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The Effect of Body Image Threat on Smoking Motivation Among College Women: Mediation by Negative Affect

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Abstract

Previous descriptive, correlational, and quasi-experimental research has established that weight concerns and negative body image are associated with tobacco smoking, cessation, and relapse among young women. A recent experimental study found that activation of negative body image cognitions produced urges to smoke (Lopez, Drobles, Thompson, & Brandon, 2008). The current study intended to replicate and extend these experimental findings by examining the role of negative affect as a mediator of the relationship between body dissatisfaction and smoking urges. Female college smokers ($N = 133$) were randomly assigned to a body image challenge (trying on a bathing suit) or a control condition (evaluating a purse). State levels of urge to smoke, mood, and body dissatisfaction were assessed both pre- and post-manipulation. Trying on a bathing suit increased body dissatisfaction and reported urges to smoke, particularly those urges related to reducing negative affect. Additionally, state negative affect mediated the relationship between the body image manipulation and smoking urge. This study provides additional support, through an experimental design, that situational challenges to body image influence smoking motivation, and that this effect occurs, at least in part, via increases in negative affect. Theoretical and applied implications are discussed.

The prevalence of tobacco use in the United States has declined significantly over the past few decades to about 20 percent of adults, but smoking rates among females have declined less than among males (Husten, 1998; USDHHS, 2001). Although smoking is the leading cause of preventable death and disease in both men and women (USDHHS, 2004), smoking may confer greater risks on women than on men and also increases risk for diseases unique to females such as cervical cancer (USDHHS, 2001). In addition, women seem to be less aware of these risks than men, as seen in their less frequent reporting of health concerns when discussing their motivations to quit smoking (Curry, Grothaus, & McBride, 1997). These findings underscore the importance of understanding female smoking behavior.

Research has suggested that men and women may differ in underlying motivations and outcome expectancies related to smoking initiation, maintenance, and cessation. In

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particular, women, more so than men, appear to associate their smoking behavior to reasons of weight control (Killen, 1998; Klesges et al., 1998; Ogden, 1994; Ward, Klesges, Zbikowski, Bliss, & Garvey, 1997), weight loss (Klesges & Klesges, 1988; Ogden, 1994; Perkins, Levine, Marcus, & Shiffman, 1997), and/or fear of or actual post-cessation weight gain (Klesges & Klesges, 1988; Levine, Perkins, & Marcus, 2001; Perkins et al., 1997). Furthermore, although nearly all females report having concerns about their appearance (Cash, Winstead, & Janda 1986), smoking women are more likely than nonsmoking women to have concerns about their weight (Feldman, Hodgson, & Corber, 1985), to use diet pills (Gritz & Crane, 1991), to view their body weight as important to their self-esteem (Bruckner, Spring, & Pingitore, 1994), to be dissatisfied with their weight (Bruckner et al., 1994), to be higher in dietary restraint (Bruckner et al., 1994; Meyers et al., 1997), to feel unattractive (King, Matacin, Marcus, Bock, & Tripolone, 2000), and to internalize the cultural standard of the thin ideal, which leads to body shame that plays a role in smoking behavior (Fiissel & Lafreniere, 2006).

Although understanding the relationship between body image and smoking motivation among women of all ages is important in developing appropriate interventions, university students are of particular interest because college females are often transitioning from occasional to regular smoking (Lantz, 2003; Ling & Glantz, 2002), and almost half of female college smokers report smoking as a weight control strategy (Camp, Klesges, & Relyea, 1993; Klesges & Klesges, 1988). Additionally, among college women, elevated dieting concerns are a significant risk factor for smoking initiation (Saules et al., 2004), having ever smoked is associated with feeling pressured to maintain a healthy weight, and current smoking is related to weight loss intention (Carroll et al., 2006). Also, among women smokers, younger women have the least intention to quit (Perkins et al., 2001), and women are up to four times more likely than men to report weight gain as a cause of smoking relapse (Swan, Ward, Carmelli, & Jack, 1993). Therefore, understanding this specific population may lead to the development of secondary prevention interventions, ultimately decreasing smoking rates among all women.

