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State body dissatisfaction predicts momentary positive and negative affect but not weight control behaviors: an ecological momentary assessment study

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Abstract

Purpose—Body dissatisfaction is ubiquitous in our society and leads to eating disorders. Longitudinal research suggests that higher body dissatisfaction predicts higher negative affect and unhealthy weight control behaviors over time. However, no study has assessed how body dissatisfaction impacts affect and weight control behaviors in the moment. In the current study, we examined the momentary relationships between body dissatisfaction, affect and weight control behaviors using ecological momentary assessment.

Methods—Female college students ($N = 67$) completed measures of state body dissatisfaction, affect, and weight control behaviors across fourteen days using ecological momentary assessment.

Results—Greater body dissatisfaction significantly predicted lower subsequent positive affect and higher subsequent negative affect, but positive and negative affect did not predict subsequent body dissatisfaction. Daily average body dissatisfaction was not significantly associated with daily engagement in either healthy or unhealthy weight control behaviors.

Conclusion—Short-term negative effects of body dissatisfaction on affect were apparent. Targeting body dissatisfaction may be important for improving affect.

Level of evidence—Level IV, multiple time series without intervention.

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Author contributions MS and CP conceptualized the study aims. MS conducted formal data analysis. MS wrote the original draft of the manuscript. All authors reviewed and edited the manuscript.

Conflict of interest Dr. Crosby is a paid statistical consultant for Health Outcomes Solutions, Winter Park, Florida.

Compliance with ethical standards

Ethical approval All procedures performed in studies involving human participants were conducted in accordance with the ethical standards of the institutional and national research committee and the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all study participants.

Keywords

Body satisfaction; Body dissatisfaction; Affect; Weight loss; Eating disorders

Introduction

Body dissatisfaction refers to the extent to which one experiences displeasure with one's body [1], and is common, with most of college women expressing body dissatisfaction [2, 3]. Body dissatisfaction is an eating disorder risk and maintenance factor [4]. Because of the role body dissatisfaction and affect play in the development and maintenance of eating pathology, it is imperative to understand the determinants and intermediate consequences of body dissatisfaction prior to disordered eating onset.

Body dissatisfaction has been typically defined as a trait, and research has shown that trait body dissatisfaction impacts both affect and eating behaviors. Higher body dissatisfaction predicts higher psychological distress (e.g., disordered eating, depression, stress, low self-esteem) over time [5–7]. Body dissatisfaction also impacts engagement in healthy vs. unhealthy weight control behaviors. Healthy weight control behaviors can include exercising, eating more fruits and vegetables, drinking less soda, eating fewer high-fat foods, and watching portion sizes [8]. Unhealthy weight control behaviors can include fasting, skipping meals, using food substitutes, taking diet pills, taking laxatives, and smoking [8]. Longitudinal research suggests that higher body dissatisfaction predicts lower levels of healthy weight control behaviors and higher levels of unhealthy weight control behaviors across five years [8].

Research suggests that body dissatisfaction can also be conceptualized as a construct that can vary within person [9, 10], and both trait and state body dissatisfaction uniquely predict eating pathology [9]. However, there has been a dearth of research on determinants and consequences of state body dissatisfaction. It is critical to understand the real-time determinants and consequences of body dissatisfaction, as the extent to which individuals are satisfied with their bodies varies throughout the course of the day [12].

Existing research suggests that state body dissatisfaction is associated with body image dysphoria (i.e., negative body image in specific contexts), dysfunctional investment in appearance (i.e., body image investment, related to beliefs and assumptions about the importance and influence of appearance in one's life), disturbed eating attitudes (i.e., symptoms of disordered eating), and the use of maladaptive body image coping strategies (i.e., using strategies, such as avoidance or appearance fixing, rather than acceptance to manage threats or challenges to one's body image) [12]. Additionally, engaging in exercise predicts higher subsequent body image satisfaction, particularly for individuals who are younger, have a low BMI, engage in regular exercise, and who infrequently engage in body surveillance practices [11]. However, most of the research on determinants of state body dissatisfaction has focused on cognitive and behavioral processes, and it is currently unclear whether affective states predict state body dissatisfaction.

