

Body-, Eating-, and Exercise-Related Comparisons During Eating Disorder Recovery and Validation of the BEECOM-R

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Abstract

Social comparison tendencies are strongly associated with body dissatisfaction and disordered eating. In the current study, we quantitatively examined the structure and predictive value of these constructs during eating disorder recovery. We revised an existing measure of body-, eating-, and exercise-related social comparisons, the Body, Eating, and Exercise Comparison Orientation Measure (BEECOM), to improve psychometric properties. We also assessed the psychometric properties of the shortened Body, Eating, and Exercise Comparison Orientation Measure-Revised (BEECOM-R) in a comparison sample, resulting in an abbreviated measure suitable for recovering, clinical, and non-clinical samples. Finally, we used the revised measure to examine the additive influence of body-, eating-, and exercise-related comparisons on shape and weight dissatisfaction and disordered eating cognitions among 150 women (ages of 18–35 years) in self-identified recovery. Results suggest that body-, eating-, and exercise-related social comparisons all continue to correlate with body dissatisfaction and disordered eating during recovery. A minority of participants reported these comparisons to be helpful during the recovery process. We recommend social comparison as a clinical target for most women seeking support for eating pathology. *Additional online materials for this article are available on PWQ's website at <http://journals.sagepub.com/doi/suppl/10.1177/0361684319851718>*

Keywords

social comparison, body dissatisfaction, recovery, eating disorder, eating pathology

Eating disorders (EDs) are serious mental illnesses associated with high morbidity and mortality, clinical impairment, and co-morbid psychopathology (Klump, Bulik, Kaye, Treasure, & Tyson, 2009). The current transdiagnostic prevalence rates of sub-threshold and at-or-above threshold EDs among young adult women in the United States are calculated at 13% (Stice, Marti, & Rohde, 2013). Women and girls meet diagnostic criteria for a clinical ED at rates 4–10 times higher than men (Javaras & Hudson, 2017), making EDs a significant public health issue disproportionately affecting women. The vast majority of individuals with EDs are diagnosed in their second or third decade of life by clinicians (Hay, 2017). However, recovery is possible at any point during the illness trajectory and can be supported by researchers' identification of cost-effective, modifiable factors that target, accelerate, and solidify ED recovery courses (Kazdin, Fitzsimmons-Craft, & Wilfley, 2017).

Social comparison, particularly the tendency to compare one's appearance with others, has been identified as an antecedent to ED etiology and maintenance (Arigo, Schumacher, & Martin, 2014). Eating- and exercise-related comparisons

have also been linked to disordered eating in non-clinical samples of college-aged women (Fitzsimmons-Craft, 2017). Although social comparisons are considered relatively automatic, evidence suggests that they may be altered through conscious processing over time (Want, 2009). Therefore, social comparisons may be a modifiable, social-cognitive factor contributing not only to the development and maintenance of EDs, but also to ED recovery.

Although body-, eating-, and exercise-related social comparisons are robust ED risk factors, to our knowledge, no

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prior study has quantitatively examined how ED-related social comparisons operate during ED recovery or the function these comparisons serve. Furthermore, prior to the current study, researchers had not psychometrically evaluated any existing measures of social comparison for use with this population. A quantitative examination of the role of body-, eating-, and exercise-related social comparisons during the recovery process fills a critical gap in the literature. In the current study, we sought to examine whether these comparisons support or hinder the recovery process; we aimed to clarify whether social-comparison behaviors should be a target for intervention in ED treatment settings (Cardi, Tchanturia, & Treasure, 2018).

Clinical Eating Disorders and the Recovery Process

The EDs recognized in the most updated version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V; American Psychiatric Association [APA], 2013) include anorexia nervosa, bulimia nervosa, binge eating disorder, and “other specified feeding and eating disorders”—the latter diagnosis encompasses individuals with significant eating disorder symptomology who do not meet the strict diagnostic criteria (National Eating Disorders Association, 2018). These diagnoses exist to classify the distinct clinical presentations of eating disorders and to tailor treatment recommendations. However, recent research supports adopting a transdiagnostic perspective, as EDs share core psychopathology not seen in other psychiatric disorders: the over-evaluation and attempts at controlling weight, shape, and eating (Cooper, 2017). All types of EDs lead to large decrements in quality of life across multiple domains—psychological, social, physical, cognitive, work/school, and financial (Engel et al., 2006)—and often result in debilitating medical complications. Some medical consequences include hair loss, infertility, osteoporosis, electrolyte abnormalities, and cardiac arrest (Klump et al., 2009). Given the vast economic (Whiteford et al., 2013), physical, and psychosocial costs associated with the maintenance of EDs for patients, their families, and society, it is critical to identify ways to improve ED recovery outcomes.

Eating disorders are relapsing illnesses, and recovery from an ED is rarely linear (Lindgren, Enmark, Bohman, & Lundström, 2015). And, there is little consensus among researchers, clinicians, and clients as to what physical, behavioral, and psychological characteristics indicate a recovered status (Dawson, Rhodes, & Touyz, 2015). In a study of 45 women in self-defined ED recovery, for example, participants defined themselves as recovered, despite residual ED symptoms (Pettersen & Rosenvinge, 2002). As ED recovery is a process, rather than a static outcome, it is important to study not only ED recovery but also the potential biopsychosocial pathways to recovery (Bardone-Cone, Hunt, & Watson, 2018). Sociocultural constructs, or social and cultural norms and values, may represent one such pathway.

Sociocultural Models of Disordered Eating

Sociocultural constructs are messages reflecting a culture’s ideology (Levine & Smolak, 2014). Sociocultural factors do not cause EDs; ED etiology is multifaceted and derived from a combination of biological, social, and psychological factors (Culbert, Racine, & Klump, 2015). However, sociocultural factors do play a significant role in the development of most disordered eating behaviors. Messages reflecting gendered meanings of body and attractiveness have been found to play a role in disordered eating and clinical EDs (Levine & Smolak, 2014). Such messages are conveyed via numerous sources, most commonly mass media, parents, and peers (Keery, van den Berg, & Thompson, 2004). Models linking sociocultural messages to disordered eating outcomes do not assume a direct route from these messages to disordered eating behaviors. Instead, the models emphasize the important role of linking or mediating factors, such as thin-ideal internalization and social comparison (Fitzsimmons-Craft et al., 2014; Keery et al., 2004). These more proximal factors are strong components of current sociocultural models of disordered eating (Levine & Smolak, 2014) and merit exploration in recovered and recovering samples.

