Title

A naturalistic examination of social comparisons and disordered eating thoughts, urges, and behaviors in college women

Journal

International Journal of Eating Disorders, 49(2)

ISSN

0276-3478

Authors

Fitzsimmons-Craft, Ellen E
Ciao, Anna C
Accurso, Erin C

Publication Date

2016-02-01

DOI

10.1002/eat.22486

Peer reviewed

HHS Public Access

Author manuscript

Int J Eat Disord. Author manuscript; available in PMC 2017 February 01.

Published in final edited form as:

Int J Eat Disord. 2016 February ; 49(2): 143–152. doi:10.1002/eat.22486.

A Naturalistic Examination of Social Comparisons and Disordered Eating Thoughts, Urges, and Behaviors in College Women

Ellen E. Fitzsimmons-Craft, PhD[1], **Anna C. Ciao, PhD**[2], and **Erin C. Accurso, PhD**[3]

[1]Department of Psychiatry, Washington University School of Medicine, St. Louis, MO, USA

[2]Department of Psychology, Western Washington University, Bellingham, WA, USA

[3]Department of Psychiatry, University of California, San Francisco, San Francisco, CA, USA

Abstract

Objective—We examined the effects of body, eating, and exercise social comparisons on prospective disordered eating thoughts and urges (i.e., restriction thoughts, exercise thoughts, vomiting thoughts, binge eating urges) and behaviors (i.e., restriction attempts, exercising for weight/shape reasons, vomiting, binge eating) among college women using ecological momentary assessment (EMA).

Method—Participants were 232 college women who completed a two-week EMA protocol, in which they used their personal electronic devices to answer questions three times per day. Generalized estimating equation models were used to assess body, eating, and exercise comparisons as predictors of disordered eating thoughts, urges, and behaviors at the next report, adjusting for body dissatisfaction, negative affect, and the disordered eating thought/urge/behavior at the prior report, as well as body mass index.

Results—Body comparisons prospectively predicted more intense levels of certain disordered eating thoughts (i.e., thoughts about restriction and exercise). Eating comparisons prospectively predicted an increased likelihood of subsequent engagement in all disordered eating behaviors examined except vomiting. Exercise comparisons prospectively predicted less intense thoughts about exercise and an increased likelihood of subsequent vomiting.

Discussion—Social comparisons are associated with later disordered eating thoughts and behaviors in the natural environment and may need to be specifically targeted in eating disorder prevention and intervention efforts. Targeting body comparisons may be helpful in terms of reducing disordered eating thoughts, but eating and exercise comparisons are also important and may need to be addressed in order to decrease engagement in actual disordered eating behaviors.

Keywords

ecological momentary assessment; social comparison; disordered eating; eating disorder; college students

[*]*Correspondence to*: Ellen E. Fitzsimmons-Craft, Department of Psychiatry, Washington University School of Medicine, Campus Box 8134, 660 S. Euclid Ave., St. Louis, MO 63110. fitzsimmonscrafte@psychiatry.wustl.edu.

Eating disorder pathology is pervasive among college women. Roughly 4–9% of college women suffer from clinical eating disorders,[1,2] and 40–49% or more exhibit subthreshold symptoms.[3] Such alarming rates of eating disorder pathology among college women underscore the need to understand precursors to these symptoms, particularly mutable behaviors.

Social comparison is one potential trigger for engaging in disordered eating. Social comparison theory holds that humans have a natural drive to assess their standing in life.[4] College campuses lend themselves to engagement in comparisons, as women are surrounded female peers with whom they interact daily. Indeed, social comparisons with peers are common among college women,[5] and increased engagement in this behavior may contribute to elevated levels of disordered eating. Social comparisons regarding one's body (e.g., weight), eating (e.g., amount eaten, food healthfulness), and exercise (e.g., amount/intensity of exercise) may be particularly relevant to understanding disordered eating in this population. Body-related comparisons may increase discrepancy between a woman's actual and ideal body, which may increase thoughts about or attempts to "fix" her body. Indeed, frequency of body-related comparisons is significantly associated with disordered eating among college females.[6–8] Furthermore, individuals with eating disorders engage in more body comparisons than controls,[9] and college women with eating disorder symptoms engage in more general, everyday comparisons than their asymptomatic peers.[10] To date, much of the past research on the social comparison-disordered eating relation has focused on body-related comparisons[5,11] and neglected eating and exercise comparisons. Eating and exercise comparisons focus more on behaviors required to achieve one's ideal body.[12] Eating- and exercise-related comparisons may highlight a discrepancy between a woman's ideal eating and exercise habits and her current eating/exercise, which may result in disordered eating or unhealthy exercise thoughts or behaviors. Indeed, college women who engage in body, eating, and exercise comparisons are more likely to engage in current and future disordered eating, up to one year later.[12,13]

Previous research on the relations between body, eating, and exercise comparisons and disordered eating is limited by its reliance on traditional self-report questionnaires, which are often completed in experimental settings and require recall over long periods of time. Ecological momentary assessment (EMA) circumvents these limitations with data collected in the natural environment and real-time reporting of experiences. In an overview of this approach, Smyth et al.[14] highlighted several advantages of EMA: ecological validity because data collection occurs in the natural environment; reduced retrospective recall biases since data are provided in the moment or, at most, in the past several hours; and temporal ordering of hypothesized causal factors and outcomes. Research using this methodology indicated that state-like body, eating, and exercise comparisons were contemporaneously associated with body dissatisfaction and that state-like eating comparisons predicted later body dissatisfaction among college women,[15] but the relations between such comparisons and later disordered eating thoughts, urges, and behaviors in the natural environment are unknown.

