

EXAMINING AN ELABORATED SOCIOCULTURAL MODEL OF DISORDERED EATING  
AMONG COLLEGE WOMEN: THE ROLES OF SOCIAL COMPARISON AND BODY  
SURVEILLANCE

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## **ABSTRACT**

Ellen E. Fitzsimmons-Craft: Examining an Elaborated Sociocultural Model of Disordered Eating in College Women: The Roles of Social Comparison and Body Surveillance  
(Under the direction of Anna M. Bardone-Cone)

College represents a unique vulnerability period for the development of body dissatisfaction and disordered eating among women. These negative health concerns may be at least partially explained by social comparison and objectification theories. This study extended previous research by examining how these theories fit into an elaborated version of the sociocultural model of disordered eating and by using an ecological momentary assessment (EMA) approach. Participants were 238 women attending a large, public Southeastern university. They completed two self-report questionnaire sessions (at the start and end of an academic semester) and a two-week EMA component (i.e., via their personal computers, participants completed a short set of questions 3x/day mid-semester). First, eating disorder-related social comparison (i.e., including body, eating, and exercise comparisons) and body surveillance (i.e., the behavioral indicator of self-objectification) were tested as factors that may explain the relation between thin ideal internalization and body dissatisfaction in the sociocultural model of disordered eating. Results indicated that this model provided a good fit to the data and that the total indirect effect from thin ideal internalization to body dissatisfaction through this set of mediators was significant. Social comparison emerged as a significant specific mediator while body surveillance did not. This mediation model did not hold prospectively. Second, we examined the effects of momentary body, eating, and exercise social comparisons and body

surveillance on momentary body dissatisfaction. When examining these effects in a single model, results indicated that within- and between-person levels of body comparisons and body surveillance, within-person levels of eating comparisons, and within-person levels of exercise comparisons predicted increased body dissatisfaction contemporaneously. Between-person levels of eating and exercise comparisons did not predict unique variance in body dissatisfaction. Finally, we were interested in whether trait thin ideal internalization predicted momentary reports of body dissatisfaction and if this relationship was mediated by momentary reports of body, eating, and exercise social comparison and body surveillance. Although the total between-person indirect effect through this set of mediators was significant, only body comparison and body surveillance emerged as significant specific mediators. These findings have significant clinical implications and are suggestive of many avenues for future research.

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## **LIST OF ABBREVIATIONS**

BAAR	Beliefs About Attractiveness Scale-Revised
BC	Bias-corrected
BEECOM	Body, Eating, and Exercise Comparison Orientation Measure
BMI	Body mass index
BSQ	Body Shape Questionnaire
BULIT-R	Bulimia Test-Revised
CFA	Confirmatory factor analysis
CFI	Comparative fit index
CI	Confidence interval
EAT-26	Eating Attitudes Test-26
EDE-Q	Eating Disorder Examination-Questionnaire
EDI-BD	Eating Disorder Inventory-Body Dissatisfaction
EFA	Exploratory factor analysis
EMA	Ecological momentary assessment
GEEs	Generalized estimating equations
IBSS-R	Ideal-Body Stereotype Scale-Revised
ICC	Intraclass correlation
MCAR	Missing completely at random
MLM	Multilevel modeling
MSEM	Multilevel structural equation modeling
OBCS	Objectified Body Consciousness Scale
PSPS	Perceived Sociocultural Pressure Scale

RMSEA	Root mean square error of approximation
SATAQ-4	Sociocultural Attitudes Toward Appearance Questionnaire-4
SEM	Structural equation modeling
SRMR	Standardized root-mean-square residual
TLI	Tucker-Lewis Index
T1	Time 1
T2	Time 2

## INTRODUCTION

In university settings, the statistics regarding eating disorder prevalence are alarming, as between 4% and 9% of college women suffer from diagnosable eating disorders (Hesse-Biber, Marino, & Watts-Roy, 1999; Keel, Heatherton, Dorer, Joiner, & Zalta, 2006; Pyle, Neuman, Halvorson, & Mitchell, 1991). When disordered eating estimates for this group are broadened to include subthreshold presentations, prevalence estimates range from 34% to 67% of college women (e.g., Berg, Frazier, & Sherr, 2009; Franko & Omori, 1999; Hoerr, Bokram, Lugo, Bivins, & Keast, 2002; Krahn, Kurth, Gomberg, & Drewnowski, 2005; Mintz & Betz, 1988; Mintz, O'Halloran, Mulholland, & Schneider, 1997). Of note, Mintz and Betz (1988) reported that only 33% of the college women in their study could be classified as “normal eaters,” indicating that disordered eating is relatively “normative” for this group. Furthermore, body dissatisfaction, which has been described as one of the “most consistent and robust risk and maintenance factors for eating pathology” (Stice, 2002, pp. 832-833) is experienced by up to 80% of college women (Heatherton, Nichols, Mahamedi, & Keel, 1995; Neighbors & Sobal, 2007; Silberstein, Striegel-Moore, Timko, & Rodin, 1988; Spitzer, Henderson, & Zivian, 1999; Vohs, Heatherton, & Herrin, 2001).

Both environmental and genetic factors and their interplay influence risk for eating disorders (Bulik, 2005; Bulik & Tozzi, 2004). Not all individuals who are exposed to societal pressures for thinness develop eating disorders and not all individuals with a genetic predisposition for eating pathology go on to develop a disorder. Thus, it is important to understand the etiological roles of *both* environmental and genetic factors. In the current study,

we will focus on better understanding certain environmental risk factors (i.e., sociocultural influences) for eating pathology. Indeed, there is support for a sociocultural model of disordered eating among college women (e.g., Stice, 1994; Stice, Nemeroff, & Shaw, 1996; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). According to Stice's sociocultural model, disordered eating is a result of pressure for women in Western society (e.g., from media, family, and peers) to achieve an ultraslender figure (Striegel-Moore, Silberstein, & Rodin, 1986). As described by Chernin (1981), there is a "tyranny of slenderness" that rules over women in the United States. For example, the media has espoused a viewpoint that the ultraslender look is both desirable and achievable, when in fact, this "ideal" is very difficult or nearly impossible for most women to achieve without engaging in extreme weight loss efforts (Brownell, 1991). Typically, for these sociocultural pressures to have harmful effects on an individual, they must be internalized. If a woman does not "buy in" to these pressures, it is less likely that they would lead to disordered eating. However, if a woman does assimilate and internalize the thin ideal and the values associated with it into her worldview (e.g., in order to be considered attractive, I must be thin), it is likely that this internalization will have adverse effects (Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004). In fact, women who most aspire to being thin are the most negatively affected by thin ideal images (e.g., Dittmar & Howard, 2004; Halliwell & Dittmar, 2004). It is of note though that among samples of college women, pressure for thinness accounts for unique variance in body dissatisfaction, even above and beyond the variance accounted for by thin ideal internalization (e.g., Stice et al., 1996). That is, on their own, repeated messages that one is not thin enough may increase dissatisfaction with the body (e.g., Stice, 2001). Thus, pressure for thinness may result in body dissatisfaction both directly and indirectly via its influence on thin ideal internalization (e.g., Stice & Shaw, 2002).

Cross-sectional research has demonstrated a robust link between thin ideal internalization and body dissatisfaction, and prospective research has indicated that thin ideal internalization predicts increased body dissatisfaction (e.g., Keery, van den Berg, & Thompson, 2004; Shroff & Thompson, 2006; Stice & Whitenton, 2002); such dissatisfaction can in turn lead to eating pathology (Halliwell & Harvey, 2006). However, sociocultural models of disordered eating (e.g., Stice, 1994; Stice et al., 1996) currently lack comprehensive explanations as to *how* thin ideal internalization leads to body dissatisfaction and subsequent eating pathology. Theoretically, women who have internalized the thin ideal would be at risk for developing body dissatisfaction when the ideal is not actualized; yet, how do these individuals come to know that they have not realized such an ideal – through what mechanisms does this occur? How does a woman come to know that there is a discrepancy between what she would ideally like to look like and what she currently looks like? A better understanding of the mechanisms by which thin ideal internalization translates itself into body dissatisfaction would inform prevention efforts and provide researchers and clinicians with a more comprehensive understanding of the sociocultural influences underlying the development of body dissatisfaction.

The current study will focus on two prominent social psychological theories, namely social comparison (Festinger, 1954) and objectification (Fredrickson & Roberts, 1997; McKinley & Hyde, 1996) theories, as explanations of the relation between thin ideal internalization and body dissatisfaction among college women for two reasons. First, social interactions, particularly with peers, become increasingly salient and important in the college setting (e.g., Borsari & Carey, 2001; Martin & Hoffman, 1993). For example, college students seek out interactions with peers and peer networks as a means to provide social opportunities and social support, as there is a marked shift in influence from parents to peers during this time for most individuals (Borsari &

Carey, 2001; Hays & Oxley, 1986; Paul & Kelleher, 1995). Second, weight and shape become increasingly salient and important in women's everyday lives in the college setting (Berscheid, Walster, & Bohrnstedt, 1973; Cash & Green, 1986; Cook-Cottone & Phelps, 2003; Fallon & Rozin, 1985). Furthermore, a woman's understanding of her body is based not only on her own views of it, but also on how she believes others view it (Davison & McCabe, 2005). Thus, the implications of social comparison and self-objectification (i.e., two ways to gain information about one's and others' view of the body) may be especially far-reaching during the college years, a time when many people undergo significant changes in self-concept (Lindner, Hughes, & Fahy, 2008; Pascarella, Smart, Ethington, & Nettles, 1987) and when peer interaction and weight and shape are particularly salient. College women may be particularly vulnerable to the effects (e.g., body dissatisfaction and disordered eating) of social comparison- and objectification-related behaviors if they result in an individual coming to the conclusion that there is a gap between her actual and ideal selves (i.e., between her current appearance and her ideal appearance; Cash & Szymanski, 1995). Thus, overall, college women represent an at-risk group given this confluence of factors, and a better understanding of the social psychological underpinnings of body dissatisfaction and disordered eating may identify specific behaviors (i.e., social comparison, body surveillance – the behavioral indicator of self-objectification; Moradi & Huang, 2008) that may adversely influence these women and which could be targeted with prevention efforts.

### **Social Comparison**

Social comparison theory, as put forth by Festinger (1954), holds that humans have a drive to assess their progress and standing in life. To achieve this end, they seek out standards against which to compare themselves. When objective standards are not available for such

comparisons (and even at times when they are; Klein, 1997), individuals look to their social environments and make comparisons with available others (Corning, Krumm, & Smitham, 2006). Indeed, comparison with others, both intentionally and unintentionally, is a common and basic social phenomenon and has been described as a “core element of human conduct and experience” (Suls, Martin, & Wheeler, 2002, p. 159) that pervades nearly all life domains (Gibbons & Buunk, 1999; Gilbert, Price, & Allan, 1995).

Festinger (1954) originally suggested that the affective consequences of such comparison processes are influenced by the direction (i.e., upward or downward) and characteristics of the target (i.e., universalistic or particularistic). Upward social comparisons are said to occur when an individual compares herself to someone whom she perceives to be “better off,” while downward social comparisons occur when an individual compares herself to someone whom she perceives to be “worse off” (Myers & Crowther, 2009). Research findings have generally demonstrated deleterious effects of upward comparisons (e.g., Gibbons, 1986; Hackmiller, 1966) and positive effects of downward comparisons (e.g., Marsh & Parker, 1984; Testa & Major, 1990). Festinger (1954) further hypothesized that people typically have a drive to make comparisons that result in favorable, as opposed to unfavorable, outcomes, and that whenever possible, individuals will compare themselves to those with whom they are most similar (i.e., particularistic targets – e.g., friends, peers, family) rather than with individuals who are perceived to be more dissimilar (i.e., universalistic targets – e.g., distant sources of influence like the mass media; Bosveld, Koomen, & van der Pligt, 1994; Morrison, Kalin, & Morrison, 2004).

However, these tenets of Festinger’s (1954) original theory do not always hold among women who make appearance-based social comparisons for the purpose of evaluating their bodies – that is, for those comparisons that are most relevant in the context of disordered eating



(Myers & Crowther, 2009). For one, women frequently make appearance-related social comparisons (Leahey, Crowther, & Mickelson, 2007) and continue to do so even when they perceive themselves as “coming up short” (Strahan, Wilson, Cressman, & Buote, 2006). Indeed, comparisons made on appearance-related dimensions are generally upward, as women tend to compare themselves to media images and other women they perceive to be thinner and/or more attractive than themselves (Morrison et al., 2004; van den Berg, Thompson, Obremski-Brandon, & Coover, 2002), and college women engage in more upward than downward comparison (e.g., Cattarin, Thompson, Thomas, & Williams, 2000; Heinberg & Thompson, 1992a; Leahey & Crowther, 2008; Leahey et al., 2007; O’Brien et al., 2009). Despite the fact that such upward comparisons often result in feelings of discontent and dissatisfaction (Thompson et al., 1999), women continue to engage in these comparisons on a regular basis. It is possible that college women may be motivated to make upward comparisons in order to gain information about and learn how to be more like individuals that they “look up to” in some sense (i.e., for purposes of self-improvement; Buunk & Gibbons, 2007; Taylor & Lobel, 1989). Although Festinger’s (1954) original theory also purported that individuals are most likely to compare themselves with similar others, research has indicated that women often compare themselves to unrealistic, thin ideal media images (Engeln-Maddox, 2005; Strahan et al., 2006). It may be that women believe making comparisons with individuals who are perceived to have much expertise in a particular area (in this case, women in the media who represent the thin ideal) could provide a good deal of information (Martinot & Redersdorff, 2002) and serve as a source of inspiration (e.g., Collins, 1996; Mills, Polivy, Herman, & Tiggemann, 2002; Myers & Biocca, 1992). In general, the perceived relevance of comparison targets may be determined by individual motives. For example, if the average woman knows she is going to be judged against thin ideal cultural norms,

images that reflect this ideal may be deemed as particularly relevant for her (Strahan et al., 2006).

College campuses are settings that may lend themselves to appearance-related social comparisons. Women are surrounded by many other women of approximately the same age with whom they interact both directly (e.g., in class, roommate interactions) and indirectly (e.g., passing another woman on campus) on a daily basis (Lindner et al., 2008). Buunk and Gibbons (2007) noted that three features characterize the “typical” individual who engages in social comparison: high chronic activation of the self (e.g., Stapel & Tesser, 2001<sup>1</sup>), a strong interest in being a part of a group and in what others think and feel, and uncertainty of the self – all of which also tend to characterize college women (e.g., Lindner et al., 2008). Not surprisingly, social comparison behavior has been found to be pervasive among college women (e.g., Summerville & Roese, 2008).

There is ample evidence that college women engage in frequent comparisons with peers in order to gain an understanding of their weight/shape status relative to others (e.g., Striegel-Moore et al., 1986), and research and theory have suggested that social comparison with peers, which are usually in the upward direction, may be one pathway through which internalized sociocultural pressures for thinness develop into body dissatisfaction and disordered eating (Dittmar, 2005; Dittmar & Howard, 2004; Fitzsimmons-Craft et al., 2012c; Leahey et al., 2007; Wood, 1996). It may be that via social comparison, individuals come to know that they have not yet actualized their ideal.

Indeed, frequent engagement in social comparisons with peers has generally been implicated in the development of body dissatisfaction and disordered eating (e.g., Cash, Cash, & Butters, 1983; Thompson, Heinberg, & Tantleff, 1991; Trottier, Polivy, & Herman, 2007).

Regarding the effects of upward versus downward and particularistic versus universalistic comparisons, Heinberg and Thompson (1992b) gave female college students feedback that their own body size was either smaller or larger than average with reference to either the “average student” (i.e., particularistic comparison target) or the “average USA citizen” (i.e., universalistic target). Interestingly, a main effect for feedback type did not emerge, but a main effect for target comparison group did. Specifically, participants who compared themselves to peers displayed greater body image anxiety and distress than participants who compared themselves to the average citizen. Thus, regardless of the type of information they were given (that they were either smaller or larger), participants experienced negative consequences from making a particularistic comparison. Research has indicated that women also make comparisons with idealized media images (i.e., universalistic targets) and that these may be associated with negative outcomes (e.g., Cattarin et al., 2000; Halliwell & Dittmar, 2005). However, as suggested by the results of Heinberg and Thompson (1992b), perhaps these negative effects are less so than those experienced as a result of comparison with peers. Similarly, Leahey and Crowther (2008) found that amongst body dissatisfied women, upward comparisons with peers were associated with more dieting thoughts than upward comparisons with media images. Leahey and Crowther (2008) posited that because these women may perceive themselves as relatively similar to the peer comparison targets, they likely feel more capable of attaining their appearance and thus have increased dietary restriction thoughts (relative to restriction thoughts after comparisons with more dissimilar images). Given the potentially more damaging effects of social comparison with peers versus media images and the great number of opportunities that present themselves for this sort of comparison behavior on college campuses, we focused on the impact of social comparison with peers in the current study.

Other experimental work has also investigated the effects of social comparison with peers. For example, Lin and Kulik (2002) examined the impact of exposure to images of thin or overweight peers on self-evaluation. College women who were exposed to and who believed they were competing with a thin peer in a mock “dating game” (i.e., told a male would choose which of the two women he would prefer to go on a date with) experienced decreased body satisfaction and confidence. Exposure to the overweight peer had no influence – that is, exposure to such an image did not produce a compensatory, elevating effect on body satisfaction and confidence. Similarly, Krones, Stice, Batres, and Orjada (2005) found that undergraduate women who were exposed to a thin ideal confederate demonstrated significant increases in body dissatisfaction relative to those in the control condition (i.e., those who were exposed to an average-sized female peer).

Correlational evidence supports the relation between social comparison with peers and eating pathology in college women, as well. Hesse-Biber and Marino (1991) suggested that the higher incidence of disordered eating in college compared to high school females may stem in part from increased comparisons with thin ideal peers and associated diminishments in self-concept; indeed, correlational studies have tended to find associations between frequency of engagement in social comparison with peers and body dissatisfaction and disordered eating among college women (e.g., Bamford & Halliwell, 2009; Faith, Leone, & Allison, 1997; Hildebrandt, Shiovitz, Alfano, & Greif, 2008; Stomer & Thompson, 1996). Similarly, social comparison tendencies are heightened among college women with eating disorder symptoms (compared to their asymptomatic peers) and these individuals come to more self-defeating appraisals of their own bodies when shown pictures of other women’s figures (Corning et al., 2006). However, research has yet to explicitly examine among college women the prospective

relations between social comparison behavior with peers and later body dissatisfaction and disordered eating.

### **Self-Objectification**

Objectification theory (Fredrickson & Roberts, 1997) is another social psychological theory that may help explain the development and maintenance of body dissatisfaction and disordered eating in college women. Within dominant American culture, theorists have posited that the feminine body has been constructed as an object to be looked at (Fredrickson & Roberts, 1997; McKinley & Hyde, 1996) and sexually gazed upon (Spitzack, 1990). It is not uncommon for a woman to feel sexually objectified (often by men), as her “sexual parts or functions are separated out from her person, reduced to status of mere instruments, or else regarded as if they were capable of representing her” (Bartky, 1990, p. 35). Such sexualization may occur in many forms, such as via sexual violence or through gaze (i.e., visual inspection of the body; Fredrickson & Roberts, 1997). Because the female body exists in this sociocultural context and because women often experience sexual objectification (i.e., the experience of being treated solely as a body that exists for the use and pleasure of others; American Psychological Association, 2007; Fisher, Cullen, & Turner, 2000; Swim, Hyers, Cohen, & Ferguson, 2001), girls and women learn to view themselves from an observer’s perspective and to treat themselves as objects to be looked at. This self-objectification, or the internalization of the “objectifying observer’s” perspective of one’s body (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998, p. 270), is thought to behaviorally manifest itself in the act of body surveillance (Moradi & Huang, 2008). That is, if a woman has internalized the observer’s perspective of her own body, she will engage in persistent body surveillance or monitoring (e.g., Moradi, 2010, 2011). In other words,

self-objectification describes a perspective of oneself, while body surveillance is the active, behavioral manifestation of this viewpoint.

Women also receive the message that they have the ability to control their bodies and that given the appropriate amount of effort, they can comply with cultural standards of thinness (McKinley & Hyde, 1996). Thus, many women feel they must engage in constant body surveillance in order to ensure their compliance with the thin ideal (Gilbert & Thompson, 1996; McKinley, 2004; Thompson & Stice, 2001). It is via this self-surveillance that many women realize there is a discrepancy between what they see and what they would ideally like to look like, and thus, may experience negative consequences (e.g., McKinley & Hyde, 1996). The development of body image disturbance in college women can be at least partially explained by body surveillance (Fredrickson & Roberts, 1997; McKinley, 1998; McKinley & Hyde, 1996). Specifically, when an individual focuses attention on herself and has an awareness of cultural standards of beauty but cannot reduce the discrepancy between the two, she feels badly (Carver & Scheier, 1981; Knauss, Paxton, & Alsaker, 2008). Thus, body surveillance may serve as an additional explanation as to how thin ideal internalization leads to body dissatisfaction and disordered eating (e.g., Fitzsimmons-Craft et al., 2012c).

College represents a period of time when women may be particularly vulnerable to self-objectification. Self-objectification and habitual body monitoring tend to decline with age (Tiggemann & Lynch, 2001), and it has been purported that this is due to changes in the appearance investment versus appearance evaluation distinction that occur over time (Muth & Cash, 1997). Measures of appearance evaluation (i.e., levels of body dissatisfaction) remain relatively stable over time and age differences in body dissatisfaction do not exist (e.g., Garner, 1997; McKinley, 1999; Rozin & Fallon, 1988). On the other hand, appearance investment, which

refers to the importance of appearance to one's sense of self, diminishes with age (e.g., Cash, Winstead, & Janda, 1986; Pliner, Chaiken, & Flett, 1990). Perhaps for these reasons, disordered eating tends to decline following college and during the transition to early adulthood (e.g., Heatherton, Mahamedi, Striepe, Field, & Keel, 1997). Thus, despite the fact that body dissatisfaction is a very strong predictor of disordered eating (e.g., Stice, 2002), it remains relatively stable across the life span in a way that disordered eating does not (Tiggemann & Lynch, 2001) – likely because of the changes in appearance investment that occur. Although older women may still feel unhappy with their bodies, they may be less likely to actually do something to alleviate such discontent since appearance becomes less important to them. Given all of this, it is important to examine processes, such as self-objectification, that leave women feeling particularly invested in appearance and vulnerable to engaging in disordered eating during the college years.