Body-, Eating-, and Exercise-Related Social Comparison

Several social-cognitive mediators have been identified as key links between thin-ideal internalization, body dissatisfaction, and the subsequent development of disordered eating pathology. Of these, the most robust is social comparison, as supported by experimental, correlational, and longitudinal research (Fitzsimmons-Craft, Bardone-Cone, et al., 2016; Want, 2009). Scholars have used multiple sociocultural models of disordered eating to explore the relations among social comparison, thin-ideal internalization, and disordered eating outcomes (Fitzsimmons-Craft et al., 2014; Tyłka & Sabik, 2010). In each model, the tendency to engage in body-, eating-, and/or exercise-related social comparisons has been viewed as serving as the indirect effect through which thin-idealization related to body dissatisfaction and disordered eating outcomes. Cultural norms determine both the target of a social comparison and the influence that social comparison has on self-esteem and body satisfaction (Myers & Crowther, 2007; Strahan, Wilson, Cressman, & Buote, 2006).

Festinger (1954) proposed social comparison theory as a mechanism by which individuals assess their position in society and use that assessment to motivate change and preserve self-esteem. As initially conceptualized, social comparison theory features two types of comparison: *upward* (comparing to a more successful target) and *downward* (comparing to a less successful target). Whereas downward comparisons are thought to be protective within the social comparison framework (Lew, Mann, Myers, Taylor, & Bower, 2007), this does not hold true in regard to body dissatisfaction and disordered eating (Saunders & Eaton, 2018a). Both upward and

downward appearance-related comparisons are predictive of higher levels of eating pathology, most robustly when experienced together (Lin & Soby, 2016). The lack of a significant differentiated effect between in vivo upward and downward social comparison supports these correlational findings (Druschinin, Fuller-Tyskiewicz, De Paoli, Lewis, & Krug, 2018).

Most research to-date examining the role of social comparisons in disordered eating has focused on body- or appearance-related comparisons (Myers & Crowther, 2007). Body-related comparisons among women begin early in development, with elementary school aged girls engaging in more frequent appearance-related comparisons than their male peers (Tatangelo & Ricciardi, 2017). Unlike ability-, lifestyle-, or opinion-based social comparisons, body-related comparisons are associated with greater levels of envy and less inspiration and pride (McKee et al., 2013). With the rise of image-based social media platforms, women have more opportunities than ever before to engage in body-related social comparisons (Fardouly, Diedrichs, Vartanian, & Halliwell, 2015).

Women with clinically significant ED symptoms demonstrate heightened appearance-related comparison tendencies compared to both women with sub-clinical symptoms and healthy control groups (Leahey, Crowther, & Ciesla, 2011). Moreover, the tendency to engage in appearance-related social comparison is also predictive of future disordered eating behavior (Arigo et al., 2014). In a two time-point design spanning 2 months, Arigo, Schumacher, and Martin (2014) found that college-aged women who developed ED symptoms over the course of the study exhibited more frequent self-reports of upward appearance-related social comparisons at baseline compared to women whose eating patterns did not clinically change between baseline and 2-month follow-up.

Eating-related social comparisons influence both food choices and the amount of food consumed, particularly among restrained eaters (Polivy & Pliner, 2015). Moreover, social situations may trigger disordered eating behavior among individuals with clinical levels of ED pathology (Brown et al., 2003). Although eating-related comparisons are frequently mentioned by clients in clinical ED treatment, most social comparison literature does not directly measure this type of comparison (Fitzsimmons-Craft, Bardone-Cone, & Harney, 2012). However, in two recent ecological momentary assessment studies, more frequent eating-related comparisons predicted body dissatisfaction over time (Fitzsimmons-Craft et al., 2015) and eating-related comparisons about the healthfulness, amount, speed, or balance of a meal correlated with increased body dissatisfaction and restrictive eating attempts (Fitzsimmons-Craft, 2017). As eating-related comparisons are associated with EDs, the relation between eating-related comparisons and ED recovery merits further exploration.

Exercise is generally viewed as a health-maintenance behavior; however, the exercise tendencies of women with

clinical EDs are often obsessive, which hinder recovery (Bardone-Cone et al., 2016). Exercising for weight control or with the intent of altering one's appearance is more likely than exercise for health maintenance to be associated with higher levels of eating pathology (Mond & Calogero, 2009). And decreases in eating pathology during the recovery process have been linked to decreased reliance on exercise to manage emotions (Bratland-Sanda et al., 2010). However, as with eating-related comparisons, exercise-related comparisons are rarely directly measured (Fitzsimmons-Craft et al., 2012). The one known existing experimental study examining the role of social comparison on exercise behavior in a non-clinical sample showed that the presence of a peer in a campus gym, perceived as more fit than oneself, resulted in decrements in body satisfaction and exercise duration, whereas the presence of a peer perceived as less fit than oneself resulted in longer exercise duration (Wasilenko, Kulik, & Wanic, 2007). Exercise-related comparisons also have been correlated with body dissatisfaction, dietary restraint, and disordered eating behaviors and cognitions in a female, non-clinical, college-aged sample (Fitzsimmons-Craft, Bardone-Cone, et al., 2016), and predict contemporaneous body dissatisfaction (Fitzsimmons-Craft et al., 2015).

Social Comparison and ED Recovery

Given the consistent documentation of both the correlational and experimental links between social comparisons and eating pathology, and the apparent malleability of social comparison tendencies, scholars recommend that this social-cognitive process is an important target of clinical interventions (Fitzsimmons-Craft, Ciao, & Accurso, 2016). Given the social nature of eating, and the structured social food environments associated with ED treatment settings (Frisch, Herzog, & Franko, 2006), it follows that eating-related comparisons would influence both disordered eating and recovery processes. However, very little previous research has examined the nature of social comparisons during ED recovery. Body-, eating-, and exercise-related social comparisons during behavioral remission have been examined qualitatively, to better understand the function these comparisons serve during recovery (Saunders & Eaton, 2018b). The emergent work on this topic highlights the varied roles comparisons can have on the recovery process; both upward and downward comparisons derived from a recovery-positive mindset have the potential to support recovery, rather than disordered eating (Saunders & Eaton, 2018b). Two other studies investigating social comparison during the ED recovery process, found that the tendency to engage in virtual comparisons (i.e., via social media) with others who had been in ED treatment was related to increased ED psychopathology and ED-related clinical impairment (Saffran et al., 2016), and that individuals who attended a hospital-based treatment program engaged in more social comparison than age-matched controls without a clinical

ED history (Bachner-Melman, Zontag-Oren, Zohar, & Sher, 2018). In non-clinical samples, social-comparison behaviors have been reduced through awareness campaigns administered in experimental settings (Arendt, Peter, & Beck, 2016). Despite being a malleable, proximal correlate of eating pathology, body-, eating-, and exercise-related social comparison is rarely measured in recovering samples, as researchers have yet to psychometrically evaluate and modify any existing measures of social comparison for use with this population.