Thus, the purpose of the current study was to examine the relations among frequency of body, eating, and exercise comparisons and prospective disordered eating thoughts, urges,

and behaviors among college women using EMA. We hypothesized that more frequent body, eating, and exercise comparisons would prospectively predict more intense disordered eating thoughts and urges (i.e., restriction thoughts, exercise thoughts, vomiting thoughts, binge eating urges) and an increased likelihood of subsequent disordered eating behaviors (i.e., restriction attempts, exercising for weight/shape reasons, vomiting, binge eating). In order to provide an even more stringent test of these relations, analyses were run adjusting for prior levels of the disordered eating thought/urge or prior engagement in the disordered eating behavior being examined (which adjusts for temporal stability of the outcome variable), as well as for body dissatisfaction, negative affect, and body mass index (BMI)—constructs that have been found to play significant roles in disordered eating.[16,17] As a secondary aim, we examined these data descriptively to shed light on what might be considered unhealthy comparison levels. Since vomiting is the least frequently reported but most concerning disordered eating behavior in college women, we compared average body-, eating-, and exercise-related comparison frequencies across the EMA period between women at low (i.e., no vomiting thoughts or behaviors), moderate (i.e., vomiting thoughts but no behaviors), and high risk (i.e., vomiting behaviors present) for vomiting. These analyses were considered exploratory and no specific hypotheses were made.

Method

Participants

Participants were 235 women attending a large, public Southeastern university who were recruited through introductory psychology courses. This study was part of a larger study on psychosocial predictors of college women's body image and disordered eating.[18] Participants' age ranged from 17 to 22 years, with a mean age of 18.70 years (*SD* = 1.00). Most women (68.9%) identified as White, 7.7% as African American or Black, 7.7% as Asian, 4.3% as Hispanic, 1.3% as American Indian or Alaskan Native, 9.8% as multiracial/multiethnic, and 0.4% as other races/ethnicities. Highest parental education was used as a proxy for socioeconomic status and ranged from 7 to 21 years (*M* = 16.50, *SD* = 2.68). BMI was calculated from self-reported height and weight and ranged from 16.13 to 41.60 kg/m^2 (*M* = 22.56, *SD* = 3.43).

Procedure

An orientation session informed participants about study procedures, EMA reporting procedures, and behaviors (providing definitions and examples) participants would track (e.g., body comparison: "comparing your body/some aspect of your body to a same-sex peer," binge eating: "eating an unusually large amount of food in a discrete period of time and feeling a sense of loss of control over your eating"). Participants were provided with a short manual containing information discussed.

Participants then completed the two-week EMA protocol using their personal electronic devices (e.g., laptop, tablet, smartphone, or some combination) to answer questions three times per day: late morning (10:30 am–1:30 pm), late afternoon (3:30 pm–6:30 pm), and before going to sleep (10:00 pm–1:00 am). Participants were provided with these times as guidelines but also received reminder emails with the survey link (i.e., signals for reporting)

at the beginning of each time period across the EMA period. Participants received reminder text messages for the first three days of data collection as well (except for one participant who opted out). Across EMA studies of social comparison, body image, and eating disorder behaviors, reactivity is generally of minimal concern.[5,19] In addition, collecting EMA data via personal computers is feasible with good compliance among college students.[20] Furthermore, compliance is improved with participant-management procedures such as training, feedback, and check-ins;[21] thus, research assistants contacted participants at least three times per week (once via phone and twice via email) to check in and address problems. Participants were also contacted by phone and email on any day after they failed to complete a bedtime report to request that they complete all reports for that day. Participants were incentivized to maximize compliance with study procedures through course credit and drawings for one of six $100 prizes. This study was approved by the university's Institutional Review Board.

Measures

Measures were chosen to maximize reliability and validity yet minimize participant burden.

Social comparison—Social comparison frequency was assessed using visual analogue scales. In particular, body-related social comparison was assessed using the following question: "Please slide the bar to indicate the level of BODY comparison behavior you have engaged in since the last time you were signaled, where 0 = *no body comparisons* and 100 = *constantly making body comparisons*." Parallel questions assessing eating- and exercise-related social comparison frequencies were administered as well. Previous naturalistic work on social comparison has often used single items.[5,22] One-item visual analogue scales are brief, easy to administer, and demonstrate sensitivity to short-term change.[23]

Body dissatisfaction—Body dissatisfaction was assessed using visual analogue scales. In particular, weight dissatisfaction was assessed with using the following question: "Please slide the bar to indicate how dissatisfied with your WEIGHT you have been since the last time you were signaled, where 0 = *not at all dissatisfied* and 100 = *very dissatisfied*." A parallel question assessing level of shape dissatisfaction was administered as well. The average of these two items was used as a measure of body dissatisfaction. In the current study, internal consistency was high (alpha = .89), and previous naturalistic work supports the use of single items to assess body dissatisfaction.[24]

Negative affect—Negative affect was assessed using a five-item version of the negative affect subscale of the Positive and Negative Affect Schedule (PANAS)[25] developed by Kercher.[26] Mackinnon et al.[27] provided further evidence of the factor structure of the five-item negative affect subscale of the PANAS in a community sample of adults and demonstrated strong internal consistency (alphas > .85). Participants were asked to rate their current level of five negative emotions (i.e. distressed, upset, scared, nervous, afraid) on a scale ranging from 1 = *not at all* to 5 = *very much*. Items were summed to create a subscale score. In the current study, internal consistency was high (alpha = .86).

