalizing this information, and, subsequently, do not experience the beneficial behavioral effects of the comparison information. As a result, their thoughts and frequency of extreme compensatory behaviors are not affected by the potentially beneficial consequences of downward appearance comparison information.

This study not only helps to illuminate a context in which women with eating pathology may experience emotional lability, body image concerns, and eating-disordered behavior, but these findings also provide important information for treating women with eating disturbances. Modifying cognitive schemata so as to eliminate processing errors such as selective attention and confirmatory bias would likely reduce the frequency and sequelae of upward appearance comparisons, including body dissatisfaction, negative emotionality, and eating-disordered behavior. Furthermore, because downward comparisons were linked to improved mood and body satisfaction in women with eating pathology, challenging cognitive errors so that women do not only attend to those whom they perceive as thinner or more attractive may improve women's self-appraisals and mitigate the negative effects of upward comparison information.

This research has some limitations. First, this study relies heavily on self-report measures. However, given that there currently are no other means to measure affect, cognitions, and eating-disordered behavior in the naturalistic environment, self-report questionnaires may be the most accurate and appropriate way of obtaining internal data. A related limitation is the use of self-reported height and weight. Although research suggests that women's self-reported heights and weights are accurate (Bowman & DeLucia, 1992), a more recent study found that women with subclinical and clinical eating disorders do not report their height and weight accurately (McCabe, McFarlane, Polivy, & Olmsted, 2001). Given that these women report body dissatisfaction and eating pathology, it is possible that the women in the present study also may have reported their weight and height less accurately. Future studies may opt to obtain a direct measurement of weight and height as a more accurate assessment of participants' BMI status.

Second, this study used stratified random sampling to assess the frequency, nature, and effects of appearance comparisons. While this approach evenly spaces assessments throughout the day and is recommended for events that may occur too frequently to assess each time (as might be the case with appearance comparisons among women with body dissatisfaction and eating pathology; Shiffman et al., 2002), it has limitations. Specifically, random sampling procedures such as the one employed in this study instruct participants to focus on their recent experience instead of their momentary experience, making responses subject to recall bias, thereby limiting the ability to draw causal conclusions. Moreover, given the potential time lag between the occurrence of comparisons and the actual recording of comparison information, it is possible that only salient social comparisons were recalled (i.e., those that produced substantial positive or negative consequences) or that individuals' beliefs about the impact of social comparisons were reported. In a related vein, although the social comparison diary asked individuals to keep their most recent social comparison in mind when completing the dependent measures, the noncomparison diary asked individuals to consider how they generally felt when completing the dependent measures. While the comparisons may not be directly comparable since the former is linked to a particular experience whereas the latter was not, Robinson and Clore (2002) suggest that different memory processes are not necessarily involved when reporting over such a narrow time frame. Also, given the stratified random sampling study design, an additional limitation of this study is that assessments occurred at differing time intervals both within and across

participants. To ameliorate this concern, we examined whether time lag between assessments affected the results and found that the inclusion of time lag in our model did not influence the effects of social comparisons on any of the dependent variables. Moreover, time lag between prompts did not differ across participants. Lastly, it is also quite possible that changes in mood may have *preceded* or led to upward or downward appearance-focused comparisons. One way to ameliorate some of these alternative explanations may be to combine event and random sampling. However, at the present time, it is not known whether event-based sampling is feasible for the naturalistic assessment of social comparison phenomena, particularly among women with body dissatisfaction and eating pathology who may engage in such processes quite frequently. Furthermore, a combination approach would not completely rule out the possibility that only salient social comparisons are recalled or that social comparisons are being evoked by preceding changes in affect. Despite the potential limitations associated with stratified random sampling, the EMA methodology used in this study is more ecologically valid and is likely to be associated with significantly less recall bias than assessment procedures used in more traditional cross-sectional research.