The consequences of state body dissatisfaction are also not well understood. Existing research suggests that engaging in upward body comparisons (i.e., comparing one's body to someone who is perceived to be better off) is associated with an increase in negative affect [13]. Additionally, the state discrepancy between one's actual and ideal body size is associated with higher subsequent depressed and anxious affect [14]. Finally, elevations in state body dissatisfaction predict binge eating episodes [10]. However, the extent to which state body dissatisfaction predicts engagement in momentary healthy and unhealthy weight control behaviors in daily life is unclear.

In the current study, we examined the relationship between body dissatisfaction, affect and weight control behaviors in female undergraduate college students participating in a randomized controlled trial assessing the impact of daily self-weighing on mood and behaviors using ecological momentary assessment (EMA). Based on previous literature [6, 8, 13], we hypothesized that: [1] higher state body dissatisfaction would predict lower subsequent state positive affect and higher subsequent state negative affect, and vice versa; and [2] higher daily state body dissatisfaction would be associated with lower daily engagement in healthy weight control behaviors (e.g., exercise, eating more fruits and vegetables) and higher daily engagement in unhealthy weight control behaviors (e.g., fasting, smoking).

Methods

Participants

Participants were 67 college student females who were part of a randomized controlled trial evaluating the effects of daily self-weighing ($n = 35$) vs. a control condition (temperature taking) ($n = 32$) on weight control behaviors and mood. Eligibility criteria included being an undergraduate student at the university between the ages of 18 and 26, answering "yes" to fewer than 3/5 items on the SCOFF questionnaire (which assess core symptoms of anorexia nervosa and bulimia nervosa) [15], and having a smartphone (Apple or Android) and WiFi connection. Participants were recruited via dissemination of paper and electronic study advertisements across the university for a study to understand how young adults can prevent weight gain, and were compensated up to \$250.

Procedures

Once enrolled in the trial, participants completed an intervention that included two weeks of EMA (i.e., EMA data were collected during the intervention period), either in the context of daily tracking of body weight or temperature taking, based on random assignment. Participants were asked to rate their affect and body dissatisfaction five times per day. At the end of the day, participants were also asked about their engagement in healthy and unhealthy weight control behaviors during that day. EMA data were obtained using ReTAINE (www.retaine.org). The study was approved by the University of Delaware Institutional Review Board.

EMA measures

State affect—Momentary ratings of positive and negative affect were assessed using the Positive and Negative Affect Schedule (PANAS) [16]. Positive affect items included: *interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive* and *active*. Negative affect items included: *distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery* and *afraid*. Participants rated each item on a scale from 1 (*not at all*) to 5 (*extremely*) according to how they felt ‘right now’. Internal consistency was excellent (positive affect $\alpha = 0.93$, negative affect $\alpha = 0.91$).

State body dissatisfaction—Momentary body dissatisfaction was assessed with a modified version of the Body Shape Satisfaction Scale [17], which is a measure of body satisfaction/dissatisfaction. Participants were asked to rate satisfaction on a scale from 1 (*very dissatisfied*) to 5 (*very satisfied*) with various body parts, including *height, weight, body shape, waist, hips, thighs, stomach, face, body build, muscles, chest* and *overall body fat*. Higher scores on the body shape satisfaction scale indicated higher body satisfaction/lower body dissatisfaction. Internal consistency was excellent ($\alpha = 0.96$).

Healthy and unhealthy weight control behaviors—Daily engagement in weight control behaviors was assessed at the end of the day by asking participants to respond yes or no for each behavior [8]. Healthy weight control behaviors included: *exercise, eating more fruits and vegetables, eating less high-fat foods, eating less sweets, drinking less soda pop* and *watching portion sizes*. Unhealthy weight control behaviors included: *fasting, eating very little food, taking diet pills, making self-vomit, using laxatives, using a food substitute, skipping meals* and *smoking cigarettes*. The daily sum of healthy and unhealthy weight control behaviors was aggregated.

Data analysis

Data were analyzed with SPSS version 21 using multilevel modeling (MLM), which is robust to missing data. Descriptive information was calculated by averaging across the mean EMA scores for each participant on a given variable. We controlled for randomized group assignment (i.e., weighing or temperature taking) in all analyses. We used within-subject cross-lag panel analyses, where we disaggregated momentary variables and controlled for previous levels of the dependent variable, allowing us to predict changes in outcome variables [18].