Disordered eating thoughts, urges, and behaviors—Disordered eating thought and urge intensity was rated from 0 = *not at all* to 6 = *markedly* using the following questions: "Have you thought about trying to restrict the amount or type of food you eat in order to influence your shape or weight?" (i.e., restriction thoughts), "Have you thought about exercising as a means of controlling your weight, altering your shape or amount of fat, or burning off calories" (i.e., exercise thoughts), "Have you thought about vomiting as a means of trying to control your shape or weight?" (i.e., vomiting thoughts), and "Have you had the urge to binge eat?" (i.e., binge eating urges). Participants were asked to think about the period of time since the last time they were signaled in responding to these questions.

Disordered eating behaviors were assessed using the following yes/no questions: "Did you attempt to restrict your eating to influence your shape or weight since the last time you were signaled?" (i.e., restriction attempt), "Did you actually exercise to influence your shape or weight since the last time you were signaled?" (i.e., exercising), "Did you actually vomit since the last time you were signaled?" (i.e., vomiting), and "Did you actually binge eat since the last time you were signaled?" (i.e., binge eating).

The disordered eating thoughts, urges, and behaviors questions were adapted from the Eating Disorders Examination-Questionnaire (EDE-Q)[28] and have been used in previous EMA research on social comparisons and disordered eating.[5,29]

Analytic Strategy

Generalized estimating equation models (with a gamma distribution for the disordered eating thought and urge models and with a logit response function for the disordered eating behavior models) were used to assess body, eating, and exercise comparisons as predictors of disordered eating thoughts/urges/behaviors at the next report, adjusting for body dissatisfaction, negative affect, and the disordered eating thought/urge/behavior at the prior report, as well as for BMI. These models assume that repeated observations are nested within persons and are appropriate for skewed data.[30] Only within-day lagged effects were examined. That is, social comparisons before going to sleep one evening were not examined as predictors of disordered eating thoughts/urges/behaviors the next morning given other factors (aside from the model predictors) that could have contributed to findings (e.g., long period of time between assessments, long period of sleep). For all models, we calculated pseudo-R^2 as a measure of effect size using corrected quasi likelihood under independence model criterion (QICC) values. This value represents the change in pseudo-R^2 when the variables of interest (i.e., body, eating, and exercise comparisons) were added to the model. To examine body, eating, and exercise comparison frequencies across vomiting risk status groups, analyses of variance (ANOVAs) and follow-up Tukey HSD tests were used. All analyses were performed using SPSS Version 19.0.

Results

Descriptive Analyses

Participants provided 8,813 separate recordings. Overall compliance with completing EMA surveys was high at 89.3% (about 38 out of 42 surveys). Further, 97% of the participants

completed 70% or more of the surveys, and 78% completed 85% or more of the surveys. Participants' timeliness was also good, with 73.8% of reports completed within the time guidelines provided. We examined *z* scores in order to determine whether there were any outliers with respect to number of surveys completed. Three participants completed 21, 24, and 26 surveys ($z \geq -3.0$); all other participants completed 28 or more surveys. Data from these three participants were excluded from analyses, yielding a final sample size of 232.

Grand means for and correlations among person-level means (i.e., individuals' mean levels of a given construct over the two-week EMA period) for social comparisons, body dissatisfaction, negative affect, and disordered eating thoughts and urges over the two-week EMA period are provided in Table 1. Of note, all constructs were significantly positively correlated, and body comparisons were the most frequent type of social comparison behavior reported, followed by eating and then exercise comparisons. In terms of disordered eating behaviors, of the 8,742 valid EMA reports, restriction attempts were reported in 22.2%, exercise for weight/shape reasons in 11.4%, vomiting in 0.5%, and binge eating in 3.2%. Any restriction attempt was reported by 74.6% of the sample, any exercise by 79.7%, any vomiting by 6.9%, and any binge eating by 28.9%. Over the two-week EMA period, participants reported a mean of 8.35 restriction attempts (*SD* = 10.51), 4.28 exercise episodes (*SD* = 5.09), .19 vomiting episodes (*SD* = 1.38), and 1.20 binge eating episodes (*SD* = 3.48).[a]

Predictors of Disordered Eating Thoughts and Urges

Results of the analyses examining body, eating, and exercise comparisons as predictors of subsequent disordered eating thoughts and urges, adjusting for prior body dissatisfaction, negative affect, and the disordered eating thoughts/urges, as well as for BMI, are presented in Table 2. Results revealed that more frequent body comparisons prospectively predicted more intense restriction thoughts ($p < .04$) and exercise thoughts ($p < .05$). More frequent exercise comparisons also prospectively predicted less intense exercise thoughts over time ($p < .001$), but eating or exercise comparisons did not prospectively predict any other disordered eating thoughts or urges (*p*s > .06). Of note, body dissatisfaction prospectively predicted all disordered eating thoughts and urges: restriction thoughts ($p < .001$), exercise thoughts ($p < .001$), vomiting thoughts ($p < .02$), and urges to binge eat ($p < .008$). Negative affect prospectively predicted vomiting thoughts ($p < .02$) and binge eating urges ($p < .05$) but not restriction thoughts or exercise thoughts (*p*s > .07). BMI did not predict any of the disordered eating thoughts or urges (*p*s > .06).

[a]Data collection for this study occurred over the course of two academic semesters; 118 participants completed the study during the Spring 2012 semester and 117 participants took part in the study during the Fall 2012 semester. We tested for group (i.e. spring semester versus fall semester participants) differences in average levels of body-, eating- and exercise-related social comparison behavior, body dissatisfaction, negative affect, and disordered eating thoughts, urges, and behaviors reported during the EMA period. Results indicated that the groups did not differ in average levels of exercise-related social comparison behavior, negative affect, exercise thoughts, or any disordered eating behaviors (*p*s > .14). However, groups did significantly differ in average levels of body-related social comparison behavior, eating-related social comparison behavior, body dissatisfaction, restriction thoughts, vomiting thoughts, and binge eating urges (*p*s < .007), with those participating in the fall reporting higher levels of these constructs than the spring participants (with the exception of vomiting thoughts, which were higher in the spring participants), perhaps reflecting an effect of returning to (or starting at) the college campus. All study analyses were re-run adjusting for semester of participation. Patterns of significance remained the same whether or not this covariate was included in the model (with the exceptions of negative affect becoming non-significant in the binge eating urges model, $p = .05$ and BMI becoming non-significant in the vomiting model, $p < .06$), and in no case was semester of participation a significant predictor of the criterion variable.