Despite the association between smoking and body image concerns among women, little research has focused on understanding the possible causal influence of body image on smoking motivation. To our knowledge, only one study has experimentally tested whether phasic fluctuations in body image influence situational cravings for cigarettes, and whether a woman's general trait body satisfaction moderates this relationship (Lopez, Drobos, Thompson, & Brandon, 2008). In that study, college female smokers were presented with images of thin women, smoking cues (e.g., cigarettes, lighters), and neutral images (e.g., office supplies). The images were displayed in a series of pairs, such that some trials included both a thin woman and a smoking cue. Results indicated that the thin model images produced increases in state body dissatisfaction and greater urges to smoke than did the neutral images, independently of whether they were paired with smoking cue images. Additionally, in the absence of smoking cues, trait body dissatisfaction moderated the effect of the thin model images on smoking. That is, women with higher trait body dissatisfaction showed greater urge responses to the images of thin model.

Regulation of negative affect appears to be a potent motivator of smoking behavior (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). Moreover, past research has demonstrated that negative affect produces smoking urge in the laboratory (Brandon, Wetter, & Baker 1996; Payne, Schare, Levis, & Colletti, 1991); women, more so than men, report that they smoke to manage their mood (Cepeda-Benito & Reig Ferrer, 2000; Ward et al., 1997); and threats to body image can increase negative affect (Pinhas, Toner, Ali, Garfinkel, & Stuckless, 1999; Stice & Shaw, 1994). Therefore, it seems reasonable to hypothesize that negative affect mediates the relationship between threats to a woman's body image and her smoking behavior. Alternatively, it is possible that state body image influences smoking motivation without negative affect mediation by, for example, directly activating expectancies that smoking will control weight. However, consistent with the mediational hypothesis, Lopez et al. (2008) found that negative affect increased after viewing the thin model images. But negative affect was measured with a single-item visual analog scale (VAS), and the study design did not allow for formal testing of mediation effects.

The current study addresses the limitations of Lopez et al. (2008). Rather than the within-subject design of that study, in which the body image manipulation involved brief presentations of photos of thin women, the current study uses another body image manipulation that is compatible with a between-subjects design. This design allows for more psychometrically sound measurement of both smoking urge and negative affect, and subsequent testing for mediation. The study was presented to participants under the guise of marketing research. Participants in the experimental group evaluated an item intended to increase body dissatisfaction—a bathing suit. Those in the control group evaluated a neutral product -- a purse. Previous research has found that trying on a bathing suit in front of a mirror elicits feelings of body shame in women of various ethnicities, including Caucasian, African American, Hispanic, and Asian American (Hebl, King, & Lin, 2004).

The first goal of this study was to replicate the results of Lopez et al. (2008). It was hypothesized that a main effect would be found for the body image manipulation, such that participants who tried on the bathing suit would experience greater increases in body dissatisfaction and smoking urge than those who evaluated the purse. The second and primary goal of the current study was to test whether negative affect would mediate the effect of the body image manipulation on smoking urge. Specifically, it was hypothesized that trying on the bathing suit would induce negative affect and negative affect-related urge to smoke, and that participants who reported the greatest increases in negative affect after trying on the bathing suit would show the greatest increases in smoking urge.

Methods

Experimental Design and Overview

Participants were recruited under the guise of a study interested in female smokers' emotions and consumer behavior. A 2×2 crossed factorial between-subjects design was used. College women were randomly assigned to evaluate either a bathing suit (experimental condition) or a purse (control condition), in the presence or absence of a smoking cue (a pack of their own cigarettes and a lighter). Women in all four conditions also evaluated a candle holder and a fragrance to bolster the cover story of the study and to reduce demand

effects. The smoking cue factor was included as a tertiary aim to explore whether the presence of such a cue would moderate any effect of the body image manipulation. Because no main or interaction effects of the smoking cue manipulation were found, the present report will focus on the body image manipulation. Participants also completed baseline measures assessing demographics and smoking history, as well as measures of state urge, affect, and body dissatisfaction both pre- and post-manipulation. The primary dependent variable was self-reported smoking urge. The study was approved by the Institutional Review Board of the University of South Florida.

Participant Recruitment

Participants were 133 females attending colleges in Tampa, Florida. They were recruited through campus newspaper advertisements; fliers posted around the campuses and in local businesses; announcements made in classes; and the psychology participant pool at the University of South Florida, which offers class credit points for research participation. Those individuals who did not receive research credit were compensated \$30. Additionally, all participants were entered into a one-time drawing to win \$50. Individuals were included if they met the following criteria during telephone screening: female, speak English, 18–24 years of age, attending college, and a smoking rate of at least 10 cigarettes per day for at least the past year.