We first tested whether body dissatisfaction (at time t) predicted subsequent positive affect and negative affect (at time $t + 1$), controlling for affect at time t , and vice versa. Time varying predictors (TVPs) were disaggregated into the participant’s average level across all assessments (TVP_{mean} ; the between-person component) and deviations from the mean at each assessment (TVP_{dev} ; the within-person component; $TVP_{\text{dev}} = TVP_{\text{raw}} - TVP_{\text{mean}}$) [18].

Second, we tested the extent to which average daily body dissatisfaction was associated with engagement in weight control behaviors during that day. This model included daily weight control behaviors as the dependent variable, and daily body dissatisfaction (disaggregated into TVP_{mean} and TVP_{dev}) as the predictor variable. Given the limitations of our measures (i.e.,

assessing for weight control behaviors at the end of the day only), we were not able to conduct predictive analyses for this question.

Of note, the distributions of negative affect and healthy and unhealthy weight control behavior variables were skewed, with most participants reporting a 1 (not at all) for negative affect and engaging in no weight control behaviors. Therefore, we used a generalized linear mixed model (GLMM) for the analyses in which negative affect and weight control behaviors were the outcome [19]. This GLMM assumed a negative binomial for the outcome, and used a log linking function. In the reverse analyses, standard MLM was used, but negative affect and weight control behaviors (as predictors) were log-transformed to reduce skewness. Fixed effects included affect and body dissatisfaction and the intercept was included as a random effect. We employed an AR1 autocorrelation given the dependence within the nested data.

Results

Descriptives

See Table 1 for descriptive information. Participants completed an average of 60.5 EMA assessments, representing an average of 2.75 assessments per day. In regard to weight control behaviors, there were 86 daily reports of engagement in one or more unhealthy weight control behaviors and 499 daily reports of engagement in one or more healthy weight control behaviors.

MLM analyses

Affect—Within-person, higher state body dissatisfaction (at time t) significantly predicted lower subsequent (at time $t + 1$) state positive affect ($b = 0.19$, $SE = 0.04$, $p < 0.001$) and higher subsequent (at time $t + 1$) state negative affect ($b = -0.12$, $SE = 0.04$, $p < 0.001$), indicating that higher state body dissatisfaction (relative to an individual's average state body dissatisfaction) was related to lower subsequent state positive affect and higher subsequent state negative affect. Negative ($b = 0.00$, $SE = 0.02$, $p = 0.96$) and positive affect ($b = -0.01$, $SE = 0.01$, $p = 0.27$) (at time t) did not predict subsequent state body dissatisfaction (at time $t + 1$).

Between-person, higher body state dissatisfaction was associated with higher state negative affect ($b = -0.12$, $SE = 0.04$, $p < 0.001$). These findings indicate that individuals who reported higher body dissatisfaction during the EMA protocol experienced higher negative affect throughout the EMA protocol. Body dissatisfaction did not predict positive affect ($b = 0.05$, $SE = 0.05$, $p = 0.25$).

Weight control behaviors—Within-person, daily average body dissatisfaction was not significantly associated with daily engagement in either healthy ($b = -0.08$, $SE = 0.23$, $p = 0.72$) or unhealthy ($b = -0.36$, $SE = 0.93$, $p = 0.70$) weight control behaviors. Similarly, between-person, daily average body dissatisfaction was not associated with daily engagement in either healthy ($b = -0.01$, $SE = 0.07$, $p = 0.90$) or unhealthy ($b = -0.27$, $SE = 0.22$, $p = 0.23$) weight control behaviors.

Discussion

This study used EMA to test momentary/daily relationships between body dissatisfaction, affect and weight control behavior in a sample of college women who reported no history of or current eating disorder. Overall, within-person, higher body dissatisfaction predicted lower subsequent positive affect and higher subsequent negative affect, but not vice versa. Between-person, only negative affect was associated with state body dissatisfaction. Daily body dissatisfaction did not predict within- or between-person daily engagement in healthy or unhealthy weight control behaviors.

Higher state body dissatisfaction predicted lower subsequent state positive affect and higher subsequent state negative affect. Additionally, higher state negative affect throughout the EMA protocol was associated with higher state body dissatisfaction during the EMA protocol. These findings are in line with longitudinal findings that suggest that body dissatisfaction predicts negative mood and distress over time [6]. Our findings suggest that body dissatisfaction may also worsen affect in the moment.