The Current Study

The original Body, Eating, and Exercise Comparison Orientation Measure (BEECOM; Fitzsimmons-Craft et al., 2012) was developed to quantify ED-related social comparison tendencies in college-attending, non-clinical female samples. The original BEECOM has been the only existing, validated measure of body-, eating-, and exercise-related comparisons, yet it has never been normed or administered to a sample of women with a clinical ED history. We aimed to fill the aforementioned gaps in the literature concerning the relation between body-, eating-, and exercise-related social comparison and ED recovery for young women.

First, we evaluated the psychometric properties of the original BEECOM (Fitzsimmons-Craft et al., 2012) for women in self-defined ED recovery. We hypothesized that the psychometric properties of the original BEECOM would be poor and would necessitate modification (Hypothesis 1). Upon establishing a psychometrically sound measure, we hypothesized that the revised BEECOM subscales (body, eating, and exercise) would differentially predict various facets of body dissatisfaction and eating pathology (Hypothesis 2).

As a final exploratory analysis, we examined the utility of social comparisons during the recovery process. Because the existing research related to this aim is limited, our analyses were exploratory rather than hypothesis driven. This exploratory analysis was derived from the emerging literature that suggests that all appearance-related comparisons, both upward and downward, contribute to disordered eating tendencies (Lin & Soby, 2016). We also aimed to understand if any specific comparisons would be helpful during recovery, as suggested by Festinger's (1954) original theory.

Method

We designed the current study to (1) validate and revise the original BEECOM for women in recovery, (2) assess the appropriateness of the revised measure for women without clinical EDs, and (3) examine the utility of comparisons in the recovery process. To meet the study aims, we recruited participants via social networking sites (Facebook and Instagram), the university undergraduate study pool of a large, southeastern public university, and referrals and snowball sampling from a qualitative study on ED recovery (Saunders

& Eaton, 2018b). Participants from the university undergraduate study pool received course extra credit in exchange for their time; participants from other sources did not receive compensation. The study recruitment advertisement invited all women between the ages of 18 and 35, regardless of whether or not they self-identified as struggling with, or being in recovery from, an ED to participate in a study to help researchers better understand women's thinking patterns regarding food and weight. All participants provided electronic informed consent and completed an online survey via the Qualtrics platform. All procedures were approved by the university's institutional review board.

Participants

Recovery sample. The recovery sample consisted of 150 women (24% from the university population) between the ages of 18 and 35 ($M_{\text{age}} = 26.02$, $SD = 5.28$). This age range was chosen to best represent women most commonly diagnosed with clinical EDs (Hay, 2017). At the start of the survey, participants were asked if they had ever been diagnosed with a clinical eating disorder. If they answered yes, they were then asked if they considered themselves to be recovered or in recovery (as these terms are often used interchangeably; de Vos et al., 2017). We allowed women to self-define their recovery status, both to take a feminist methodological approach (e.g., LaMarre & Rice, 2016) and because there is little consensus in the ED research field as to what constitutes recovery (Bardone-Cone et al., 2018). Given the high rates of diagnostic crossover in the ED population (Allen, Byrne, Oddy, & Crosby, 2013), the common characteristics across ED diagnoses (Culbert et al., 2015), and the recent push toward transdiagnostic research by the U.S. National Institute for Mental Health (Cooper, 2017), our recovery sample was transdiagnostic. Thus, participants experienced an array of clinical EDs including anorexia nervosa (60%, $n = 90$), bulimia nervosa (17%, $n = 26$), binge eating disorder (12%, $n = 18$), and otherwise specified feeding and eating disorder (11%, $n = 16$). However, these distributions were surprising, as prior research indicates binge eating disorder and bulimia nervosa to be more prevalent than anorexia nervosa (Stice et al., 2013). The majority of women in the recovery group reported a current or former diagnosis of anorexia nervosa, which may partly reflect the recruitment strategy, and the fact that individuals with anorexia are more likely than women with other disordered eating behaviors to receive a clinical diagnosis and intensive treatment for weight loss due to medical abnormalities (Hart, Granillo, Jorm, & Paxton, 2011).

However, as is typical of eating disorder prognosis, there was much diagnostic crossover among groups. For example, of those primarily diagnosed with anorexia nervosa, 11 participants had also been diagnosed with bulimia nervosa, four with binge eating disorder, and seven with otherwise specified feeding and eating disorder. Of those diagnosed primarily with bulimia nervosa, almost all (24 of 26) had also been

Table 1. Body, Eating, and Exercise Comparison Orientation Measure (BEECOM) Items, Their Standardized Loadings, and Modification Indices (If Applicable).

Sub-scale	Item	Factor loading	Cross loading modification index
Body	2. I pay attention to whether or not I am as thin as, or thinner, than my peers	.65	Eating subscale (13.34)
	4. In social situations, I think about how my figure “matches up” to the figures of those around me	.86	
	9. I notice how I compare with my peers in terms of specific body parts (e.g., stomach, hip, breast)	.94	
	12. I compare my body shape to that of my peers	.91	
	13. When I see a peer who is wearing revealing clothing, I have thoughts of how my own body compares	.76	Eating subscale (4.26)
Eating	17. I pay attention to whether or not I am as toned as my peers	.69	Exercise subscale (10.2)
	1. I look at the amount of food my peers leave on their plate in comparison to me when they are finished eating	.66	Body subscale (8.89)
	3. During meals, I compare what I am eating to what others are eating	.9	Exercise subscale (6.64)
	7. I find myself thinking about how my food choices compare with the food choices of my peers	.9	
	8. I am quick to notice how healthy or unhealthy my peers' food choices are compared to my own food choices	.69	
	11. When I go to the dining hall or out to eat, I pay attention to how much I am eating compared to other people	.88	Exercise subscale (4.30)
	16. I pay attention to how much junk food my peers eat compared to me	.82	
Exercise	5. When I am exercising, I pay attention to the length of time that those around me work out	.63	Eating subscale (4.38)
	6. I pay close attention when I hear peers talking about exercise in order to determine if I am exercising as much as they are	.87	
	10. When working out around other people, I think about how many calories I am burning in comparison to my peers	.85	
	14. I like to know how often my friends are working out so I can figure out if the number of times I work out “matches up”	.88	Eating subscale (8.63)
	15. When I exercise, I pay attention to the intensity level of the workouts of those around me	.84	
	18. When I work out, I evaluate how hard my work out was compared to how hard my friends say they worked out	.9	

Note. Items in bold were retained for the abbreviated BEECOM.

diagnosed with anorexia nervosa at some point. One third ($n = 4$) of those diagnosed with binge eating disorder, had also been diagnosed with anorexia nervosa during their illness and recovery process. This substantial diagnostic overlap provided initial support for our decision to analyze the data transdiagnostically. The recovery group consisted of predominantly (74.4%, $n = 112$) non-Hispanic White women, followed by Hispanic or Latina women (21.4%, $n = 32$), women who identified as multi-racial (3.3%, $n = 5$), and Alaska Native (0.8%, $n = 1$). The majority (60.2%) of women in ED recovery had received at least a bachelor's degree.