Measures

Demographic Questionnaire—Single items assessed participants' age, education, pregnancy status, marital status, race, ethnicity and parents' level of education and household income.

Smoking Status Questionnaire (SSQ)—This form assessed the participants' smoking status and nicotine dependence, the latter by including the Fagerström Test for Nicotine Dependence (FTND). The FTND is the standard measure of nicotine dependence (Heatherton, Kozlowski, Frecker, & Fagerström, 1991).

Positive And Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988)—The PANAS is comprised of two mood scales, each containing 10 mood adjectives. Each mood is rated on a five-point Likert scale, ranging from *very slightly or not at all* to *extremely*. A trait-like version that assessed mood during the past week, the PANAS-W, was given at baseline. A state-like version that assessed mood at that exact moment, the PANAS-I, was given at both baseline and post-manipulation. The PANAS was scored by summing items on each of the two scales, with higher scores indicating stronger affect. The Positive Affect scale and the Negative Affect scale are both highly internally consistent, with Cronbach's α for this sample of .84 and .85 for the trait version and .84 and .82 for the state version, respectively.

Questionnaire of Smoking Urges-Brief (QSU-Brief; Cox, Tiffany, & Christen, 2001)—The QSU-Brief is a 10-item version of the original QSU (Tiffany & Drobes, 1991). It is comprised of 2 factors, with Factor 1 measuring desire to smoke in anticipation of

pleasure and Factor 2 measuring desire to smoke in anticipation of negative affect relief. The alpha coefficients for this sample were .93 for Factor 1 and .92 for Factor 2.

Visual Analogue Scales (VAS)—Seven single-item VAS measures were used to capture participants' self-reports on several variables at baseline and after evaluating each product.. The participant indicated on a continuous 100mm line how she felt at that exact moment. Two scales, urge and affect, served as secondary measures to the primary measures mentioned above (QSU-Brief and PANAS-I). Two other scales, overall weight dissatisfaction and overall appearance dissatisfaction, served as manipulation checks for the body image manipulation, with higher scores indicating greater dissatisfaction. These types of state body dissatisfaction measures have been widely used in body image exposure studies (Birkeland et al., 2005; Thompson, 2004). The other three VAS measures, assessing level of excitement, interest, and boredom, were included as fillers to decrease the salience of the primary measures and to bolster the marketing cover story.

Questionnaires for evaluation tasks—Four questionnaires were used to bolster the cover story that we were assessing preferences about different products. A questionnaire was created for each item being evaluated: the candle holder (e.g., I like the shape of this candle holder), the fragrance (e.g., I like the smell of this fragrance), the purse (e.g., I think there are enough pockets on this purse), and the bathing suit (e.g., I like the color of this bathing suit). The bathing suit measure also encouraged the participant to further evaluate herself (e.g., I like the way my chest looks in this suit). All of the questionnaires also included questions that asked participants to compare each item to the 3 similar items that were displayed as images on a flip chart in the experimental room. These questions were relevant only for the bathing suit condition, where the images contained models in bathing suits to encourage self-evaluation and social comparison.

Materials

Products for evaluation tasks—Four items, or “products,” were required for the evaluation tasks that the participants had to complete: a candle holder, a fragrance (“Vanilla Fields”), a purse, and a bathing suit. All participants were first presented with the candle holder and the fragrance. For the third item, which represented the manipulation, those in the control condition were presented with the purse and those in the experimental condition were presented with the bathing suit. The one-piece, lime green bathing suit was available in five sizes, ranging from small to extra-extra-large.

Images for tasks—Participants compared each “product” to three 8 1/2 × 11, color images of similar items that were displayed on a flip chart in the experimental room. The images were taken from the websites of online stores, and were chosen to match the tastes of the target age-group. The bathing suit images contained models wearing a bikini, a tankini, and a one-piece. Both a front and back view of the women in the suits were displayed to provide greater comparison of various body areas.

Procedure

Scheduling—All qualified participants were scheduled for an individual appointment in the afternoon or evening. To ensure that participants would not be nicotine-satiated during the experiment, they were instructed to abstain from smoking at least one hour prior to their appointment.