Experimental work has supported links between self-objectification and body image and disordered eating consequences. Much of the work in this area has manipulated state feelings of self-objectification by having women either try on a swimsuit (i.e., increased self-objectification condition) or a sweater (i.e., control condition) in front of a full-length mirror. The rationale is that when wearing a swimsuit, most individuals are likely to assume an “outsider’s perspective” of their own body and to view their body as an object (Quinn, Kallen, Twenge, & Fredrickson, 2006). Fredrickson and colleagues (1998) found that women who tried on a swimsuit reported increased self-consciousness, increased body shame, and lower self-esteem than women who tried on a sweater. The women in the swimsuit condition also exhibited more restrained eating of cookies and candy bars and worse math performance than women in the sweater condition. Quinn, Kallen, and Cathey (2006) extended these findings by indicating that the impact of self-

objectification can last beyond the self-objectifying situation itself among college women; in particular, results indicated that women who tried on the swimsuit continued to have thoughts about their body even after putting their street clothes back on. Other experimental procedures designed to heighten state self-objectification, such as using a sentence scrambling task with objectifying words (Roberts & Gettman, 2004) or leading participants to believe they would be interacting with a male stranger (and anticipating a male gaze; Calogero, 2004), have also been found to lead negative outcomes, such as increased body shame and appearance anxiety.

A host of correlational research has also linked trait-level self-objectification and body surveillance with body dissatisfaction and disordered eating among college women (e.g., Greenleaf, 2005; Greenleaf & McGreer, 2006; Moradi, Dirks, & Matteson, 2005; Muehlenkamp & Saris-Baglama, 2002; Muehlenkamp, Swanson, & Brausch, 2005; Noll & Fredrickson, 1998; Tiggemann & Kuring, 2004; Tiggemann & Slater, 2001; Tylka & Hill, 2004). In an effort to extend this research, we wanted to investigate how body surveillance, the behavioral indicator of self-objectification, may fit into an elaborated sociocultural model of disordered eating. In particular and as was proposed earlier, body surveillance may explain the relation between thin ideal internalization and body dissatisfaction and disordered eating. Indeed, Myers and Crowther (2007) and Fitzsimmons-Craft and colleagues (2012c) found that both the process of self-objectification and the behavior of body surveillance mediated the relation between internalization of the thin ideal and body dissatisfaction in cross-sectional studies of college women. Thus, body surveillance may be an additional way by which thin ideal internalization translates itself into negative body image and eating disorder symptomatology among college women, but prospective research is needed to test this temporal ordering.



## **The Current Study**

While there is some evidence to support the roles of social comparison and body surveillance, which are correlated but distinct constructs (e.g., Fitzsimmons-Craft et al., 2012c), in the development and maintenance of body dissatisfaction and disordered eating, this research has a number of limitations. First, previous research has typically been done in settings that lack ecological validity (e.g., laboratory). Ecological momentary assessment (EMA) circumvents this limitation, in addition to some of the other limitations of correlational and experimental work, and involves assessing participants multiple times per day in their natural environments. In an overview of this methodological approach, it was noted that EMA has: ecological validity because data are collected in the natural environment; reduced retrospective recall biases since data are provided in the moment, or at most, for the past hours; and clear temporal ordering of hypothesized causal factors and outcomes (Smyth et al., 2001). Very little work has examined social comparison behavior and the objectifying behavior of body surveillance in this fashion (i.e., Breines, Crocker, & Garcia, 2008; Leahey & Crowther, 2008; Leahey, Crowther, & Ciesla, 2011; Leahey et al., 2007; Myers, Ridolfi, Crowther, & Ciesla, 2012; Patrick, Neighbors, & Knee, 2004; Pinkus, Lockwood, Schimmack, & Fournier, 2008; Zuckerman & O'Loughlin, 2006). What such work has generally indicated is that women regularly engage in upward appearance-related social comparisons and that these comparisons are associated with increases in negative affect, body dissatisfaction, and other negative outcomes, that individuals with elevated body dissatisfaction and/or eating pathology make more upward appearance-related social comparisons (and are more negatively affected by these comparisons) than women low on these attributes, and that momentary self-objectification is generally associated with decreases in well-being. Furthermore, in general, the use of EMA is limited within the eating disorders field,

and to date, researchers have yet to use EMA methodology to further research on the sociocultural model of disordered eating.

Second, research on this sociocultural model of disordered eating lacks a comprehensive understanding as to *how* thin ideal internalization leads to body dissatisfaction and subsequent disordered eating. Third, although aspects of the sociocultural model of disordered eating have been tested longitudinally (e.g., Stice, Shaw, & Nemeroff, 1998), much of the work in this area has been cross-sectional (e.g., Stice, Schupak-Neuberg, Shaw, & Stein, 1994; Twamley & Davis, 1999), which has precluded understanding causal mechanisms. Further, the longitudinal work that has been done has typically not controlled for the temporal stability of study constructs (Stice, 2001; Stice & Bearman, 2001). This study addresses these limitations. Data were collected from female undergraduates using the methodologies of: 1) questionnaires administered at two time points (i.e., Time 1 (T1; beginning of an academic semester) and Time 2 (T2; end of an academic semester), which were about three months apart), and 2) EMA using participants' personal computers and online surveys (3x/day) across two weeks.

Hypothesis 1: An elaborated version of the sociocultural model of disordered eating that includes social comparison and objectification theories was examined; in particular, we included social comparison and body surveillance as mediators of the thin ideal internalization-body dissatisfaction relation in this model (see Figure 1). All paths specified between constructs in the model were grounded in previously discussed empirical findings and/or in theory. It was hypothesized that a sociocultural model incorporating traditional self-report measures of social comparison and body surveillance would provide a good fit to the data and that social comparison and body surveillance would significantly mediate the thin ideal internalization-body dissatisfaction relation within this model. We also examined a traditional sociocultural model of

disordered eating (i.e., a model not including the constructs of social comparison and body surveillance) in order to ascertain what (if anything) is gained by incorporating these constructs in the model. These models were examined cross-sectionally (i.e., using only the T1 data).

If the elaborated sociocultural model provides a good fit to the data and social comparison and body surveillance emerge as significant mediators of the thin ideal internalization-body dissatisfaction relation, we will explore the potential prospective relations among the constructs involved in the mediational component of this model (i.e., thin ideal internalization, social comparison, body surveillance, body dissatisfaction). First, we will examine if thin ideal internalization at T1 prospectively predicts social comparison and body surveillance at T2 and if social comparison and body surveillance at T1 prospectively predict body dissatisfaction at T2 both without and with controlling for baseline levels of the outcome variable. In other words, we were interested in both whether these constructs predicted future levels of one another and whether these constructs predicted change in one another over time. We hypothesized that these constructs would significantly predict future levels of one another. However, the analyses regarding these constructs' ability to predict change in one another over the course of three months were considered more exploratory in nature; thus, no specific hypotheses were made.

If we determine that these constructs (i.e., thin ideal internalization, social comparison, body surveillance, body dissatisfaction) significantly predict change in one another over time, we will proceed with examining whether social comparison and body surveillance mediate the relation between thin ideal internalization and body dissatisfaction prospectively. This will be important given that the use of longitudinal data allows for a better approximation of causal relations among constructs than cross-sectional data allow for (Cole & Maxwell, 2003). The

possibility that social comparison and body surveillance would mediate the thin ideal internalization-body dissatisfaction relation using prospective data was also seen as more exploratory.

Finally, given the dearth of research examining the prospective relations between social comparison/body surveillance and disordered eating, we conducted exploratory analyses investigating this possibility. In particular, we determined if social comparison and body surveillance at T1 prospectively predicted disordered eating at T2 both without and with controlling for baseline levels of disordered eating. That is, we were interested in both whether social comparison and body surveillance predicted future levels of disordered eating and whether social comparison and body surveillance predicted change in disordered eating over the course of three months.

Hypothesis 2: The EMA data were used to examine momentary social comparison and body surveillance (i.e., engagement in these behaviors over the past several hours) and their relations to momentary body dissatisfaction (i.e., body dissatisfaction experienced over the past several hours). It was expected that momentary reports of social comparison and body surveillance would be contemporaneously associated with momentary body dissatisfaction both within- and between-persons.

Hypothesis 3: The EMA data were used to understand the mechanisms by which thin ideal internalization leads to body dissatisfaction in a more momentary fashion. In particular, we hypothesized that momentary instances of social comparison and body surveillance would mediate the relation between trait thin ideal internalization (assessed at T1) and momentary body dissatisfaction. We also investigated whether this mediational model would hold when using momentary thin ideal internalization as the independent variable.

## Preliminary Studies

A pilot study of aspects of the current study was conducted in 2010. Using a sample of 265 college women, we examined whether, in a cross-sectional design, general social comparison and body surveillance mediated the relation between thin ideal internalization and body dissatisfaction. Using bootstrapping analyses, results indicated that the total indirect effect had a standardized point estimate of .18 ( $p < .001$ ) and a 95% bias-corrected (BC) bootstrap confidence interval (CI) of .10 to .26. Thus, social comparison and body surveillance partially mediated the relation between thin ideal internalization and body dissatisfaction. The specific indirect effects of each mediator showed that body surveillance was a unique and significant mediator, with a standardized point estimate of .19 ( $p < .001$ ) and a 95% BC CI of .10 to .27. However, general social comparison did not add significantly to the model, with a standardized point estimate of -.01 ( $p = .674$ ) and a 95% BC CI of -.05 to .03. A contrast confirmed that the indirect effect of body surveillance in the thin ideal internalization-body dissatisfaction relation was significantly stronger ( $p < .001$ ) than the indirect effect of general social comparison. Similar results emerged when utilizing a measure of appearance-related social comparison (see Fitzsimmons-Craft et al. (2012c) for more details).

However, we believe that that the general measure of social comparison used in this pilot study may have been too general and that the appearance-related social comparison measure may have been too narrow. For example, other social comparison domains, such as those related to eating and exercise, may stem from thin ideal internalization and lead to body image disturbance. Appearance-related social comparison certainly plays a role in the development of body dissatisfaction, but other sorts of comparison behaviors (e.g., comparing how much one is eating to how much others are eating) may also emanate from internalizing the thin ideal and should be

included to derive the most potent and comprehensive assessment of social comparison. Further, although likely related to the construct of appearance-related social comparison, eating and exercise comparisons focus on the actions associated with achieving the appearance-related goal gleaned from the body-related comparison (Fitzsimmons-Craft, Bardone-Cone, & Harney, 2012a). Based on such comparisons, a woman may conclude that she must behave differently in terms of eating and exercise if she is to achieve her ideal weight/shape. Thus, examining the roles of body, eating, *and* exercise comparisons may be important in terms of coming to a more comprehensive understanding of the ways in which social comparison behavior contributes to body dissatisfaction and disordered eating.

Therefore, a new measure of social comparison was created for the current study. This measure, the Body, Eating, and Exercise Comparison Orientation Measure (BEECOM), assesses three dimensions of social comparison that are relevant for body dissatisfaction and eating disorders research, namely, body, eating, and exercise comparisons (Fitzsimmons-Craft et al., 2012a). This measure was validated using a large sample of college women ( $N = 441$ ) that was randomly divided into two groups ( $n = 226$ ,  $n = 215$ ) so that both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) could be conducted (Fitzsimmons-Craft et al., 2012a). These women were initially administered 30 BEECOM items; via EFA, the total number of items was reduced to 18. The factor structure of the BEECOM was then confirmed via CFA. Although there are limitations involved with the second sample not being fully independent of the first (e.g., same study conditions), we believe this approach was adequate for the purposes of initially testing and validating the factor structure of the BEECOM. Most of these women (362 of 441; 82%) also provided data two weeks later, demonstrating adequate test-retest reliability. Finally, the BEECOM was found to significantly account for variance in body dissatisfaction and

eating disorder symptomatology both concurrently and one year later (Fitzsimmons-Craft & Bardone-Cone, 2014; Fitzsimmons-Craft et al., 2012a). The final version of the measure is comprised of 18 items and three subscales, Body Comparison Orientation, Eating Comparison Orientation, and Exercise Comparison Orientation, and is provided in Appendix 1. Given prior research demonstrating the potential need to use a comprehensive measure of eating disorder-related social comparison when examining social comparison as a mediator of the thin ideal internalization-body dissatisfaction relation (i.e., Fitzsimmons-Craft et al., 2012c), we assessed body-, eating-, and exercise-related social comparisons in this study. We assessed individuals' engagement in such behavior both in the EMA portion of the study and in the questionnaire batteries that were administered at T1 and T2.

In sum, the current project is significant because it addresses two clinically concerning behaviors (i.e., social comparison, body surveillance) in a vulnerable population (i.e., college women). By developing and testing an elaborated sociocultural model of disordered eating that incorporates these clinically concerning behaviors, this study has the potential to improve scientific knowledge in the body dissatisfaction and eating disorder fields and inform prevention programming for college women by identifying relevant, mutable behaviors that may play a role in body dissatisfaction/disordered eating development. By using both longitudinal and EMA methods, knowledge about social comparison and body surveillance across time, as well as on a more momentary level, is obtained in the context of an elaborated sociocultural model of disordered eating. This study is one of the limited number of eating disorder studies using EMA and the first to jointly examine social comparison and body surveillance in this way.

## METHOD

### Participants and Procedure

Participants were 238 women attending a large, public Southeastern university. Demographic information on these individuals at the first study assessment is provided in Table 1. Of note is this sample's mean score on the Eating Attitudes Test-26 (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982), which was 9.24 ( $SD = 7.30$ ). The EAT-26 is a commonly used measure of eating disorder attitudes and behaviors, and a score of 20 or more indicates a probable eating disorder (King, 1989, 1991). Thus, on average, this sample exhibited a level of disordered eating that was moderate and similar in magnitude to that observed in other studies of college women (e.g., Fitzsimmons-Craft et al., 2012a; Fitzsimmons-Craft, Harney, Brownstone, Higgins, and Bardone-Cone, 2012b).

Table 2 includes all the project activities, their timing, and the participating sample (i.e., Spring 2012 Semester participants, Fall 2012 Semester participants). A questionnaire battery was administered at baseline (beginning of semester, T1) and then again at the end of the semester (T2; about three months later), so as to complete data collection within a single semester and maximize retention. Informed consent was obtained at T1. Questionnaire completion occurred online in private locations of the participants' choosing (e.g., their homes).

About 1-1.5 months after the T1 assessment (i.e., at about mid-semester), participants completed a two-week EMA protocol. Here, EMA refers to participants using a computer to answer questions three times per day as a means to provide a more intensive study of individuals' thoughts, feelings, experiences, and behavior in their natural environment. This



methodology is ideally suited to the current project given the emphasis on social comparison and body surveillance behaviors as they occur and the potential prevention and intervention implications of this project. Research has indicated that reactivity is at most a minimal concern (generally, in EMA studies of social comparison, in EMA studies of body image, and in EMA studies that measure negative health behaviors – e.g., binge eating, alcohol use; Crosby et al., 2009; Heron & Smyth, 2013; Hufford, Shields, Shiffman, Paty, & Balabanis, 2002; Leahey et al., 2007; Stein & Corte, 2003), that participant burden is not excessive (Smyth et al., 2001; Wegner et al., 2002), and that collecting EMA data via personal computers is feasible in college students with good compliance rates (Zuckerman & O’Loughlin, 2006).

In the current project, participants provided data three times per day on thoughts, emotions, and behaviors from the period between the last and current signal. In particular, they completed surveys on a computer in the late morning, late afternoon, and before going to sleep. They were given time guidelines for filling out the surveys (i.e., late morning: 10:30 am-1:30 pm; late afternoon: 3:30 pm-6:30 pm; before going to sleep: 10:00 pm-1:00 am) and were also sent reminder emails with the survey link during each of these time periods on each day of the EMA data collection period. Additionally, all but one of the participants were sent reminder text messages for the first three days of the EMA period (i.e., this one participant opted out of receiving study-related text messages). These text messages reminded them to fill out a survey soon and to check their email for the survey link.

Prior to their T1 assessment, in an informational session with about 30 other study participants, the following were described: rationale for the EMA component of the study, logistics of completing reports 3x/day, definitions of the behaviors (e.g., social comparison) they were to track during the EMA period, and troubleshooting solutions. Participants were provided

with a short manual containing information discussed, as well as the phone numbers and email addresses for myself and one of my research assistants (i.e., their assigned research assistant) for round-the-clock availability in case of any questions/problems recording data. Shiffman (2009) notes that participant-management procedures, such as training, feedback, and check-ins with participants contribute to high compliance, and thus, participants were contacted by their assigned research assistants at least 1x/week via phone and 2x/week via email to check in and address any problems. On each morning of the EMA period, we checked whether participants completed a bedtime report for the previous day and called and emailed those who failed to do so; we reminded them of the incentives for completing most of the EMA question sets and asked them to fill out the reports for that day.

Of note, we considered several EMA issues carefully. First, we considered using portable measurement devices (e.g., study-provided smartphones) instead of participants' personal computers. Although using such devices would provide an even more accurate study of thoughts, emotions, and behaviors in the natural environment (as these devices can be carried/used anywhere), we chose to use participants' personal computers. Given that this study was primarily run and implemented by myself, the expertise, labor, and time needed to program and collect data on portable devices, and the small number of portable devices that could be obtained (due to budget constraints), we chose to use personal computers. Doing so ensured the feasibility of the study and that a relatively large sample size could be obtained. Second, we considered carefully how many times per day to collect data. Given our use of personal computers, we believed that collecting data 3x/day was appropriate. This assessment schedule provided us with multiple daily reports of thoughts, emotions, and behaviors, while at the same time, was feasible and, to our knowledge, not overly burdensome for participants. Although we were unable to collect data as

frequently as is the case in some EMA work, reports on thoughts, emotions, and behaviors were much more frequent/less retrospective than is the case in many studies. We hope to conduct a similar study using more intensive EMA methods in the future. This study is viewed as a “jumping-off point” for future EMA work on social comparison and self-objectification.

Participants were provided with research credit in their introductory psychology courses for participating in this study. Each battery of questionnaires (T1 and T2) took about one hour to complete. Because the university’s psychology department offers one credit for one hour of research participation, participants received one credit for completing each questionnaire session (two credits total for the questionnaires). For their two weeks of EMA participation (with question sets taking about five minutes, 3x/day for a total of 42 surveys), participants received 3.5 research credits if they filled out the short EMA question sets at least 30 times (credit was prorated if they responded less frequently). Of note, the university’s introductory psychology courses require students to obtain 5.5 credits of research participation – this study was advertised as one in which individuals were able to earn all of their credits within a single study.

Participants were also entered into a drawing for one of six \$100 prizes if they completed both questionnaire sessions and at least 36 (85%) of the EMA question sets. Of note, incentives have been identified as important in boosting compliance in EMA studies (Shiffman, 2009). This study was reviewed and approved by the university’s Institutional Review Board.

Regarding attrition, three study participants (out of a total *N* of 238) only completed T1 (i.e., did not complete the EMA portion of the study or T2). Two of these individuals dropped their introductory psychology course after completing T1 and thus no longer needed credit for this course; the third individual dropped the study for personal reasons. Thus, in total, 235 individuals completed all aspects of the study; however, the data from the three individuals who

completed only T1 were used for analyses involving only T1 data. Additionally, in an attempt to control for random responding and inattentiveness, a validity check item was included in both the T1 and T2 questionnaire batteries. These items asked participants to choose a specific response choice (i.e., Please choose “Disagree Strongly”); not responding appropriately to these items suggests possible random or inattentive responding. Of the 238 participants who completed T1, 12 “failed” the T1 validity check (5.1%), and of the 235 participants who completed T2, eight “failed” the T2 validity check (3.4%). Of the 235 participants who completed both T1 and T2, 16 “failed” either the T1 or T2 validity check or both validity checks (6.8%). For analyses involving T1 but not T2 data, we excluded all who failed the T1 validity check (resulting in  $n = 226$ ), and for analyses involving T2 but not T1 data (e.g., obtaining alphas for measures at T2), we excluded all who failed the T2 validity check (resulting in  $n = 227$ ). For analyses involving both T1 and T2 data, we excluded all who failed either validity check or both validity checks (resulting in  $n = 219$ ). For analyses involving only the EMA data, we did not exclude participants based on these validity checks. Although an incorrect validity check suggests that a participant may not have been paying close enough attention during a self-report questionnaire session, we do not believe that we can necessarily generalize a participant’s inattention to the EMA component of the study.

### **Measures at Time 1 (T1) and Time 2 (T2)**

Where possible, we assessed each study construct via at least three different measures so that latent variables with multiple indicators could be used in our structural equation modeling (SEM) analyses (which will be described in more detail later in this manuscript). However, there were three constructs for which we did not use three separate measures. In the case of social comparison, this construct was assessed via one measure (the BEECOM), which

comprehensively assesses eating disorder-related social comparison behavior with three subscales. For SEM analyses, these three subscales were used as indicators of an eating disorder-related social comparison behavior latent variable. Given that, to our knowledge, only one measure of body surveillance exists, this was the only measure of this construct that was administered, and the items that comprise this measure were used as indicators of a body surveillance latent variable in SEM analyses. In the case of pressure for thinness, we used only two measures to assess this construct given that we identified only two psychometrically-supported existing measures of this construct in the literature.

**Demographics.** Demographic data for age, parents' highest levels of education, and race/ethnicity were collected at T1 via a set of questionnaires created for this study. Additionally, participants reported on their current weight and height at T1, and we used this information to compute body mass index (BMI), as we were interested in the ways in which BMI may relate to the study constructs. There is evidence that individuals are generally accurate with their self-reported weights (Shapiro & Anderson, 2003).

**Pressure for thinness.** Pressure for thinness was measured via two questionnaires. The Perceived Sociocultural Pressure Scale (PSPS; Stice & Agras, 1998; Stice & Bearman, 2001; Stice, Ziemba, Margolis, & Flick, 1996) assesses perceived pressure from family, friends, dating partners, and the media to be thin. This measure consists of eight items that are rated on a 1 (*none*) to 5 (*a lot*) scale, and an example item is, "I've felt pressure from my friends to lose weight." Items are averaged to create a total score. Past research with a similar measure has found that child reports of parental pressure to lose weight correspond well with parental self-reports of such pressure (average  $r = .51$ ; Thelen & Cormier, 1995), and research has indicated adequate internal consistency among samples of adolescent females and individuals with bulimia

nervosa (Cronbach's alphas from .83-.88; Stice & Agras, 1998; Stice et al., 1996). Further, research has indicated that this construct remains relatively stable over time (two-week test-retest reliability:  $r = .93$ ; Stice & Agras, 1998; Stice et al., 1996). In the current study, alpha was .79 at T1.