Predictors of Disordered Eating Behaviors

Results of the analyses examining body, eating, and exercise comparisons as predictors of later disordered eating behaviors, adjusting for prior body dissatisfaction, negative affect, and the disordered eating behavior, as well as for BMI, are presented in Table 3. Results revealed that more frequent eating comparisons prospectively predicted an increased likelihood of subsequent restriction attempts ($p < .04$), exercising ($p < .004$), and binge eating ($p < .02$), but not vomiting ($p < .24$). More frequent exercise comparisons prospectively predicted an increased likelihood of subsequent vomiting ($p < .001$), but body or exercise comparisons did not prospectively predict likelihood of any other subsequent disordered eating behaviors ($ps > .35$). Of note, body dissatisfaction prospectively predicted an increased likelihood of subsequent restriction attempts ($p < .001$), exercising ($p < .001$), and binge eating ($p < .001$), but not vomiting ($p < .10$). Negative affect prospectively predicted an increased likelihood of subsequent restriction attempts ($p < .02$) and vomiting ($p = .001$) but not exercising or binge eating ($ps > .13$). BMI prospectively predicted a decreased likelihood of vomiting ($p < .04$) but did not predict any other disordered eating behaviors ($ps > .11$).

Defining Unhealthy Levels of Social Comparison Behaviors

Participants were sorted into one of three categories (i.e., low, moderate, and high risk for vomiting) based on their EMA data: 1) low risk: no vomiting thoughts or behaviors ($n = 158$); 2) high risk: vomiting thoughts (i.e., any vomiting thought rating > 0) but no behaviors ($n = 58$); or 3) high risk: vomiting behaviors present ($n = 16$). As detailed in Table 4, those who did not endorse vomiting thoughts or behaviors reported significantly lower frequencies of body-, eating-, and exercise-related social comparisons compared to individuals who thought about or who engaged in the behavior (who did not differ).

Discussion

This study examined the relations among social comparison frequencies (i.e., body, eating, and exercise) and prospective disordered eating thoughts, urges, and behaviors. Results indicated that social comparisons were associated with later disordered eating thoughts and behaviors in the natural environment. More frequent eating comparisons were found to be particularly harmful, as they prospectively predicted an increased likelihood of subsequent engagement in all disordered eating behaviors examined (i.e., restriction attempts, exercising, binge eating), with the exception of vomiting. More frequent exercise comparisons prospectively predicted an increased likelihood of subsequent vomiting, and contrary to our predictions, were associated with less intense thoughts about exercise. Finally, more frequent body comparisons prospectively predicted more intense thoughts about restriction and exercise.

Much of the past research on the relation between social comparison and disordered eating has focused on body-related comparisons.[5,11] While body comparisons did predict subsequent thoughts about restrictive-type aspects of disordered eating in the current study, they did not predict actual engagement in disordered eating behaviors. Rather, eating and exercise comparisons emerged as important predictors of subsequent disordered eating

behavior. More frequent eating comparisons predicted an increased likelihood of subsequent restriction attempts, binge eating, and exercise, while more frequent exercise comparisons predicted an increased likelihood of subsequent vomiting. Interestingly, more frequent exercise comparisons also prospectively predicted less intense exercise thoughts. Although past research using traditional self-report questionnaires suggested that eating comparisons accounted for variance in concurrent but not prospective levels of disordered eating,[12,13] the current study sheds light on the harmful effects of more momentary engagement in this behavior. Furthermore, Fitzsimmons-Craft et al.[15] found that momentary eating comparisons were a particularly potent predictor of body dissatisfaction over time.

At least some eating and exercise comparisons may occur during the act of eating or exercising. Eating in particular may be associated with persisting physiological sensations such as fullness or bloating, which may increase motivation to "do something" (e.g., engage in unhealthy behaviors) to mitigate these feelings. The effect of exercise comparisons on thoughts about exercise may be more immediate and fleeting than the timeframe examined here. That is, it could be that exercise comparisons increase the intensity of exercise thoughts while one is actually exercising but that the intensity of these thoughts decreases once one stops exercising. Future research should explore this possibility. In terms of the relationship between exercise comparisons and later vomiting, it is possible that because exercise does not result in immediate effects on weight, students may be motived to engage in a more extreme disordered eating behavior—vomiting. Alternatively, body-related comparisons may make only temporarily salient the discrepancy between a woman's ideal and current bodies, which may result in increased thoughts about how she *could* change her body (e.g., thoughts about restricting and exercising). Unlike eating comparisons, body comparisons are not as readily associated with physiological sensations and therefore may not result in the same urgency to engage in disordered eating behaviors.