Surprisingly, affect did not predict subsequent state body dissatisfaction. This finding stands in contrast to experimental studies that suggest that experimental negative mood inductions worsen body dissatisfaction in undergraduate college women [21]. It may be that these findings do not translate into a day-to-day context, and that state body dissatisfaction in daily life is determined by cognitive and behavioral factors instead [11, 12]. Indeed, our finding that affect does not predict body dissatisfaction is in line with longitudinal findings (i.e., across 9 months) that suggest that higher negative affect does not predict increases in body dissatisfaction over time in girls [22].

Daily body dissatisfaction was not associated with daily engagement in healthy or unhealthy weight control behaviors. This finding stands in contrast to findings that state body dissatisfaction predicts binge eating in a sample of individuals with eating disorders [10]. It may be that state body dissatisfaction may predict eating pathology in individuals with eating disorders, but not weight control behaviors in a healthy sample. Whereas women with eating disorders may engage in weight control behaviors and disordered eating to cope with body dissatisfaction, healthy women may not, and instead may cope with poor body dissatisfaction in a more adaptive manner (e.g., accepting their bodies). Our findings also differ from those of Neumark-Sztainer and colleagues (2006) [8] who found that higher body dissatisfaction predicted higher levels of unhealthy weight control behaviors and lower levels of healthy weight control behaviors across 5 years. This difference may be because Neumark-Sztainer and colleagues (2006) [8] examined longitudinal relationships, whereas we tested within-person momentary relationships. It may be that body dissatisfaction predicts weight control behaviors in the long term, but not the short term.

Study limitations

One limitation is that we used fewer EMA assessments than other studies in the field [23]. It is possible that the current study had too few assessments to reliably capture relationships between body dissatisfaction, affect and weight control behaviors. However, we used as many assessments as other EMA studies in the field [24–26]. Relatedly, we only

assessed engagement in weight control behaviors at the day level. Future research should assess engagement in weight control behaviors several times throughout the day. A second limitation is our measures of healthy and unhealthy behaviors. Some healthy behaviors may not be healthy when taken to the extreme (e.g., exercising excessively). Third, we had low frequency of unhealthy weight control behaviors and, therefore, may not have had sufficient power to observe significant relationships for unhealthy weight control behaviors. Similarly, we had relatively low average levels of negative affect, and it is possible that new relationships may emerge at higher levels of negative affect. Fourth, given that the study was not experimental, causal inferences cannot be made. However, this study is an ecological representation of how body dissatisfaction impacts day-to-day life in college women. Finally, participants were recruited to be part of an intervention to prevent weight gain. As such, it is possible that participants were particularly motivated to prevent weight gain, and these results might not generalize to the general college population.

Our findings suggest that there are short-term negative effects of body dissatisfaction on affective response in college women who report no history of or current eating disorder. College women may, therefore, experience improvements in affect by targeting their state body dissatisfaction. However, we did not find that affect predicts subsequent body dissatisfaction in college women. Therefore, it is unclear if targeting affect would improve body dissatisfaction, at least in the short term. Future research will need to continue exploring what variables predict state body dissatisfaction. We also did not find any evidence that body dissatisfaction impacts the extent to which individuals engage in weight control behaviors. Targeting body dissatisfaction may be important for improving affect, but the extent to which targeting body dissatisfaction may promote healthier weight control behaviors in college women in the short term is still unclear.

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Data availability

The datasets analyzed in the current study are available from the corresponding author by request.

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What is already known on this subject?

Longitudinal research suggests that higher body dissatisfaction predicts higher negative affect and unhealthy weight control behaviors over time.

What does this study add?

This study shows that higher state body dissatisfaction significantly predicts higher subsequent state negative affect and lower subsequent state positive affect, in the moment. However, we did not find any evidence that state body dissatisfaction impacts the extent to which individuals engage in healthy vs. unhealthy weight control behaviors.

Table 1

Descriptive information

	Mean (<i>SD</i>) or <i>n</i> (%)
BMI	22.81 (2.86)
Race/ethnicity	
European American	53 (79.10%)
Hispanic	8 (11.94%)
Asian	3 (4.47%)
Unknown	3 (4.47%)
Body dissatisfaction	3.07 (.86)
Negative affect	1.52 (.46)
Positive affect	2.19 (.58)
EAT	5.77 (4.20)

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