Comparison sample. The comparison sample consisted of 224 women (14% from the university sample) between the ages of 18 and 35 ($M_{\text{age}} = 25.29$, $SD = 4.44$). This sub-sample was about evenly split between non-Hispanic White (39.3%, $n = 88$) and Hispanic White (38.8%, $n = 87$) identifying women. A small portion of the sample self-identified as Black (13.5%, $n = 30$), multi-racial (5.6%, $n = 12$), Asian (2.2%, $n = 5$), and

other (0.6%, $n = 2$). About half of the sample had received at least an associate's degree (46.1%). Please see online Supplemental Table 1 at <http://journals.sagepub.com/doi/suppl/10.1177/0361684319851718> for a comparison of the demographic characteristics of the two sub-samples.

Measures

Body-, eating-, and exercise-related comparisons. To quantify body-, eating-, and exercise-related comparison tendencies, participants completed the original Body, Eating, and Exercise Comparison Orientation Measure (BEECOM; Fitzsimmons-Craft et al., 2012). The initial measure was developed for a non-clinical female college-aged sample (aged 17–24) and was created to provide researchers and clinicians with a psychometrically sound measure to quantify body-, eating-, and exercise-related comparisons in non-clinical samples. For us to examine the psychometric purposes of the current study, all participants completed all 18

items from the initial measure. Following factor analysis, the final revised measure (see below, BEECOM-R) consisted of 9 items related to body-, eating-, and exercise-related comparison tendencies, three for each comparison type, rated on a 7-point Likert-type scale with response options varying from 1 (*never*) to 7 (*always*). Higher scores are indicative of greater body-, eating-, and exercise-related social comparison tendencies. All BEECOM items and those retained for the revised measure appear in Table 1. Women who self-identified as being in ED recovery received an additional question with each original BEECOM item. This sub-set of participants were also asked to indicate if “this type of comparison is helpful in [my] recovery process (promotes healing and staying in recovery)” for each of the 18 comparison items, with the response options of “yes/helpful,” “unsure/neutral,” or “no/unhelpful.” The internal consistency for the final revised measure was acceptable (body comparison $\alpha = .93$, eating comparison $\alpha = .92$, exercise comparison $\alpha = .88$). These reliability coefficients were slightly lower than those obtained in the initial scale development study ($\alpha = .96$). The original measure demonstrates both temporal stability and predictive validity in college-aged, non-clinical samples (Fitzsimmons-Craft & Bardone-Cone, 2014).

Body dissatisfaction and ED symptomology. To quantify body dissatisfaction and ED symptomology, participants completed the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994), the leading self-report measure in ED research and clinical practice. This scale consists of 20 items assessing frequency of thoughts and behaviors as rated on a 7-point Likert-type scale, ranging from 0 (*no days*) to 6 (*everyday*) over the course of the past 28 days. Sample items include “On how many of the past 28 days have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?” The scale also asks an additional eight questions assessing the degree to which an individual experienced certain disordered cognitions about food, body, and weight, rated on a 7-point scale ranging from 0 (*not at all*) to 6 (*markedly*). Sample items include “Over the past 28 days, has your shape influenced how you think about yourself as a person?” The current study used each of the four EDE-Q subscales: (1) shape concern (to quantify body dissatisfaction), (2) eating concern (emotions and cognitions related to eating, to quantify disordered eating), (3) weight concern, and (4) dietary restraint, as well as the global EDE-Q score averaged across each of the four subscales. The EDE-Q demonstrated adequate internal consistency and 2-week test-retest reliability (α ranging from .78 to .93; Luce & Crowther, 1999). In the current sample, the internal consistency of each subscale (shape concern [$\alpha = .91$], weight concern [$\alpha = .84$], eating concern [$\alpha = .78$], and restraint [$\alpha = .88$]) was adequate and similar to the reliability coefficients obtained in prior studies. According to Mond, Hay,

Rodgers, and Owen (2006), the global EDE-Q average community norm is 1.52 ($SD = 1.25$).

General social comparison tendencies. The abbreviated version of the Iowa-Netherlands Comparison Orientation Measure (INCOM; Gibbons & Buunk, 1999) was used to assess general social comparison tendencies that were quantified to allow for assessment of construct validity and to control for general comparison tendencies when assessing the additive effects of body, eating, and exercise social comparison tendencies on body dissatisfaction and disordered eating cognitions during recovery. The abbreviated INCOM consists of five items. Items are rated on a 5-point scale, ranging from 1 (*I disagree strongly*) to 5 (*I agree strongly*). The data from the scale development study yielded internal consistency estimates ranging from .78 to .85 and the internal consistency for the current sample was adequate and similar ($\alpha = .78$).

Analytic Plan and Data Screening

Descriptive, preliminary, and regression analyses were conducted using SPSS Version 23.0, and the CFAs were conducted using Mplus Version 7.0 (Múthen & Múthen, 2010). Data were first evaluated for skewness, kurtosis, missingness, and the presence of univariate or multivariate outliers. Missing values ranged from 0% to 5% per item for the recovery group (62 participants were missing at least one data point) and 0% to 11.9% for the comparison group (42 participants were missing at least one data point). Prior research indicates that missing data on the EDE-Q are extremely common; one study cites only receiving complete scales from 28% of their sample (Becker et al., 2010). Excluding individuals with missing EDE-Q data from the sample produces biased estimates and tends to remove the individuals with greater eating psychopathology (Kelly, Cotter, Lydecker, & Mazzeo, 2017). The missing EDE-Q data for the comparison group were not missing at completely random (MCAR), Little’s MCAR, $\chi^2(62) = 99.86$, $p < .002$. Therefore, all missing data were imputed in SPSS using Expectation-Maximization (EM), shown to produce relatively unbiased estimates both for item-level missing data (Enders, 2003) and data not missing at random (Little, 1988). We examined each model both with the imputed values and with a data set of only complete responses, and found no statistical differences between the two. Thus, we report the estimates from the imputed data sets below. To thoroughly and robustly evaluate model fit, multiple fit indices were used. We considered a model well-fitting if the root mean square error of approximation (RMSEA) values were less than or equal to .06 (Hu & Bentler, 1999), standardized root mean squared residual (SRMR) values were less than or equal to .05 (Múthen & Múthen, 2010), Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values were greater than or equal to .95 (Hu & Bentler, 1999; Yu & Múthen, 2002), and if the ratio of χ^2 to its degrees of freedom was less than or equal to 2.0 (Ullman, 2007).

