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# Effects of a body image manipulation on smoking motivation

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Effects of a Body Image Manipulation on Smoking Motivation

by

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A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
College of Arts and Sciences  
University of South Florida

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## Dedication

This dissertation is dedicated to all those who have supported me through what felt like a never-ending process! I want to thank my fellow-USF friends who were always there for me and made graduate school more bearable, specifically Haitham Khoury (my new brother!), Hazel-Anne Johnson-Marcus, and Sherecce Fields. Thanks also go to my best friend so far away, Michelle Naggar. Over the years she has been a constant source of support. Thank you for always listening to me, giving me advice, and being understanding when I couldn't always hold up my end of our annual visits. Losing my calculator freshman year (as well as the rest of the drama) was one of the best things to happen to me as it led to me having a best friend that few are fortunate to find.

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Finally, I want to dedicate this dissertation to the two people who have stood by me and supported me in all that I do: my parents, Carlos and Janis Lopez. I know how lucky I have been to have them in my life, and I look forward to their continued love, support, and encouragement. This achievement is as much theirs as it is mine, for they are the ones that have instilled in me my quest for knowledge, my commitment to achieve, and my sense of determination. Thank you for all that you have done and continue to do – I love you both very much.

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## Effects of a Body Image Manipulation on Smoking Motivation

Elena Nicole Lopez Khoury

### ABSTRACT

Smoking is now the leading cause of preventable death and disease in women. Understanding women's motivations to smoke is important in developing effective cessation and relapse prevention programs. Previous descriptive, correlational, and quasi-experimental research has established that weight concerns and negative body image are associated with tobacco smoking, cessation, and relapse, particularly among young women. This study, building upon a previous experimental study (Lopez, Drobos, Thompson, & Brandon, 2008), examined whether activation of negative body image cognitions would produce greater urges to smoke and would affect actual smoking behavior.

A randomized 2 X 2 crossed factorial, between-subjects design (body image manipulation X smoking cue manipulation) was conducted with 133 female college smokers. The body image manipulation involved trying on a one-piece bathing suit or evaluating a purse, and the smoking cue manipulation included the presentation of their pack of cigarettes or a stapler. Participants completed pre-intervention measures assessing smoking history, trait body dissatisfaction, trait self-objectification, and trait affect. State levels of urge to smoke, mood, and body dissatisfaction were assessed after the manipulations.

It was hypothesized that main effects on the measures of smoking motivation (i.e., self-reported urges to smoke and topographical measures of smoking behavior) would be found for the body image manipulation, with trait body dissatisfaction and/or trait self-objectification moderating the body image manipulation and state negative affect serving as a mediator. Results indicated that trying on a bathing suit, which increased body dissatisfaction, did increase reported urges to smoke, particularly those urges related to reducing negative affect. Women assigned to the bathing suit condition also subsequently took a greater number of puffs from their cigarette than those who evaluated the purse. (No main effects were found for the smoking cue manipulation). No moderation effects were found, but the effect on smoking urges by the body image manipulation was mediated by state negative affect.

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.

## Chapter One

### Introduction

#### *Smoking, Women, and the Role of Body Image*

According to the Surgeon General's Report on Smoking, cigarette smoking has been found to cause diseases in nearly every organ of the body (USDHHS, 2004). Despite widespread knowledge of the health risks associated with tobacco smoking, almost a quarter of the U.S. population continues to smoke (CDC, 2004). Although this statistic reflects a decline in the past few decades of the prevalence of smoking, this decline is not as great in women as it is in men (Escobedo & Peddicord, 1996, 1997; National Center for Health Statistics, 1993; Ockene, 1993). Young females seem to be initiating at higher rates than their male counterparts (CDC, 1994), and among older adolescents, the females are more nicotine dependent than the males (Young et al., 2002). Women also seem to have more difficulties in quitting and remaining abstinent than men (Bjornson et al., 1995; Blake et al., 1989; CDC, 1994; Cepeda-Benito et al., 2004; Ockene, 1993; Ortner et al., 2002; Swan et al., 1993; Ward et al., 1997; Wetter et al., 1999).

Smoking is now the leading cause of preventable death and disease in women (Husten, 1998; USDHHS, 2001), with 20% of women smoking as of 2002 (CDC, 2004). And while the lung cancer mortality rate in men is now beginning to level off, it continues to rise in females (Husten, 1998). This rise led to lung cancer becoming the

United States' leading cause of female cancer death, surpassing breast cancer in 1987 (USDHHS, 2001). Although both men and women are susceptible to smoking-related illnesses, such as cancer and heart disease, it is believed that women may be at an even greater risk than men (Baldini & Strauss, 1997; Langhammer et al., 2000; Ortner et al., 2002; Zang & Wynder, 1996). Women are also susceptible to other smoking-related diseases unique to females, such as those related to cervical cancer and reproductive function (USDHHS, 2001). In general, women who smoke lose more years off their lives than men who smoke (14.5 years versus 13.2 years; USDHHS, 2004). In addition, women seem to be less aware of the significant dangers posed to them by continuing to smoke, as seen in their less frequent reporting of health concerns compared to men when discussing their motivations to quit smoking (Curry et al., 1997). These findings illustrate the extreme importance of understanding smoking behavior within the female population.

We must be aware, however, of other gender differences. Past research has demonstrated that, in general, individuals report greater urges to smoke when experiencing negative affect (Brandon et al., 1996); however, women, more than men, report that they smoke to manage their mood (Cepeda-Benito & Reig Ferrer, 2000; Ward et al., 1997). Women also report weight control as another perceived benefit of smoking (Cepeda-Benito & Reig Ferrer, 2000; Ward et al., 1997). These differences in outcome expectancies may reflect the motivations underlying gender differences in smoking initiation, maintenance, and cessation. Women, more so than men, appear to tie their smoking behavior to reasons of weight control (Killen, 1998; Klesges et al., 1998; Ogden, 1994; Ward et al., 1997), weight loss (Klesges & Klesges, 1988; Ogden, 1994;

Perkins et al., 1997), and/or fear of or actual post-cessation weight gain (Klesges & Klesges, 1988; Levine et al., 2001; Perkins et al., 1997). Females are also more likely than males to diet (Klesges et al., 1998) and use inappropriate and even dangerous methods to control their weight, such as smoking (Cavallo & Pinto, 2001; Klesges et al., 1998; Mitchell & Perkins, 1998; Polivy & McFarlane, 1998; Wiseman et al., 1998).