Third, not all of the participants complied with instructions to complete six diary entries per day (average number of diaries completed each day was 4.70 ± 1.10) and the decrease in the report of social comparisons over the sampling period was statistically significant, although perhaps not clinically significant. It is possible that participant fatigue played a part in the later part of the sampling period and women realized that they could limit the time spent recording information if they denied engaging in body-focused comparisons. However, given that participants were instructed not to complete diaries in potentially compromising situations (e.g., while in class, while driving), they were relatively compliant; all three groups completed over 80% of potential diary entries.

Fourth, because paper–and-pencil methodology was used, we could not use electronic time stamping to verify whether time of diary completion was consistent with the randomly selected assessment sampling time points. However, we were able to verify that participants' average time between diary completions was consistent with the protocol. Lastly, one could argue that the use of a female undergraduate population limits the generalizability of these findings; however, college-age women have been shown to have high rates of body dissatisfaction and eating disorders and, as a result, are an appropriate population to study.

The present research illustrates the importance of investigating contextual variables that influence women's emotions, cognitions, and eating-disordered behavior. This naturalistic investigation allowed for an ecologically valid, theory-based examination of social comparison processes and their effects on women with and without eating pathology. This study not only expands social comparison theory but provides a unique investigation of how naturally occurring appearance comparisons may affect women's mood, body satisfaction, and eating-disordered behavior, which will help inform both treatment and prevention efforts.

References

American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4. Washington, DC: Author; 1994.

Amoroso DM, Walters RH. Effects of anxiety and socially mediated anxiety reduction on paired-associate learning. Journal of Personality and Social Psychology. 1969; 11:388–396. [PubMed: 5787027]

Attie I, Brooks-Gunn J. Development of eating problems in adolescent girls: A longitudinal study. Developmental Psychology. 1989; 25:70–79.

Bowman RL, DeLucia JL. Accuracy of self-reported weight: A meta-analysis. Behavior Therapy. 1992; 23:637–655.

Brantley PJ, Waggoner CD, Jones GN, Rappaport NB. A Daily Stress Inventory: Development, reliability, and validity. Journal of Behavioral Medicine. 1987; 10:61–74. [PubMed: 3586002]

Bryk, AS.; Raudenbush, SW. Hierarchical linear models: Applications and data analysis methods. Newbury Park, CA: Sage; 1992.

Buunk, JP.; Ybema, JF. Social comparison and occupational stress: The identification contrast model. In: Buunk, BP.; Gibbons, FX., editors. Social comparison, health, and coping. Mahwah, NJ: Erlbaum; 1997. p. 359-388.

Cash TF, Deagle EA. The nature and extent of body-image disturbances in anorexia nervosa and bulimia nervosa: A meta-analysis review. International Journal of Eating Disorders. 1997; 22:107–125. [PubMed: 9261648]

Cash, TF.; Pruzinsky, T., editors. Body image: A handbook of theory, research, and clinical practice. New York: Guilford Press; 2002.

Cohen, P.; Cohen, J.; West, SG.; Aiken, LS. Applied multiple regression/correlation analysis for the behavioral sciences. 3. New York: Routledge Academic; 2002.

Collins RL. For better or for worse: The impact of upward social comparison on self-evaluations. Psychological Bulletin. 1996; 119:51–69.

Cooper PJ, Taylor MJ, Cooper Z, Fairburn CG. The development and validation of the body shape questionnaire. International Journal of Eating Disorders. 1987; 6:485–494.

Fairburn CG, Beglin SJ. The assessment of eating disorders: Interview or self-report questionnaire. International Journal of Eating Disorders. 1994; 16:363–370. [PubMed: 7866415]

Fairburn, CG.; Cooper, Z. The eating disorders examination. In: Fairburn, CG.; Wilson, GT., editors. Binge eating: Nature, assessment, and treatment. 12. New York: Guilford Press; 1993. p. 317-331.

Festinger L. A theory of social comparison processes. Human Relations. 1954; 7:117–140.