To accomplish our first aim, we began by performing a hierarchical confirmatory factor analysis (CFA) to assess whether the published model for the original BEECOM provided an adequate fit to the data. We then revised the model based on theoretically and statistically relevant modification indices, following the process of model respecification outlined in prior work (Whittaker, 2012). As there was no existing theoretical work on social comparison in ED recovery, we considered all modification indices to be theoretically meaningful. We included all suggested significant (values greater than 3.84) model respecifications to arrive at our final abbreviated measure. Scores on the revised measure (BEECOM-R) were then correlated with EDE-Q total and subscale scores.

We also evaluated whether the BEECOM-R had adequate psychometric properties for use in a non-clinical sample. To do so, we assessed whether the abbreviated measure demonstrated invariance across the recovery and comparison samples, applying Molenaar and Nesselroade's (2012) higher-order invariance method to our multi-group model comparison. This method allows the factor loadings and variances of each manifest variable to be freely estimated and differ across individuals while constraining the higher order factor loadings, thereby testing for metric equivalence between samples. We chose this method as it is possible the underlying comparison "mechanism" changes during recovery in an idiosyncratic way, but the interrelations among higher order factors remains intact (see Nesselroade & Molenaar, 2016).

To accomplish our second aim, we conducted a series of stepwise hierarchical linear regression analyses with the global EDE-Q, Body Dissatisfaction, and Disordered Eating subscales as the dependent variables, and the body-, eating-, and exercise-related comparison scores as stepwise predictors. Each hierarchical multiple regression model also controlled for the general tendency to socially compare (i.e., on domains other than body, eating, and exercise). We also examined the relation between the perceived usefulness of each comparison item with eating disorder symptomology in a multivariate analysis of covariance (MANCOVA).

Power Considerations

A power analysis was conducted to determine the minimum sample size required for our planned multiple regression analyses. Given our four predictors, assuming a medium effect size, and setting power = .80 and $\alpha = .05$, this analysis suggested a sample of at least 84 participants. Likewise, a power analysis conducted to determine the minimum sample size required for our planned MANCOVA indicated the need for a minimum of 84 participants. A CFA model with three to four indicators per factor requires a minimum of 100 participants (Marsh & Hau, 1999). Thus, our sample size ($n = 150$) assured that our statistical models were powerful enough to produce reliable standardized coefficients.

Results

Recovery Sample Characteristics

Despite the fact that all participants in our sample self-identified as being in ED recovery, the average global ED pathology scores in the sample were elevated compared to non-clinical community norms (Mond, Hay, Rodgers, & Owen, 2006), $t(249) = 19.73, p < .001, d = 1.94$. Consistent with past work on ED recovery (Pettersen & Rosenvinge, 2002), this suggests participants defined recovery along a continuum and relative to personal and cultural norms. To support our transdiagnostic exploration of the body-, eating-, and exercise-related social comparisons, we conducted a MANOVA to examine potential differences in the mean scores on each BEECOM and EDE-Q subscale by diagnosis. The multivariate test yielded no significant mean differences across groups, $F(21, 296) = 1.26, p < .20$, Wilks's $\Lambda = .78$.

Body-, Eating-, and Exercise-Related Comparison Measure Revision

Recovery sample. As anticipated, the data for the recovery group fit the original BEECOM model poorly (see Hu & Bentler, 1999), $\chi^2(122) = 378.48, p < .001$ ($\chi^2/df = 3.10$), RMSEA = .12, 90% CI [.108, .136], CFI = .90, TLI = .87, and SRMR = .06, suggesting the need to revise the scale for use in a recovering sample. High modification indices (greater than 3.84) pointed to the potential cross-loading of nine of the items onto a factor other than the factor they were intended for in the initial conceptualization of the scale (see Table 1). The nine remaining items also appear in Table 1 in bold. We retained three items per factor to ensure mean scores across factors are comparable when used in future practice and research.

The data for the recovery group fit the BEECOM-R model well: $\chi^2(24) = 19.16, p = .21$ ($\chi^2/df = 1.25$), RMSEA = .04, 90% CI [.00, .11], p -close = .46, CFI = .99, TLI = .99, and SRMR = .02. As depicted in Figure 1, each of the remaining nine items loaded substantially on their respective factor (standardized loadings ranging from .78 to .92). Each subscale loaded significantly onto a higher order ED-related comparison factor, supporting the use of both the subscales and the total score in future research.

Scores on the BEECOM-R were subsequently correlated with global EDE-Q scores as well as scores on its four subscales (Fairburn & Beglin, 2008) and INCOM scores (Gibbons & Buunk, 1999) to assess construct validity (see Table 2). BEECOM-R total and subscale (body, eating, and exercise) scores were significantly and positively correlated with each EDE-Q subscale as well as global EDE-Q scores. Of note, the global EDE-Q and INCOM scores were also significantly and positively correlated ($r = .22, p < .01$), suggesting that general comparison tendencies were related to eating disorder symptomology.