With regard to initiation, Killen (1998) found that thoughts about weight, eating disorder symptoms, and weight control attempts were prospectively related to females – but not males – initiating smoking. This finding was supported by French, Perry, Leon, and Fulkerson (1994) who found that general weight concerns predicted initiation of smoking in adolescent females but not in adolescent males. Stice and Shaw (2003) also found that body image disturbances greatly increased the risk for smoking initiation in adolescent girls. Although smoking for weight control is prevalent in both males and females in many different race/ethnic groups, it appears that girls are more influenced than boys by the desire to smoke for weight control or weight loss (Fulkerson & French, 2003; USDHHS, 2001). Klesges et al. (1998) also found that weight-conscious females, particularly Whites, may be initiating smoking in an attempt to control weight, believing that smoking has anorexic effects. Additionally, research has indicated that elevated dieting concerns among women were a significant risk factor for smoking onset during college (Saules et al., 2004).

The focus on weight and body image is not limited to adolescent girls, but instead affects women across the life span. In fact, in a national survey conducted by Cash, Winstead, and Janda (1986), fewer than 10% of the women reported having only minor concerns about their appearance, whereas the rest reported greater concerns. It is this

focus on weight and body image that is a recurring theme when querying women about their smoking behavior. Compared to nonsmoking women, smokers are more likely to be concerned about their weight (Feldman et al., 1985), to use diet pills (Gritz & Crane, 1991), to view their body weight as important to their self-esteem (Bruckner et al., 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 et al., 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). Of women who are currently smoking, young women have the least intention to quit (Perkins et al., 2001) and they are up to 4 times more likely than men to report weight gain as a cause of relapse (Swan et al., 1993). Women's fear of post-cessation weight gain appears to have a factual basis (Williamson et al., 1991). Women are more likely to self-report greater eating and weight gain after quitting (Perkins et al., 2001), and, indeed, they do appear to gain more than men, either as a percentage of their initial weight or in absolute pounds (Williamson et al., 1991). It is, therefore, not surprising that women hold expectancies that smoking controls body weight and cessation leads to weight gain (Meyers et al., 1997). In fact, women hold higher expectations than men of cigarette's utility when it comes to controlling appetite and weight (Brandon & Baker, 1991; Copeland et al., 1995).

With smoking now the leading cause of preventable death in women (Husten, 1998; USDHHS, 2001) and with 20% of women smoking as of 2002 (CDC, 2004) it is imperative that we better understand the motivations behind women's smoking behavior. This knowledge can guide development of interventions for prevention, cessation, and relapse-prevention. Prior research has indicated a general relationship between smoking



and weight concerns among women (Killen, 1998; Klesges & Klesges, 1988; Klesges et al., 1998; Levine et al., 2001; Ogden, 1994; Perkins et al., 1997; Ward et al., 1997).

However, what has been unclear and untested is whether phasic changes in body image influence situational cravings for cigarettes and actual smoking behavior. Such a relationship would provide evidence of a causal role of body image on smoking motivation. Additionally, the presence and availability of cigarettes may affect whether a body image manipulation would lead to greater smoking behavior.

We focused on university students because of findings from the CDC (2002) indicating that, nationally from 1993-2000, individuals in the age group of 18-24 have not decreased their prevalence of smoking and continue to have one of the highest rates of prevalence. In addition, the prevalence of current smoking increased among those aged 20-24 with 13 or more years of education. A nationwide study by Wechsler, Rigotti, Gledhill-Hoyt, and Lee (1998) indicated that the prevalence of smoking among all types of college students was increasing, while research by Klesges and Klesges (1988) indicated that this population has an increased smoking incidence and rate, especially in the female population. There is evidence suggesting that university females report a greater level of body dissatisfaction and increased beliefs of being overweight than they had as high school seniors (Vohs et al., 2001). It has also been shown that within the university population, it is a high priority to achieve and maintain an ideal weight, and that the use of dieting strategies of all types are extremely high in this group (Klesges & Klesges, 1988). Almost half of female college student smokers report smoking as a weight control strategy (Camp et al., 1993; Klesges & Klesges, 1988). Elevated dieting concerns have been found to be a significant risk factor for smoking

initiation in college women (Saules et al., 2004). A significant association has been demonstrated between college students who have reported having ever smoked and pressure to maintain a healthy weight, and current smoking in this population is related to weight loss intention (Carroll et al., 2006). In addition to these risk factors, college females are often transitioning from occasional to regular smoking (Lantz, 2003; Ling & Glantz, 2002). Therefore, understanding this specific population may lead to the development of secondary prevention interventions, ultimately decreasing smoking rates among all women.

### *Body Image Dissatisfaction*

Body image is a person's perception of his or her outer appearance (Thompson et al., 1999). It is believed that dysfunctional body image is caused by socio-environmental variables (e.g., parents, peers, and media) that provide comparison standards, as well as by events that activate self-appraisal, such as viewing thin models (Cash, 1998; Thompson et al., 1999). Before the 1980's, the focus of body image research was on patients suffering from anorexia nervosa and bulimia. It was not until the 1980's that research began to demonstrate that individuals who do not have eating disorders experience body dissatisfaction (for a review see Thompson et al., 1999). Women are generally less satisfied with their bodies than men (Turner et al., 1997). In fact, this phenomenon is so prevalent in the general population of women that the widespread dissatisfaction with one's body has now been labeled "normative discontent" (Rodin et al., 1984; Tiggemann & Wilson-Barrett, 1998).

The mass media are thought to be among the greatest influences of women's desire for thinness. Over the past three decades in Western culture, the models in

magazines, movies, and television have become increasingly thin. This promotes a modern ideal of feminine attractiveness that is a thin body (Owen & Laurel-Seller, 2000; Polivy & McFarlane, 1998). There is, consequently, a great deal of pressure on women to achieve an unhealthy level of body weight, which ranges from below-normal to a weight approaching the criteria for anorexia nervosa (Owen & Laurel-Seller, 2000; Polivy & McFarlane, 1998).