Gibbons FX. Social comparison and depression: Company's effect on misery. Journal of Personality and Social Psychology. 1986; 51:140–148. [PubMed: 3735064]

Grabe S, Ward LM, Hyde JS. The role of the media in body image concerns among women: A meta-analysis of experimental and correlational studies. Psychological Bulletin. 2008; 134:460–476. [PubMed: 18444705]

Groesz LM, Levine MP, Murnen SK. The effect of experimental presentation of thin media images on body satisfaction: A meta-analytic review. International Journal of Eating Disorders. 2002; 31:1–16. [PubMed: 11835293]

Heatherton PF, Polivy J. Development and validation of a scale for measuring state self-esteem. Journal of Personality and Social Psychology. 1991; 60:895–910.

Irving LM. Mirror images: Effects of the standard of beauty on the self- and body-esteem of women exhibiting varying levels of bulimic symptoms. Journal of Social and Clinical Psychology. 1990; 9:230–242.

Leahey TM, Crowther JH. An ecological momentary assessment of comparison target as a moderator of the effects of appearance-focused social comparisons. Body Image. 2008; 5:307–311. [PubMed: 18585108]

Leahey TM, Crowther JH, Mickelson KD. The frequency, nature, and effects of naturally occurring appearance-focused social comparisons. Behavior Therapy. 2007; 38:132–143. [PubMed: 17499080]

Lin LF, Kulik JA. Social comparison and women's body satisfaction. Basic and Applied Social Psychology. 2002; 24:115–123.

McCabe RE, McFarlane T, Polivy J, Olmsted MP. Eating disorders, dieting, and the accuracy of self-reported weight. International Journal of Eating Disorders. 2001; 29:59–64. [PubMed: 11135334]

Robinson MD, Clore GL. Belief and feeling: Evidence for an accessibility model of emotional self-report. Psychological Bulletin. 2002; 128:934–960. [PubMed: 12405138]

Rodin J, Silberstein L, Striegel-Moore R. Women and weight: A normative discontent. Nebraska Symposium on Motivation. 1984; 32:267–307. [PubMed: 6398857]

Rosen, JC. Body-image disorder: Definition, development, and contribution to eating disorders. In: Crowther, JH.; Tennenbaum, DL.; Hobfoll, SE.; Stephens, MA., editors. The etiology of bulimia nervosa: The individual and familial context. Washington, DC: Hemisphere; 1992. p. 157-177.

Rosen JC, Jones A, Ramirez E, Waxman S. Body Shape Questionnaire: Studies of validity and reliability. International Journal of Eating Disorders. 1996; 20:315–319. [PubMed: 8912044]

Smyth JM, Wonderlich SA, Heron KE, Sliwinski MJ, Crosby RD, Mitchell JE, et al. Daily and momentary mood and stress are associated with binge eating and vomiting in bulimia nervosa patients in the natural environment. Journal of Consulting and Clinical Psychology. 2007; 75:629–638. [PubMed: 17663616]

Smyth JM, Wonderlich SA, Sliwinski MJ, Crosby RD, Engel SG, Mitchell JE, et al. Ecological momentary assessment of affect, stress, and binge–purge behaviors: Day of week and time of day effects in the natural environment. International Journal of Eating Disorders. 2009; 42:429–436. [PubMed: 19115371]

Spitzer RL, Williams JB, Gibbon M, First MB. The Structured Clinical Interview for DSM-III-R (SCID). History, rationale, and description. Archives of General Psychiatry. 1992; 49:624–629. [PubMed: 1637252]

Stice E. A prospective test of the dual-pathway model of bulimic pathology: Mediating effects of dieting and negative affect. Journal of Abnormal Psychology. 2001; 110:124–135. [PubMed: 11261386]

Stice, E. Body image and bulimia nervosa. In: Cash, TF.; Pruzinsky, T., editors. Body image: A handbook of theory, research, and clinical practice. New York: Guilford Press; 2002. p. 304-311.