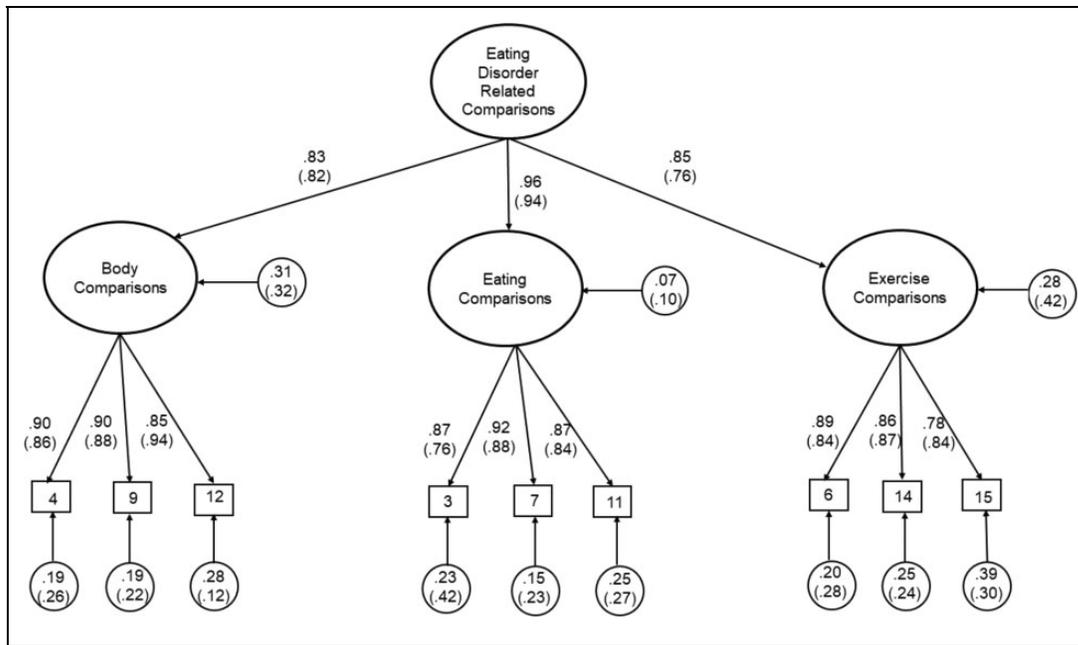


Figure 1. Factor structure for revised Body, Eating, and Exercise Comparison Orientation Measure (BEECOM) items. The standardized coefficients for the recovery group appear outside of the parentheses, and the standardized regression coefficients for the comparison group appear inside of the parentheses. The values inside each circle represent the amount of unexplained variance remaining for each item.

Table 2. Correlations Between the Abbreviated Body, Eating, and Exercise Comparison Orientation Measure (BEECOM), low-Netherlands Comparison Orientation Measure (INCOM) Scale, and Eating Disorder Examination Questionnaire (EDE-Q) Scores for the Recovery Group.

Measures	Scale, M (SD)	Total BEECOM	Body	Eating	Exercise	Global EDE-Q	Eating concern	Shape	Weight	Restraint
Total BEECOM	44.73 (12.89)									
Body comparison	17.12 (4.36)	.86								
Eating comparison	15.60 (4.77)	.91	.70							
Exercise comparison	12.01 (5.38)	.90	.62	.73						
Global EDE-Q	4.25 (1.55)	.71	.53	.72	.64					
Eating concern	3.68 (1.79)	.61	.42	.66	.55	.90				
Shape concern	4.4 (1.43)	.67	.57	.63	.61	.92	.76			
Weight concern	4.88 (1.54)	.48	.46	.49	.39	.93	.78	.93		
Restraint	3.96 (1.93)	.58	.40	.61	.52	.86	.72	.67	.65	
General comparison	20.18 (4.26)	.48	.43	.45	.41	.38	.38	.29	.30	.30

Note. All correlations are significant at $p < .01$.

Comparison sample. To ensure that the abbreviated measure is suitable for use in both clinical and non-clinical samples, we conducted a CFA on the BEECOM-R using data from a sample of women without a clinical ED history. As with the sample of women in ED recovery, the data for the comparison group fit the BEECOM-R model fairly well: $\chi^2(24) = 40.82$, $p < .05$ ($\chi^2/df = 1.70$), RMSEA = .07, 90% CI [.04, .11], p -close = .06, CFI = .98, TLI = .97, and SRMR = .03. Factor loadings and percentage of variance explained appear in Figure 1 in parentheses (values for the recovery sample appear outside of the parentheses). The data from both groups were simultaneously fit to the same model to evaluate model invariance across the two groups.

The difference in the model fit when the higher order factor loadings (body, eating, and exercise) were freely estimated compared to when these loadings were constrained to be equal across groups was not significant, $\Delta\chi^2(3) = 6.38$, $p > .05$.

Role of Body-, Eating-, and Exercise-Related Comparisons on Disordered Eating Outcomes

To evaluate the role of body-, eating-, and exercise-related comparisons on disordered eating outcomes, we conducted a series of hierarchical multiple linear regressions. We examined the four EDE-Q subscales to provide foundational

Table 3. Multiple Hierarchical Regression Analyses Exploring the Additive Effect of Body, Eating, and Exercise Comparisons on Overall Eating Disorder Psychopathology (Global EDE-Q), Shape Concern, and Weight Concern.

Predictors	Global EDE-Q			Shape concern			Weight concern		
	β	<i>t</i>	ΔR^2	β	<i>t</i>	ΔR^2	β	<i>t</i>	ΔR^2
Step 1			.14***			.08**			.09***
INCOM	.38	4.23***		.29	3.13**		.30	3.37**	
Step 2			.17***			.26***			.22***
Body	.46	5.06***		.55	6.30***		.52	5.97***	
Step 3			.15***			.06**			.10***
Body	.09	0.89		.32	2.84**		.22	2.00*	
Eating	.56	5.37***		.36	3.21**		.47	4.35***	
Step 4			.04**			.05**			.03*
Body	.02	0.16		.24	2.15**		.15	1.42	
Eating	.39	3.38***		.18	1.49		.33	2.75**	
Exercise	.31	2.89**		.33	2.98**		.26	2.39*	

Note. INCOM = Iowa-Netherlands Comparison Orientation Measure Scale; EDE-Q = Eating Disorder Examination Questionnaire.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4. Multiple Hierarchical Regression Analyses Exploring the Additive Effect of Eating, Body, and Exercise Comparisons on Dietary Restraint and Eating Concern.