Experimental studies have examined the immediate impact of viewing images of thin models versus normal-weight models, obese models, or neutral images. These studies have found that women, following immediate exposure to thin models, report greater depression (Pinhas et al., 1999; Stice & Shaw, 1994), stress (Stice & Shaw, 1994), shame (Stice & Shaw, 1994), body and weight dissatisfaction (Irving, 1990; Kalodner, 1997; Ogden & Munday, 1996; Shaw, 1995; Stice & Shaw, 1994; Turner et al., 1997), weight concern (Posavac et al., 1998) and anger (Pinhas et al., 1999), especially among women who are more responsive to personal cues (Wilcox & Laird, 2000). In terms of self-reported body satisfaction, Groesz and colleagues (2002), in their meta-analytic review, found an overall  $d$  value of -0.31, indicating body satisfaction decreased with the viewing of thin models as compared to viewing the control images. These studies support the conclusion by Turner et al. (1997) that the media shape societal perceptions, rather than just reflecting those perceptions.

### *Cue Reactivity*

It is believed that classical conditioning may play a key role in drug use behavior. Under this general paradigm, it is thought that external stimuli, such as drug paraphernalia and situations, and interoceptive stimuli, such as cognition and affect, that

accompany drug administration become paired with the drug itself. Over time, with repeated and reliable pairings, these conditioned stimuli can elicit conditioned responses. Many studies have been able to demonstrate this phenomenon in a laboratory setting, with smokers having subjective, physiological, and behavioral responses to either external or internal cues (Brandon et al., 1995; Carter & Tiffany, 1999; Niaura et al., 1988b; Rohsenow et al., 1990). Cue reactivity can help identify the motivations behind drug use, including the stimuli and situations that provoke ongoing smoking and relapse.

Different theoretical models have been developed to account for cue reactivity (for a summary of theoretical models, see Tiffany, 1995). Two models are based on the idea of conditioned withdrawal; that is that certain stimuli evoke aversive, withdrawal-like responses, and the individual relapses to avoid or escape these negative effects. The first such model was proposed by Wikler (1948). This conditioned withdrawal model stated that the environmental stimuli associated with a drug user's withdrawal become conditioned stimuli (CS) eliciting a conditioned withdrawal response. Siegel and his associates (Poulos et al., 1981; Siegel, 1983) proposed an alternate model, known as the conditioned compensatory response model, which was still based on the notion of conditioned withdrawal. This model stated that a stimulus paired with drug administration becomes the CS's that elicits compensatory withdrawal-like response. Research has not consistently supported these models, and thus new theoretical models have been introduced. One such model is the conditioned incentive model proposed by Stewart, de Wit, and Eikelboom (1984). This model hypothesizes that environmental stimuli associated with drug administration become positive incentives by mimicking the appetitive effects of the drug, which motivates an individual to use the drug. This model

has also faced some shortcomings in being able to predict an addict's behavior and response to drug-paired stimuli. Although these specific theoretical models have not completely explained how classical conditioning is involved in a drug user's craving, there is consensus that this general concept has a great deal of utility in helping to understand addictive behaviors (Drummond et al., 1995). A common element of all the models is that conditioned stimuli should elicit responses that include cravings to smoke.

In a meta-analysis conducted by Carter and Tiffany (1999), there were consistent findings indicating that exposure to smoking cues, as compared to neutral cues, increased both physiological and self-report assessments of craving. The average effect size for self-report of cravings in Cohen's  $d$  was 1.18. The smoking cues included the induction of negative affect, the imagining of a drug-related situation, the viewing of smoking images, or the presentation of real cigarettes. These results found in the smoking literature paralleled those found for other addictive substances (Brandon et al., 1995; Carter & Tiffany, 1999).

### *Initial Experimental Study*

*Background.* Although a general relationship between smoking and weight concerns has been found among women, what had been unclear and untested is whether phasic fluctuations in body image influence situational cravings for cigarettes, and if this relationship was moderated by a woman's general body satisfaction. Such a relationship would provide evidence of a causal influence of body image on smoking motivation.

An initial study was conducted with 62 college, female smokers to test if state body satisfaction played a causal role in smoking motivation (Lopez et al., 2008). This study drew upon two areas of research – body dissatisfaction and cue reactivity – and

used methodology already established within each of these areas. The experiment was a randomized 2 X 2 crossed factorial, within-subjects design (body image manipulation X smoking cue manipulation). The experimental condition of the body image manipulation displayed stimuli of thin fashion models, intended to threaten the woman's self-image, whereas the experimental condition of the smoking cue manipulation displayed smoking stimuli, intended to induce cravings. The control conditions of both manipulations were of neutral images of inanimate objects.

The body image manipulation tested whether activation of negative body image cognitions would produce greater urges to smoke. The smoking cue manipulation was included to test whether both factors were necessary to evoke cravings to smoke. Additionally, the simultaneous presentation of the two factors allowed us to test whether there was a synergistic effect of the two manipulations on smoking urges. It was hypothesized that main effects of urge to smoke would be found for both the smoking manipulation and the body image manipulation, and the effects would be at least additive within the condition that included both experimental manipulations.

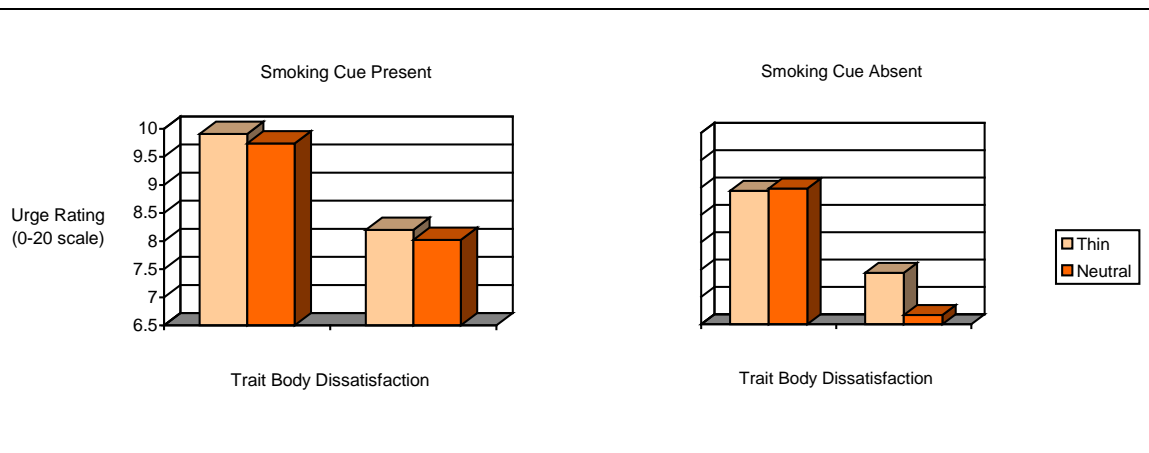
In past research on body image satisfaction, greater effects for thin model images were found for participants with greater body dissatisfaction (Groesz et al., 2002). Therefore, our second aim was to evaluate level of body satisfaction as a moderating variable in the body image manipulation. A secondary hypothesis was that those individuals with higher scores on the measure of body dissatisfaction would demonstrate the greatest impact from the body image manipulation.