Stice E, Fisher M, Martinez E. Eating disorder diagnostic scale: Additional evidence of reliability and validity. Psychological Assessment. 2004; 16:60–71. [PubMed: 15023093]

Stice E, Telch CF, Rizvi SL. Development and validation of the Eating Disorder Diagnostic Scale: A brief self-report measure of anorexia, bulimia, and binge-eating disorder. Psychological Assessment. 2000; 12:123–131. [PubMed: 10887758]

Stormer SM, Thompson JK. Explanations of body-image disturbance: A test of maturational status, negative verbal commentary, social comparison, and sociocultural hypotheses. International Journal of Eating Disorders. 1996; 19:193–202. [PubMed: 8932558]

Striegel-Moore R, Silberstein L, Rodin J. The social self in bulimia nervosa: Public self-consciousness, social anxiety, and perceived fraudulence. Journal of Abnormal Psychology. 1993; 102:297–303. [PubMed: 8315142]

Tesser A, Millar M, Moore J. Some affective consequences of social comparison and reflection processes: The pain and pleasure of being close. Journal of Personality and Social Psychology. 1988; 54:49–61. [PubMed: 3346807]

Testa M, Major B. The impact of social comparisons after failure: The moderating effects of perceived control. Basic and Applied Social Psychology. 1990; 11:205–218.

Thompson JK, Coovert MD, Stormer SM. Body image, social comparison, and eating disturbance: A covariance structure modeling investigation. International Journal of Eating Disorders. 1999; 26:43–51. [PubMed: 10349583]

Vitousek KB, Hollon SD. The investigation of schematic content and processing in eating disorders. Cognitive Therapy and Research. 1990; 14:191–214.

Watson, D.; Clark, LA. Unpublished manuscript. University of Iowa; 1994. The PANAS-X: Manual for the Positive and Negative Affect Schedule-Expanded Form.

Table 1

Sample Characteristics

	EPHB (*n*=55)	HB (*n*=45)	LB (*n*=60)	Difference (*p*-value)	Overall Effect Size (partial η^2)
Age	19.71 ± 5.81	19.44 ± 3.23	19.34 ± 3.88	ns (p = .91)	-
Ethnicity (%)				ns (p = .45)	-
Caucasian	90.2	90.2	86.4		
African American	6.0	7.3	8.5		
Other	3.8	2.5	5.1		
BSQ	140.71±19.32	128.20±16.88	55.32 ±12.28	EPHB>HB>LB (*p*s ≤ .001)	.86
BMI	25.46 ± 4.57	25.43 ± 4.62	21.34 ± 3.07	EPHB, HB>LB (*p*s < .001)	.20

Note. EPHB = women with high body dissatisfaction and eating disorders; HB = women with high body dissatisfaction and no eating pathology; LB = women with low body dissatisfaction and no eating pathology. BSQ = Body Shape Questionnaire; higher scores indicate greater body dissatisfaction. BMI = Body Mass Index (based on self-reported weight and height).

Table 2

Tests of the Level 1 Variance Components

Variable	Chi-Square	*p*-value
	Bernoulli Models	
Upward Comparison	571.28	<.001
Downward Comparison	381.94	<.001
No Comparison/Any Comparison	618.55	<.001
	Normal Distribution Models	
NA	2243.96	<.001
PA	2728.20	<.001
Guilt	3823.93	<.001
Social Esteem	5344.10	<.001
Appearance Esteem	4534.64	<.001
Diet Thoughts	179.82	.148
Diet Behavior	1697.72	<.001
Exercise Thoughts	3355.05	<.001
Exercise Behavior	1079.82	<.001

Note. For all chi-square, degrees of freedom = 161; NA = negative affect; PA = positive affect.

Table 3

Group Differences in the Effects of Upward and Downward Comparisons Relative to Baseline, or No Comparison, Levels