We also used the Pressures subscale of the Sociocultural Attitudes Toward Appearance Questionnaire-4 (SATAQ-4; Schaefer et al., 2013) to assess pressure for thinness. This subscale of the SATAQ-4 assesses perceived pressure from family, peers, and the media to be thin/to strive for cultural ideals of beauty. The subscale consists of 12 items that are rated on a 1 (*definitely disagree*) to 5 (*definitely agree*) scale, and an example item is, "I've felt pressure from family members to look thinner." Items are summed to create a total score. Schaefer et al. (2013) reported high internal consistency (Cronbach's alphas = .85-.96) in a large sample of college women collected from four sites and demonstrated excellent construct validity (e.g., the Pressures subscale correlated with a measure of eating disorder psychopathology). In the current study, alpha was .92 at T1.

**Thin ideal internalization.** The construct of thin ideal internalization was assessed using three measures. First, we used the Ideal-Body Stereotype Scale-Revised (IBSS-R; Stice & Agras, 1998; Stice et al., 1996), which assesses participants' level of agreement with statements concerning what attractive women look like. This measure consists of six items that are rated on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale, and an example item is, "Slender women are more attractive." Items are averaged to create a total score. Regarding convergent and discriminant validity, the IBSS-R evidenced a stronger correlation with a body dissatisfaction measure than with a measure of negative affect (Stice et al., 1996) in a sample of adolescent females. Adequate internal consistency has been demonstrated among samples of adolescent

females and individuals with bulimia nervosa (Cronbach's alphas from .89-.91; Stice & Agras, 1998; Stice et al., 1996). In the current study, alpha was .72 at T1.

Thin ideal internalization was also measured via the Internalization-Thin/Low Body Fat subscale of the SATAQ-4 (Schaefer et al., 2013), which assesses endorsement and acceptance of messages that espouse unrealistic ideals for female beauty and the striving toward such ideals. This subscale consists of five items that are rated on a 1 (*definitely disagree*) to 5 (*definitely agree*) scale, and an example item is, "I want my body to look very lean." Items are summed to create a total score. Evidence of good construct validity has been demonstrated (e.g., relatively high correlation with a measure of eating disorder pathology; Schaefer et al., 2013) and high internal consistency has been reported in a large sample of college women from four sites (alphas of .87-.92; Schaefer et al., 2013). In the current study, alpha was .83 at T1.

Finally, thin ideal internalization was measured via the Importance of Being Attractive and Thin subscale of the Beliefs About Attractiveness Scale-Revised (BAAR) (Petrie, Rogers, Johnson, & Diehl, 1996), which assesses agreement with Western societal values regarding the importance of being thin and attractive. This measure consists of 10 items that are rated on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale, and an example item is, "People would prefer to date thin rather than overweight women." Items are averaged to create a total score. In samples of college women, alphas of .84-.86 have been reported for the Importance of Being Attractive and Thin subscale (Bradford & Petrie, 2008; Wood & Petrie, 2010). Evidence of construct validity in a sample of college women is demonstrated by the subscale's significant associations with bulimic symptomatology, concern with body size and shape, and depression (Petrie et al., 1996). In the current study, alpha was .89 at T1.

**Social comparison.** Social comparison behavior, including body, eating, and exercise social comparison tendencies, was assessed using the Body, Eating, and Exercise Comparison Orientation Measure (BEECOM; Fitzsimmons-Craft et al., 2012a). This measure consists of 18 items that are rated on 1 (*never*) to 7 (*always*) scale. Example items are, “I compare my body shape to that of my peers,” “During meals, I compare what I am eating to what others are eating,” and “When I am exercising (e.g., at the gym, running outdoors), I pay attention to the length of time that those around me work out.” Items are summed to create subscale scores (i.e., Body Comparison Orientation, Eating Comparison Orientation, and Exercise Comparison Orientation) and the total score (i.e., eating disorder-related social comparison orientation). Evidence of construct validity is demonstrated by the subscales’ and total score’s significant positive correlations with general social comparison orientation ( $r$ s of .42-.58), eating disorder symptomatology ( $r$ s of .60-.70), and body dissatisfaction ( $r$ s of .61-.75) in a female college sample (Fitzsimmons-Craft et al., 2012a). Fitzsimmons-Craft and colleagues (2012a) found estimates of internal consistency for the subscale and total scores that ranged from .93 to .97. In the current study, alphas for the BEECOM total and subscale scores were all .91 or greater at both T1 and T2.

**Body surveillance.** Body surveillance was assessed via the Body Surveillance subscale of the Objectified Body Consciousness Scale (OBCS; McKinley & Hyde, 1996). To our knowledge, this is the only existing tool for assessing body surveillance, and thus, only one measure was used to assess this construct. This subscale consists of eight items that are rated on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale, and an example item is, “I often worry about whether the clothes I am wearing make me look good.” Items are averaged to create a subscale score. This subscale contains one comparison-related item (i.e., “I rarely compare how I look



with how other people look”); in order to minimize issues related to construct overlap, this item was not included when computing the subscale score, so that all analyses were run using the 7-item version of the OBCS Body Surveillance score. Also of note, if more than two items are missing on an OBCS subscale (with a “not applicable” response option being counted as missing), then the score for that subscale is not computed (McKinley & Hyde, 1996). However, no study participants had more than two items missing on the Body Surveillance subscale at either T1 or T2. Construct validity in a sample of college women is demonstrated by high correlations with public self-consciousness ( $r = .73$ ) and nonsignificant relations with private self-consciousness (McKinley & Hyde, 1996). McKinley and Hyde (1996) reported a coefficient alpha of .89 in a sample of student and nonstudent women. In the current study, alpha was .79 at T1 and .86 at T2 for the 7-item version of the OBCS Body Surveillance subscale.

**Body dissatisfaction.** The construct of body dissatisfaction was assessed in a number of ways. First, we measured body dissatisfaction using the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987), which assesses concerns about body shape, in particular, participants’ experience of “feeling fat” over the past four weeks. This measure consists of 34 items that are rated on a 1 (*never*) to 6 (*always*) scale, and an example item is, “Has eating even a small amount of food made you feel fat?” Items are summed to create a total score. The BSQ has demonstrated validity and reliability in samples of body image therapy patients, obese individuals seeking weight reduction, and nonclinical samples of college students and adults (e.g., Rosen, Jones, Ramirez, & Waxman, 1996). For example, research has indicated that scores on the BSQ are correlated with other types of negative body image symptoms, including concerns about non-weight-related appearance features, and three-week test-retest

reliability has indicated the measure's stability ( $r = .88$ ; Rosen et al., 1996). In the current study, alpha was .97 at T1 and .98 at T2.

Next, we measured body dissatisfaction via the Body Dissatisfaction subscale of the Eating Disorder Inventory (EDI-BD; Garner, Olmsted, & Polivy, 1983), which assesses the belief that specific parts of the body are too large (e.g., hips, thighs, buttocks). This measure consists of nine items that are rated on a six-point scale ranging from *never* to *always*, and an example item is, "I think that my stomach is too big." Garner et al. (1983) originally recommended that item responses *never*, *rarely*, and *sometimes* receive a score of 0, and the responses *often*, *usually*, and *always* receive scores of 1, 2, and 3 respectively; however, because this reduces the variability in responses in non-clinical samples, we coded these responses using the continuous six-point scale (see Tylka & Subich, 2004). Items are summed to create a total subscale score. Construct validity in samples of college women is demonstrated by the measure's high correlations with body preoccupation (Tylka & Subich, 2004) and eating disordered behavior (Spillane, Boerner, Anderson, & Smith, 2004). Reliability coefficients for college women range from .83 to .93 (Garner et al., 1983). In the current study, alpha was .91 at T1 and .92 at T2.

Finally, body dissatisfaction experienced over the past 28 days was assessed via the Weight Concern and Shape Concern subscales of the Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 2008), which is one of the most commonly used measures of disordered eating attitudes and behaviors in clinical and community populations (Anderson & Williamson, 2002). These two subscales focus on weight and shape dissatisfaction and the degree to which one's self-worth and acceptance of oneself are defined by weight or shape, and were combined since previous work has indicated that these two subscales load onto

one underlying factor (Peterson et al., 2007). In particular, the 12 items that comprise these two subscales were rated on a 0 to 6 scale (with items either rated on a *no days* to *everyday* scale or a *not at all* to *markedly* scale), and an example item is, “How dissatisfied have you been with your weight?” Items are averaged to create a total body dissatisfaction score. The Weight Concern and Shape Concern subscales have demonstrated good internal consistency (alphas of .89-.93; Luce & Crowther, 1999) and convergent validity (Fairburn & Beglin, 1994; Grilo, Masheb, & Wilson, 2001) among samples of college women and community and patient groups. In the current study, alpha for this combined subscale was .94 at both T1 and T2.

**Disordered eating.** We used several measures of disordered eating in order to capture various facets of this construct. First, we used the Bulimia Test-Revised (BULIT-R; Thelen, Farmer, Wonderlich, & Smith, 1991) to assess bulimic attitudes and behaviors. This measure consists of 36 items (with 28 items contributing to the BULIT-R score) that have a five-option multiple choice format. Construct coverage is broad, with items on binge eating, purging, and negative attitudes related to weight and shape. Items are summed to create a total score. The BULIT-R has well-established psychometric properties and has been successfully used to aid in the diagnosis of bulimia nervosa and in the measurement of bulimic symptom severity in clinical and nonclinical populations (Thelen et al., 1991; Williamson, Anderson, Jackman, & Jackson, 1995). In the current study, alpha was .93 at both T1 and T2.

We used the Restraint subscale of the EDE-Q (Fairburn & Beglin, 2008) to assess attempts to restrict food intake over the past four weeks. This subscale consists of five items that are rated on a 0 (*no days*) to 6 (*everyday*) scale, and an example item is, “On how many days out 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)?” Items are averaged to

create a total subscale score. The Restraint subscale has demonstrated good internal consistency (alphas of .84-.85; Luce & Crowther, 1999) and convergent validity (Fairburn & Beglin, 1994; Grilo et al., 2001) among samples of college women and community and patient groups. In the current study, alpha was .81 at T1 and .83 at T2.

Finally, the Eating Attitudes Test-26 (EAT-26; Garner et al., 1982) was used to assess eating disorder symptoms more generally. The EAT-26 is one of the most widely used standardized measures of eating disorder attitudes and behaviors (Garner, 1993). This measure consists of 26 items that are rated on a 1 (*never*) to 6 (*always*) scale, and an example item is, “Avoid eating when I am hungry.” Items endorsed as 1, 2, or 3 are scored as “0,” while items marked as 4, 5, or 6, are scored as “1,” “2,” or “3,” respectively. Items are then summed to create a total score. Studies have found the EAT-26 to be effective as a screening measure, with a cutoff score of 20 indicating a probable eating disorder (King, 1989, 1991). Additionally, good internal consistency ( $\alpha = .83-.90$ ) and test-retest reliability ( $r = .84$ ) have been demonstrated in samples of young women (Carter & Moss, 1984; Garner et al., 1982). In the current study, alpha was .81 at both T1 and T2.

### **Ecological Momentary Assessment (EMA) Measures**

The questions that participants were asked to fill out 3x/day during the EMA period of the study are provided in Appendix 2. These questions were designed to tap into social comparison and body surveillance behavior, their effects, and other components of the sociocultural model of disordered eating. Of these, there were several questions that were most relevant to the current study. In particular, the question, “Since the last time you were signaled, how important has it been to you to be thin?” was used to assess thin ideal internalization, with response options ranging from 1 = *not at all* to 5 = *extremely*. The 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*,” was used to assess body-related social comparison. Similar questions assessing level of eating- and exercise-related social comparison behavior were administered, as well. For body surveillance, we modified the Body Surveillance subscale of McKinley and Hyde’s (1996) OBCS to be more momentary, similar to the approach of Breines et al. (2008). As when we computed scores for the Body Surveillance subscale using the T1 and T2 data, in order to minimize issues related to construct overlap, the one comparison-related item (i.e., “I rarely compare how I look with how other people look”) was not included when computing the subscale score. All analyses using the EMA data were run using the 7-item version of the more momentary OBCS Body Surveillance subscale, with response options ranging from 1 = *strongly disagree* to 7 = *strongly agree*. Lastly, the 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*,” was used to assess weight dissatisfaction. A similar question assessing level of shape dissatisfaction was administered, as well. The two items assessing levels of weight and shape dissatisfaction were averaged to create a measure of “body dissatisfaction.”

### **Analytic Strategy**

Hypothesis 1: *Examining the traditional versus the elaborated sociocultural model of disordered eating (cross-sectionally) and examining if social comparison and body surveillance mediate the thin ideal internalization-body dissatisfaction relation both in the context of this model (i.e., cross-sectionally) and in a separate prospective model. Exploring the prospective relations between social comparison/body surveillance and later disordered eating.* SEM using

data from T1 will be used to examine the traditional sociocultural model of disordered eating and the elaborated sociocultural model of disordered eating (i.e., including social comparison and body surveillance as mediators of the thin ideal internalization-body dissatisfaction relation). Because these two models are not nested, it will not be possible to test the difference in fit between them using a nested chi-square difference test (Widaman & Thompson, 2003). Instead, we will focus more on determining whether the total and specific indirect effects of thin ideal internalization on body dissatisfaction via social comparison and body surveillance are significant in the context of the sociocultural model of disordered eating and on the size of the residual direct effect from thin ideal internalization to body dissatisfaction once these mediators are included in the model.

If the elaborated sociocultural model provides a good fit to the data and social comparison and body surveillance emerge as significant mediators of the thin ideal internalization-body dissatisfaction relation, we will examine if thin ideal internalization prospectively predicts social comparison and body surveillance and if social comparison and body surveillance prospectively predict body dissatisfaction both without and with controlling for baseline levels of the outcome variable. We will use latent variables and SEM for investigating these possibilities and will use a similar strategy for investigating the prospective relations between social comparison/body surveillance and disordered eating, as well. If we determine that these constructs (i.e., thin ideal internalization, social comparison, body surveillance, body dissatisfaction) significantly predict change in one another over time, we will then proceed with examining whether social comparison and body surveillance mediate the relation between thin ideal internalization and body dissatisfaction prospectively.

In particular, we will use a pair of longitudinal tests as per Cole and Maxwell (2003). As

these researchers note, mediation models tested using longitudinal designs allow for more rigorous inferences about causal relations. Since our data come from two time points, “half-longitudinal” tests will be employed in this study (Cole & Maxwell, 2003). We will first estimate the paths in the regression of the T2 mediators onto T1 thin ideal internalization controlling for T1 mediator values (i.e., the  $a_1$  and  $a_2$  regression coefficients). Then we will estimate the paths in the regression of T2 body dissatisfaction onto the T1 mediators controlling for T1 levels of body dissatisfaction (i.e., the  $b_1$  and  $b_2$  regression coefficients). Estimates of the specific indirect effects can be calculated by means of multiplying together the  $a_1$  and  $b_1$  terms and the  $a_2$  and  $b_2$  terms. The total indirect effect associated with the two mediators can then be calculated using the formula  $a_1b_1 + a_2b_2$ , where the two terms represent the indirect effect of thin ideal internalization on body dissatisfaction through social comparison and the indirect effect of thin ideal internalization on body dissatisfaction through body surveillance. Assuming that the conditions for stationarity (i.e., stable casual relationship between two variables over time; Kenny, 1979) are met, paths between the T1 mediators and T2 body dissatisfaction would be equal to the paths between T2 mediators and a hypothetical T3 body dissatisfaction. Under this assumption, the  $a_ib_i$  product terms provide estimates of the mediational effect of thin ideal internalization on body dissatisfaction through social comparison and body surveillance. Mplus Version 6.1 (Muthén & Muthén, 2010) will be used to run the Hypothesis 1 analyses.

Cole and Maxwell (2003) purport that this approach is superior to the methods typically applied to “half-longitudinal designs” (e.g., testing the prospective relations between the mediators and the dependent variable but examining only the contemporaneous relations between the independent variable and the mediators). Although this set of analyses is what is recommended when there are two waves of data with all variables in the model measured at each

wave (Cole & Maxwell, 2003), we note that two limitations emerge. First, although we can test whether the mediators are partial mediators, we cannot test whether they completely mediate the relation between our independent and dependent variables. Second, the assumption of stationarity may not hold; if this assumption is false,  $a_i b_i$  estimates will likely be biased. Problematically, without at least three waves of data, the assumption of stationarity cannot be tested. Despite these limitations, Cole and Maxwell (2003) suggest that failing to control for prior levels of the dependent variables will likely lead to more problems than failing to take into account potential violations of stationarity.

Hypothesis 2: *Examining if momentary reports of social comparison and body surveillance are contemporaneously associated with body dissatisfaction both within- and between-persons.* Multilevel modeling (MLM) will be used to examine the influences of (a) time, (b) body-related social comparison behavior over the past several hours, (c) eating-related social comparison behavior over the past several hours, (d) exercise-related social comparison behavior over the past several hours, and (e) body surveillance over the past several hours on body dissatisfaction experienced over the past several hours, over the two-week study EMA period. These models assume that repeated observations are nested within persons. Analyses will be performed using a two-level multilevel model with an unstructured covariance matrix. Level 1 observations represent the multiple daily reports of body, eating, and exercise social comparison behavior, body surveillance, and body dissatisfaction. Level 2 observations represent individual participants. In order to evaluate whether the effects of social comparison and body surveillance on body dissatisfaction differ within- versus between-persons, both the person-mean centered levels of the predictors (i.e., which represent the tests of the within-person effects) and the individuals' mean levels of the predictors (i.e., which represent the tests of the between-person



effects) will be entered into the models. Of note, we will examine separate models of the effects of body, eating, and exercise comparisons and body surveillance on body dissatisfaction, as well as a single model examining all of these effects (so that they can be pitted against one another). Analyses will be performed using SPSS Version 19.0.

Hypothesis 3: Examining if momentary instances of social comparison mediate the relation between trait thin ideal internalization and momentary body dissatisfaction. We will use multilevel structural equation modeling (MSEM; Preacher, Zyphur, & Zhang, 2010) to examine this hypothesis. Upper-level mediation techniques will be used (Kenny, Kashy, & Bolger, 1998; Krull & MacKinnon, 1999); in particular, thin ideal internalization is conceptualized as a trait assessed at Level 2 (and comes from the T1 traditional self-report data), and social comparison, body surveillance, and body dissatisfaction are assessed in a more momentary fashion at Level 1. Of note, for this type of 2-1-1 mediation model, it is important to separate within- and between-person mediated effects (Zhang, Zyphur, & Preacher, 2009), and using MSEM, it is possible to do that. A benefit of using MSEM versus the MLM framework is that MSEM can overcome possible conflation or bias of the within- or between-person indirect effects (Preacher et al., 2010). Additionally, MSEM uses a robust maximum likelihood estimation method, which accommodates for missing data and unbalanced clusters (i.e., number of observations for each person; Preacher et al., 2010). Further, this method of estimation does not assume normality and generates robust estimates of asymptotic covariances of parameter estimates (Preacher et al., 2010).

We will also examine a lower-level mediation model (i.e., a 1-1-1 mediation model), in which we will investigate whether momentary instances of social comparison and body surveillance mediate the relation between momentary levels of thin ideal internalization and

body dissatisfaction. Of note, before examining such a model, it will be important to investigate the intraclass correlation (ICC) for our predictor, thin ideal internalization. Here, the ICC represents the degree of correlation across momentary reports of thin ideal internalization within an individual; thus, the ICC measures the degree of dependence in the data. If the ICC is close to or equal to one (as it may be for thin ideal internalization; a variable that has thus far been assumed to be very “trait-like” within the literature), then all differences in this construct are between-person differences and all reports of this construct that an individual makes are nearly identical. If this is the case, then examining a 1-1-1 mediation model would not provide useful information; however, if results reveal that the ICC of thin ideal internalization is lower than one (and that this construct varies at least somewhat on a moment-to-moment basis), then examining this type of lower-level mediation model will be informative. Mplus Version 6.1 (Muthén & Muthén, 2010) will be used to run these analyses.

## **RESULTS**

### **Descriptive Statistics**

Data collection for this study occurred over the course of two semesters; 120 participants took part in the study during the Spring 2012 semester and 118 participants took part in the study during the Fall 2012 semester. Thus, EMA data collection occurred during two separate two-week periods at different points in the calendar year. In particular, the spring semester EMA data collection occurred from March 19-April 1, 2012 (just after the university's spring break that year), and the fall semester EMA data collection occurred from September 24-October 7, 2012 (just before the university's fall break that year). It is possible that these two separate two-week periods may have differed systematically in various ways – including in the weather occurring at those times. The weather across the two EMA periods was important to consider given that social comparison, body surveillance, and body dissatisfaction may be amped up (or down) for some individuals depending on the weather, the types of clothes others are wearing, etc. However, to our knowledge, there have been no studies conducted that assess the effects of season and/or temperature on these constructs.