*Results.* A main effect of the smoking cue manipulation was found,  $F(1, 61) = 17.13, p < .001, \eta_p^2 = .22$ . Smoking images produced greater urges to smoke ( $M = 8.97$ ,

$SE = .77$ ) than neutral images ( $M = 8.00, SE = .69$ ), replicating previous cue-reactivity research. A main effect, although smaller, was also found for the body image manipulation,  $F(1, 61) = 5.80, p = .02, \eta_p^2 = .09$ . Consistent with our primary hypothesis, the thin model images produced greater urges to smoke ( $M = 8.62, SE = .73$ ) than neutral images ( $M = 8.35, SE = .72$ ). Although there was not an interaction between the two factors,  $F(1, 61) = .65, p = .42$ , the exposure to the two experimental conditions did produce an additive effect. These results indicate that not only can smoking cues evoke urges to smoke, but so, too, can images of thin models that cause state body dissatisfaction.

Because a main effect for the body image manipulation was found, we explored trait body dissatisfaction (TBD) as a potential moderating variable. A significant three-way interaction was found between the two within-subjects factors and the participants' TBD,  $F(1, 60) = 5.72, p = .02$ . To determine the nature of the three-way interaction, separate ANOVAs were conducted to assess for a main effect of the body image manipulation both in the presence and absence of the smoking image. In the absence of the smoking image, there was not only a significant main effect of the body image manipulation,  $F(1, 60) = 5.04, p = .03$ , but also a significant interaction effect with TBD,  $F(1, 60) = 8.42, p < .01$ . This indicates that the TBD moderated the effect of the body image manipulation. In the presence of the smoking image, there was no main effect of the body image manipulation,  $F(1, 60) = 1.36, p = .25$ , nor an interaction with the TBD,  $F(1, 60) = .18, p = .67$ . Thus, only when smoking images were *not* present did thin images induce urges, and this effect was moderated by body dissatisfaction. Figure 1 displays this relationship using a median split of TBD, although TBD was assessed as a

continuous variable for analyses. These results indicated that those women with higher body dissatisfaction were most affected by the thin model image and thus showed greater urge responses. However, this effect was only observed in the absence of the smoking image, possibly due to the smoking cue overpowering the more subtle effect of the thin image.



*Figure 1.* This shows that Trait Body Dissatisfaction moderates the body image manipulation only when the smoking cue is absent (3-way interaction:  $p = .02$ ; interaction when smoking cue is absent:  $p < .01$ ). TBD categories are based on a median split of that variable. Ratings were made on a 21-point scale (0 = *urge to smoke a cigarette is not strong at all*, 20 = *urge to smoke a cigarette is very strong*).

To test the possibility that negative affect may mediate the relationship between the body image manipulation and urges to smoke, a repeated measures ANOVA with the single-item mood ratings as the dependent variable was first conducted. Although there was a trend for the thin model image to produce greater negative affect than the neutral image ( $M = 10.92$ ,  $SE = .42$  and  $M = 11.18$ ,  $SE = .42$ , respectively), the difference did not reach significance,  $F(1, 61) = 2.87$ ,  $p = .10$ . The lack of standard statistical significance for the body image manipulation on mood may have been due to psychometric and



statistical limitations. The trend, however, was in the expected direction, with the thin images producing greater negative affect than neutral images.

This study built upon past descriptive and correlational research that has indicated a relationship between body dissatisfaction and smoking behavior by utilizing an experimental paradigm. The presentation of images depicting thin women increased smoking urge, which is consistent with a causal influence of body image. Although many women report smoking for weight control reasons in a global sense, this study was the first to show that images of thin women, which have been shown to threaten body image, can affect situational cravings to smoke. Although these findings are important to the field, the study had several limitations.

*Limitations.* First, although the differences in urge ratings among the different trials were statistically significant, the effect sizes were quite small. This may have been the result of the within-subjects design (i.e., carry-over effects), which is consistent with other research (see Groesz et al., 2002; Wilson et al., 2007). It is also possible that the manipulations were not powerful enough to evoke greater urges.

Another limitation was the lack of a behavioral measure of smoking motivation. In their study, Brandon, Wetter, and Baker (1996) found no covariance between measures of self-reported urge and smoking consumption, which is consistent with Tiffany's (1990) model of drug motivation, viewing urge and administration behavior as functionally independent. Multi-modal assessment is essential, and therefore future studies should include behavioral assessments in addition to self-reported urge ratings.

Finally, the study was unable to determine whether body dissatisfaction directly influenced smoking urge or if the association was mediated by negative affect. In

particular, due to the need for repeated measurement of the within-subject design, negative affect was assessed via a single visual analog item rather than a psychometrically validated scale.

### *Current Study*

The current study was intended to build from the initial study, addressing the limitations. To begin with, the current study used a between-subjects design, to eliminate carry-over effects that attenuate effect sizes. There was an observation of the participant's smoking topography, which provided a behavioral assessment of smoking motivation in addition to self-reported cravings (Brandon et al., 1996; Payne et al., 1991). A psychometrically-validated measure of negative affect was included to better test for mediation. Also, both the smoking manipulation and body manipulation were more potent.

The previous study's body image manipulation relied on the participants passively viewing images of thin models, which was intended to lead the participant to compare herself with the model, thus decreasing her body satisfaction. The current study based the new body image manipulation on objectification theory, which is a particular type of self-awareness or self-consciousness.

Self-awareness theory (Duval & Wicklund, 1972) states that attention can be directed on the external environment or internally on the self. When attention is focused on the self, the individual, in a state of self-consciousness, compares him/herself to salient standards. When a discrepancy is perceived, negative affect occurs and this may motivate action to be taken which will decrease the discrepancy. The typical self-awareness manipulation involves participants looking at themselves in a mirror. This has

been shown to have consistent effects on negative affect and self-referent attribution, especially among women (for a meta-analytic review, see Fejfar & Hoyle, 2000).