Pre-manipulation—Participants were informed that they were participating in a study of “emotions and consumer behavior,” and that they would be asked to engage in tasks typical of everyday trips to a shopping mall. Following collection of informed consent and HIPAA authorization, they provided a breath sample for carbon monoxide verification of smoking status and verified via self-report that they had not smoked in the past hour. (Those who reported smoking within the hour before the appointment were asked to wait until an hour had lapsed since they smoked, or they were rescheduled for another day.) They then completed the baseline measures, including the demographics questionnaire, SSQ, PANAS-W the baseline state measures, PANAS-I, and the seven VAS measures. Next, all participants completed two consecutive dummy tasks (evaluation of a candle holder and a fragrance) to bolster the cover story of a marketing study. For each task, participants were presented with the item and its evaluation questionnaire. After completing each dummy evaluation questionnaire, the participants completed the seven VAS measures.

Body image manipulation—Participants were randomly assigned to the experimental condition (trying on a bathing suit in front of a full-length mirror) or the control condition (evaluating a purse). In the bathing suit condition, the participant was presented with all five sizes of the suit to choose from once left on her own. The participants were asked to try on the swimsuit and, while looking into a full-length mirror, complete the evaluation measure and the seven VAS measures. (Participants were instructed to keep their undergarments on, as they would if they were trying on a suit in a store. Additionally, they were given a sanitary liner to place in the bottom of the bathing suit for hygienic purposes.) In the control condition, participants were asked to evaluate the purse and complete the evaluation and VAS measures. No mirror was used in the purse condition.

Smoking cue manipulation—At the same time that participants were presented with either the bathing suit or purse, the experimenter also placed either the participant’s pack of cigarettes and lighter (smoking cue) or a stapler (neutral cue) on the experimental table. These items were left on the table while participants evaluated the bathing suit or purse.

Post-manipulation—Once the evaluation and VAS measures were completed for the third task (and those in the bathing suit condition changed back into their own clothing), all participants completed post-manipulation affect and urge measures (PANAS-I and QSU-Brief).

End of experiment—The participants were asked to guess the purpose of the experiment to assess whether the manipulations were adequately concealed. The experimenter then measured their weights and heights (for calculation of Body Mass Index [BMI]), and

debriefed them. Lastly, the participants were awarded either experimental points or money for participation and were entered into the \$50 lottery.

Results

Participant Characteristics

There were no significant group differences (all $ps > .05$) on demographic or smoking history variables (e.g., age, number of cigarettes smoked per day) (see Table 1). The groups were also equivalent on baseline measures of trait and state variables (e.g., smoking urge, negative affect, body dissatisfaction). The smoking variables (cigarettes/day, FTND score, and baseline CO) indicate a relatively low level of nicotine dependence, consistent with college student smokers (Patterson, Lerman, Kauffman, Neuner, & Audrain-McGovern, 2004; Rigotti, Lee, & Wechsler, 2000). The mean BMI (25.07) can be characterized is slightly overweight.

Manipulation Check

The VAS ratings for overall weight and appearance dissatisfaction were highly intercorrelated at each time point (time 1: $r = .63, p < .001$; time 2: $r = .71, p < .001$; time 3: $r = .71, p < .001$; time 4: $r = .68, p < .001$; time 5: $r = .77, p < .001$). Therefore, we created a new single variable, *state body dissatisfaction*, from the mean of these two measures.

The experiment was predicated on the hypothesis that trying on the bathing suit and making evaluations of oneself would induce body dissatisfaction, as has been found within the body image literature (Fredrickson et al., 1998; Hebl et al., 2004). We conducted an analysis of covariance (ANCOVA) using post-manipulation state body dissatisfaction ratings as the dependent variable, the body image manipulation (bathing suit vs. purse) as the independent variable, and baseline state body dissatisfaction ratings as the covariate. As predicted, trying on the bathing suit produced greater body dissatisfaction (post-manipulation $M = 64.30, SD = 25.75$) than evaluating the purse (post-manipulation $M = 52.33, SD = 25.00$), indicating that the manipulation was successful, $F(1, 132) = 19.74, p < .001$. An examination of the change scores revealed that from baseline to post-manipulation, mean body dissatisfaction rating increased by 8.60 points in the bathing suit condition and actually decreased by 2.42 points in the purse condition.