	EPHB				HB				LB				Group Differences
	γ	***SE***	***t***	***p***	***γ***	***SE***	***t***	***p***	***γ***	***SE***	***t***	***p***	
NA													
Up	4.07	1.35	3.02	<.01	3.02	1.31	2.02	.02	2.20	1.15	1.91	.06	EPHB > HB,LB
Down	−2.86	1.92	−1.49	.14	−3.52	1.73	−1.89	.04	−1.68	1.56	−1.08	.28	HB < LB
PA													
Up	−1.27	1.89	−0.67	.50	−2.41	1.83	−1.32	.19	0.04	1.61	0.03	.98	HB < LB
Down	6.97	2.68	2.60	.01	4.04	2.42	1.67	.10	4.32	2.18	1.98	.05	EPHB > LB, HB
Guilt													
Up	5.60	0.94	5.97	<.01	3.89	0.91	4.28	<.01	3.08	0.80	3.86	<.01	EPHB > LB, HB
Down	−1.98	1.33	−1.49	.14	−3.24	1.20	−2.70	<.01	−1.30	1.08	−1.20	.23	EPHB, LB > HB
Appearance Esteem													
Up	−2.44	0.93	−2.64	<.01	−2.45	0.90	−2.73	<.01	−2.25	0.79	−2.85	<.01	ns
Down	6.76	1.31	5.14	<.01	7.25	1.19	6.11	<.01	4.82	1.07	4.50	<.01	EPHB, HB > LB
Social Esteem													
Up	−4.99	1.14	−4.38	<.01	−3.59	1.10	−3.25	<.01	−2.45	0.97	−2.53	.01	EPHB < HB < LB
Down	0.27	1.61	0.17	.87	2.72	1.46	1.87	.06	−0.28	1.32	−0.22	.83	EPHB, LB < HB
Diet Thoughts													
Up	1.44	0.37	3.89	<.01	1.00	0.36	2.79	<.01	0.67	0.32	2.13	.03	EPHB > HB > LB
Down	−0.01	0.52	−0.02	.98	0.11	0.47	0.23	.82	−0.01	0.43	−0.03	0.98	ns
Diet Behavior													
Up	−0.03	0.11	−0.27	.78	−0.09	0.10	−0.84	.40	−0.06	0.09	−0.64	.52	ns
Down	−0.14	0.15	−0.93	.35	−0.14	0.14	−0.99	.32	−0.11	0.12	−0.86	.39	ns
Exercise Thoughts													
Up	0.78	0.40	1.95	.05	0.34	0.39	0.87	.38	0.50	0.34	1.45	.15	EPHB > HB

	EPHB				HB				LB				Group Differences
	γ	***SE***	***t***	***p***	***γ***	***SE***	***t***	***p***	***γ***	***SE***	***t***	***p***	
Down	−0.09	0.57	−0.17	.87	−0.45	0.51	−0.87	.38	−0.05	0.46	−0.11	.91	ns
Exercise Behavior													
Up	0.07	0.09	0.70	.48	0.03	0.09	0.35	.73	0.03	0.08	0.36	.72	ns
Down	0.08	0.13	0.61	.54	0.04	0.12	0.35	.72	0.17	0.11	1.62	.11	LB > HB

Note. Positive coefficients (γ) indicate that the measured dependent variable increased from no comparison levels, whereas negative coefficients indicate that the measured dependent variable decreased from no comparison levels. Time lag between prompts was controlled for in these analyses. EPHB = women with high body dissatisfaction and eating pathology; HB = women with high body dissatisfaction and no eating pathology; LB = women with low body dissatisfaction and no eating pathology.

Table 4

Thoughts and Frequency of Extreme Compensatory Behaviors for EPHB Women in the Absence of a Comparison, After an Upward Comparison, and After a Downward Comparison

	M ± *SD*	*p*	Effect Size (*d*)
Thoughts of Extreme Compensatory Behavior			
No comparison	.32 ± .59 [a]		
Upward comparison	.75 ± 1.25 [b]	.001	.44
Downward comparison	.60 ± 1.42 [a,b]	.21	-
Frequency of Extreme Compensatory Behavior			
No comparison	.03 ± .08 [a]		
Upward comparison	.06 ± .07 [b]	.02	.32
Downward comparison	.06 ± 1.42 [a,b]	.29	-

Note. Within groupings, values with different subscripts (a, b) differ significantly from each other ($p < .05$). For example, participants reported more thoughts of compensatory behaviors after an upward comparison than in the absence of comparisons (a vs. b); however, frequency of thoughts did not differ between upward and downward comparisons, as shown by the shared subscript (b).