Objectification theory (Fredrickson & Roberts, 1997) posits that the cultural climate of sexual objectification, which is the separating out of people's bodies and body parts from their identity, socializes females to consider themselves as objects whose evaluation is based on appearance. This preoccupation with their physical appearance is termed *self-objectification*. As stated above, this is a type of self-awareness in which one focuses on the body's appearance. Self-objectification can be considered both a trait and a state, the latter being triggered in the presence of actual or imagined observers making evaluations of one's body. The theory predicts that shame about one's body, which is a result of negative self-evaluation and the potential for social exposure, is a consequence of self-objectification (Fredrickson et al., 1998). The manipulation often employed to trigger state self-objectification and induce body shame involves the participants trying on and evaluating either a sweater (control condition) or a bathing suit (experimental condition) in front of a mirror. The swimsuit condition elicits higher levels of body shame, and this is especially true among those women already high in trait self-objectification (Fredrickson et al., 1998). This effect has been found for women of various ethnicities, including Caucasian, African American, Hispanic, and Asian American (Hebl et al., 2004). An increase in body shame, which can arise from a comparison to society's ideals, can motivate individuals to engage in behaviors to change their physical appearance, such as restrained eating (Fredrickson et al., 1998). Because many females report smoking for weight loss or weight control reasons (Cepeda-Benito & Reig Ferrer, 2000; Ward et al., 1997), it was hypothesized that an increase in feelings

of negative self-evaluation, or body dissatisfaction, might act as a cue, reminding them that they could be thin if they smoked, and thus it would increase their motivation to smoke.

With respect to the smoking cue, the viewing of smoking-related images in the previous study did slightly increase self-reported urges to smoke. But it is possible that the physical presence of cigarettes may be more salient and thus may cause greater urges. Additionally, research has found that when participants were informed that they would be able to smoke soon, as compared to being told they would not be able to smoke, reported urges to smoke increased (Droungas et al., 1995; Juliano & Brandon, 1998; Sayette et al., 2003). Therefore, for the current study, the smoking cue manipulation employed both the presence of the participant's cigarettes and the information that they would be able to smoke soon.

This study drew upon two areas of research: body dissatisfaction/self-objectification and cue exposure. It used methodology already established within each of these areas, and it built upon an initial experimental study (Lopez et al., 2008). The study utilized manipulations designed to threaten self-image and to expose participants to more traditional smoking-related stimuli previously shown to induce cravings. Both manipulations were included to allow us to test whether a body image manipulation was sufficient to generate cravings or whether exposure to smoking stimuli was also necessary. Additionally, past research has suggested that combining cues might allow for more optimally assessed reactivity (Laberg, 1990). There were two modes of assessment of smoking motivation, which were the dependent variables: self-report measures of craving and smoking topography. The present study had the following specific aims:

**Specific Aim 1: To assess motivation to smoke a cigarette as a consequence of threats to body image by the use of urge assessment and smoking behavior.** It was hypothesized that a main effect would be found for the body image manipulation, such that those in the experimental condition would demonstrate greater motivation to smoke. We also tested for a main effect of the smoking cue manipulation as well as an interaction, or synergistic, effect between the two factors.

**Specific Aim 2: To evaluate level of trait body dissatisfaction and trait self-objectification as moderating variables in the body image experimental manipulations.** In past research, greater effects from a body image manipulation were found for participants with greater trait body dissatisfaction and trait self-objectification. It was hypothesized that those individuals with higher scores on the measures of trait body dissatisfaction and trait self-objectification would demonstrate the greatest impact of the body image manipulation on the dependent variables.

**Specific Aim 3: To evaluate whether negative affect mediated the relationship between the body image manipulation and the subsequent measures of smoking motivation.** Some studies have demonstrated that body image manipulations can increase negative affect (Stice & Shaw, 1994), and other studies have found negative affect to produce smoking urges (Brandon et al., 1996; Payne et al., 1991). Therefore we examined whether state negative affect served as a mediator between the body image challenge and smoking motivation. Expectancies can be thought of as determinants of behavior (for a review see Kirsch, 1999). Previous research has indicated that expectancies, particularly the expectancy that cigarettes will control weight, may need to be primed and then assessed post-manipulation to have greater predictive power (McKee

et al., 2006). Therefore, we measured post-manipulation appetite and weight control expectancies as possible mediators.

## Chapter Two

### Methods

#### *Experimental Design and Overview*

Participants were recruited under the guise of a study interested in female smokers' emotions and consumer behavior. The experiment was a randomized 2 X 2 crossed factorial between-subjects design. Participants completed measures assessing basic demographics, smoking history, trait body image dissatisfaction, trait affect, and trait self-objectification. Furthermore, state levels of urge, affect, and body dissatisfaction were assessed. The dependent measures were self-reported smoking urge and smoking topography.

#### *Participant Recruitment*

Participants were 133 females recruited from local colleges within Tampa, Florida. They were recruited through 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 individuals credit for classes for participation. Those individuals who did not receive research credit were compensated with \$30. All participants were entered into a one-time drawing to win an additional \$50. Individuals were included if they met the following criteria upon 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. Moreover, the women

could not be currently pregnant as they were required to smoke during the study.

#### *Assessment*

*Demographic Questionnaire.* Single items assessed participants' age, education, pregnancy status, marital status, race, ethnicity and parents' level of education and household income. (See Appendix B).

*Smoking Status Questionnaire (SSQ).* This form assessed the participants' smoking status and nicotine dependence, the latter based on items from the Fagerström Test for Nicotine Dependence (FTND). The FTND is a reliable and valid measure of nicotine dependence (Heatherton et al., 1991). (See Appendix C).

*Eating Disorders Examination Self-Report Questionnaire Version – Weight and Shape Concerns Subscales (EDE-Q WC & SC; Fairburn & Beglin, 1994).* The EDE-Q is a 41-item self-report measure based on the Eating Disorders Examination clinical interview (EDE; Cooper & Fairburn, 1987), which has excellent psychometric properties. Good to adequate correspondence was found between the two assessments on the different subscales indicating the EDE-Q's acceptability as a self-report measure (Fairburn & Beglin, 1994). We used the Shape Concerns and Weight Concerns subscales, which have excellent internal consistency ( $\alpha = .92$  and  $.86$ , respectively, for the current sample), and two week test-retest reliability. These subscales total 12 items, and the items are rated on a 7-point forced-choice format ranging from 0-6. Higher scores reflect greater frequency or severity.