After data collection occurred, we calculated the average high and low temperatures during each of the EMA periods (data obtained from “History for,” 2012). For the spring semester EMA period, the average high temperature was 75.5 degrees Fahrenheit and the average low temperature was 54.3 degrees. For the fall semester EMA period, the average high temperature was 78.1 degrees and the average low temperature was 58.6 degrees. Thus, average temperatures across the two EMA periods were very similar. Even though this was the case, we

tested for group (i.e., spring semester versus fall semester participants) differences in average levels of thin ideal internalization, body-, eating- and exercise-related social comparison behavior, body surveillance, and body dissatisfaction reported during the EMA period. Results indicated that the groups did not differ in average levels of exercise-related social comparison behavior (spring semester:  $M = 9.01$ ,  $SD = 18.27$ ; fall semester:  $M = 9.44$ ,  $SD = 18.37$ ;  $t(8486) = -1.07$ ,  $p = .284$ ) or body surveillance (spring semester:  $M = 3.95$ ,  $SD = 1.39$ ; fall semester:  $M = 3.96$ ,  $SD = 1.59$ ;  $t(8644) = -.06$ ,  $p = .953$ ). However, groups did significantly differ in average levels thin ideal internalization (spring semester:  $M = 2.78$ ,  $SD = 1.31$ ; fall semester:  $M = 2.84$ ,  $SD = 1.30$ ;  $t(8758) = -2.33$ ,  $p = .020$ ), average levels of body-related social comparison behavior (spring semester:  $M = 17.62$ ,  $SD = 22.69$ ; fall semester:  $M = 19.06$ ,  $SD = 23.79$ ;  $t(8552) = -2.86$ ,  $p = .004$ ), average levels of eating-related social comparison behavior (spring semester:  $M = 11.65$ ,  $SD = 19.44$ ; fall semester:  $M = 13.36$ ,  $SD = 21.57$ ;  $t(8462) = -3.85$ ,  $p < .001$ ), and average levels of body dissatisfaction (spring semester:  $M = 30.27$ ,  $SD = 26.91$ ; fall semester:  $M = 33.55$ ,  $SD = 29.24$ ;  $t(8387) = -5.36$ ,  $p < .001$ ). Given this, we were curious to know whether these groups significantly differed from one another on these or any of the other study constructs when they were assessed via traditional self-report questionnaires at T1 and T2. Interestingly, spring semester and fall semester participants did not significantly differ from one another on any of the study constructs at either T1 or T2 (all  $ps > .05$ ). Thus, participants across the two semesters of data collection did not appear to differ from one another on trait levels of the study constructs but did differ in terms of the momentary experiences of thin ideal internalization, body-related social comparison, eating-related social comparison, and body dissatisfaction they reported on (despite the fact that the weather during the two different EMA periods was very similar). Specially, the fall semester participants reported significantly higher average levels of momentary thin ideal

internalization, body-related social comparison, eating-related social comparison, and body dissatisfaction than the spring semester participants. Given this, all analyses that used the EMA data were re-run controlling for semester of participation. Patterns of significance remained the same whether or not this covariate was included in the model, and semester of participation was never a significant predictor of the outcome variable (i.e., body dissatisfaction experienced over the past several hours).<sup>2</sup> As such, results without semester of participation as a covariate are presented for the sake of parsimony.

### **Hypothesis 1: Examining the Elaborated Sociocultural Model of Disordered Eating**

Some of the study participants had missing data for their T1 and/or T2 questionnaire assessments. Regarding the T1 and T2 study measures, missing data ranged from a low of 0% for the T1 and T2 OBCS Body Surveillance subscale scores to a high of 13.22% for the T2 EAT-26 scores. Further, no individual item at T1 or T2 had more than 2.2% of values missing. We ran two separate Little's Missing Completely at Random analyses: one including the T1 measures/items that were to be used in analyses related to Hypothesis 1 and one including the T2 measures/items that were to be used in analyses related to Hypothesis 1. Both of these analyses were non-significant, T1:  $\chi^2(744) = 784.44, p = .148$ ; T2:  $\chi^2(526) = 210.13, p = 1.00$ , indicating that the data for all of the study measures/items that were to be used in Hypothesis 1-related analyses were largely consistent with MCAR (missing completely at random). Overall, this information suggests that the amount and pattern of missingness should not be problematic.

We next evaluated skewness and kurtosis for each measure (including the individual items of the OBCS Body Surveillance subscale) that was to be used in the SEM analyses at either T1 or both T1 and T2. Standardized kurtosis values greater than 10 may suggest a problem and values greater than 20 may be indicative of a “more serious” problem (Kline, 2005); no

measures/item exhibited kurtosis values greater than 10. Standardized skewness values greater than three may be problematic (Kline, 2005); eight measures/items exhibited values greater than three at both T1 and T2 and one measure (that was only used at T1) exhibited a value greater than three at T1. Given that tests of variances and covariances (e.g., SEM analyses) are affected by kurtosis more so than skew (DeCarlo, 1997; Jobson, 1991; Mardia, Kent, & Bibby, 1979) and the fact that in large samples (i.e., greater than 200), skewness cutoffs should not be applied because of the problem of small standard errors (Field, 2005), these measures/items were not transformed. Their kurtosis values were in the acceptable range and in examining their actual distributions, which Field (2005) recommends should be done in large samples, although skewed, their distributions appeared acceptable.

Table 3 contains means and standard deviations for the study variables at T1, and Table 4 contains correlations among the study variables at T1. Correlations were in the directions expected based on the literature; that is, we found positive correlations between all measured variables, with the exception that BMI exhibited a significant negative correlation with the IBSS-R ( $r = -.18, p = .006$ ). Such correlations offer preliminary support for the notion that these constructs may combine in meaningful ways to explain body dissatisfaction and disordered eating in college women. However, in SEM analyses, it is recommended that indicators of separate latent variables not be very highly correlated (i.e.,  $r$ s should be less than .90; Tabachnick & Fidell, 1996). As can be seen in Table 4, many indicators of separate latent variables are related but the  $r$ s do not reach .90. This was also the case when we examined the correlations between the OBCS Body Surveillance subscale items, which were used as indicators of the body surveillance latent variable, and the other study constructs at T1, and when we examined correlations for the study variables/items at T2 that were used in SEM analyses.

We used maximum likelihood estimation to examine the traditional and elaborated versions of the sociocultural model of disordered eating cross-sectionally using latent variables. Goodness-of-fit was evaluated using the root mean square error of approximation (RMSEA), the standardized root-mean-square residual (SRMR), the comparative fit index (CFI), and the Tucker-Lewis Index (TLI). Good model fit was defined by the following criteria: RMSEA values of about .08 or below (Browne & Cudeck, 1993), SRMR values less than about .08 (Hu & Bentler, 1999), CFI values of about .95 or above (Bentler, 1990; Hu & Bentler, 1999), and TLI values above about .90 (Hu & Bentler, 1999). Multiple fit indices were used together because they provide a more conservative and reliable approach to the evaluation of model fit than the examination of a single index of fit.

**Traditional sociocultural model of disordered eating.** Following the recommendations of Tabachnick and Fidell (1996), we evaluated the adequacy of the traditional sociocultural model of disordered eating measurement model before simultaneously evaluating both the measurement and structural components of the model. The SRMR (.042), CFI (.959), and TLI (.941) all approximated good fit for the traditional sociocultural model measurement model according to the aforementioned criteria. However, the RMSEA value we obtained (.088; 90% confidence interval: .068-.108) indicated mediocre model fit (MacCallum, Browne, & Sugawara, 1996). Chen, Curran, Bollen, Kirby, and Paxton (2008) recommend that RMSEA values be evaluated in the context of other fit indices, rather than solely on strict cutoff values. On this basis, and considering that the other fit indices indicated good model fit, we concluded that the traditional sociocultural model measurement model had an acceptable fit. Additionally, all measures loaded significantly onto their respective latent factors. This information suggests that these latent factors were adequately operationalized. Thus, this measurement model was used to

test the traditional sociocultural model of disordered eating structural model. Correlations between the latent variables were all positive and significant ( $r$ s of .54-.86, all  $p$ s < .001), and factor loadings are included in Figure 2.

Next, we evaluated the traditional sociocultural model structural model. As with the measurement model, the structural model provided an acceptable fit to the data. The SRMR (.048), CFI (.951), and TLI (.933) all approximated good fit. However, the RMSEA (.093; 90% confidence interval: .074-.113) again indicated mediocre model fit (MacCallum et al., 1996). Considering that the other fit indices indicated good model fit, we concluded that the traditional sociocultural model structural model had an acceptable fit. All model paths were positive and significant and are presented in Figure 2. Results indicated that pressure for thinness accounted for 37.7% of the variance in thin ideal internalization. Pressure for thinness and thin ideal internalization accounted for 65.7% of the variance in body dissatisfaction. Lastly, body dissatisfaction accounted for 75.2% of the variance in disordered eating.

**Elaborated sociocultural model of disordered eating.** We next examined an elaborated sociocultural model of disordered eating that incorporated social comparison and body surveillance as mediators of the thin ideal internalization-body dissatisfaction relation. We again first tested the measurement model before analyzing the structural model. The RMSEA (.068; 90% confidence interval: .058-.078), SRMR (.054), CFI (.935), and TLI (.921) all approximated good fit according to the aforementioned criteria. Further, all measures/items loaded significantly onto their respective latent factors. This information suggests that the latent factors were adequately operationalized, and thus, this measurement model was used to examine the elaborated sociocultural model structural model. Correlations between the latent variables were



all positive and significant (*rs* of .38-.86, all *ps* < .001), and factor loadings are included in Figure 3.

We then evaluated the structural model for the elaborated sociocultural model of disordered eating, which provided an acceptable fit to the data. The RMSEA (.070; 90% confidence interval: .060-.079), SRMR (.057), and TLI (.917) all approximated good fit. The CFI (.928) was slightly below the aforementioned criterion of .95; however, some work has indicated that CFI values greater than roughly .90 may indicate adequate fit (Kline, 2005). Additionally, given that other fit indices indicated good model fit, we concluded that the elaborated sociocultural model structural model had an acceptable fit. All model paths except for two were positive and significant; the non-significant paths were: the path from thin ideal internalization to body dissatisfaction ( $\beta = .07, p = .703$ ) and the path from body surveillance to body dissatisfaction ( $\beta = .11, p = .196$ ). See Figure 3 for the full structural model for the elaborated sociocultural model of disordered eating.

Given our interest in examining whether social comparison and body surveillance would mediate the thin ideal internalization-body dissatisfaction relation in the context of the sociocultural model of disordered eating, it is interesting that the path from thin ideal internalization to body dissatisfaction was no longer significant once these constructs (i.e., social comparison, body surveillance) were included in the model. Indeed, results indicated that the total indirect effect of thin ideal internalization on body dissatisfaction through social comparison and body surveillance (as a set) was significant, with a standardized point estimate of .47 ( $p < .001$ ). Thus, social comparison and body surveillance significantly mediated the relation between thin ideal internalization and body dissatisfaction in the context of this model. Given that the direct effect of thin ideal internalization on body dissatisfaction in this model was

not significant ( $\beta = .07, p = .703$ ), this suggests indirect-only mediation (Zhao, Lynch, & Chen, 2010), which is also known as “full mediation” (Baron & Kenny, 1986). The specific indirect effects of each mediator showed that social comparison was a unique and significant mediator, with a standardized point estimate of .39 ( $p = .003$ ). However, body surveillance was not a significant specific mediator of the thin ideal internalization-body dissatisfaction relation, with a standardized point estimate of .08 ( $p = .198$ ). A contrast confirmed that the indirect effect of social comparison in the thin ideal internalization-body dissatisfaction relation was significantly stronger ( $p = .001$ ) than the indirect effect of body surveillance. Further, results indicated that pressure for thinness accounted for 40.4% of the variance in thin ideal internalization. Thin ideal internalization accounted for 77.3% of the variance in eating disorder-related social comparison and for 51.5% of the variance in body surveillance. Pressure for thinness, thin ideal internalization, eating disorder-related social comparison, and body surveillance accounted for 72.0% of the variance in body dissatisfaction. Thus, by including social comparison and body surveillance in the model, an additional 6.3% of the variance in body dissatisfaction was explained. Finally, body dissatisfaction accounted for 75.2% of the variance in disordered eating.

**Prospective examination of social comparison and body surveillance as mediators of the thin ideal internalization-body dissatisfaction link.** Given that the elaborated sociocultural model of disordered eating provided a good fit to the data and the fact that social comparison and body surveillance (as a set) were found to significantly mediate the thin ideal internalization-body dissatisfaction relation in the context of this cross-sectional model, we were interested in investigating whether this mediation model would hold when investigating it using half-longitudinal techniques. However, before examining whether social comparison and body surveillance mediated the relation between thin ideal internalization and body dissatisfaction

half-longitudinally, it was necessary to examine whether these constructs prospectively predicted one another and if they prospectively predicted one another when controlling for baseline levels of the outcome variable. A single analysis using latent variables (using the same indicators as shown in Figure 3 but at T2 in the case of social comparison and body surveillance) was conducted to assess the relationships between the thin ideal internalization at T1 and social comparison and body surveillance at T2. Results indicated that thin ideal internalization at T1 predicted significant variance in both social comparison ( $\beta = .65, p < .001; R^2 = .43$ ) and body surveillance ( $\beta = .54, p < .001; R^2 = .29$ ) at T2. However, this model did not provide a good fit to the data (RMSEA: .131; SRMR: .076; CFI: .832; TLI: .789), and thus, it was unclear whether these parameter estimates could be meaningfully interpreted. Next, a single analysis using latent variables (using the indicators shown in Figure 3 but at T2 in the case of body dissatisfaction) was conducted to assess the relationships between social comparison and body surveillance at T1 and body dissatisfaction at T2. Results indicated that T1 social comparison predicted unique variance in T2 body dissatisfaction ( $\beta = .67, p < .001$ ), while body surveillance did not ( $\beta = .01, p = .957$ ). This model explained 45.2% of the variance in T2 body dissatisfaction and provided a modest fit to the data (RMSEA: .086; SRMR: .056; CFI: .929; TLI: .911). When we examined separate models of the influence of T1 social comparison and body surveillance on T2 body dissatisfaction, results indicated that both T1 social comparison ( $\beta = .68, p < .001$ ; RMSEA: .069; SRMR: .023; CFI: .991; TLI: .983) and body surveillance ( $\beta = .49, p < .001$ ; RMSEA: .103; SRMR: .059; CFI: .914; TLI: .887) predicted variance in T2 body dissatisfaction. However, the model looking at the relation between T1 body surveillance and T2 body dissatisfaction did not provide a good fit to the data.

We then investigated whether these constructs prospectively predicted one another when controlling for baseline levels of the dependent variable. Examining these effects in a single model with latent variables, results indicated that thin ideal internalization at T1 did not predict T2 social comparison ( $\beta = .01, p = .936$ ) or body surveillance ( $\beta = -.01, p = .952$ ) after controlling for baseline levels of these constructs. Additionally, this model did not provide a good fit to the data (RMSEA: .102; SRMR: .069; CFI: .814; TLI: .788). Likewise, social comparison and body surveillance at T1 did not predict body dissatisfaction at T2 after controlling for baseline levels ( $\beta = .03, p = .781$ ;  $\beta = -.07, p = .361$ , respectively). This model provided a possibly acceptable fit to the data (RMSEA: .100; SRMR: .055; CFI: .911; TLI: .891). Given that these constructs were not found to predict change in one another over the course of three months, it was not possible that social comparison and body surveillance would mediate the thin ideal internalization-body dissatisfaction relation prospectively. Thus, a half-longitudinal mediation model was not investigated.

**Examination of the prospective relations between social comparison/body surveillance and disordered eating.** Finally, we investigated the relations between social comparison and body surveillance at T1 and disordered eating at T2 both without and with controlling for baseline levels of disordered eating. A single analysis using latent variables was conducted to assess the relationships between social comparison and body surveillance at T1 and disordered eating at T2. Results indicated that T1 social comparison predicted unique variance in T2 disordered eating ( $\beta = .74, p < .001$ ), while body surveillance did not ( $\beta = -.12, p = .328$ ). This model explained 43.3% of the variance in T2 disordered eating and provided a modest fit to the data (RMSEA: .086; SRMR: .060; CFI: .912; TLI: .890). When we examined separate models of the influence of T1 social comparison and body surveillance on T2 disordered eating,

results indicated that both T1 social comparison ( $\beta = .67, p < .001$ ; RMSEA: .066; SRMR: .029; CFI: .988; TLI: .977) and body surveillance ( $\beta = .41, p < .001$ ; RMSEA: .103; SRMR: .063; CFI: .878; TLI: .839) predicted variance in T2 disordered eating. However, the model investigating the relation between T1 body surveillance and T2 disordered eating did not provide a good fit to the data. A separate analysis revealed that social comparison and body surveillance at T1 did not predict disordered eating at T2 after controlling for baseline levels of disordered eating ( $\beta = -.08, p = .577$ ;  $\beta = -.14, p = .143$ , respectively). This model did not provide a good fit to the data (RMSEA: .101; SRMR: .062; CFI: .871; TLI: .842).

### **Hypothesis 2: Examining the Effects of Momentary Social Comparison and Body Surveillance on Momentary Body Dissatisfaction**

As previously mentioned, 235 participants completed the EMA portion of the study. They provided 8,813 separate EMA recordings. Compliance with EMA reporting was quite good, with overall compliance rates for the sample at an average of 89.3% of EMA surveys completed (about 38 surveys out of the possible 42). Further, 97.0% of the participants completed 70% or more of the surveys, and 77.9% completed 85% or more of the surveys. Participants' timeliness was quite good, as well, with overall compliance within the time guidelines provided at an average of 73.8%. Although the majority of participants complied quite well with the EMA portion of the study, we examined a histogram of participants' compliance in order to determine if there were any outliers. Based on what had been asked of participants in terms of the minimum number of surveys they should complete during the EMA period (i.e., 30 surveys) and our inspection of the histogram, it was determined that three participants were outliers in terms of their overall compliance during this part of the study. These three participants completed 21, 24, and 26 surveys, respectively, while all other participants completed 28 or more surveys. Data from these three participants were excluded from all analyses involving the EMA data, leaving

us with a total  $n$  of 232.

One of the assumptions of MLM is that the dependent variable should follow a normal distribution (Raudenbush & Bryk, 2002). Thus, before running any MLM analyses, we examined whether our dependent variable, body dissatisfaction (i.e., mean of two items administered during the EMA period; range: 0-100) followed this assumption. Results indicated that this variable was very highly skewed (standardized skew = 22.22); in particular, a histogram of this variable revealed that there was a large pile-up of scores of zero (i.e., 15.2% of the values for this variable were zero). Given this, we attempted to transform this variable using a log transformation. Doing this improved the distribution only slightly. Therefore, we chose to run our Hypothesis 2 analyses using generalized estimating equations (GEEs; Liang & Zeger, 1986) with a gamma distribution, which is appropriate for skewed continuous data (e.g., Manning, Basu, & Mullahy, 2005). Such analyses generate population-averaged coefficients, as opposed to cluster-specific coefficients. Population-averaged parameters represent the averaged effect of a unit change in the predictors for the whole population, whereas cluster-specific parameters assume there is heterogeneity across individuals in their regression coefficients; these two sets of parameters are the same when there are no Level 1 random effects (Ghisletta & Spini, 2004; Zorn, 2001).

Results of the separate analyses of the effects of momentary body-, eating-, and exercise-related social comparison and body surveillance on momentary body dissatisfaction are presented in Table 5. Across all models, results indicated that body dissatisfaction increased over the course of the two-week EMA period on average (all  $ps < .001$ ). Further, results indicated that on their own (i.e., when examining separate models of the effects of body, eating, and exercise comparisons and body surveillance on body dissatisfaction), both within- and between-person

levels of body comparisons (within:  $B = .01, \chi^2(1) = 112.39, p < .001$ ; between:  $B = .03, \chi^2(1) = 127.06, p < .001$ ), eating comparisons (within:  $B = .01, \chi^2(1) = 100.88, p < .001$ ; between:  $B = .03, \chi^2(1) = 96.14, p < .001$ ), exercise comparisons (within:  $B = .01, \chi^2(1) = 71.77, p < .001$ ; between:  $B = .03, \chi^2(1) = 84.33, p < .001$ ), and body surveillance (within:  $B = .13, \chi^2(1) = 103.44, p < .001$ ; between:  $B = .41, \chi^2(1) = 86.62, p < .001$ ) predicted elevated levels of body dissatisfaction contemporaneously. When examining these effects in a single model (see Table 6), results indicated that within- and between-person levels of body comparisons (within:  $B = .003, \chi^2(1) = 33.61, p < .001$ ; between:  $B = .04, \chi^2(1) = 34.57, p < .001$ ) and body surveillance (within:  $B = .10, \chi^2(1) = 58.19, p < .001$ ; between:  $B = .19, \chi^2(1) = 9.84, p = .002$ ), within-person levels of eating comparisons (within:  $B = .003, \chi^2(1) = 23.51, p < .001$ ), and within-person levels of exercise comparisons (within:  $B = .003, \chi^2(1) = 17.58, p < .001$ ) predicted elevated levels of body dissatisfaction. Between-person levels of eating and exercise comparisons did not predict unique variance in body dissatisfaction ( $ps > .089$ ).

### **Hypothesis 3: Examining Social Comparison and Body Surveillance as Mediators of the Thin Ideal Internalization-Body Dissatisfaction Relation Using Momentary Data**

We first investigated a 2-1-1 mediation model using MSEM in which we hypothesized that social comparison (i.e., body, eating, and exercise comparisons) and body surveillance (Level 1 variables, assessed during the EMA portion of the study) would mediate the effect of thin ideal internalization (Level 2 variable, assessed by the SATAQ-4 Internalization-Thin/Low Body Fat subscale at T1) on body dissatisfaction (Level 1 variable, assessed during the EMA portion of the study). Of note, we chose to operationalize thin ideal internalization in this model using just one construct because we believed that using a latent variable with three indicators for thin ideal internalization would lead to too many parameters being estimated in the model (i.e., that the model would be too complex). We chose to use the SATAQ-4 Internalization-Thin/Low

Body Fat subscale in particular given that it had the highest loading on the thin ideal internalization latent variable in the Hypothesis 1 analyses (see Figures 2 and 3).

We were interested in whether, and to what degree, person-level variability in social comparison and body surveillance served as mediators of the person-level effect of thin ideal internalization on the person-level component of body dissatisfaction. Thus, the outcome of interest was, in essence, Level 2 variance in body dissatisfaction. In a 2-1-1 mediation model, the effect of the independent variable on the dependent variable must be a strictly between-person effect; because the independent variable is constant for a given person, variation in that independent variable cannot influence within-person variation (Hoffman, 2002; Preacher et al., 2010). More generally, any mediation of the effect of a Level 2 independent variable must also occur at the between-person level (regardless of what level the mediators and the dependent variable were assessed at), given that the only kind of effect that the independent variable can exert is at the between-person level.

Given that what we were really predicting with this model was Level 2 variance in body dissatisfaction, we first needed to determine how much variance in body dissatisfaction was at Level 2. Results showed that the ICC for body dissatisfaction was .750, indicating that 75.0% of the variance in body dissatisfaction was attributable to between-person differences (as opposed to within-person differences). Thus, there was a substantial amount of Level 2 variance in body dissatisfaction, which provides support for the idea of investigating a 2-1-1 mediation model and between-person mediational effects. Of note, although our outcome variable of body dissatisfaction was skewed, as aforementioned, MSEM uses a robust maximum likelihood estimation method, which does not assume normality.