Predictors	Dietary restraint			Eating concern		
	β	<i>t</i>	ΔR^2	β	<i>t</i>	ΔR^2
Step 1			.09**			.15***
INCOM	.31	3.41***		.39	4.40***	
Step 2			.24***			.24***
Eating	.54	6.37***		.55	6.48***	
Step 3			.001			.002
Eating	.57	5.05***		.59	5.39***	
Body	-.04	-0.38		-.07	-0.65	
Step 4			.02			.02*
Eating	.45	3.52***		.46	3.71***	
Body	-.09	-0.81		-.13	-1.13	
Exercise	.23	1.92		.23	2.00*	

Note. INCOM = Iowa-Netherlands Comparison Orientation Measure Scale; EDE-Q = Eating Disorder Examination Questionnaire.
* $p < .05$. ** $p < .001$.

information about how these comparison tendencies relate to a variety of eating disorder cognitions. For each hierarchical multiple regression analysis that follows, the covariate of general comparison tendencies (i.e., INCOM scores) was entered on Step 1, the predictor hypothesized to explain the greatest amount of variance was entered on Step 2, and the predictors with potential additional explanatory power were entered on Steps 3 and 4. In the models related to body and weight concerns, as well as global eating pathology, body-related comparisons were entered on Step 1, given the robust link between appearance comparisons and disordered eating. Eating-related comparisons were entered on Step 1 when we examined eating concern and dietary restraint. Exercise-related comparisons were added on the final step in each model, as not all women with EDs engage in exercise, and

exercise-related comparisons were predicted to have the least explanatory power.

The analytic details of the five hierarchical multiple linear regression models appear in Tables 3 and 4. Eating-related ($\beta = .39, p < .001$) and exercise-related comparisons ($\beta = .31, p < .01$) significantly predicted global EDE-Q scores. Eating-related ($\beta = .33, p < .01$) and exercise-related comparisons ($\beta = .26, p < .05$) also significantly predicted weight concern. Finally, eating-related ($\beta = .46, p < .001$) and exercise-related comparisons ($\beta = .23, p < .05$) significantly predicted eating concern. Body-related ($\beta = .33, p < .01$) and exercise-related comparisons ($\beta = .26, p < .05$) significantly predicted weight concern. Eating-related comparisons significantly predicted dietary restraint ($\beta = .45, p < .001$).

In summary, the BEECOM-R, eating- and exercise-related comparisons (and not body-related comparisons) remained significant predictors of global EDE-Q scores, eating concern, and weight concern at the final step of the respective models. Only eating-related comparisons were a significant predictor of dietary restraint at Step 4. The only model to emerge with body-related comparison as a significant predictor on the final step was shape concern. Both body-related and exercise-related comparisons predicted shape concern at Step 4.

Helpfulness of Comparisons During Recovery

As Festinger's (1954) theory and preliminary qualitative work suggest, social comparison might also be helpful in recovery (Saunders & Eaton, 2018b), we tested this possibility quantitatively. To better understand social comparison processes in recovery, participants were asked whether they viewed each comparison target as helpful to their recovery trajectory. A small minority of participants found some types of comparisons helpful (2.2–8.1% across items). For one of the remaining nine items (Item 3: "During meals, I compare

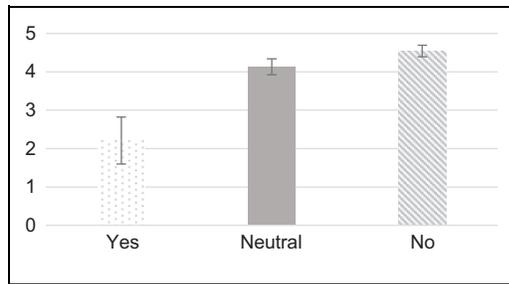


Figure 2. Global Eating Disorder Examination Questionnaire (EDE-Q) score differences based on perceived helpfulness in recovery of comparing to what others are eating during meals, controlling for comparison frequency. Yes significantly differed from neutral ($p < .01$) and from no ($p < .001$), which did not differ significantly from one another.

what I am eating to what others are eating”), the level of social comparison that individuals engaged in significantly differed based on their perception of its helpfulness, $F(2, 130) = 5.21, p < .01, \eta_p^2 = .07$. Individuals perceiving this comparison as helpful engaged in this comparison significantly more than the individuals who were unsure if it was helpful, and those who felt it was not helpful. To further probe this finding, and determine if perceived helpfulness related to lower ED symptomology, we conducted an ANCOVA, with perceived helpfulness of the comparison (“yes,” “unsure,” “no”) as the independent variable and EDE-Q scores as the dependent variable, covarying the level of comparison, $F(2, 130) = 7.48, p < .001, \eta_p^2 = .16$. Results demonstrated that if a participant perceived this particular comparison to be helpful, she was more likely to have a lower global EDE-Q score (2.2 for *yes*, compared to 4.13 for *unsure*, and 4.54 for *no*; see Figure 2). These participants were using this one comparison to support their recovery process rather than to derail it. We highlight the implications of this finding in the Discussion section. All other comparisons failed to demonstrate a similar effect (see online Supplemental Table 2 at <http://journals.sagepub.com/doi/suppl/10.1177/0361684319851718>).

Discussion

The current study provides a foundation for understanding the, previously unstudied, role that body-, eating-, and exercise-related comparisons play during ED recovery. We assessed the psychometric properties of the only existing, validated measure of these comparisons (BEECOM; Fitzsimmons-Craft et al., 2012) for women in self-defined ED recovery. We revised this measure for our sample, and applied a nuanced, quantitative lens to the additive function of body-, eating-, and exercise-related social comparison on residual disordered eating cognitions during ED recovery. As predicted, and suggested by existing qualitative work (i.e., Saunders & Eaton, 2018b), the BEECOM required significant revision for use with women in ED recovery, as the

function and utility of certain body-, eating-, and exercise-related comparisons differs during the recovery process. The purpose these constructs serve in recovery, and the role they play in eating-, food-, and appearance-related choices, likely shifts with the return of normalized weight, eating, and the psychosocial correlates that accompany these physical changes (Bardone-Cone et al., 2009). By providing researchers and clinicians with an abbreviated measure that is appropriate for use in a transdiagnostic sample of women recovering from EDs, the BEECOM-R, the current research establishes the groundwork for further quantitative exploration of the role of body-, eating-, and exercise-related comparisons during ED recovery.

In revising the BEECOM, we eliminated nine items from the original 18-item scale (Fitzsimmons-Craft et al., 2012). Many of the items removed from the scale mentioned comparisons that become counter-cultural during ED recovery (LaMarre & Rice, 2016). For example, looking at the amount of food a peer leaves on her plate when finished eating, noticing the amount of “junk” or “health” food one consumes in relation to her peers, and the degree to which one’s body displays muscle definition, shift, and come to stand in opposition to the dominant societal prescriptions for health. The current study provides a quantitative extension of prior qualitative work by LaMarre and Rice (2016). In a study of the recovery narratives of ten young women, these researchers highlighted the ways in which ED recovery is perceived as contrary to the status quo and patriarchal definitions of the typical relation between food and health by women undergoing the process, with what is considered “healthy” or “junk” food no longer polarized into these two categories during the recovery process. Moreover, in ED recovery, comparing the healthfulness of one’s food choices to someone else’s often leads to confusion over what constitutes health; a healthy option for someone without a history of an ED may differ from that of someone in recovery (Saunders & Eaton, 2018b). In addition, individuals in ED recovery are often prescribed a meal plan to follow to normalize eating patterns (Mittnacht & Bulik, 2015) and may therefore become less focused on the amount of food left behind by others in relation to themselves.