*Eating Disorders Inventory - Body Dissatisfaction Subscale (EDI-BD; Garner et al., 1983).* The EDI is a widely used self-report measure of symptoms associated with eating disorders, such as body dissatisfaction, perfectionism, and weight concern. The 9-



item Body Dissatisfaction (BD) subscale of the EDI assesses satisfaction with weight-related body sites. This subscale has shown good to excellent internal consistency ( $\alpha=.92-.93$ ) in a nonpatient female group (Garner et al., 1984; Raciti & Norcross, 1987; Vanderheyden & Boland, 1987). Excellent to good test-retest reliability in nonpatient college students has been demonstrated at three weeks ( $r=.97$ ; Wear & Pratz, 1987) and at one year ( $r=.75$ ; Crowther et al., 1990). The items were scored with a 1-6 scoring system, with greater numbers indicating greater severity or frequency. The alpha coefficient was .88 in the current sample.

*Positive And Negative Affect Schedule (PANAS; Watson et al., 1988).* The PANAS is comprised of two mood scales, each containing 10 items and orthogonal to the other. A trait-like measure was taken at baseline with the PANAS-W, which assessed mood during the past week. A state-like assessment was taken both at baseline and post-manipulation with the PANAS-I, which assessed mood at that exact moment. The participant rated the level of her mood on a five-point Likert scale, ranging from *very slightly or not at all* to *extremely*. The PANAS was scored by summing the rating of each mood scale with higher scores indicating a stronger affect. The Positive Affect scale and the Negative Affect scale are both highly internally consistent, with Cronbach's  $\alpha$  for this sample of .84 and .85 for the trait version and .84 and .82 for the state version, respectfully. When compared to longer measures that assess underlying mood factors, the PANAS has excellent convergent and discriminant correlations.

*Self-Objectification Questionnaire (SOQ; Noll & Fredrickson, 1998)* The SOQ has participants rank order a set of 10 body attributes by how important each is to their own physical self-concept. Scores indicating a greater emphasis on appearance has been

interpreted as greater trait self-objectification. This measure has demonstrated satisfactory construct validity and has only a moderate correlation with body dissatisfaction or with obesity, as it assesses concern with appearance, regardless of weight, without a judgmental or evaluative component. This is consistent with the premise that self-objectification is not restricted to only women dissatisfied with their physical appearance (Noll, 1996). Scores range from -25 to 25, with higher scores indicating greater emphasis on appearance, i.e., greater trait self-objectification.

*Short Smoking Consequences Questionnaire (Short-SCQ; Myers et al., 2003).*

This is a 21-item version for use with young adults and adolescents of the original 50-item Smoking Consequences Questionnaire (SCQ; Brandon & Baker, 1991), a standard instrument for measuring smoking expectancies. Research on the Short-SCQ has shown it has high internal consistency (.93) and that it correlates highly with the original ( $r=.94$ ). Both questionnaires have four factors on which outcome expectancies can be measured: Positive Reinforcement/Sensory Satisfaction, Negative Reinforcement/Negative Affect Reduction, Appetite/Weight Control, and Negative Consequences. The Appetite/Weight Control factor is the same for both the SCQ and the Short-SCQ and the other three factors on the Short-SCQ have correlated well with the factors of the SCQ (PR:  $r=.86$ , NR:  $r=.99$ , NC:  $r=.78$ ). We were interested in only the Appetite/Weight Control factor ( $\alpha = .96$ ), although we administered the entire short form.

*Questionnaire of Smoking Urges-Brief (QSU-Brief; Cox et al., 2001).* This is a 10-item version of the original QSU (Tiffany & Drobes, 1991). It is comprised of 2 factors, with Factor 1 measuring a strong desire to smoke due to perceiving smoking as rewarding and Factor 2 measuring a strong desire to smoke due to an expectancy of

relieving negative mood. These factors allow one to examine two distinctive components of craving to smoking. The alpha coefficients for the factors were greater than .90.

*Visual Analogue Scales (VAS).* Seven single-item VAS measures allowed for immediate assessment of the participant's feelings on various dimensions at baseline and after each task. These scales were used after each task to bolster the marketing cover story and to decrease their attention after the body image manipulation. The participant indicated on a continuous 100mm line where she felt at that exact moment. The score was found by measuring with a ruler to the nearest millimeter. Two scales, urge and affect, served as secondary measures to the primary measures mentioned above (QSU-Brief and PANAS-I) to allow for multiple measurements. 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 other measures. (See Appendix D).

*Questionnaires for dummy tasks.* Five 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: a candleholder (e.g. I like the shape of this candleholder), a fragrance (e.g., I like the smell of this fragrance), a purse (e.g., I think there are enough pockets on this purse), a bathing suit (e.g., I like the color of this bathing suit), and a cigarette (e.g., I like the taste of this cigarette). The bathing suit measure also served to have the participant evaluate herself (e.g., I like the way my chest looks in this

suit). All the measures, with the exception of the cigarette one, required the participants make comparisons to 3 items similar to that being evaluated, which were displayed as images on a flip chart in their experimental room. This was relevant only for the bathing suit condition, where the images contained models in bathing suits to encourage more self-evaluation and greater social comparison. (See Appendices E-I).

*Products for evaluation tasks.* Four items were required for the various tasks the participants had to complete: a candleholder, a fragrance (Vanilla Fields), a purse, and a bathing suit. The one-piece, lime green bathing suit was available in five sizes, ranging from small to extra-extra-large.

*Images for tasks.* Each “product” (with the exception of the cigarette) required three 8 1/2 X 11, color images of items to be displayed on a flip chart during the time the product was evaluated to make comparisons. The images were taken from numerous online stores selling similar products, and were chosen to match the tastes of the target age-group. The bathing suit images contained models wearing the comparison suits: 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.

*Topographical measures of smoking behavior.* A behavioral index of smoking motivation was assessed during a task guised to have participants believe they were evaluating their cigarette. Smoking was recorded with a discrete video camera and was later independently scored by two trained raters using a specialized computer program. Latency to smoke (time until cigarette is first lit) was the smoking behavior of primary interest because experimental manipulations of negative affect and anxiety have typically resulted in decreased smoking latency (Conklin & Perkins, 2005; Payne et al., 1991; Rose

et al., 1983). Latency to smoke has been shown to reflect changes in smoking motivational states (Droungas et al., 1995; Juliano & Brandon, 1998). Behavioral variables of secondary interest included: number of puffs, mean puff duration, mean inter-puff interval, and total time spent smoking.