Primary Analyses

Smoking urge—Analyses of variance (ANOVAs) were conducted with the body image manipulation (suit and purse conditions) and the smoking cue manipulation (smoking cue and neutral cue conditions) as independent variables, and each of the factors of the QSU-Brief as the dependent variables. As shown in Table 2, these analyses indicated no main effect of the body image manipulation on QSU Factor 1 (urge in anticipation of smoking producing pleasure), $F(1, 132) = .64, p = .42$. However, as predicted, a significant main effect was found for Factor 2 (urge in anticipation of negative affect relief), with means of 16.93 ($SD = 9.54$) and 13.94 ($SD = 7.21$) in response to the bathing suit and purse conditions, respectively, $F(1, 132) = 4.16, p = .04, \eta^2 = .03$. Consistent with our hypothesis, this result indicates that trying on the bathing suit produced greater negative

affect reduction urges to smoke than did evaluating the purse. No main effect of the body image manipulation was found on the single-item, VAS measure of smoking urge, $F(1, 132) = 1.44, p = .23$.

Negative Affect—An ANCOVA was conducted with the two experimental factors as the independent variables, post-manipulation PANAS state negative affect scores as the dependent variable, and baseline PANAS state negative affect scores as the covariate. As hypothesized, and seen in Table 2, a significant main effect was found for the body image manipulation, with post-manipulation means of 17.37 ($SD = 6.86$) and 14.30 ($SD = 5.78$) for the bathing suit and purse conditions, respectively, compared to baseline means of 15.34 ($SD = 5.17$) and 14.79 ($SD = 5.94$), $F(1, 132) = 14.64, p < .001, \eta^2 = .10$, indicating that trying on the bathing suit produced greater increases in negative affect than evaluating the purse. Similarly, a main effect of the body image manipulation was found on the single-item, VAS measure of affect, $F(1, 132) = 21.83, p < .001, \eta^2 = .15$, also indicating greater negative affect in the bathing suit condition.

Mediation

We conducted a series of mediation analyses to test whether increases in negative affect mediated the effect of the body image manipulation on smoking urge. These tests were conducted using Factor 2 of the QSU-Brief and the change in state PANAS negative affect scale. Formal significance tests of the indirect effect of state negative affect were conducted using the Sobel test (1982) and a bootstrap approach (Efron & Tibshirani, 1993), as described by Preacher & Hayes (Preacher & Hayes, 2004). The tests were conducted with the change in state PANAS negative affect scale as the mediator. Results of both procedures were statistically significant ($ps < .05$), indicating that the indirect effect of the body image manipulation on Factor 2 of the QSU-Brief was through increased state negative affect. To further examine the degree of mediation, a four-step, ordinary least squares approach was employed (Baron & Kenny, 1986). According to Baron and Kenny (1986), if all four steps are met, the data are consistent with the hypothesis that state negative affect completely mediates the body image manipulation and smoking urge relationship. Step 1 indicated a significant effect of the body image manipulation on urge (Factor 2 of the QSU-Brief), $\beta = .18, R^2 = .03, p = .04$. Step 2 indicated a significant effect of the body image manipulation on the change in negative affect, $\beta = .31, R^2 = .10, p < .001$. Step 3 indicated a significant effect of negative affect on urge to smoke while controlling for the body image manipulation, $\beta = .22, sr^2 = .22, p = .01$. These three steps established that mediation was satisfied, consistent with the earlier tests of the indirect effect. Finally, Step 4 revealed that negative affect completely mediated the relationship between the body image manipulation and the reported smoking urge to decrease negative affect, $\beta = .10, sr^2 = .10, p = .24$.

Discussion

The current study builds upon past correlational and descriptive research, which has established a relationship between weight concerns/body image dissatisfaction and smoking among women, as well as our previous experimental study (Lopez et al., 2008) that demonstrated a causal relationship between body image threats and smoking urges in

college women. All the a priori hypotheses were supported. First, the body image challenge (trying on a bathing suit) was successful in increasing body dissatisfaction and urge to smoke, when compared to the control condition of evaluating a purse. This finding replicated the previous within-subjects study that found that looking at images of thin models increased body dissatisfaction and smoking urge (Lopez et al., 2008). Thus, evidence that situational cues that decrease one's self-perceived body satisfaction increase one's motivation to smoke has now been found among college women using two different experimental paradigms.

The primary aim of the current study was to expand upon the findings of Lopez et al. (2008) to test whether the association between body dissatisfaction and smoking urge was mediated by negative affect. Three findings support the mediation hypothesis. First, the body image manipulation influenced only urges related to negative affect reduction (Factor 2 on the QSU). Second, the body image manipulation influenced negative affect, with the bathing suit condition producing greater negative affect than the control condition. It is notable that this effect was larger than the effect on urge. And third, the effect of the body image manipulation upon smoking urge was completely mediated by changes in negative affect.