The current work highlights how the content and functions of the social comparisons made by women in ED recovery defy simple categorization using Festinger’s (1954) original paradigm. Consider an individual recovering from anorexia nervosa, who is trying to eat appropriate quantities of food for maintaining a healthy weight. For this individual, both upward and downward comparisons could have the potential to either further or stunt her recovery process. If she is aiming for a healthier relationship with food and weight, a recovery-supporting upward comparison could be to compare what she is eating against that of a weight-restored or “healthy” peer, with the hope to better match her normative quantities. In contrast, if she is struggling with motivation and cultural thin ideals, a recovery-hindering upward comparison would be to

compare her food choices against those of a peer who is restricting her food intake, with the hope of better matching her restricted quantities. Thus, the result of “upward” or aspirational comparisons here depends not only on what outcome is hoped for, but also what “self” she is using as her reference category (e.g., the recovering self or the ED self) and which cultural standard she is holding in mind. Similarly, a recovery-supporting downward comparison could involve comparing her food quantity to that of ED patients less advanced in their recovery, and feeling reassured by the observation that she has more food than her struggling peers; a recovery-hindering downward comparison could be comparing herself against a friend who does not have an ED, and feeling superior for eating less.

For this reason, we examined lateral social comparisons, and the utility of these comparisons, in our scale revision and subsequent analyses. The direction of the comparison (e.g., upward, downward, lateral) has shown not to matter in predicting body dissatisfaction and disordered eating in prior correlational and experimental work with non-clinical samples (Fitzsimmons-Craft, 2017; Lin & Soby, 2016; Saunders & Eaton, 2018a). As with prior research, our results demonstrate that most body-, eating-, and exercise-related comparisons are not helpful to the recovery process. The current data demonstrate the robust and differential predictive power of these comparisons on dietary restraint, eating concern, weight concern, and shape concern. More frequent body-related comparison tendencies were related to greater shape concern. More frequent eating-related comparison tendencies were predictive of dietary restraint, eating concern, and weight concern. Last, more frequent exercise-related comparison tendencies were predictive of eating concern, shape, and weight concern.

Although body- or appearance-related comparisons are the most common comparison type studied in the existing literature (Want, 2009), eating- and exercise-related comparisons demonstrated more predictive power in the current study. These results suggest that targeting body-related comparisons would be most efficacious for individuals struggling primarily with body dissatisfaction, often a residual symptom during ED recovery (Delinsky & Wilson, 2006). It also suggests that, although women in ED recovery continue to compare themselves to both familiar and unfamiliar others, the link between appearance-related comparisons and disordered eating cognitions and behaviors is disrupted during recovery.

Our participants only engaged in one comparison with increased frequency as a result of its perceived utility in promoting recovery: “During meals, I compare what I am eating to what others are eating.” Participants who perceived this comparison as being helpful to their recovery were more likely to have a lower global EDE-Q score, demonstrating less eating pathology. This example quantitatively demonstrates how, in specific instances, comparison to others can be recovery supporting. The utility of a social comparison in one’s recovery process appears to depend more on the

subjective motive behind the comparison (i.e., whether it is being used to support recovery or disordered eating) rather than the comparison direction (upward vs. downward). Of note, however, most participants in the current study were engaging in comparisons that did not help their recovery process. This is evidenced by both participant ratings of the perceived helpfulness of the body-, eating-, and exercise-related comparisons and the strong relations between greater comparison frequency and ED-related cognitions.

Practice Implications

The current findings support prior assertions that social comparison is an important treatment target for women in recovery from a clinical eating disorder (ED). The short and valid BEECOM-R scale presented here is suitable for use in both clinical and research practice. These findings also suggest that it may be especially important to target and challenge eating- and exercise-related comparison tendencies (vs. body-related comparisons) in practice with clients in ED recovery. The data from the current study also support the continued use of some social comparisons, to the extent that they are being used to support the recovery process. We recommend clinicians explore the motive behind their clients’ ED-related comparisons and that clinicians use the abbreviated measure to track the frequency with which clients are engaging in body, eating, and exercise comparison tendencies over time.

Limitations and Directions for Future Research

Although informative, the current research is limited by its single-timepoint design and our use of a single item to assess comparison helpfulness. Future research should evaluate the stability and incremental and predictive validity of the abbreviated measure, as has been done with the original BEECOM in a non-clinical sample (Fitzsimmons-Craft & Bardone-Cone, 2014), and examine comparison utility in greater depth. In addition, sociocultural variables and disordered eating cognitions likely share bidirectional relations (Tiggemann, 2011). Therefore, future research also needs to examine changes in these constructs prospectively, using a person-centered data analytic approach to best understand how the interrelations between social comparison and disordered eating cognitions change over time for women in recovery. A longitudinal or experimental design would provide further insight into how to therapeutically target these constructs to promote sustained recovery outcomes.

Researchers should also examine similarities and differences in comparison tendencies among recovering women from varied ethnic and racial backgrounds. Research investigating the role of appearance-related social comparison on disordered eating outcomes for cultural and ethnic minorities without EDs is in the nascent stages of exploration (Rancourt, Shaefer, Bosson, & Thompson, 2016). Recently, frequent

downward appearance-related comparisons were found to correlate with higher eating, weight, and shape concerns for Hispanic women and to greater body dissatisfaction for Asian and White women without clinical EDs (Rancourt et al., 2016). Thus, intersectional variations in the types of body-, eating-, and exercise-related comparisons observed in the current study merit further investigation. Moreover, the use of an online, convenience sample in the current study comes with limitations. Participation was only open to individuals who viewed the online advertisement and link, were participating for course extra credit, or were personally invited by the investigators based on participation in prior studies.

Conclusions

In the current research, we quantitatively explored women's body-, eating-, and exercise-related social comparison tendencies during ED recovery. As with the development of body dissatisfaction and eating pathology, Festinger's (1954) social comparison paradigm does not adequately capture the nuances of these comparisons during the recovery process. The data point to the importance of considering comparison motive over direction for women in ED recovery and highlight the potential efficacy of targeting body-, eating-, and exercise-related comparisons in a clinical setting to address body dissatisfaction and disordered eating cognitions.

Declaration of Conflicting Interests

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