Of note, body dissatisfaction prospectively predicted more intense levels of all disordered eating thoughts and urges examined over time, as well as an increased likelihood of subsequent engagement in all disordered eating behaviors with the exception of vomiting. Negative affect was associated with more intense binge-purge thoughts over time and prospective engagement in restriction attempts and vomiting. It was somewhat surprising that negative affect was not also associated with binge eating over time given past EMA research highlighting negative affect as a key precipitant of both bingeing and purging in the natural environment among women with anorexia nervosa and bulimia nervosa.[31,32] However, one must keep in mind that this discrepancy could be due to differences in the samples used (clinical samples in the Engel et al.[31] and Smyth et al.[32] studies vs. college student sample in the current study) and/or in the overall frequency of binge eating (means of 2.5 and 8.7 binge eating episodes over two weeks in the Engel et al. anorexia nervosa sample and Smyth et al. bulimia nervosa sample, respectively vs. mean of 1.2 binge eating episodes over two weeks in the current sample). Regardless, these findings highlight that while social comparisons are important prospective predictors of disordered eating thoughts and behaviors among college women, so too are body dissatisfaction and negative affect. It would be interesting for future research to explore potential reciprocal relations among these constructs in the natural environment. On the other hand, BMI was not related to any of the

disordered eating thoughts, urges, or behaviors examined except for vomiting—lower BMI was associated with an increased likelihood of vomiting. This suggests that BMI may not be an especially important predictor of disordered eating in the natural environment when other, more relevant constructs are considered, which is in line with past research on college women.[33]

This study also shed some light on the question of healthy vs. unhealthy levels of these comparisons by examining mean levels of body, eating, and exercise comparisons across individuals who endorsed no vomiting thoughts or behaviors vs. vomiting thoughts but no behaviors vs. vomiting behaviors present. Women who thought about or engaged vomiting reported much higher levels of these comparisons than women who were not thinking about or engaging this behavior. These levels were about one-fifth to one-quarter up the visual analogue scales, where the highest level would have indicated “constantly making comparisons.” These data suggest that thinking about or engaging in a harmful aspect of disordered eating such as vomiting is associated with heightened body-, eating-, and exercise-related social comparison frequency. Interestingly, for both participants in general and participants endorsing vomiting thoughts or behaviors, body comparisons were the most frequent type of comparison reported, followed by eating and then exercise comparisons. It is important to note that eating and exercise comparisons, which were less frequently reported than body comparisons, emerged as important predictors of disordered eating behaviors. This is in contrast to body comparisons, which were more predictive of disordered eating thoughts. Thus, these less common forms of comparison appear to have the most harmful effects.

A strength of this study is its use of EMA, which provides information on behaviors in the moment and reduces the influence of retrospective recall biases.[14] An additional strength is the assessment different types of social comparisons, which provides information on differential relations between body, eating, and exercise comparisons and disordered eating thoughts, urges, and behaviors. Furthermore, the analytic technique provided a stringent test of these relations since analyses were run adjusting for body dissatisfaction, negative affect, and BMI, constructs that have been found to be associated with disordered eating in past work,[16,17] as well as for prior levels of the disordered eating thought, urge, or behavior.

In terms of limitations relative to other EMA studies, participants were asked to fill out EMA question sets three times per day during certain windows of time (generally responding to questions about the past several hours) rather than being randomly signaled to complete surveys. Future research would benefit from the use of random signals and more questions about the current moment, which would provide even more momentary information and reduce the influence of retrospective recall biases even further. An additional limitation is the fact that all participants, even those who endorsed vomiting thoughts and behaviors, evidenced relatively low grand means for social comparisons and body dissatisfaction, which may have been due to the use of visual analogue scales with a range of 0–100. It is possible that these floor effects may have decreased power or attenuated relationships between study variables. Likewise, the proportion of the current sample who reported any binge eating is somewhat high (28.9%) but is in line with other work assessing prevalence of any binge eating in a general college female sample (e.g., Berg

et al.[3]: 17–20%; Eisenberg et al.[34]: 26%). Participants were provided with a definition of binge eating as well; however, we cannot rule out the possibility that at least some participants may not have understood the definition of binge eating and that this could have inflated reports of this behavior. The assessment of restriction and exercise thoughts/behaviors is also a limitation in the sense that endorsement of these items may not always reflect disordered eating. For example, participants could have been thinking about or engaging in these behaviors in the context of healthy weight loss efforts. Finally, we assessed overall frequencies of the different comparisons without consideration of the direction of the comparison—upward or downward. Upward social comparisons occur when an individual compares herself to someone whom she perceives to be "better off" in some way, while downward comparisons occur when an individual compares herself to someone whom she perceives to be "worse off."[35] There is some evidence that upward comparisons may be associated with more negative outcomes than downward comparisons,[5] but importantly, research has shown that college women engage in more upward than downward comparisons.[5,29,36,37] Thus, while the current study was not able to assess frequency of upward vs. downward comparisons, the majority of comparisons on which participants reported were likely in the upward direction. Furthermore, correlational research indicates that upward and downward comparison tendencies are both positively associated with body dissatisfaction and disordered eating among college women.[37,38] As such, examining overall frequencies of comparisons is likely to provide important information, but future research may also wish to examine associations between specific frequencies of upward vs. downward body-, eating-, and exercise-related comparisons and disordered eating thoughts, urges, and behaviors.

These results have several clinical implications. In particular, social comparisons may need to be specifically targeted in eating disorder prevention and intervention efforts. Results of the current study suggest that it may not be enough to target body dissatisfaction and negative affect (known predictors of disordered eating)[17] because social comparisons were damaging above and beyond the effects of these constructs. Furthermore, when comparison-making is addressed, the focus is often on body comparisons exclusively, as is the case in Fairburn's[39] Cognitive-Behavioral Therapy-Enhanced manual for eating disorders. Results of this study suggest that targeting body comparisons may be helpful in terms of reducing disordered eating thoughts, but that eating and exercise comparisons are also important and may need to be specifically addressed in order to decrease engagement in actual disordered eating behaviors.