Thus, our model could be described as a 2-1-1 model with four mediators (i.e., body-,



eating-, and exercise-related social comparison, body surveillance) that were allowed to correlate (see Figure 4). We specified random intercepts and fixed slopes. As previously discussed, via this model, we were only investigating the possible mediational roles of social comparison and body surveillance in the thin ideal internalization-body dissatisfaction relation at the between-person level. Results indicated that the total between-person indirect effect of thin ideal internalization on body dissatisfaction through this set of mediators (i.e., body-, eating-, and exercise-related social comparison, body surveillance) was significant, with an unstandardized point estimate of 1.45 ( $p < .001$ ). Thus, as a set, body-, eating-, and exercise-related social comparison and body surveillance partially mediated the relation between thin ideal internalization and body dissatisfaction at the between-person level. The specific between-person indirect effects of each mediator showed that body-related social comparison (unstandardized point estimate = 1.27,  $p < .001$ ) and body surveillance (unstandardized point estimate = .28,  $p = .039$ ) were unique and significant mediators, indicating that individuals' aggregated reports of body-related social comparison and body surveillance behavior engaged in during the two-week EMA period significantly and uniquely mediated the relationship between trait-level thin ideal internalization (assessed at T1) and individuals' aggregated reports of body dissatisfaction experienced during the two-week EMA period. Eating-related social comparison (unstandardized point estimate = -.24,  $p = .341$ ) and exercise-related social comparison (unstandardized point estimate = .15,  $p = .291$ ) did not add significantly to the model. Contrasts revealed that the between-person indirect effect of body-related social comparison in the thin ideal internalization-body dissatisfaction relation was significantly stronger than the indirect effects of eating-related social comparison ( $p = .003$ ), exercise-related social comparison ( $p = .001$ ), and body surveillance ( $p = .006$ ). Results further revealed that the between-person indirect effect of body

surveillance in the thin ideal internalization-body dissatisfaction relation was not significantly stronger than the indirect effects of eating-related social comparison ( $p = .078$ ) or exercise-related social comparison ( $p = .462$ ). Additionally, the non-significant indirect effects of eating- and exercise-related social comparison were similar in size ( $p = .280$ ). See Figure 4 for the full 2-1-1 mediation model. Of additional note and as can be seen in Figure 4, results indicated that there were significant within-person effects of body-, eating-, and exercise-related social comparison and body surveillance on body dissatisfaction. Finally, it is interesting that when we examined separate 2-1-1 mediation models for each of the four mediators, all four emerged as significant mediators of the between-person effect of thin ideal internalization on body dissatisfaction ( $ps < .001$ ).

We next wished to examine a lower-level mediation model (i.e., a 1-1-1 mediation model) to determine whether momentary instances of social comparison and body surveillance mediated the relation between momentary levels of thin ideal internalization (i.e., assessed during the EMA period) and body dissatisfaction. Before examining this model, we determined the ICC for thin ideal internalization, which was .664. This indicates that 66.4% of the variance in thin ideal internalization (as assessed during the EMA period) was due to between-person differences. Given that thin ideal internalization has been assumed to be very “trait-like” in the literature (e.g., Colautti et al., 2011), it is interesting that about 33% of the variance of thin ideal internalization in this sample was due to within-person differences (i.e., moment-to-moment variability). Thus, given that thin ideal internalization was found to have to have a sizeable amount of within-person variance, we determined that it was appropriate to examine a 1-1-1 mediation model. We investigated this model using MSEM; we hypothesized that social comparison (i.e., body, eating, and exercise comparisons) and body surveillance (Level 1

variables, assessed during the EMA portion of the study) would mediate the effect of thin ideal internalization on body dissatisfaction (Level 1 variables, assessed during the EMA portion of the study). Given that all constructs in our model were assessed at Level 1 (and thus contained both within- and between-person variance), it was possible to examine both the within and between effects of these variables on one another. Given this, we were interested in determining whether the relationship between thin ideal internalization and body dissatisfaction was mediated by social comparison and body surveillance both within- and between-persons.

Thus, this model could be described as a 1-1-1 model with four mediators (i.e., body-, eating-, and exercise-related social comparison, body surveillance) that were allowed to correlate (see Figure 5). We specified random intercepts and fixed slopes, and via this model, we were able to investigate the possible mediational roles of social comparison and body surveillance in the thin ideal internalization-body dissatisfaction relation at both the within- and between-person levels. Results indicated that the total within-person indirect effect of thin ideal internalization on body dissatisfaction through this set of mediators (i.e., body-, eating-, and exercise-related social comparison, body surveillance) was significant, with an unstandardized point estimate of 1.89 ( $p < .001$ ). Thus, as a set, body-, eating-, and exercise-related social comparison and body surveillance partially mediated the relation between thin ideal internalization and body dissatisfaction at the within-person level. The specific within-person indirect effects of each mediator showed that all four were significant; thus, body- (unstandardized point estimate = .75,  $p < .001$ ), eating- (unstandardized point estimate = .38,  $p < .001$ ), and exercise-related social comparison (unstandardized point estimate = .22,  $p < .001$ ) and body surveillance (unstandardized point estimate = .54,  $p < .001$ ) were unique and significant mediators at the within-person level. In other words, within-person increases in thin ideal internalization were

related to within-person increases in body dissatisfaction and this relationship was partially explained by within-person increases in body-, eating-, and exercise-related social comparison and body surveillance. Contrasts revealed that the within-person indirect effect of body-related social comparison in the thin ideal internalization-body dissatisfaction relation was significantly stronger than the indirect effects of eating-related social comparison ( $p = .004$ ) and exercise-related social comparison ( $p < .001$ ) and that the within-person indirect effect of body surveillance was significantly stronger than the indirect effect of exercise-related social comparison ( $p = .008$ ). Otherwise, the sizes of the indirect effects were not significantly different from one another ( $ps > .05$ ).

Regarding the between-person effects in this model, results indicated that the total between-person indirect effect of thin ideal internalization on body dissatisfaction through this set of mediators (i.e., body-, eating-, and exercise-related social comparison, body surveillance) was significant, with an unstandardized point estimate of 5.34 ( $p < .001$ ). Thus, as a set, body-, eating-, and exercise-related social comparison and body surveillance partially mediated the relation between thin ideal internalization and body dissatisfaction at the between-person level. The specific between-person indirect effects of each mediator showed that body-related social comparison (unstandardized point estimate = 5.22,  $p < .001$ ) was a unique and significant mediator, indicating that individuals' aggregated reports of body-related social comparison behavior engaged in during the two-week EMA period significantly and uniquely mediated the relationship between individuals' aggregated reports of thin ideal internalization and body dissatisfaction experienced during the two-week EMA period. Results indicated that eating-related social comparison (unstandardized point estimate = -.44,  $p = .709$ ), exercise-related social comparison (unstandardized point estimate = .47,  $p = .462$ ), and body surveillance (point

estimate = .09,  $p = .890$ ) did not add significantly to the model. Contrasts revealed that the between-person indirect effect of body-related social comparison in the thin ideal internalization-body dissatisfaction relation was significantly stronger than the indirect effects of eating-related social comparison ( $p = .016$ ), exercise-related social comparison ( $p = .002$ ), and body surveillance ( $p = .002$ ). Otherwise, the sizes of the indirect effects were not significantly different from one another ( $ps > .05$ ). See Figure 5 for the full 1-1-1 mediation model. Interestingly, when we examined separate 1-1-1 mediation models for each of the four mediators, all four emerged as significant mediators of the within- and between-person effects of thin ideal internalization on body dissatisfaction (all  $ps < .005$ ).

## DISCUSSION

The current study aimed to extend research on the sociocultural model of disordered eating and social comparison and objectification theories in a number of ways using a sample of college women.

### **Hypothesis 1: Examining the Elaborated Sociocultural Model of Disordered Eating**

First, we were interested in whether social comparison (i.e., body, eating, and exercise comparisons) and body surveillance fit into an elaborated version of Stice's (1994) sociocultural model of disordered eating. In particular, we investigated whether these behaviors mediated the relation between thin ideal internalization and body dissatisfaction in the context of this model using cross-sectional data. Indeed, results indicated that the elaborated sociocultural model of disordered eating (i.e., including the elaborations of social comparison and body surveillance as mediators of the thin ideal internalization-body dissatisfaction relation) provided a good fit to the data and that the total indirect effect of thin ideal internalization on body dissatisfaction through this set of mediators was significant. The specific indirect effects of each mediator showed that social comparison was a unique and significant mediator, while body surveillance did not add significantly to the model. Of particular interest is the fact that when we examined the traditional sociocultural model of disordered eating, the path from thin ideal internalization to body dissatisfaction was strong and significant. However, once social comparison and body surveillance were included in the model as mediators of the thin ideal internalization-body dissatisfaction relation, the direct path between these two constructs (i.e., thin ideal

internalization and body dissatisfaction) was near zero and no longer significant. This suggests indirect-only mediation, otherwise known as “full mediation.”

Therefore, as a set, social comparison and body surveillance acted as we had expected – as factors that may explain the relation between thin ideal internalization and body dissatisfaction in the context of an elaborated sociocultural model of disordered eating. However, only social comparison emerged as a significant specific mediator. Thus, results of the current study provide support for the notion that social comparison behavior in particular, including body, eating, and exercise comparisons, may be motivated by thin ideal internalization as a way for women to assess their standing relative to the thin ideal. Such comparison behavior may result in making salient the discrepancy between what a woman currently looks like and what she would ideally like to look like, which may in turn be associated with discontent with the body.

Contrary to our hypothesis, body surveillance did not emerge as a significant specific mediator of the relation between thin ideal internalization and body dissatisfaction in the context of this elaborated sociocultural model. This finding is in contrast to some prior work. In particular and as noted earlier in this manuscript, Fitzsimmons-Craft et al. (2012c) found that while, as a set, general social comparison and body surveillance partially mediated the relation between thin ideal internalization and body dissatisfaction in a sample of college women, only body surveillance emerged as a unique and significant mediator of this relation. Similar results emerged when a measure of appearance-related social comparison was used. However, other work had found social comparison (specific to appearance) to mediate the relation between internalization of the thin ideal and body dissatisfaction in a sample of preadolescent girls (Blowers, Loxton, Grady-Flessner, Occhipinti, & Dawe, 2003). We speculated that the general

measure of social comparison used in Fitzsimmons-Craft et al. (2012c) may have been too general and that the appearance-related measure of social comparison may have been too narrow. We posited that other social comparison domains, such as those related to eating and exercise, may also stem from internalization of the thin ideal and be associated with dissatisfaction with the body. It may be that social comparison is a more “potent” mediator of this relation when it is assessed more comprehensively. Social comparison behavior may provide a woman with a very direct means of assessing whether she “measures up” (i.e., by comparing herself to others). Body surveillance may represent a less direct or less powerful way of obtaining the same type of information, as via body surveillance, a woman surveys her body from an outsider’s perspective and may then consider whether she matches up to her own internalized standards. However, the notion that a woman will consider how to matches up to a certain standard is somewhat implied and is not key to the actual construct of body surveillance as it was operationalized by McKinley and Hyde (1996).

Overall, these results suggest that it is important to consider how thin ideal internalization translates itself into body dissatisfaction in the context of the sociocultural model of disordered eating. Indeed, when we included mediators (i.e., social comparison, body surveillance) of this relation in the model, the direct relationship between thin ideal internalization and body dissatisfaction became non-significant. Thus, these results suggest that it is not a “given” or “automatic” that internalization of the thin ideal is associated with discontent with the body. Rather, results of the current study suggest that engaging in certain behaviors is what leads a woman to perceive that she does not match up to the thin ideal and subsequently feel badly about her body. Therefore, future research on the sociocultural model of disordered eating should



include relevant behaviors, such as social comparison and body surveillance, as mediators of the thin ideal internalization-body dissatisfaction relation.

We then wished to examine whether this mediational model would hold prospectively. Our findings advance prior cross-sectional and experimental research that has demonstrated links between social comparison and body dissatisfaction given that in this sample of college women, social comparison tendencies (i.e., including body, eating, and exercise comparisons) predicted unique variance in body dissatisfaction three months later above and beyond the effects of body surveillance. Again, this may suggest that when social comparison is measured in a way that more comprehensively assesses the types of comparison that play a role in eating pathology (i.e., body, eating, and exercise comparisons), it is a more powerful predictor of dissatisfaction with the body than body surveillance. Results also indicated that thin ideal internalization predicted variance in both social comparison and body surveillance three months later, but this model did not provide a good fit to the data (and thus it is unclear as to whether these results can be meaningfully interpreted). Furthermore, there was no evidence that thin ideal internalization predicted change in social comparison or body surveillance over the course of three months or that social comparison or body surveillance predicted change in body dissatisfaction over the course of three months.

One factor to keep in mind when considering the findings attempting to predict change is that the three-month temporal stability coefficients for the social comparison, body surveillance, and body dissatisfaction latent variables used in the current study were high ( $r = .80$  for social comparison,  $r = .81$  for body surveillance,  $r = .87$  for body dissatisfaction, all  $ps < .001$ ). Therefore, on average, participants were very stable in their reports of these traits over the course of three months, which meant that a large amount of the variance in these constructs at T2 was

already accounted for by baseline levels. It may be that these constructs would account for change in one another over time if the time frame between study assessments was lengthened; that is, the amount of time between T1 and T2 in the current study (i.e., three months) may have simply been too short to allow for such change to occur. Given that these constructs were not found to predict change in one another over the course of the study, it was not possible that social comparison and body surveillance would mediate the thin ideal internalization-body dissatisfaction relation prospectively using a half-longitudinal design.

As an exploratory aim, we also investigated whether social comparison and body surveillance predicted levels of disordered eating three months later both without and with controlling for baseline levels of disordered eating. Results indicated that social comparison significantly predicted unique variance in disordered eating three months later, while body surveillance did not. This finding provides additional support for notion that eating disorder-related social comparison behavior is associated with negative effects. However, neither social comparison nor body surveillance significantly predicted change in disordered eating over the course of three months. Again, it may have been that the amount of time between T1 and T2 was simply too short to allow for social comparison and body surveillance to impact change in disordered eating.

### **Hypothesis 2: Examining the Effects of Momentary Social Comparison and Body Surveillance on Momentary Body Dissatisfaction**

Next, we were interested in extending the research on social comparison and body surveillance by investigating how these behaviors impact body dissatisfaction on a more momentary basis. More specifically, we were interested in the potential negative effects of naturally occurring body, eating, and exercise social comparisons and body surveillance on body dissatisfaction. Using GEEs, results indicated that on their own (i.e., when examining separate

models of the effects body, eating, and exercise social comparisons and body surveillance on body dissatisfaction), both within- and between-person levels of body comparisons, eating comparisons, exercise comparisons, and body surveillance predicted increased body dissatisfaction contemporaneously. This means that, on average, when individuals engage in higher levels of these comparisons or body surveillance, they experience higher levels of body dissatisfaction. Further, individuals who, on average, engage in higher levels of these comparisons or body surveillance, generally experience higher levels of body dissatisfaction.

When these effects were examined in a single model, within- and between-person levels of body comparisons and body surveillance, within-person levels of eating comparisons, and within-person levels of exercise comparisons predicted increased body dissatisfaction. Between-person levels of eating and exercise comparisons did not predict unique variance in body dissatisfaction. These results provide support for the notion that more momentary body dissatisfaction is affected by both trait- and state-like characteristics. In particular, body, eating, and exercise comparisons and body surveillance may function as proximal triggers for body dissatisfaction, while general tendencies to engage in body comparisons and body surveillance may be more potent distal predictors of body dissatisfaction than general eating or exercise comparison tendencies. Although trait-like tendencies to engage in eating and exercise comparisons may be at least somewhat damaging, as suggested by the results of this study, their effects may be less so than trait-like tendencies to engage in body comparisons and body surveillance. It may be that general tendencies to engage in high levels of body comparisons and body surveillance are especially damaging because such behaviors may provide individuals with a rather direct understanding that their bodies are not what they would like them to be. Alternatively, eating and exercise comparisons focus more on the actions associated with

achieving the appearance-related goal gleaned from body-related comparisons or body surveillance (Fitzsimmons-Craft et al., 2012a). Based on eating and exercise comparisons, a woman may conclude that she must behave differently in terms of eating and exercise if she is to achieve her ideal weight and shape. Therefore, it may be that general tendencies to engage in body comparisons and body surveillance are more damaging than general tendencies to engage in eating or exercise comparisons because these behavioral tendencies could be seen as ones that are more “secondary” to body comparisons and body surveillance in terms of their influence on body dissatisfaction. Furthermore, it is possible that engaging in eating and exercise comparisons could actually increase a woman’s efficacy by identifying actions she believes could “improve” her body. In contrast, body comparisons and body surveillance in and of themselves do not provide women with information on how to “improve,” and thus, it may be that little good can come of them.

It is interesting that across the Hypothesis 2-related models, time was a significant predictor of body dissatisfaction. More specifically, results indicated that body dissatisfaction increased over the course of the study. Various hypotheses can be generated to explain the increase in body dissatisfaction over the course of the two-week study. First, it is possible that repeated assessments over the course of the two-week EMA component of the study may have increased participants’ self-monitoring and awareness of their feelings and behaviors, which may have accounted for the increase in body dissatisfaction across time. While this would reflect the well-established phenomenon of reactivity (Campbell & Stanley, 1963), prior research found no systematic change in average body dissatisfaction reported across study days over the course of one week of EMA data collection (Heron & Smyth, 2013). Further, across various areas of research and using different study designs, there is very little evidence that participants’ self-

reports are reactive to the use of EMA (e.g., Le Grange, Gorin, Dymek, & Stone, 2002; Stein & Corte, 2003). Second, to the degree that elevations in body dissatisfaction were a response to some trigger, it could be that individuals experienced more of these triggers as the EMA period of the study progressed. The spring semester data collection occurred just after the university's spring break that year, and the fall semester data collection occurred just before the university's fall break that year. It could be that many participants' body dissatisfaction increased as they stopped their "spring break diets" and allowed themselves to eat with fewer dietary constraints. It could also be that many participants' body dissatisfaction increased as they studied for their fall midterms and used eating as a coping mechanism. Lastly, it may have been that, over time, participants experienced changes in what they perceived as "weight dissatisfaction" and "shape dissatisfaction," leading them to respond to these EMA items differently over the course of the study.

### **Hypothesis 3: Examining Social Comparison and Body Surveillance as Mediators of the Thin Ideal Internalization-Body Dissatisfaction Relation Using Momentary Data**

Finally, we were interested in whether trait thin ideal internalization predicted momentary reports of body dissatisfaction and if this relationship was mediated by momentary reports of body, eating, and exercise social comparisons and body surveillance. Thus, we were interested in whether the mediational model that we explored using traditional self-report data in Hypothesis 1 would hold when using more momentary reports of social comparison, body surveillance, and body dissatisfaction. Our results showed that the total between-person indirect effect of thin ideal internalization on body dissatisfaction through the set of mediators (i.e., body, eating, and exercise social comparisons and body surveillance) was significant; however, only body-related social comparison and body surveillance emerged as significant specific mediators. Thus, these results suggest that individuals with higher levels of thin ideal internalization tend to, on average,

engage in more body-related social comparisons and body surveillance, and these in turn mediate the effect of trait thin ideal internalization on individuals' average levels of body dissatisfaction.

Our Hypothesis 3 analyses build on our Hypothesis 1 findings and indicate that when using momentary measures of social comparison, body surveillance, and body dissatisfaction and examining the effects of body, eating, and exercise comparisons separately, body-related social comparison and body surveillance emerge as unique and specific mediators of the thin ideal internalization-body dissatisfaction relation. Therefore, these analyses indicate that tendencies to engage in body comparisons in particular may be important in terms of explaining the between-person effect of thin ideal internalization on body dissatisfaction. Additionally, it is interesting that body surveillance emerged as a significant specific mediator of the between-person effect of thin ideal internalization on body dissatisfaction when body surveillance and body dissatisfaction were assessed more momentarily but that it was not a significant specific mediator of this relation when all constructs were assessed using traditional self-report measures. One factor to keep in mind is that we operationalized social comparison as a single latent variable (with body, eating, and exercise social comparison indicators) in the Hypothesis 1 analyses and that we examined body, eating, and exercise comparisons as separate mediators in the Hypothesis 3 analyses. Given this, it may be that something about the way in which we assessed social comparison in each set of analyses allowed body surveillance to emerge as a significant specific mediator in the Hypothesis 3 analyses. It may also be that the method of data collection (i.e., traditional self-report versus EMA) contributed to this change in the pattern of results. Future research should attempt to understand exactly what may have contributed to this differential pattern of results.

As an extension of these findings, we were also interested in determining whether momentary reports of thin ideal internalization predicted momentary reports of body dissatisfaction and if this relationship was mediated by momentary reports of body, eating, and exercise social comparisons and body surveillance. Although thin ideal internalization has been described as “trait-like” in the literature, we found that there was a sizeable amount of moment-to-moment variability in individuals’ reports of thin ideal internalization. Thus, examining this kind of mediation model (i.e., with momentary thin ideal internalization as the independent variable) was appropriate. Given that all of the constructs in this model were assessed momentarily, it was possible to examine whether the thin ideal internalization-body dissatisfaction relation was mediated by body, eating, and exercise social comparisons and body surveillance at both the within- and between-person levels. Our results showed that the total within-person indirect effect of thin ideal internalization on body dissatisfaction through the set of mediators (i.e., body, eating, and exercise social comparisons and body surveillance) was significant, and the specific within-person indirect effects of each mediator showed that all four were significant. Thus, for the study participants, momentary increases in thin ideal internalization were associated with momentary increases in body dissatisfaction, and this relation was partially explained by momentary increases in body, eating, and exercise social comparisons and body surveillance. Furthermore, these results provide additional support for the notion that, in the moment, body, eating, and exercise comparison and body surveillance behaviors are associated with negative outcomes.

Regarding the between-person effects in this model, results showed that the total between-person indirect effect of thin ideal internalization on body dissatisfaction through this set of mediators (i.e., body, eating, and exercise social comparisons and body surveillance) was

significant, with body-related social comparison being the only variable to emerge as a significant specific mediator. It is interesting that body surveillance emerged as a significant specific mediator of the between-person effect of thin ideal internalization on body dissatisfaction when thin ideal internalization was measured using a traditional self-report questionnaire (but not when thin ideal internalization was measured via EMA). However, body surveillance did not emerge as a significant specific mediator of the thin ideal internalization-body dissatisfaction relation in the context of the elaborated sociocultural model of disordered eating that was examined in Hypothesis 1. Thus, across analyses, results suggest that, in relation to social comparison (especially body-related social comparisons), body surveillance may not be as powerful a mechanism to explain how thin ideal internalization translates itself into dissatisfaction with the body at the trait or between-person level.