There is a range of evidence that negative affect is a potent motivator of tobacco smoking (Brandon, 1994), including laboratory studies that manipulate affect (e.g., Payne et al., 1991; Perkins & Grobe, 1992), population studies demonstrating comorbidity of smoking and depression (e.g., Anda et al., 1990; Degenhardt & Hall, 2001), and naturalistic studies of situations that precede smoking relapse (e.g., Shiffman, Paty, Gnys, Kassel, & Hickcox, 1996). (A notable exception is Shiffman et al. [2002], which found no relation between negative affect and smoking using real-time data collection.) It has been posited that avoiding and relieving negative affect underlies much of smoking motivation (Baker et al., 2004). Interestingly, the evidence that smoking actually does reduce negative affect (aside from that caused by nicotine withdrawal itself) is far less clear (Kassel, Stroud, & Paronis, 2003). The results of the current study suggest that negative affect related to body dissatisfaction is sufficient to increase smoking motivation. Given that body dissatisfaction is highly prevalent among young women (Cash et al., 1986), and given the previously reviewed association of various body image and weight-related variables with tobacco smoking among young women, body dissatisfaction may prove to be an important and robust motivator of situational smoking in this subpopulation. Note that the body image manipulations used in our two studies—seeing thin women, and trying on clothing—usually occur on numerous occasions during a typical day, along with other stimuli likely to invoke body dissatisfaction (e.g., conversations about weight and attractiveness, advertisements for weight control or beauty products, and a wide variety of stimuli presented through mass media modalities). A typical college aged female is bombarded with stimuli throughout her day that may serve to remind her of perceived inadequacies in her body, induce a degree of negative affect, and consequently increase her motivation to smoke.

It was possible that body dissatisfaction could have influenced smoking motivation through a route that did not include negative affect. For example, it could have directly activated outcome expectancies about cigarettes' ability to control appetite and weight, which have been found to be associated with magnitude of nicotine dependence (Copeland, Brandon, &

Quinn, 1995). However, such expectancies are also correlated with expectancies that smoking reduces negative affect (Copeland et al., 1995), lending further support to the notion that the motivational influence of appearance-related variables occurs through negative affect.

Limitations and Future Directions

Sample composition—Although the sample was representative of the student population at an ethnically diverse urban university, the vast majority (81%) were nevertheless Caucasian. Smoking prevalence tends to be higher among Caucasian college students compared to other racial and ethnic groups (King, Saules, & Irish, 2007; Patterson, Lerman, Kaufmann, Neuner, & Audrain-McGovern, 2004; USDHHS, 1998), and there are also ethnic differences in body satisfaction (Miller et al., 2000). Thus, the role of body dissatisfaction on smoking motivation, and its mediation by negative affect, may differ across racial and ethnic groups. Additionally, although past descriptive and correlational research reviewed above has demonstrated that women throughout the life span relate their smoking behavior to weight and body image concerns, applying our results beyond a college-student population should be done cautiously. College smokers may be dissimilar from older individuals or those with different educational backgrounds (Pierce, Fiore, Novotny, Hatziaudreu, & Davis, 1989).

Moderators of cue-reactivity—It is worth noting several factors that tend to influence the magnitude of cue-reactivity, and which therefore may have affected reactivity to the body image manipulation, the smoking cue manipulation, or both. These include level of nicotine dependence, nicotine withdrawal state, cessation motivation, and menstrual phase. Previous studies have indicated that cue-provoked urges are positively correlated with both nicotine dependence and withdrawal state (e.g., Sayette, Martin, Wertz, Shiffman, & Perrott, 2001). As would be expected for the age group, the participants in the current study tended to be relatively light smokers. Participants were asked to abstain from smoking for at least one hour prior to beginning the study, which would be expected to produce only mild withdrawal symptoms (Hendricks, Ditte, Drobes, & Brandon, 2006), particularly among these less-dependent smokers. Although greater cue-induced responding might have been found with more dependent smokers experiencing more extreme nicotine withdrawal, such a sample would have been less representative of the target population of female college smokers. In addition, motivation to quit smoking appears to be associated with reactivity to smoking cues (Abrams, Monti, Carey, Pinto, & Jacobus, 1988; McDermut & Haaga, 1998), yet we did not assess quitting motivation in the present study. Finally, some research has indicated that menstrual cycle phase can have an effect on women's responsiveness to smoking cues, such that those women in the follicular (preovulatory) phase of the cycle report lower overall craving (e.g., Allen, Hatsukami, Christianson & Nelson, 1999; Franklin, 2004). Cycle phase may be even more salient with respect to body image threats because certain phases, such as the luteal (premenstrual) phase, are associated with symptoms such as bloating and acne that may increase body dissatisfaction. Future studies may want to examine the role of cycle phase on body image and smoking.