Acknowledgements

This research was supported by the following grants: F31 MH093978 and T32 MH082761 from the National Institute of Mental Health; T32 HL007456 from the National Heart, Lung, and Blood Institute; University of North Carolina at Chapel Hill Department of Psychology Earl and Barbara Baughman Dissertation Research Award.

References

1. Hesse-Biber S, Marino M, Watts-Roy D. A longitudinal study of eating disorders among college women: Factors that influence recovery. Gender Soc. 1999; 13:385–408.
2. Keel PK, Heatherton TF, Dorer DJ, Joiner TE, Zalta AK. Point prevalence of bulimia nervosa in 1982, 1992, and 2002. Psychol Med. 2006; 36:119–127. [PubMed: 16202192]

3. Berg KC, Frazier P, Sherr L. Change in eating disorder attitudes and behavior in college women: Prevalence and predictors. Eat Behav. 2009; 10:137–142. [PubMed: 19665094]
4. Festinger L. A theory of social comparison processes. Hum Relat. 1954; 7:117–140.
5. Leahey TM, Crowther JH, Mickelson KD. The frequency, nature, and effects of naturally occurring appearance-focused social comparisons. Behav Ther. 2007; 38:132–143. [PubMed: 17499080]
6. Arigo D, Schumacher L, Martin LM. Upward appearance comparison and the development of eating pathology in college women. Int J Eat Disord. 2014; 47:467–470. [PubMed: 24375614]
7. Lindner D, Tantleff-Dunn S, Jentsch F. Social comparison and the 'circle of objectification.'. Sex Roles. 2012; 67:222–235.
8. Pinkasavage E, Arigo D, Schumacher LM. Social comparison, negative body image, and disordered eating behavior: The moderating role of coping style. Eat Behav. 2015; 16:72–77. [PubMed: 25464070]
9. Amin R, Strauss C, Waller G. Body-related behaviours and cognitions in the eating disorders. Behav Cogn Psychoth. 2014; 42:65–73.
10. Corning AF, Krumm AJ, Smitham LA. Differential social comparison processes in women with and without eating disorder symptoms. J Couns Psychol. 2006; 53:338–349. (2006).
11. Bamford B, Halliwell E. Investigating the role of attachment in social comparison theories of eating disorders within a non-clinical female population. Eur Eat Disord Rev. 2009; 17:371–379. [PubMed: 19593745]
12. Fitzsimmons-Craft EE, Bardone-Cone AM, Harney MB. Development and validation of the Body, Eating, and Exercise Comparison Orientation Measure (BEECOM) among college women. Body Image. 2012; 9:476–487. [PubMed: 22902098]
13. Fitzsimmons-Craft EE, Bardone-Cone AM. One-year temporal stability and predictive and incremental validity of the Body, Eating, and Exercise Comparison Orientation Measure (BEECOM) among college women. Body Image. 2014; 11:27–35. [PubMed: 24120182]
14. Smyth J, Wonderlich S, Crosby R, Miltenberger R, Mitchell J, Rorty M. The use of ecological momentary assessment approaches in eating disorder research. Int J Eat Disord. 2001; 30:83–95. [PubMed: 11439412]
15. Fitzsimmons-Craft EE, Bardone-Cone AM, Wonderlich SA, Crosby RD, Engel SG, Bulik CM. The relationships among social comparisons, body surveillance, and body dissatisfaction in the natural environment. Behav Ther. 2015; 46:257–271. [PubMed: 25645173]
16. Keel PK, Forney KJ, Brown TA, Heatherton TF. Influence of college peers on disordered eating in women and men at 10-year follow-up. J Abnorm Psychol. 2013; 122:105–110. [PubMed: 23025666]
17. Stice E. Risk and maintenance factors for eating pathology: A meta-analytic review. Psychol Bull. 2002; 128:825–848. [PubMed: 12206196]
18. Fitzsimmons-Craft EE, Bardone-Cone AM, Bulik CM, Wonderlich SA, Crosby RD, Engel SG. Examining an elaborated sociocultural model of disordered eating among college women: The roles of social comparison and body surveillance. Body Image. 2014; 11:488–500. [PubMed: 25160010]
19. Heron KE, Smyth JM. Is intensive measurement of body image reactive? A two-study evaluation using ecological momentary assessment suggests not. Body Image. 2013; 10:35–44. [PubMed: 22999225]
20. Zuckerman M, O'Loughlin RE. Self-enhancement by social comparison: A prospective analysis. Pers Soc Psychol B. 2006; 32:751–760.
21. Shiffman S. Ecological momentary assessment (EMA) in studies of substance abuse. Psychol Assessment. 2009; 21:486–497.
22. Myers TA, Ridolfi DR, Crowther JH, Ciesla JA. The impact of appearance-focused social comparisons on body image disturbance in the naturalistic environment: The roles of thin-ideal internalization and feminist beliefs. Body Image. 2012; 9:342–351. [PubMed: 22520342]
23. McCormack HM, Horne DJ, Sheather S. Clinical applications of visual analogue scales: A critical review. Psychol Med. 1988; 18:1007–1019. [PubMed: 3078045]
24. Durkin SJ, Paxton SJ, Sorbello M. An integrative model of the impact of exposure to idealized female images on adolescent girls' body satisfaction. J Appl Soc Psychol. 2007; 37:1092–1117.

25. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: The PANAS scales. J Pers Soc Psychol. 1988; 54:1063–1070. [PubMed: 3397865]
26. Kercher K. Assessing subjective well-being in the old-old: The PANAS as a measure of orthogonal dimensions of positive and negative affect. Res Aging. 1992; 14:131–168.
27. Mackinnon A, Jorm AF, Christensen H, Korten AE, Jacomb PA, Rodgers B. A short form of the Positive and Negative Affect Schedule: Evaluation of factorial validity and invariance across demographic variables in a community sample. Pers Indiv Differ. 1999; 27:405–416.
28. Fairburn, CG.; Beglin, S. Eating Disorder Examination Questionnaire (EDE-Q 6.0). In: Fairbun, CG., editor. Cognitive behavior therapy and eating disorders. New York: Guilford; 2008. p. 309-313.
29. Leahey TM, Crowther JH, Ciesla JA. 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. Behav Ther. 2011; 42:197–210. [PubMed: 21496506]
30. Manning WG, Basu A, Mullahy J. Generalized modeling approaches to risk adjustment of skewed outcomes data. J Health Econ. 2005; 24:465–488. [PubMed: 15811539]
31. Engel SG, Wonderlich SA, Crosby RD, Mitchell JE, Crow S, Peterson CB, et al. The role of affect in the maintenance of anorexia nervosa: Evidence from a naturalistic assessment of momentary behaviors and emotion. J Abnorm Psychol. 2013; 122:709–719. [PubMed: 24016011]
32. 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. J Consult Clin Psych. 2007; 75:629–638.
33. Cooley E, Toray T. Disordered eating in college freshman women: A prospective study. J Am Coll Health. 2001; 49:229–235. [PubMed: 11337898]
34. Eisenberg D, Nicklett EJ, Roeder K, Kirz NE. Eating disorder symptoms among college students: Prevalence, persistence, correlates, and treatment-seeking. J Am Coll Health. 2011; 59:700–707. (2011). [PubMed: 21950250]
35. Myers TA, Crowther JH. Social comparison as a predictor of body dissatisfaction: A meta-analytic review. J Abnorm Psychol. 2009; 118:683–698. [PubMed: 19899839]
36. 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]
37. O'Brien KS, Caputi P, Minto R, Peoples G, Hooper C, Kell S, et al. Upward and downward physical appearance comparisons: Development of scales and examination of predictive qualities. Body Image. 2009; 6:201–206. [PubMed: 19447692]
38. Vartanian LR, Dey S. Self-concept clarity, thin-ideal internalization, and appearance-related social comparison as predictors of body dissatisfaction. Body Image. 2013; 10:495–500. [PubMed: 23809858]
39. Fairburn, CG. Cognitive behavior therapy and eating disorders. New York: Guilford; 2008.

Table 1

Grand Means For and Correlations Among Person-Level Means For Social Comparisons, Body Dissatisfaction, Negative Affect, and Disordered Eating Thoughts and Urges (n = 232)

Measure	1	2	3	4	5	6	7	8	9	*M*	*SD*	Possible Range
1. Body-related social comparison	-									18.24	15.20	0–100
2. Eating-related social comparison	.89***	-								12.48	14.10	0–100
3. Exercise-related social comparison	.78***	.86***	-							9.37	11.67	0–100
4. Body dissatisfaction	.67***	.59***	.53***	-						31.67	24.45	0–100
5. Negative affect	.25***	.30***	.25***	.13*	-					7.91	2.33	5–25
6. Restriction thoughts	.54***	.49***	.39***	.63***	.19**	-				1.54	1.40	0–6
7. Exercise thoughts	.43***	.36***	.37***	.56***	.15*	.71***	-			1.80	1.42	0–6
8. Vomiting thoughts	.29***	.40***	.42***	.20**	.36***	.23***	.21**	-		.09	.38	0–6
9. Binge eating urges	.37***	.47***	.42***	.33***	.30***	.42***	.30***	.49***	-	.39	.75	0–6

Note.

*** $p < .001$.

** $p < .01$.

* $p < .05$.

Table 2

Parameter Estimates for Generalized Estimating Equation Models Examining Body-, Eating-, and Exercise-Related Social Comparison as Predictors of Disordered Eating Thoughts and Urges at the Next Report

Criterion Variable	Predictor Variables	B	*SE*	Wald χ^2	*p*
Restriction thoughts$_{T2}$	*Covariates*				
Pseudo-R^2 = .041	Body dissatisfaction$_{T1}$	.003	.001	15.58	< .001
	Negative affect$_{T1}$	.01	.003	3.26	.071
	BMI$_{T1}$	.01	.01	3.62	.057
	Restriction thoughts$_{T1}$	.21	.01	457.44	< .001
	Main Predictor Variables				
	Body-related social comparison$_{T1}$	.001	.001	4.08	.043
	Eating-related social comparison$_{T1}$	.001	.001	2.60	.107
	Exercise-related social comparison$_{T1}$	−.001	.001	1.84	.175
Exercise thoughts$_{T2}$	*Covariates*				
Pseudo-R^2 = .053	Body dissatisfaction$_{T1}$	.003	.001	15.42	< .001
	Negative affect$_{T1}$	.01	.003	2.19	.139
	BMI$_{T1}$	.0004	.01	.01	.935
	Exercise thoughts$_{T1}$	.21	.01	568.56	< .001
	Main Predictor Variables				
	Body-related social comparison$_{T1}$	.001	.001	4.01	.045
	Eating-related social comparison$_{T1}$	.001	.001	3.58	.059
	Exercise-related social comparison$_{T1}$	−.003	.001	17.85	< .001
Vomiting thoughts$_{T2}$	*Covariates*				
Pseudo-R^2 = .028	Body dissatisfaction$_{T1}$	.001	.001	5.45	.020
	Negative affect$_{T1}$	.01	.002	5.43	.020
	BMI$_{T1}$	−.002	.003	.62	.431
	Vomiting thoughts$_{T1}$	.32	.02	248.78	< .001
	Main Predictor Variables				
	Body-related social comparison$_{T1}$	−.0004	.0003	1.37	.241