### **Strengths**

This study contributes to the existing literature by expanding our understanding of the sociocultural model of disordered eating and the concurrent, prospective, and momentary effects of body-, eating-, and exercise-related social comparisons and body surveillance. To our knowledge, no research had yet investigated which factors may explain the relation between thin ideal internalization and body dissatisfaction in the context of the sociocultural model. Thus, a major strength of the current study is the examination of two such factors (i.e., eating disorder-related social comparison, body surveillance). An additional strength of the current study is that participants provided data at two time points, which allowed for the prospective examination of this mediation model. Although there was no evidence that social comparison and body surveillance mediated the relation between thin ideal internalization and body dissatisfaction prospectively using a half-longitudinal design, we were able to use these data to examine



whether these constructs prospectively predicted levels of and change in one another over time. Very little past research on the study constructs has been longitudinal in nature, and thus, this represents a major strength of the current study.

Another strength of the current study involves the way in which we assessed social comparison. Past work indicated that general measures of social comparison may be too general and that appearance-related comparison measures may be too narrow when it comes to investigating social comparison as a mediator of the thin ideal internalization-body dissatisfaction relation (Fitzsimmons-Craft et al., 2012c). Thus, in the current study, we looked at body-, eating-, and exercise-related social comparisons. Indeed, tendencies to engage in all three of these types of social comparison have been found to be associated with body dissatisfaction and disordered eating (Fitzsimmons-Craft & Bardone-Cone, 2014; Fitzsimmons-Craft et al., 2012a), and results of the current study provide additional information on the potential harmfulness of engaging in social comparisons in these three domains.

Finally, the use of EMA is a strength. To date, EMA in the eating disorders and body image fields has been somewhat limited. Thus, the current study adds to the literature in that it provides information on the momentary effects of engaging in social comparison and body surveillance behavior. Such data are informative because they provide information on these behaviors as they occur in the natural environment. This study is also the first to use EMA to further our understanding of the sociocultural model of disordered eating. In general, the use of EMA is a strength given that such methodology has ecological validity and reduced retrospective recall biases and allows for a large number of observations of the constructs of interest. Additionally, EMA data allow for clear temporal ordering of hypothesized causal factors and

outcomes, and in the future, we will be able to use these data to investigate the potential causal effects of social comparison and body surveillance on body dissatisfaction and disordered eating.

## **Limitations**

One limitation of the current study is generalizability, which is limited to similar samples (i.e., college women). However, high levels of body dissatisfaction and disordered eating among college women (e.g., Berg et al., 2009; Neighbors & Sobal, 2007) highlight the importance of examining factors, such as social comparison and body surveillance, that may contribute to this pathology. Therefore, the focus on college women in the current study may be conceptually appropriate. Additionally, this undergraduate sample was largely homogenous in terms of race/ethnicity and educational experiences. It will be important for future research to determine if these findings replicate in more racially/ethnically diverse samples, community samples, clinical samples, and in males.

Although a strength of the current study is that we had participants complete a set of traditional self-report measures at the beginning and end of an academic semester, a limitation is that the amount of time (i.e., about three months) between these two assessments was rather short. This time frame was chosen so as to allow data collection to occur within a single semester and to minimize study attrition, but it may have been that this time frame was too short to allow for meaningful change to occur in the study constructs. For example, it may have been that social comparison and/or body surveillance behavior would have predicted change in body dissatisfaction or disordered eating had the time frame between study assessments been increased. Another limitation of the current study is that all measures (i.e., both the traditional self-report questionnaires and EMA questions) were self-evaluative in nature. However, given that there are currently no other readily available and efficient means of measuring the study

constructs at the trait level or in the natural environment, self-report questions may be the most appropriate method of gathering such data.

An additional limitation involves the EMA methodology employed in the current study. As previously discussed, participants were instructed to fill out the EMA question sets 3x/day during certain windows of time (or as close to those windows as possible). Given that we were reliant on participants having access to their personal computers to fill out the EMA question sets, we believed that this was the most appropriate assessment schedule and that the associated participant burden would not be too great. However, by including more assessments in the EMA component of the study and/or by requiring that participants fill out surveys at more specific times throughout the day, the data would have been even more momentary. We also instructed participants to report on their recent experiences (i.e., since the last time they filled out a survey) rather than on their experiences at that very moment. Although recall bias using this methodology is reduced compared to the use of more traditional self-report measures, it is possible that responses were subject to at least some bias. For example, it is conceivable that participants were more likely to recall and report on very salient experiences of social comparison behavior (e.g., ones that made them feel especially good or poorly about themselves) given the potential lag between having these experiences and actually reporting on them.

Finally, the fact that the EMA data collection occurred during two separate two-week periods at different points in the calendar year is a limitation. Although the weather was found to be very similar across these two two-week periods, results indicated that participants who took part in the study during the fall semester reported significantly higher average levels of some of the constructs they reported on during the EMA period (i.e., thin ideal internalization, body-related social comparison, eating-related social comparison, body dissatisfaction) than spring

semester participants. It is possible that this pattern of findings emerged given that our fall semester participants were primarily first semester freshmen. Indeed, 66.0% of the participants in this study were first year students (and 61.0% of the fall semester participants were first year students). Perhaps the newness of college life and issues related to adjusting to such an environment contributed to these women experiencing higher levels of these constructs. It is also possible that these women were experiencing changes in their bodies. Although the “freshman 15” appears to be a myth for the majority of college students, most students do experience some weight gain during their freshman year, particularly during their first semester at college (e.g., Anderson, Shapiro, & Lundgren, 2003; Gropper et al., 2009). Thus, it may be that freshmen in our study who participated during the spring semester were more adjusted to college life and any weight gain they may have experienced during the fall semester. This in turn may have contributed to them experiencing lower levels of some of the constructs assessed during the EMA portion of the study. However, what is unclear is why certain EMA constructs (i.e., exercise-related social comparison, body surveillance) did not differ across groups. Future research should attempt to tease apart this pattern of findings. Interestingly, spring semester and fall semester participants did not significantly differ from one another on any of the traditional self-report measures they completed at T1 or T2. Running the analyses that involved EMA data controlling for semester of participation did not change the pattern of results; however, future research may wish to consider collecting EMA data of this nature during a single two-week period so as to decrease the influence of the time of assessment on the results.

### **Future Directions**

Results of the current study are suggestive of various avenues for future research. As aforementioned, in the context of the sociocultural model of disordered eating, eating disorder-related social comparison emerged as a significant specific mediator of the thin ideal

internalization-body dissatisfaction relation while body surveillance did not. Given this, it would be interesting for future research to examine if body surveillance emerges as a significant specific mediator for certain groups of individuals (e.g., those with a diagnosable eating disorder) or under certain conditions (e.g., for those with high levels of appearance-contingent self-worth). Similarly, future research should ascertain whether social comparison and body surveillance would mediate the thin ideal internalization-body dissatisfaction relation prospectively under certain moderating conditions (e.g., for those with high levels of perseveration) or when the length of time between study assessments is lengthened.

Future research may also benefit from examining even more complex models using the EMA data. Results from the current study indicated that within-person increases in body-, eating-, and exercise-related social comparisons and body surveillance were associated contemporaneously with elevated levels of body dissatisfaction. As an extension of these findings, it would be interesting to ascertain whether these effects held prospectively. For example, do within-person increases in social comparison and body surveillance behavior predict within-person increases in body dissatisfaction at the next study assessment? That is, future research should examine whether social comparison and body surveillance have lagged effects on body dissatisfaction. Likewise, future research should explore the influence of social comparison and body surveillance on certain disordered eating outcomes. For instance, it is possible that average levels of exercise-related comparison over the course of a given day are predictive of the presence or absence of engaging in a driven exercise episode that same day. Additionally, it may be that one's level of eating-related social comparison is predictive of attempting to restrict one's eating and/or being "successful" at restriction at the next study

assessment. In general, it will be important to consider how to “chunk” time and/or when effects need to be looked at in a lagged fashion when examining certain disordered eating outcomes.

Finally, future research may wish to explore how emotions relate to the interrelations between the study constructs. For example, it could be that negative affect drives engagement in social comparison and body surveillance or that the presence of negative affect makes it more likely that such behaviors will have negative effects. Furthermore, is it that certain types of negative affect are particularly important in terms of driving social comparison or body surveillance or the likelihood of these behaviors having negative effects? For instance, it could be that anxiety is especially important to consider in relation to these constructs. Indeed, Fitzsimmons-Craft et al. (2012b) conceptualized social comparison and body surveillance as safety behaviors, or actions that are intended to detect, avoid, escape, or endure a feared outcome (e.g., weight gain; Abramowitz, Deacon, & Whiteside, 2011). Safety behaviors may be engaged in in response to anxiety and may momentarily reduce anxiety; however, in general and over the longer-term, they “paradoxically” tend to maintain anxiety given that they prevent the disconfirmation of maladaptive thoughts and beliefs (Abramowitz et al., 2011; Salkovskis, 1991; Thwaites & Freeston, 2005). It would be very interesting for future EMA research to actually test the notion that these behaviors can be understood in part as safety behaviors. Via such methodology, momentary affect prior to and follow these behaviors could be explored. Such work would greatly contribute to our understanding of these behaviors and would shed additional light on factors that impact their maintenance.

### **Clinical Implications**

Findings from the current study have interesting implications for prevention programming. Results indicated that eating disorder-related social comparison and body

surveillance fully explained the relationship between thin ideal internalization and body dissatisfaction in the context of the sociocultural model of disordered eating, with social comparison emerging as the stronger specific mediator of the two. Furthermore, eating disorder-related social comparison tendencies were predictive of body dissatisfaction and disordered eating three months later, above and beyond the effects of body surveillance. Given this pattern of findings, eating disorder-related prevention efforts may wish to explicitly target social comparison behavior.

Several eating disorder prevention programs use cognitive dissonance to target thin ideal internalization by having participants speak and act in ways that are inconsistent with this ideal (e.g., Becker, Smith, & Ciao, 2006; Stice & Presnell, 2007). Dissonance-based prevention efforts have been found to reduce eating disorder risk factors and symptoms and to significantly reduce risk for future onset of an eating disorder (e.g., Stice, Marti, Spoor, Presnell, & Shaw, 2008; Stice, Shaw, Burton, & Wade, 2006). Although significant progress has been made in terms of eating disorder prevention efforts, there is room for improvement. Per Stice, South, and Shaw (2012), prevention researchers should work to create programs that produce larger effects that last for longer periods of time. As suggested by these authors, it may be that larger effects could be achieved by targeting multiple risk factors (Stice et al., 2012).

Thus, in the future, it may be interesting to test the efficacy of an intervention that goes beyond targeting thin ideal internalization to also targeting behaviors (e.g., social comparison) that have been found to translate thin ideal internalization into body dissatisfaction and disordered eating. For example, body, eating, and exercise comparisons could be addressed in prevention programming by aiding participants in understanding the consequences and functions of such behavior. Participants could be provided with psychoeducation about comparison-

making by discussing and participating in activities related to: the fact that individuals tend to selectively compare themselves to others whom they perceive as “better off” (e.g., thinner, eats less, exercises more; Cash, 2008); the concern that women make comparisons that are appearance- or body-related in some way to the exclusion of making comparisons in other domains (e.g., academics, extra-curricular activities); and the association between engaging in social comparisons and body dissatisfaction and disordered eating. Overall, it may be useful to target social comparison in both prevention and intervention efforts. Indeed, Fairburn (2008) suggests that such behavior should be addressed in cognitive-behavioral therapy for eating disorders given that social comparisons aid in maintaining concerns about weight and shape.

Results using the EMA data presented a slightly different picture in that body surveillance was found to have some significant specific negative effects. In particular, results indicated that body, eating, and exercise comparisons and body surveillance may function as proximal triggers for body dissatisfaction, while general tendencies to engage in body comparisons and body surveillance were more potent distal predictors of body dissatisfaction than trait-like tendencies to engage in eating or exercise comparisons. Furthermore, individuals’ aggregated reports of body-related social comparison and body surveillance behavior engaged in during the EMA period significantly and uniquely mediated the relationship between trait thin ideal internalization and individuals’ aggregated reports of body dissatisfaction experienced during the EMA period. Thus, it may also be useful to target body surveillance in prevention programs and in clinical settings. Many women have been socialized to assume that body monitoring is natural (e.g., Calogero, Davis, & Thompson, 2005; Fairburn, 2008). Given this, intervention efforts could help individuals build awareness of these behaviors and their consequences and structure change of these behaviors, which may aid in stopping the translation



of thin ideal internalization into body dissatisfaction. Decreasing body surveillance may also foster an individual's conceptualization of her body as an instrument of function rather than as an object to be looked at. Additionally, these findings highlight the importance of targeting body comparisons in particular. As aforementioned, it is possible that eating and exercise comparisons did not exhibit significant specific between-person effects on body dissatisfaction because they may provide a woman with information on how she could "improve," thereby increasing her sense of efficacy. Alternatively, there appears to be little good that can come of engaging in body comparisons, and thus, intervention efforts should be certain to focus on these comparison behaviors in particular.

## **Conclusion**

The current study extended research on the sociocultural model of disordered eating and social comparison and objectification theories in a number of ways. First, results indicated that eating disorder-related social comparison (i.e., including body, eating, and exercise comparisons) was a significant specific mediator of the thin ideal internalization-body dissatisfaction relation in the context of the sociocultural model while body surveillance was not. Although this mediational model did not hold prospectively, eating-disorder related social comparison was found to significantly predict body dissatisfaction and disordered eating three months later, above and beyond the effects of body surveillance. Second, we examined the effects of momentary body-, eating-, and exercise-related social comparison and body surveillance on momentary body dissatisfaction. These findings suggested that more momentary body dissatisfaction was affected by both trait- and state-like characteristics, with general tendencies to engage in body comparisons and body surveillance emerging as more potent trait-like predictors of body dissatisfaction than general tendencies to engage in eating or exercise

comparisons. However, it is important to keep in mind that body, eating, and exercise comparisons and body surveillance all functioned as proximal triggers for body dissatisfaction. Finally, we examined whether body, eating, and exercise comparisons and body surveillance mediated the thin ideal internalization-body dissatisfaction relation using momentary data. Results generally suggested that trait-like body comparison behavior was the strongest mediator of the relation between trait-like thin ideal internalization and trait-like body dissatisfaction. However, within a given person, momentary increases in thin ideal internalization were associated with momentary increases in body dissatisfaction and this relation was significantly mediated by momentary increases in body, eating, and exercise social comparison behavior and body surveillance. These results are suggestive of various ideas for future research and implications for prevention and intervention work.

Table 1

*Demographic Information*

<b>Demographic Characteristic</b>			
Race/ethnicity	<i>n</i>	%	
White	163	68.5	
African American or Black	20	8.4	
Asian	18	7.6	
Hispanic	10	4.2	
American Indian or Alaskan Native	3	1.3	
Multiracial/Multiethnic	23	9.7	
Other	1	.4	
	<i>M</i>	<i>SD</i>	Range
Age (years)	18.71	1.00	17-22
Body mass index (BMI; kg/m <sup>2</sup> )	22.69	3.42	17.43-41.60
Highest parental education (years)	16.50	2.68	7-21
Disordered eating (EAT-26)	9.24	7.30	0-78

*Note.* Highest parental education was used as a proxy for socioeconomic status. EAT-26 = Eating Attitudes Test-26.

Table 2

*Schedule of Study Activities*

<b>Sample</b>	<b>Activity</b>	<b>Timing</b>
Spring 2012 Semester	Questionnaires	Time 1 (T1) – beginning of semester (weeks of January 16 and 23, 2012)
Spring 2012 Semester	EMA	Middle of semester (March 19-April 1, 2012)
Spring 2012 Semester	Questionnaires	Time 2 (T2) – end of semester (weeks of April 9 and 16, 2012)
Fall 2012 Semester	Questionnaires	Time 1 (T1) – beginning of semester (weeks of August 20 and 27, 2012)
Fall 2012 Semester	EMA	Middle of semester (September 24-October 7, 2012)
Fall 2012 Semester	Questionnaires	Time 2 (T2) – end of semester (weeks of November 19 and 26, 2012)

*Note.* EMA = ecological momentary assessment.

Table 3

*Means and Standard Deviations of the Measured Variables at T1 (n = 226)*

Measure	<i>M</i>	<i>SD</i>	Possible Range
1. Perceived Sociocultural Pressure Scale (PSPS)	2.48	.75	1-5
2. Sociocultural Attitudes Toward Appearance Questionnaire-4 (SATAQ-4), Pressure	34.42	11.08	12-60
3. Ideal-Body Stereotype Scale-Revised (IBSS-R)	3.78	.53	1-5
4. SATAQ-4, Internalization	17.48	4.75	5-25
5. Beliefs About Attractiveness Scale-Revised (BAAR), Importance of Being Attractive and Thin	3.04	1.15	1-7
6. Body, Eating, and Exercise Comparison Orientation Scale (BEECOM), Body	31.26	7.20	6-42
7. BEECOM, Eating	28.26	7.43	6-42
8. BEECOM, Exercise	22.97	8.03	6-42
9. BEECOM, Total	82.51	20.48	18-126
10. Objectified Body Consciousness Scale (OBCS), Surveillance	5.04	.93	1-7
11. Body Shape Questionnaire (BSQ)	92.17	34.48	34-204
12. Eating Disorder Inventory-Body Dissatisfaction (EDI-BD)	31.94	10.22	9-54
13. Eating Disorder Examination-Questionnaire-6 (EDE-Q-6), Weight Concern/Shape Concern	2.67	1.53	0-6
14. Bulimia Test-Revised (BULIT-R)	49.57	16.39	28-140
15. EDE-Q-6, Restraint	1.50	1.36	0-6
16. Eating Attitudes Test-26 (EAT-26)	9.24	7.30	0-78

Table 4

*Correlations Among the Measured Variables at T1 (n = 226)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. PSPS	-																
2. SATAQ-4, Pressure	.82***	-															
3. IBSS-R	.17*	.26***	-														
4. SATAQ-4, Internalization	.40***	.49***	.42***	-													
5. BAAR, Importance of Being Attractive and Thin	.32***	.36***	.41***	.45***	-												
6. BEECOM, Body	.49***	.52***	.45***	.61***	.42***	-											
7. BEECOM, Eating	.44***	.50***	.38***	.56***	.42***	.73***	-										
8. BEECOM, Exercise	.39***	.43***	.41***	.52***	.43***	.69***	.69***	-									
9. BEECOM, Total	.50***	.55***	.47***	.63***	.48***	.90***	.90***	.89***	-								
10. OBCS, Surveillance	.28***	.30***	.34***	.52***	.39***	.65***	.47***	.47***	.60***	-							
11. BSQ	.61***	.66***	.28***	.57***	.46***	.70***	.65***	.62***	.74***	.54***	-						
12. EDI-BD	.56***	.61***	.20**	.47***	.44***	.60***	.53***	.49***	.61***	.45***	.85***	-					
13. EDE-Q-6, Weight Concern/Shape Concern	.49***	.57***	.26***	.60***	.48***	.67***	.61***	.55***	.68***	.52***	.89***	.81***	-				
14. BULIT-R	.41***	.45***	.25***	.46***	.41***	.54***	.56***	.49***	.60***	.38***	.74***	.58***	.71***	-			
15. EDE-Q-6, Restraint	.30***	.36***	.18*	.42***	.30***	.33***	.46***	.40***	.45***	.29***	.56***	.42***	.61***	.54***	-		
16. EAT-26	.34***	.39***	.27***	.57***	.41***	.50***	.54***	.49***	.57***	.44***	.62***	.48***	.64***	.65***	.56***	-	
17. BMI	.32***	.40***	-.18**	.02	.10	.20**	.22**	.18**	.22**	.09	.48***	.47***	.38***	.31***	.14*	.14	-

*Note.* PSPS = Perceived Sociocultural Pressure Scale. SATAQ-4 = Sociocultural Attitudes Toward Appearance Questionnaire-4.

IBSS-R = Ideal-Body Stereotype Scale-Revised. BAAR = Beliefs About Attractiveness Scale-Revised. BEECOM = Body, Eating, and

Exercise Comparison Orientation Scale. OBCS = Objectified Body Consciousness Scale. BSQ = Body Shape Questionnaire. EDI-BD = Eating Disorder Inventory-Body Dissatisfaction. EDE-Q-6 = Eating Disorder Examination-Questionnaire-6. BULIT-R = Bulimia Test-Revised. EAT-26 = Eating Attitudes Test-26. BMI = Body mass index. Variables are continuous, with higher values reflecting higher levels of the construct.  $*p < .05$ .  $**p < .01$ .  $***p < .001$ .