*Carbon monoxide (CO) monitor.* A BreathCo carbon monoxide monitor by Vitalograph was used to measure the participants' level of CO in parts per million (ppm). The participant was instructed to hold her breath for 20 seconds and then exhale into a disposable cardboard tube. A baseline measurement was taken immediately following informed consent and HIPPA consent.

*Weight.* A professional, medical scale was used to measure weight to the nearest pound and height to the nearest ¼ inch, which were used to calculate the Body Mass Index (BMI).

Table 1

*Summary of Procedure*

<b>Upon Entering the Lab</b>	<ul style="list-style-type: none"> <li>• Informed consent and HIPAA authorization completed</li> <li>• CO measured and 1 hour smoking abstinence verified</li> <li>• Completed baseline trait measures               <ul style="list-style-type: none"> <li>○ Demographic questionnaire</li> <li>○ SSQ</li> <li>○ EDE-Q (Weight Concern and Shape Concern subscales)</li> <li>○ EDI (Body Dissatisfaction subscale)</li> <li>○ PANAS-W</li> <li>○ SOQ</li> </ul> </li> <li>• Completed baseline state measures               <ul style="list-style-type: none"> <li>○ PANAS-I</li> <li>○ VAS measures (VASbase)</li> </ul> </li> </ul>
<b>Dummy Tasks</b>	<ul style="list-style-type: none"> <li>• Evaluated a candleholder and completed VAS measures (VAS1)</li> <li>• Evaluated a fragrance and completed VAS measures (VAS2)</li> </ul>
<b>Smoking Manipulation</b>	<ul style="list-style-type: none"> <li>• Experimental condition: presented with her pack of cigarettes; informed she would able to smoke soon</li> <li>• Control condition: presented with a stapler; not provided with any information about smoking availability</li> </ul>
<b>Body Image Manipulation</b>	<ul style="list-style-type: none"> <li>• Experimental condition: tried on and evaluated a bathing suit and completed VAS measures (VAS3)</li> <li>• Control condition: evaluated a purse and completed VAS measures (VAS3)</li> </ul>
<b>Post-Manipulation</b>	<ul style="list-style-type: none"> <li>• Completed post-manipulation measures               <ul style="list-style-type: none"> <li>○ PANAS-I</li> <li>○ QSU-Brief</li> <li>○ Short-SCQ</li> </ul> </li> </ul>
<b>Smoking Behavior</b>	<ul style="list-style-type: none"> <li>• Taken to another room</li> <li>• Smoked and evaluated at least one cigarette and completed VAS measures (VAS4)</li> </ul>
<b>End of Experiment</b>	<ul style="list-style-type: none"> <li>• Consented to videotape while smoking</li> <li>• Deception check</li> <li>• Height and weight measured</li> <li>• Debriefed</li> <li>• Compensated for participation</li> </ul>

## *Procedure*

*Recruitment.* Some participants were recruited through the University of South Florida's undergraduate psychology pool. These individuals registered to participate in the study through an on-line registration site where they were screened on-line and received credit for courses after the completion of the experiment. Other participants were recruited through flyers, newspaper ads, and announcements in courses. These individuals were screened over the phone and received monetary compensation after the completion of the experiment. All qualified participants, regardless of how they were recruited, were scheduled for an individual appointment in the afternoon or evening to be held in a room at the Tobacco Research and Intervention Program at the H. Lee Moffitt Cancer Center and Research Institute. The late scheduling time was established with the hope that most of the participants would have smoked at least one cigarette before arriving and thus would not be in a state of over-night abstinence. The participants were tested individually. They were instructed to bring a pack of their cigarettes and to abstain from smoking at least one hour prior to their appointment.

*Upon entering the lab.* All participants were informed of their rights as participants. They were told that they were participating in a study of "emotions and consumer behavior," and that they would be asked to engage in three tasks typical of everyday trips to a shopping mall. They completed both informed consent and HIPAA forms before beginning the experiment. They provided a breath sample to assess level of carbon monoxide and verified that they had not smoked in the past hour.<sup>1</sup> The female experimenter then collected the participants' cigarettes. For all the tasks and batteries of

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<sup>1</sup> Those that 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.

questionnaires, each participant was alone in a room with the door closed. The experimenter would enter the room after the participant signaled she had completed the task by opening the door.

At the beginning of the study, all participants completed the baseline measures, including the demographics questionnaire, SSQ, PANAS-W, EDE-Q Weight Concern and Shape Concern subscales, EDI Body Dissatisfaction subscale, and SOQ. Afterward, they completed the baseline state measures, PANAS-I and the seven VAS measures.

*Dummy tasks.* All participants participated in two dummy tasks to bolster the cover story of a marketing study. These tasks were presented consecutively, and each required the participant to evaluate and rank the item on numerous categories as well as make comparisons to the three images of similar items. After completing the dummy evaluation questionnaire, the participants completed the seven VAS measures. The first task was the evaluation of a candleholder while the second task was of a fragrance.

*Smoking manipulation.* As the experimenter entered the room after the second task (i.e., the evaluation of the fragrance), she brought in with her the stimuli for the smoking cue manipulation condition to which the participant was randomly assigned. In the experimental condition, the experimenter brought in the participant's pack of cigarettes and lighter and placed them next to the participant. The experimenter informed her that she would be able to smoke soon. This manipulation has been used successfully in past research in this lab (Juliano & Brandon, 1998). For those assigned to the control condition, a stapler was brought in and placed next to the participant. No information was provided about smoking availability.



*Body image manipulation.* The next task was the 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 swimsuit 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<sup>2</sup> and, while looking into a full-length mirror, complete the dummy evaluation measure and the seven VAS measures. In the control condition, participants were asked to evaluate a purse and complete the evaluation and VAS measures and no mirror was used in this condition.

*Post-manipulation.* Once the measures were completed (and those in the bathing suit condition changed back into their own clothing), the participants completed post-manipulation measures that assessed their feelings at that moment (PANAS-I, QSU-Brief, and Short-SCQ).

*Smoking behavior.* After completion of the post-manipulation measures, the participants were led to a second experimental room equipped with an ashtray and lighter. There they were given their pack of cigarettes. They were instructed to take their time completing this task, as they would be in the room for about 10 minutes. (This was intended to discourage abbreviated smoking behavior due to desires to end the study earlier.) The participants were instructed to smoke at least one cigarette to make their evaluations. After extinguishing their cigarette, they were to complete the seven VAS

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<sup>2</sup> 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.

measures. This room was monitored by video camera to allow for the behavioral measurement of smoking topography.