Criterion Variable	Predictor Variables	B	*SE*	Wald χ^2	*p*
	Eating-related social comparison$_{T1}$	.001	.0004	2.90	.089
	Exercise-related social comparison$_{T1}$	.0001	.001	.06	.803
Binge eating urges$_{T2}$	*Covariates*				
Pseudo-R^2 = .034	Body dissatisfaction$_{T1}$	.002	.001	6.94	.008
	Negative affect$_{T1}$	.01	.004	4.02	.045
	BMI$_{T1}$	.002	.01	.14	.706
	Binge eating urges$_{T1}$	.30	.01	433.68	< .001
	Main Predictor Variables				
	Body-related social comparison$_{T1}$	−.0003	.001	.22	.642
	Eating-related social comparison$_{T1}$	.001	.001	1.44	.230
	Exercise-related social comparison$_{T1}$	.0002	.001	.04	.839

Note. T1 = Time 1. T2 = Time 2. These terms reflect the fact that we examined the relations between the predictor variables at one EMA report and the criterion variable at the next EMA report.BMI = body mass index.

Table 3

Parameter Estimates for Generalized Estimating Equation Models Examining Body-, Eating-, and Exercise-Related Social Comparison as Predictors of Disordered Eating Behaviors at the Next Report

Criterion Variable	Predictor Variables	B	*SE*	Odds Ratio	Wald χ^2	*p*
Restriction attempt$_{T2}$	*Covariates*					
Pseudo-R^2 = .039	Body dissatisfaction$_{T1}$	.01	.003	1.01	12.74	< .001
	Negative affect$_{T1}$	.04	.02	1.04	5.26	.022
	BMI$_{T1}$	.03	.02	--	1.88	.170
	Restriction attempt$_{T1}$	2.31	.17	10.04	190.80	< .001
	Main Predictor Variables					
	Body-related social comparison$_{T1}$	−.001	.003	--	.04	.851
	Eating-related social comparison$_{T1}$	.01	.003	1.01	4.34	.037
	Exercise-related social comparison$_{T1}$	−.001	.003	--	.04	.839
Exercising$_{T2}$	*Covariates*					
Pseudo-R^2 = .042	Body dissatisfaction$_{T1}$	.01	.003	1.01	11.02	.001
	Negative affect$_{T1}$	.03	.02	--	1.47	.225
	BMI$_{T1}$	−.04	.03	--	2.58	.109
	Exercising$_{T1}$	.82	.19	2.28	19.81	< .001
	Main Predictor Variables					
	Body-related social comparison$_{T1}$	−.001	.003	--	.06	.801
	Eating-related social comparison$_{T1}$	.01	.003	1.01	8.41	.004
	Exercise-related social comparison$_{T1}$	.002	.004	--	.21	.650
Vomiting$_{T2}$	*Covariates*					
Pseudo-R^2 = .077	Body dissatisfaction$_{T1}$	.01	.01	--	2.70	.101
	Negative affect$_{T1}$	.08	.02	1.09	11.41	.001
	BMI$_{T1}$	−.25	.12	.78	4.07	.044
	Vomiting$_{T1}$	2.31	.55	10.03	17.62	< .001
	Main Predictor Variables					
	Body-related social comparison$_{T1}$	−.02	.02	--	.84	.360

Criterion Variable	Predictor Variables	B	*SE*	Odds Ratio	Wald χ^2	*p*
	Eating-related social comparison$_{T1}$	.02	.01	--	1.41	.236
	Exercise-related social comparison$_{T1}$	.03	.01	1.03	14.24	< .001
Binge eating$_{T2}$	*Covariates*					
Pseudo-R^2 = .049	Body dissatisfaction$_{T1}$	.02	.004	1.02	21.18	< .001
	Negative affect$_{T1}$	.04	.03	--	2.26	.133
	BMI$_{T1}$	−.03	.05	--	.37	.545
	Binge eating$_{T1}$	2.10	.42	8.20	24.98	< .001
	Main Predictor Variables					
	Body-related social comparison$_{T1}$	−.01	.01	--	.86	.355
	Eating-related social comparison$_{T1}$	.01	.01	1.01	5.30	.021
	Exercise-related social comparison$_{T1}$	.01	.01	--	.86	.354

Note. T1 = Time 1. T2 = Time 2. These terms reflect the fact that we examined the relations between the independent variables at one EMA report and the criterion variable at the next EMA report.BMI = body mass index.

Table 4

Comparison of Body-, Eating-, and Exercise-Related Comparison Frequencies Across Vomiting Risk Status Groups

	Low Risk: No Vomiting Thoughts or Behaviors (*n* = 158)	**Moderate Risk: Vomiting Thoughts But No Behaviors (*n* = 58)**	**High Risk: Vomiting Behaviors Present (*n* = 16)**	**Significance**	**Pairwise Comparisons**
Body-related social comparison	15.39 (13.57)	23.65 (16.10)	26.83 (15.20)	$F(2, 229) = 9.70$; $p<.001$ partial $\eta^2= .08$	L<M, H
Eating-related social comparison	9.60 (11.14)	17.67 (16.95)	21.96 (19.52)	$F(2, 228) = 11.82$; $p<.001$ partial $\eta^2= .09$	L<M, H
Exercise-related social comparison	7.07 (8.78)	13.80 (1.81)	19.07 (4.77)	$F(2, 229) = 12.19$; $p< .001$ partial $\eta^2= .10$	L<M, H

Note. L = low risk; M = moderate risk; H = high risk. Means (and standard deviations in parentheses) for the study constructs are provided for each vomiting status group. Pairwise comparisons listed were significant at least at $p< .05$.