Table 5

*Separate Generalized Estimating Equations Analyses Using a Gamma Distribution of the Effects of Momentary Body-, Eating-, and Exercise-Related Social Comparison and Body Surveillance on Momentary Body Dissatisfaction*

<b>For the model involving the predictor variable of body-related social comparison:</b>					
Parameter Estimates	B	SE	Wald $\chi^2$	df	<i>p</i>
<i>Outcome variable: body dissatisfaction, <math>N_{Level\ 1} = 8742</math>, <math>N_{Level\ 2} = 232</math></i>					
Intercept	2.64	.10	639.58	1	<.001
Body-related Social Comparison (person-mean centered)	.01	.001	112.39	1	<.001
Body-related Social Comparison (person means)	.03	.003	127.06	1	<.001
Time (Scale)	.001 .91	.0001	18.39	1	<.001
<b>For the model involving the predictor variable of eating-related social comparison:</b>					
Parameter Estimates	B	SE	Wald $\chi^2$	df	<i>p</i>
<i>Outcome variable: body dissatisfaction, <math>N_{Level\ 1} = 8742</math>, <math>N_{Level\ 2} = 232</math></i>					
Intercept	2.99	.08	1250.07	1	<.001
Eating-related Social Comparison (person-mean centered)	.01	.001	100.88	1	<.001
Eating-related Social Comparison (person means)	.03	.003	96.14	1	<.001
Time (Scale)	.0004 1.00	.0001	11.00	1	.001
<b>For the model involving the predictor variable of exercise-related social comparison:</b>					
Parameter Estimates	B	SE	Wald $\chi^2$	df	<i>p</i>
<i>Outcome variable: body dissatisfaction, <math>N_{Level\ 1} = 8742</math>, <math>N_{Level\ 2} = 232</math></i>					
Intercept	3.06	.07	1671.83	1	<.001
Exercise-related Social Comparison (person-mean centered)	.01	.001	71.77	1	<.001
Exercise-related Social Comparison (person means)	.03	.003	84.33	1	<.001
Time (Scale)	.0005 .80	.0001	14.29	1	<.001
<b>For the model involving the predictor variable of body surveillance:</b>					
Parameter Estimates	B	SE	Wald $\chi^2$	df	<i>p</i>



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<i>Outcome variable: body dissatisfaction, <math>N_{Level\ 1} = 8742</math>, <math>N_{Level\ 2} = 232</math></i>					
Intercept	1.65	.20	66.18	1	<.001
Body Surveillance (person-mean centered)	.13	.01	103.44	1	<.001
Body Surveillance (person means)	.41	.04	86.62	1	<.001
Time	.001	.0001	28.36	1	<.001
(Scale)	.78				

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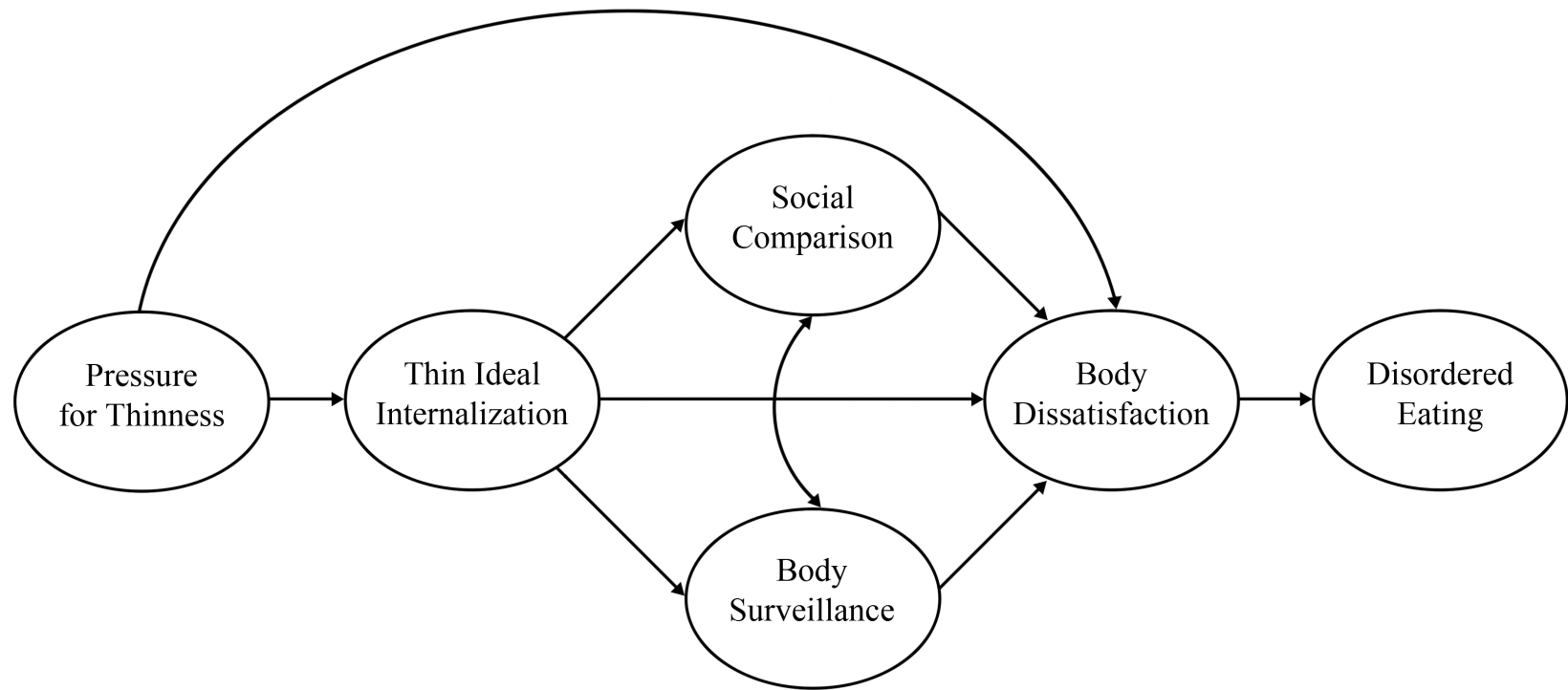
*Note.* The grand mean of all body-related social comparison scores ( $n = 8,487$ ) was 18.23 ( $SD = 23.14$ ) with a range from 0-100. The grand mean of all eating-related social comparison scores ( $n = 8,456$ ) was 12.36 ( $SD = 20.38$ ) with a range from 0-100. The grand mean of all exercise-related social comparison scores ( $n = 8,420$ ) was 9.08 ( $SD = 18.14$ ) with a range from 0-100. The grand mean of all body surveillance scores ( $n = 8,669$ ) was 3.94 ( $SD = 1.49$ ) with a range from 1-7. Body dissatisfaction scores ranged from 0-100 with a mean of 31.84 ( $SD = 28.08$ ).

Table 6

*Generalized Estimating Equations Analysis Using a Gamma Distribution of the Effects of Momentary Body-, Eating-, and Exercise-Related Social Comparison and Body Surveillance on Momentary Body Dissatisfaction in a Single Model*

Parameter Estimates	B	SE	Wald $\chi^2$	df	<i>p</i>
<i>Outcome variable: body dissatisfaction, <math>N_{Level\ 1} = 8742</math>, <math>N_{Level\ 2} = 232</math></i>					
Intercept	1.90	.22	77.14	1	<.001
Body-related Social Comparison (person-mean centered)	.003	.001	33.61	1	<.001
Body-related Social Comparison (person means)	.04	.01	34.57	1	<.001
Eating-related Social Comparison (person-mean centered)	.003	.001	23.51	1	<.001
Eating-related Social Comparison (person means)	-.01	.01	2.89	1	.089
Exercise-related Social Comparison (person-mean centered)	.003	.001	17.58	1	<.001
Exercise-related Social Comparison (person means)	.001	.01	.07	1	.796
Body Surveillance (person-mean centered)	.10	.01	58.19	1	<.001
Body Surveillance (person means)	.19	.06	9.84	1	.002
Time	.001	.0001	31.51	1	<.001
(Scale)	.90				

*Note.* The grand mean of all body-related social comparison scores ( $n = 8,487$ ) was 18.23 ( $SD = 23.14$ ) with a range from 0-100. The grand mean of all eating-related social comparison scores ( $n = 8,456$ ) was 12.36 ( $SD = 20.38$ ) with a range from 0-100. The grand mean of all exercise-related social comparison scores ( $n = 8,420$ ) was 9.08 ( $SD = 18.14$ ) with a range from 0-100. The grand mean of all body surveillance scores ( $n = 8,669$ ) was 3.94 ( $SD = 1.49$ ) with a range from 1-7. Body dissatisfaction scores ranged from 0-100 with a mean of 31.84 ( $SD = 28.08$ ).



*Figure 1.* An elaborated version of Stice's (1994) sociocultural model of disordered eating. Social comparison and body surveillance are conceived as mediators of the thin ideal internalization-body dissatisfaction link.

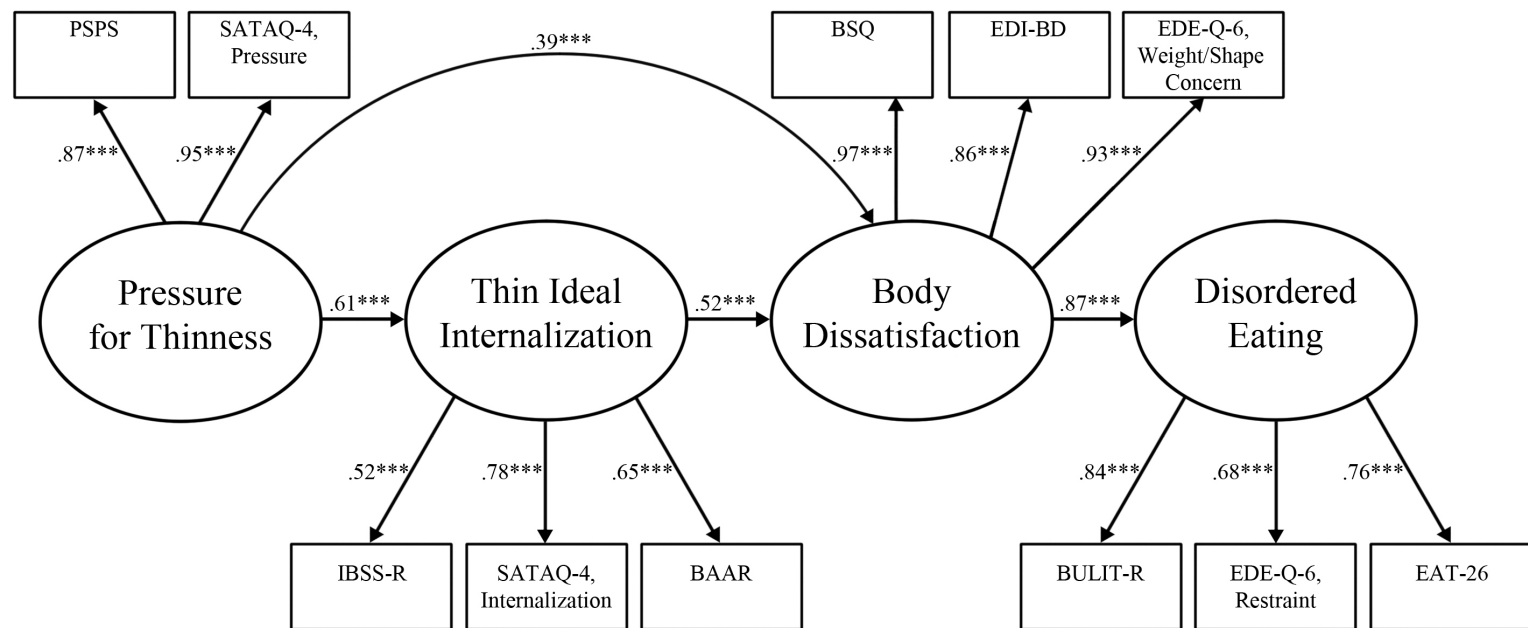
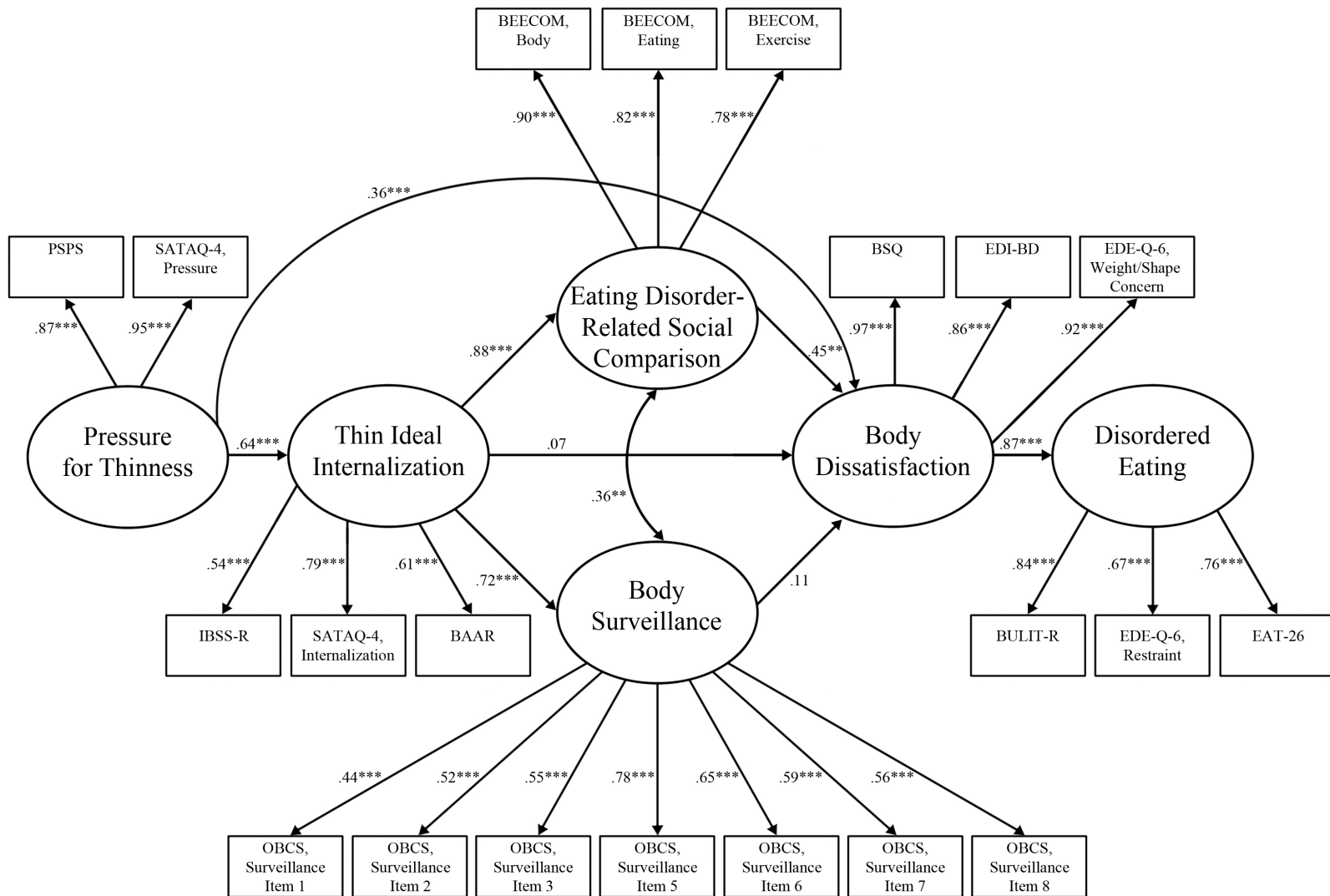
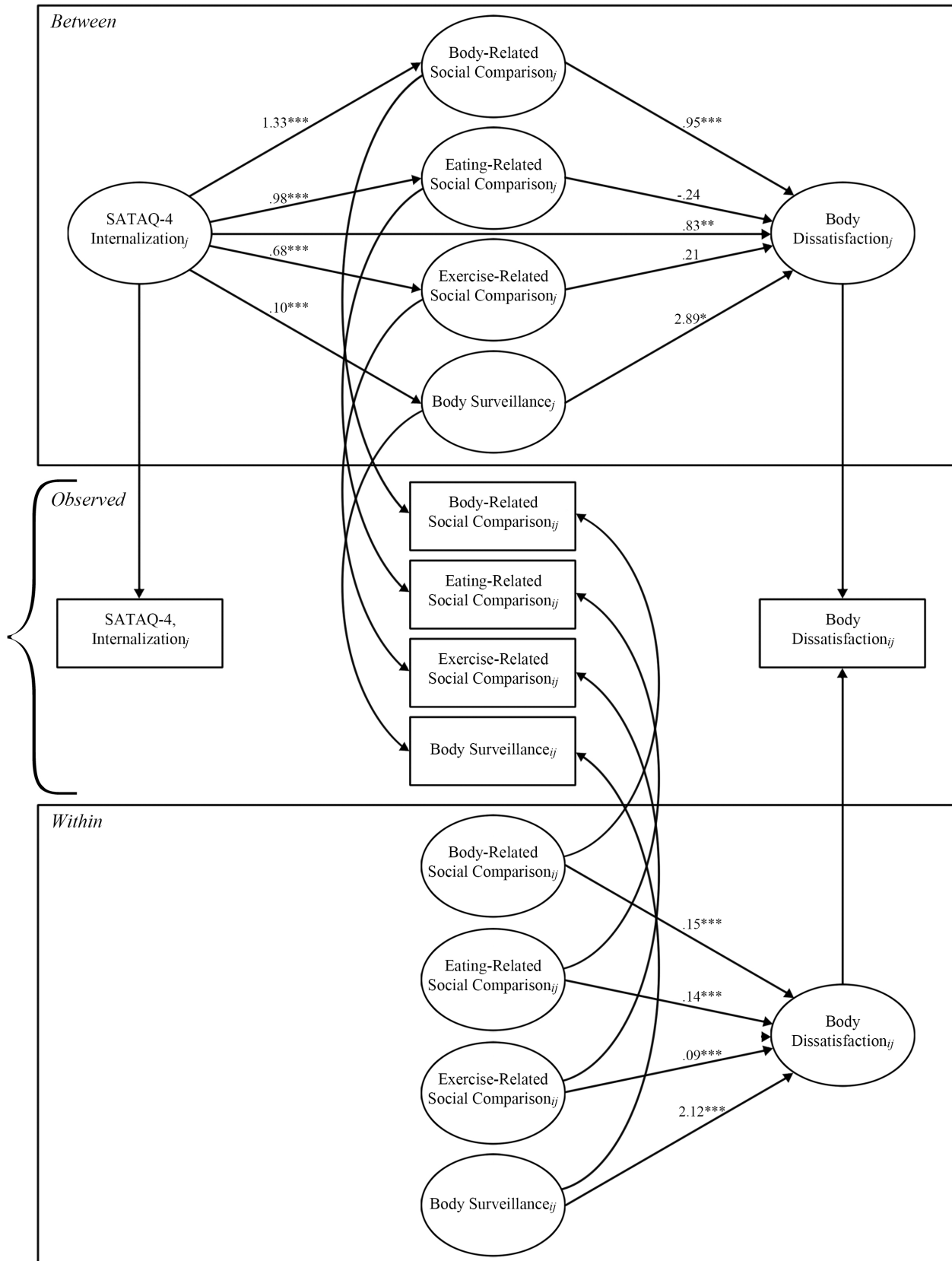


Figure 2. Standardized path coefficients and factor loadings for the traditional sociocultural model of disordered eating structural model. PSPS = Perceived Sociocultural Pressure Scale. SATAQ-4 = Sociocultural Attitudes Toward Appearance Questionnaire-4. IBSS-R = Ideal-Body Stereotype Scale-Revised. BAAR = Beliefs About Attractiveness Scale-Revised; we note that we are using the

Importance of Being Attractive and Thin subscale. BSQ = Body Shape Questionnaire. EDI-BD = Eating Disorder Inventory-Body Dissatisfaction. EDE-Q-6 = Eating Disorder Examination-Questionnaire-6. BULIT-R = Bulimia Test-Revised. EAT-26 = Eating Attitudes Test-26. \*\*\* $p < .001$ .



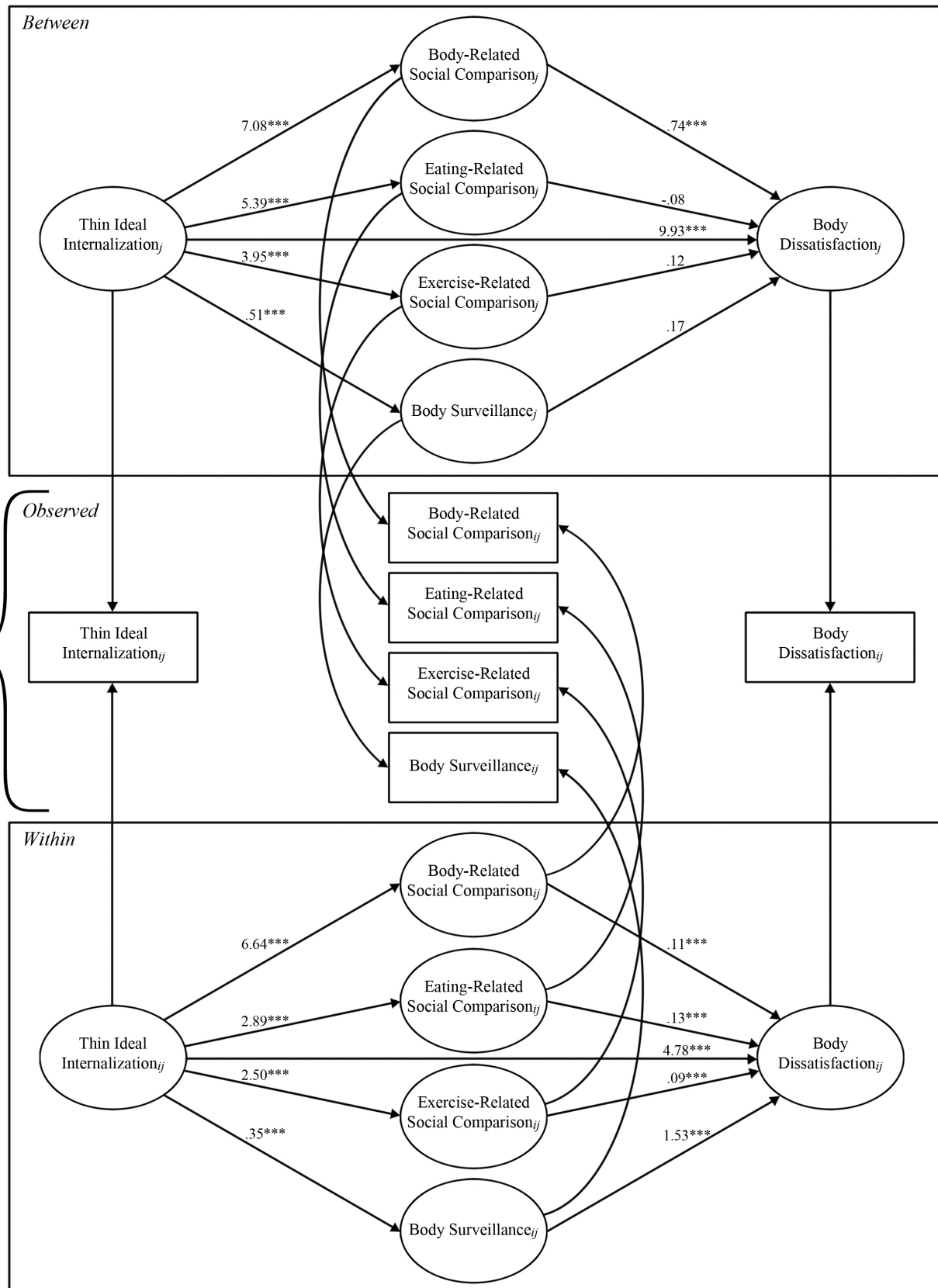
*Figure 3.* Standardized path coefficients and factor loadings for the elaborated sociocultural model of disordered eating structural model. PSPS = Perceived Sociocultural Pressure Scale. SATAQ-4 = Sociocultural Attitudes Toward Appearance Questionnaire-4. IBSS-R = Ideal-Body Stereotype Scale-Revised. BAAR = Beliefs About Attractiveness Scale-Revised; we note that we are using the Importance of Being Attractive and Thin subscale. BEECOM = Body, Eating, and Exercise Comparison Orientation Measure. OBCS = Objectified Body Consciousness Scale. BSQ = Body Shape Questionnaire. EDI-BD = Eating Disorder Inventory-Body Dissatisfaction. EDE-Q-6 = Eating Disorder Examination-Questionnaire-6. BULIT-R = Bulimia Test-Revised. EAT-26 = Eating Attitudes Test-26.  $**p < .01$ .  $***p < .001$ .