External validity—Although the current study was designed to simulate shopping in a mall, the laboratory setting and experimental design cannot be expected to fully capture the cumulative impact of repetitive real-world exposure to body image threats on women's smoking motivation. A naturalistic study that maximizes external validity rather than internal validity – possibly using ecological momentary assessment (Stone & Shiffman, 1994) to examine the correspondence between body dissatisfaction and smoking motivation —would compliment the current line of experimental laboratory research on the causal relationship of body image threats on smoking motivation.

Treatment—An implication of our research is that psychological treatments for smoking, such as cognitive-behavioral therapy, should include body dissatisfaction and weight concerns as direct targets of therapy (Croghan et al., 2006; King et al., 2007; Levine, Marcus, & Perkins, 2003; Perkins et al., 2001), as well as the negative affect associated with body dissatisfaction. This is especially important, as nicotine replacement therapy in college students has not been effective at decreasing urges associated with relief of negative affect (Morissette, Palfai, Gulliver, Spiegel, & Barlow, 2005). Additionally, cue exposure therapies based on extinction of conditioned cues to smoke (e.g., Niaura et al., 1999) might be expanded to include as cues threats to one's body image and induction of body dissatisfaction. The dysfunctional cognitions and resulting negative affect associated with body dissatisfaction induction could also be incorporated.

Conclusion

Lopez et al. (2008) conducted the first study to demonstrate experimentally that a body image manipulation can induce situational urges to smoke, which is consistent with a causal relationship. Threats to body image also increase state negative affect, and the current study found that a body image manipulation (trying on a bathing suit) increased smoking urges specifically related to a desire for negative affect relief. Additionally, we demonstrated that negative affect mediated the relationship between the body image manipulation and subsequent increases in smoking urge. Future research needs to explore how this finding relates to the frequency and intensity of smoking among women, and the development and maintenance of tobacco dependence. Although this research is most relevant to young, college women who are in a transitory period of their smoking behavior, future studies should examine this effect in women of other ages as body dissatisfaction is common across the life span. Understanding women's motivations for their smoking behavior is important to the development of future prevention, cessation, and relapse-prevention interventions.

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Table 1

Participant Characteristics (Means and Standard Deviations Unless Specified)

	Experimental Condition			<i>p</i>
	Bathing Suit (N=67)	Purse (N=66)	Total Sample	
Age	20.00 (1.62)	20.35 (1.81)	20.17 (1.72)	.24
Race				.19
White (%)	76.1	84.8	80.5	
Black (%)	6.0	1.5	3.8	
Hispanic (%)	10.4	13.6	12.0	.57
Body Mass Index (BMI)	24.30 (5.92)	25.84 (5.66)	25.07 (5.82)	.13
Years smoked	4.24 (2.73)	4.18 (2.48)	4.21 (2.60)	.90
Number of cigarettes/day	14.45 (5.33)	14.65 (5.45)	14.60 (5.37)	.83
Fagerström score	2.79 (1.81)	3.06 (1.94)	2.92 (1.87)	.41
CO level (ppm)	12.48 (11.83)	11.44 (8.22)	11.96 (10.17)	.56

Table 2

Means (Std. Deviations) of Post-Manipulation Smoking Urge and Negative Affect (NA)

Scale	<u>Body Image Manipulation</u>	
	Bathing Suit	Purse
Positive Affect Urge: QSU-Brief Factor 1	26.81 (7.14)	25.76 (7.96)
Negative Affect Urge: QSU-Brief Factor 2	16.93 (9.54)	13.94 (7.21) *
PANAS State Negative Affect	17.37 (6.86)	14.30 (5.78) ***

Notes.

*
 $p < .05$;***
 $p < .001$, controlling for baseline PANAS.

QSU rating scale ranged from 0 to 35 and PANAS from 0 to 50.