*Figure 4.* Illustration of the full 2-1-1 mediation model with unstandardized path coefficients.

For simplicity, correlations between the mediators are not shown but were included in the model (and were all significant at the  $p < .001$  level). SATAQ-4 = Sociocultural Attitudes Toward Appearance Questionnaire-4.  $*p < .05$ .  $**p < .01$ .  $***p < .001$ .



*Figure 5.* Illustration of the full 1-1-1 mediation model with unstandardized path coefficients.

For simplicity, correlations between the mediators are not shown but were included in the model (and were all significant at the  $p < .001$  level). \*\*\* $p < .001$ .

## APPENDIX 1: BODY, EATING, AND EXERCISE COMPARISON ORIENTATION MEASURE (BEECOM)

Please rate each of the following items regarding how often you compare yourself to your same-sex peers in terms of appearance, exercise, and eating. Remember, there are no right or wrong answers, so please be as honest as possible.

Regarding the items that refer to comparisons you might make when you are exercising (e.g., running outside, playing an organized sport, using a cardio machine at a gym): **If you are not currently exercising, think back to times when you have exercised (e.g., participated in gym class, played an organized sport, walked or ran outside) and answer accordingly.**

1. I look at the amount of food my peers leave on their plate in comparison to me when they are finished eating.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

2. I pay attention to whether or not I am as thin as, or thinner than, my peers.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

3. During meals, I compare what I am eating to what others are eating.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

4. In social situations, I think about how my figure “matches up” to the figures of those around me.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

5. When I am exercising (e.g., at the gym, running outdoors), I pay attention to the length of time that those around me work out.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

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).

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost</i>	<i>Always</i>

*never* *always*

7. I find myself thinking about how my food choices compare with the food choices of my peers.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

8. I am quick to notice how healthy (or unhealthy) my peers' food choices are compared to my own food choices.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

9. I notice how I compare with my peers in terms of specific parts of the body (e.g., stomach, hips, breasts, etc.).

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

10. When working out around other people, I think about how many calories I am burning in comparison to my peers.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

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.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

12. I compare my body shape to that of my peers.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

13. When I see a peer who is wearing revealing clothing, I have thoughts of how my own body compares.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

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.”

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

15. When I exercise (e.g., at the gym, running outdoors), I pay attention to the intensity level of the workouts of those around me.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

16. I pay attention to how much junk food my peers eat compared to me.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

17. I pay attention to whether or not I am as toned as my peers.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

18. When I work out, I evaluate how hard my workout was compared to how hard my friends say they worked out.

1	2	3	4	5	6	7
<i>Never</i>	<i>Almost never</i>	<i>Seldom</i>	<i>Sometimes</i>	<i>Often</i>	<i>Almost always</i>	<i>Always</i>

## APPENDIX 2: EMA QUESTIONS

Participants were asked to respond to these questions 3x/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) – on thoughts, emotions, behaviors, etc. from the period between the last and current signal. Participants were given these time guidelines and a link to the EMA survey at the beginning of the EMA data collection period, but they were also sent a reminder email with a link to the survey during each of these time frames on each day of the EMA period (so, participants were given the link and time guidelines as to when to fill out the survey, but they were also sent reminder emails). Additionally, all but one of the participants were sent reminder text messages for the first three days of the EMA period (this one individual opted out of receiving study-related text messages). These text messages reminded them to fill out a survey soon and to check their email for the survey link.

Please rate your **CURRENT** mood (that is, your mood at this very moment) by responding to **ALL** of the following items:

	Not at all	A little	Somewhat	Quite a bit	Very Much
<b>Distressed</b>	1	2	3	4	5
<b>Excited</b>	1	2	3	4	5
<b>Upset</b>	1	2	3	4	5
<b>Scared</b>	1	2	3	4	5
<b>Enthusiastic</b>	1	2	3	4	5
<b>Alert</b>	1	2	3	4	5
<b>Inspired</b>	1	2	3	4	5
<b>Nervous</b>	1	2	3	4	5
<b>Determined</b>	1	2	3	4	5
<b>Afraid</b>	1	2	3	4	5

Since the last time you were signaled, how much pressure have you felt from your friends to be thin?

1	2	3	4	5
<i>None</i>				<i>A Lot</i>

Since the last time you were signaled, how much pressure have you felt from your family to be thin?

1	2	3	4	5
<i>None</i>				<i>A Lot</i>

Since the last time you were signaled, how much pressure have you felt from your romantic partner to be thin?

\*If you do not currently have a romantic partner, please choose “Not Applicable.”

1	2	3	4	5	NA
<i>None</i>				<i>A Lot</i>	<i>Not</i>
					<i>Applicable</i>

Since the last time you were signaled, how much pressure have you felt from the media to be thin?

1	2	3	4	5
<i>None</i>				<i>A Lot</i>

Since the last time you were signaled, how important has it been to you to be thin?

1	2	3	4	5
<i>Not at All</i>				<i>Extremely</i>

Since the last time you were signaled, how important has it been to you to be muscular/toned?

1	2	3	4	5
<i>Not at All</i>				<i>Extremely</i>

On average, how many people have you been around since you were last signaled?

none – I have been alone since I was last signaled

just one other person

a few or a handful of other people

a moderately sized group of people (e.g., in a small seminar class of about 15 or 20 people)

a relatively large group of people (e.g., at a party)

VISUAL ANALOGUE SCALE: 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.

0	100
<i>No Body</i>	<i>Constantly</i>
<i>Comparisons</i>	<i>Making Body</i>
	<i>Comparisons</i>

Since the last time you were signaled, how many times have you compared your BODY with a same-sex peer? \_\_\_\_\_

*\*If participant did not endorse making at least one body-related comparison since the last time they were signaled, they were directed to fill out 17 questions related to their feelings of self-efficacy over the period of time since they were last signaled. Of note, we used the questions from the General Self-Efficacy Scale (GSES; Sherer et al., 1982) but slightly modified them to make them more “momentary.”*



IF PARTICIPANT ENDORSED MAKING AT LEAST ONE BODY-RELATED SOCIAL COMPARISON SINCE THE LAST TIME THEY WERE SIGNALLED...

(Participant then responded to the following set of questions for *THE MOST RECENT* body comparison instance.)

Think about the most recent time you compared your BODY to a same-sex peer in answering the following questions...

How long ago did that most recent BODY comparison occur?

in the past 10 minutes  
in the past 30 minutes  
in the past hour  
more than 1 hour ago

Compared to the last peer who you compared your BODY with, did you think you looked...

1	2	3	4	5
<i>Much worse</i>	<i>Worse</i>	<i>Same</i>	<i>Better</i>	<i>Much better</i>

**\*\*NOTE:** here, “worse” and “much worse” will be coded as an upward comparison and “better” and “much better” will be coded as a downward comparison

**\*\*NOTE:** no follow-up questions if participant responds with “same”

In what categories did you feel like your body was [*much worse/worse/better/much better*]? (check all that apply)

weight

shape

muscularity/level of tone

other (please specify and be specific): \_\_\_\_\_

→ For those categories checked,

- Did you feel [*much worse/worse/better/much better*] because your weight was less or more than the peer you compared your body with?
- Did you feel [*much worse/worse/better/much better*] because your shape was less curvy or curvier than the peer you compared your body with?
- Did you feel [*much worse/worse/better/much better*] because your muscularity/level of tone was more or less than the peer you compared your body with?

Keeping in mind your thoughts and feelings immediately following this most recent incident in which you compared your BODY...

I felt satisfied with the way my body looked just following making the body comparison.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt self-conscious.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt displeased with myself.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt good about myself.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt pleased with my appearance right after making the body comparison.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I was worried about what other people thought of me.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

Which of the following best describes your relationship with the peer that you made this most recent BODY comparison with?

close friend  
acquaintance  
stranger

Where were you when you made this most recent BODY-related comparison? Please choose the MOST relevant option.

where I live (e.g., dorm room, sorority house, apartment)  
walking around (e.g., on campus, on Franklin street)  
at the gym or somewhere else working out (e.g., running or walking outside)  
eating somewhere (e.g., at the dining hall, in a restaurant)  
somewhere on campus (but not walking around) (e.g., in class, in the library doing homework)  
shopping (e.g., at the mall, in shops on Franklin street)  
other

→ Tell us about the specifics of the setting (i.e., *[choice from above]*) you were in during this most recent BODY-related comparison – include information on your geographical location, as well as the context: \_\_\_\_\_

How many individuals (including the one you compared with) were you surrounded by when you made this most recent BODY-related comparison?

just the person I compared with  
a few or a handful of other people  
a moderately sized group of people (e.g., in a small seminar class of about 15 or 20 people)  
a relatively large group of people (e.g., at a party, at a large exercise class)

VISUAL ANALOGUE SCALE: Please slide the bar to indicate the level of EATING comparison behavior you have engaged in since the last time you were signaled, where 0 = No Eating Comparisons and 100 = Constantly Making Eating Comparisons.

0  
*No Eating  
Comparisons*

100  
*Constantly  
Making Eating  
Comparisons*

Since the last time you were signaled, how many times have you compared your EATING with a same-sex peer?

Of note, you and/or the comparison target do not have to have been actually eating for such a comparison to occur.

\_\_\_\_\_  
*\*If participant did not endorse making at least one eating-related comparison since the last time they were signaled, they were directed to fill out a question regarding where they spent the majority of their time since the last time they were signaled and 10 questions related to their feelings of self-esteem over the period of time since they were last signaled. Of note, we used the questions from the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) but slightly modified them to make them more “momentary.”*

**IF PARTICIPANT ENDORSED MAKING AT LEAST ONE EATING-RELATED SOCIAL COMPARISON SINCE THE LAST TIME THEY WERE SIGNALLED...**

*(Participant then responded to the following set of questions for THE MOST RECENT eating comparison instance.)*

Think about the most recent time you compared your EATING to a same-sex peer in answering the following questions...

How long ago did that most recent EATING comparison occur?

in the past 10 minutes  
in the past 30 minutes  
in the past hour  
more than 1 hour ago

Compared to the last peer who you compared your EATING with, did you think your eating was...

1	2	3	4	5
<i>Much worse</i>	<i>Worse</i>	<i>Same</i>	<i>Better</i>	<i>Much better</i>

**\*\*NOTE:** here, “worse” and “much worse” will be coded as an upward comparison and “better” and “much better” will be coded as a downward comparison

**\*\*NOTE:** no follow-up questions if participant responds with “same”

In what categories did you feel like your eating was [*much worse/worse/better/much better*]? (check all that apply)

healthiness

amount

level of balance

speed

other (please specify and be specific): \_\_\_\_\_

→ For those categories checked,

- Did you feel [*much worse/worse/better/much better*] because your eating was healthier or less healthy than the peer you compared your eating with?
- Did you feel [*much worse/worse/better/much better*] because your amount of food was smaller or larger than the peer you compared your eating with?
- Did you feel [*much worse/worse/better/much better*] because your eating was more balanced or less balanced than the peer you compared your eating with?
- Did you feel [*much worse/worse/better/much better*] because your eating was slower or faster than the peer you compared your eating with?

Keeping in mind your thoughts and feelings immediately following this most recent incident in which you compared your EATING...

I felt satisfied with my eating (e.g., amount, types of foods) just following making the eating comparison.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt self-conscious.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt displeased with myself.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt good about myself.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt pleased with my eating (e.g., amount, types of foods) right after making the eating comparison.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I was worried about what other people thought of me.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

Which of the following best describes your relationship with the peer that you made this most recent EATING comparison with?

close friend  
acquaintance  
stranger

Where were you when you made this most recent EATING-related comparison? Please choose the MOST relevant option.

where I live (e.g., dorm room, sorority house, apartment)  
walking around (e.g., on campus, on Franklin street)  
at the gym or somewhere else working out (e.g., running or walking outside)  
eating somewhere (e.g., at the dining hall, in a restaurant)  
somewhere on campus (but not walking around) (e.g., in class, in the library doing homework)  
shopping (e.g., at the mall, in shops on Franklin street)  
other

→ Tell us about the specifics of the setting (i.e., *[choice from above]*) you were in during this most recent EATING-related comparison – include information on your geographical location, as well as the context: \_\_\_\_\_

How many individuals (including the one you compared with) were you surrounded by when you made this most recent EATING-related comparison?

just the person I compared with  
a few or a handful of other people  
a moderately sized group of people (e.g., in a small seminar class of about 15 or 20 people)  
a relatively large group of people (e.g., at a party, at a large exercise class)

VISUAL ANALOGUE SCALE: Please slide the bar to indicate the level of EXERCISE comparison behavior you have engaged in since the last time you were signaled, where 0 = No Exercise Comparisons and 100 = Constantly Making Exercise Comparisons.

0  
*No Exercise  
Comparisons*

100  
*Constantly  
Making  
Exercise  
Comparisons*

Since the last time you were signaled, how many times have you compared your EXERCISE with a same-sex peer?

Of note, you and/or the comparison target do not have to have been actually exercising for such a comparison to occur.

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*\*If participant did not endorse making at least one exercise-related comparison since the last time they were signaled, they were directed to fill out 12 questions related to their feelings of self-concept clarity over the period of time since they were last signaled. Of note, we used the questions from the Self-Concept Clarity Scale (SCC; Campbell et al., 1996) but slightly modified them to make them more “momentary.”*

**IF PARTICIPANT ENDORSED MAKING AT LEAST ONE EXERCISE-RELATED SOCIAL COMPARISON SINCE THE LAST TIME THEY WERE SIGNALLED...**

*(Participant then responded to the following set of questions for THE MOST RECENT exercise comparison instance.)*

Think about the most recent time you compared your EXERCISE to a same-sex peer in answering the following questions...

How long ago did that most recent EXERCISE comparison occur?

in the past 10 minutes  
in the past 30 minutes  
in the past hour  
more than 1 hour ago

Compared to the last peer who you compared your EXERCISE with, did you think your exercise was...

1	2	3	4	5
<i>Much</i>	<i>Worse</i>	<i>Same</i>	<i>Better</i>	<i>Much</i>
<i>worse</i>				<i>better</i>

**\*\*NOTE:** here, “worse” and “much worse” will be coded as an upward comparison and “better” and “much better” will be coded as a downward comparison

**\*\*NOTE:** no follow-up questions if participant responds with “same”

In what categories did you feel like your exercise was [*much worse/worse/better/much better*]? (check all that apply)

intensity

length of time

type of exercise

speed (e.g., running pace)

quantity (e.g., days per week)

other (please specify and be specific): \_\_\_\_\_

→ For those categories checked,

- Did you feel [*much worse/worse/better/much better*] because your exercise was more intense or less intense than the peer you compared your exercise with?
- Did you feel [*much worse/worse/better/much better*] because the amount of time you exercised was longer or shorter than the peer you compared your exercise with?
- Did you feel [*much worse/worse/better/much better*] because the type of exercise you did was more difficult or easier than the peer you compared your exercise with?
- Did you feel [*much worse/worse/better/much better*] because your exercise was at a faster pace/speed or slower pace/speed (e.g., running pace) than the peer you compared your exercise with?
- Did you feel [*much worse/worse/better/much better*] because your exercise quantity (e.g., days per week) was larger or smaller than the peer you compared your exercise with?

Keeping in mind your thoughts and feelings immediately following this most recent incident in which you compared your EXERCISE...

I felt satisfied with my exercise habits (e.g., amount, intensity, type) just following making the exercise comparison.

1	2	3	4	5
<i>Not At All</i>	<i>A Little Bit</i>	<i>Somewhat</i>	<i>Very Much</i>	<i>Extremely</i>

I felt self-conscious.

1                      2                      3                      4                      5  
*Not At All    A Little Bit    Somewhat    Very Much    Extremely*

I felt displeased with myself.

1                      2                      3                      4                      5  
*Not At All    A Little Bit    Somewhat    Very Much    Extremely*

I felt good about myself.

1                      2                      3                      4                      5  
*Not At All    A Little Bit    Somewhat    Very Much    Extremely*

I felt pleased with my exercise habits (e.g., amount, intensity, type) right after making the exercise comparison.

1                      2                      3                      4                      5  
*Not At All    A Little Bit    Somewhat    Very Much    Extremely*

I was worried about what other people thought of me.

1                      2                      3                      4                      5  
*Not At All    A Little Bit    Somewhat    Very Much    Extremely*

Which of the following best describes your relationship with the peer that you made this most recent EXERCISE comparison with?

close friend  
acquaintance  
stranger

Where were you when you made this most recent EXERCISE-related comparison? Please choose the MOST relevant option.

where I live (e.g., dorm room, sorority house, apartment)  
walking around (e.g., on campus, on Franklin street)  
at the gym or somewhere else working out (e.g., running or walking outside)  
eating somewhere (e.g., at the dining hall, in a restaurant)  
somewhere on campus (but not walking around) (e.g., in class, in the library doing homework)  
shopping (e.g., at the mall, in shops on Franklin street)  
other

→ Tell us about the specifics of the setting (i.e., *[choice from above]*) you were in during this most recent EXERCISE-related comparison – including information on your geographical location, as well as the context: \_\_\_\_\_



How many individuals (including the one you compared with) were you surrounded by when you made this most recent EXERCISE-related comparison?

just the person I compared with

a few or a handful of other people

a moderately sized group of people (e.g., in a small seminar class of about 15 or 20 people)

a relatively large group of people (e.g., at a party, at a large exercise class)

Please think about the period of time since they last time you were signaled in answering the following questions.

I rarely thought about how I looked.

1	2	3	4	5	6	7
<i>Strongly</i>			<i>Neither</i>			<i>Strongly</i>
<i>Disagree</i>			<i>Agree Nor</i>			<i>Agree</i>
			<i>Disagree</i>			

I thought it was more important that my clothes were comfortable than whether they looked good on me.

1	2	3	4	5	6	7
<i>Strongly</i>			<i>Neither</i>			<i>Strongly</i>
<i>Disagree</i>			<i>Agree Nor</i>			<i>Agree</i>
			<i>Disagree</i>			

I thought more about how my body felt than how my body looked.

1	2	3	4	5	6	7
<i>Strongly</i>			<i>Neither</i>			<i>Strongly</i>
<i>Disagree</i>			<i>Agree Nor</i>			<i>Agree</i>
			<i>Disagree</i>			

I rarely compared how I looked with how other people looked.

1	2	3	4	5	6	7
<i>Strongly</i>			<i>Neither</i>			<i>Strongly</i>
<i>Disagree</i>			<i>Agree Nor</i>			<i>Agree</i>
			<i>Disagree</i>			

I thought about how I looked many times.

1	2	3	4	5	6	7
<i>Strongly</i>			<i>Neither</i>			<i>Strongly</i>
<i>Disagree</i>			<i>Agree Nor</i>			<i>Agree</i>
			<i>Disagree</i>			

I often worried about whether the clothes I was wearing made me look good.

1	2	3	4	5	6	7
<i>Strongly</i>			<i>Neither</i>			<i>Strongly</i>
<i>Disagree</i>			<i>Agree Nor</i>			<i>Agree</i>
			<i>Disagree</i>			

I rarely worried about how I looked to other people.

1	2	3	4	5	6	7
<i>Strongly</i>			<i>Neither</i>			<i>Strongly</i>
<i>Disagree</i>			<i>Agree Nor</i>			<i>Agree</i>
			<i>Disagree</i>			

I was more concerned with what my body could do than how it looked.

1	2	3	4	5	6	7
<i>Strongly</i>			<i>Neither</i>			<i>Strongly</i>
<i>Disagree</i>			<i>Agree Nor</i>			<i>Agree</i>
			<i>Disagree</i>			

Since the last time you were signaled...

Have you pinched areas of your body to see how much fat there is?

Yes                      No

VISUAL ANALOGUE SCALE: 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.

0	100
<i>Not at all</i>	<i>Very</i>
<i>dissatisfied</i>	<i>dissatisfied</i>

VISUAL ANALOGUE SCALE: Please slide the bar to indicate how dissatisfied with your SHAPE you have been since the last time you were signaled, where 0 = Not at All Dissatisfied and 100 = Very Dissatisfied.

0	100
<i>Not at all</i>	<i>Very</i>
<i>dissatisfied</i>	<i>dissatisfied</i>

Since the last time you were signaled, have you had the urge to binge eat?

0	1	2	3	4	5	6
<i>Not at all</i>		<i>Slightly</i>		<i>Moderately</i>		<i>Markedly</i>

44. Did you actually binge eat since the last time you were signaled?

Yes

No

Since the last time you were signaled, have you thought about trying to restrict the amount or type of food you eat in order to influence your shape or weight?

0	1	2	3	4	5	6
<i>Not at all</i>		<i>Slightly</i>		<i>Moderately</i>		<i>Markedly</i>

Did you attempt to restrict your eating to influence your shape or weight since the last time you were signaled?

Yes

No

*if YES:*

Were you successful in your restriction efforts?

Yes

No

Since the last time you were signaled, have you thought about exercising as a means of controlling your weight, altering your shape or amount of fat, or burning off calories?

0	1	2	3	4	5	6
<i>Not at all</i>		<i>Slightly</i>		<i>Moderately</i>		<i>Markedly</i>

Did you actually exercise to influence your shape or weight since the last time you were signaled?

Yes

No

Since the last time you were signaled, have you thought about vomiting as a means of trying to control your shape or weight?

0	1	2	3	4	5	6
<i>Not at all</i>		<i>Slightly</i>		<i>Moderately</i>		<i>Markedly</i>

Did you actually vomit since the last time you were signaled?

Yes

No

## ENDNOTES

<sup>1</sup> The Noort Committee found no evidence of scientific fraud in this paper (Levelt Committee, Noort Committee, & Drenth Committee, 2012).

<sup>2</sup> It is true that patterns of significance remained the same whether or not semester of participation was included in models and that semester was never a significant predictor of the outcome variable (i.e., body dissatisfaction experienced over the past several hours) in the study models that used the EMA data. However, when we ran the MSEM models (i.e., the 2-1-1 models and the 1-1-1 models) and included semester as a covariate, the models had some difficulties converging. In particular, we received error messages that the model standard errors may not be trustworthy. Thus, while it is true that the pattern of significance in our EMA models remained the same whether or not semester was included as a covariate, one must keep in mind that the MSEM models including semester as a covariate may not be entirely trustworthy. Despite this, results generally seem to suggest that including semester in the models had no effect.

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