*End of experiment.* When the experimenter returned, the participants were informed that they had been videotaped while they smoked. A second consent form was given addressing this. Only those participants who gave their consent had their videotape coded. 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, debriefed them, and asked that they not tell anyone else about their experience. Lastly, the participants were awarded either experimental points or money for participation and were entered into the \$50 lottery.

## Chapter Three

### Results

#### *Participant Characteristics*

Demographic and smoking history characteristics are presented in Tables 2 and 3. Although based upon the phone screening, all participants met the inclusion criteria of smoking a minimum of 10 cigarettes per day for at least one year, the mean score on the FTND (2.92) and the mean baseline CO level (11.96) indicate a low level of nicotine dependence. Additionally, the mean BMI (25.07) is at the level of overweight according to the American Cancer Society (overweight BMI = 25 to 29.9; obese BMI = 30+). There were no significant group differences (all  $ps > .05$ ) on demographic variables (e.g., age, FTND, year in school), or on baseline measures of trait or state variables (e.g., smoking urge, negative affect, body dissatisfaction). Please see Appendix A for the correlations among baseline variables and other key variables.

Table 2

*Participant Characteristics (Means and Standard Deviations)*

Variable	Suit/Cigarette	Suit/Stapler	Purse/Cigarette	Purse/Stapler	Overall	<i>p</i>
N	34	33	33	33	133	
Age	19.97 (1.46)	20.03 (1.79)	20.52 (1.79)	20.18 (1.84)	20.17 (1.72)	ns
Smoking History						
Years smoked	4.43 (2.63)	4.04 (2.85)	4.38 (2.59)	3.98 (2.38)	4.21 (2.60)	ns
Cigarettes smoked per day	14.43 (4.80)	14.47 (5.89)	14.68 (5.92)	14.62 (5.02)	14.60 (5.37)	ns
Fagerström score	2.76 (1.78)	2.82 (1.86)	3.18 (1.94)	2.94 (1.95)	2.92 (1.87)	ns
Carbon monoxide level at baseline	12.59 (8.02)	12.36 (14.90)	12.79 (9.11)	10.09 (7.12)	11.96 (10.17)	ns
Baseline Smoking Urge (VASurgebase)	44.56 (24.95)	52.70 (27.31)	46.97 (24.84)	44.09 (24.86)	47.06 (25.45)	ns
Baseline Affect						
PANAS-positive W (trait)	31.59 (6.20)	30.45 (7.23)	31.39 (8.76)	31.39 (6.53)	31.21 (7.17)	ns
PANAS-negative W (trait)	22.03 (8.10)	23.64 (6.84)	21.73 (8.31)	22.64 (7.39)	22.50 (7.63)	ns
PANAS-positive I (state)	24.00 (6.62)	25.85 (6.85)	24.85 (8.14)	23.91 (6.08)	24.65 (6.93)	ns
PANAS-negative I (state)	14.91 (5.79)	15.79 (4.48)	15.00 (7.04)	14.58 (4.68)	15.07 (5.55)	ns
VASaffectbase	55.26 (17.53)	61.21 (18.97)	56.52 (18.81)	57.82 (15.65)	57.68 (17.72)	ns
Body Dissatisfaction						
EDI-Body Dissatisfaction	31.59 (9.24)	31.27 (10.08)	33.61 (8.98)	34.30 (9.03)	32.68 (9.33)	ns
EDE-Weight Concerns	10.68 (8.40)	13.97 (8.71)	13.64 (9.20)	13.97 (7.50)	13.05 (8.49)	ns
EDE-Shape Concerns	21.91 (14.17)	25.55 (14.35)	25.39 (14.12)	24.36 (10.71)	24.29 (13.36)	ns
VASsdbbase	57.28 (22.48)	58.12 (28.53)	58.56 (28.57)	54.92 (21.22)	57.22 (24.62)	ns
SOQ	2.18 (12.59)	8.81 (10.62)	6.27 (12.69)	5.18 (12.27)	5.56 (12.18)	ns
Body Mass Index (BMI)	23.83 (4.71)	24.79 (6.99)	26.34 (6.06)	25.35 (5.28)	25.07 (5.82)	ns

*Note.* VAS (base) = Visual Analogue Scale (baseline), PANAS = Positive and Negative Affect Scale, EDI = Eating Disorders Inventory; EDE = Eating Disorders Examination, sdb = State Body Dissatisfaction, SOQ = Self-Objectification Questionnaire.

Table 3

*Participant Characteristics (Percentages)*

Variable	Suit/Cigarette	Suit/Stapler	Purse/Cigarette	Purse/Stapler	Overall	<i>P</i>
Ethnicity						
American Indian/Alaska Native	0.0	0.0	6.1	0.0	1.5	ns
Asian	2.9	0.0	0.0	0.0	0.8	ns
Black/African American	2.9	9.1	3.0	0.0	3.8	ns
White/Caucasian	79.4	72.7	84.8	84.8	80.5	ns
More than one race	8.8	15.2	3.0	6.1	8.3	ns
Other	5.9	3.0	3.0	9.1	5.3	ns
Hispanic						
Yes	8.8	12.1	6.1	21.2	12.0	ns
No	91.2	87.9	93.9	78.8	88.0	ns
Year in school						
Freshman	29.4	36.4	21.2	21.2	27.1	ns
Sophomore	17.6	18.2	24.2	27.3	21.8	ns
Junior	32.4	21.2	21.2	24.2	24.8	ns
Senior	17.6	24.2	30.3	21.2	23.3	ns
Other	2.9	0.0	3.0	6.1	3.0	ns
Marital Status						
Single	97.1	100.0	93.9	93.9	96.2	ns
Married	2.9	0.0	3.0	6.1	3.0	ns
Divorced	0.0	0.0	3.0	0.0	0.8	ns
Does/did Father Smoke						
Yes	55.9	57.6	51.5	63.6	57.1	ns
No	38.2	36.4	39.4	36.4	37.6	ns
I don't know	5.9	6.1	9.1	0.0	5.3	ns
Does/did Mother Smoke						
Yes	55.9	48.5	54.5	45.5	51.1	ns
No	44.1	51.5	45.5	54.5	48.9	ns
I don't know	0.0	0.0	0.0	0.0	0.0	ns

### *Manipulation Check*

The VAS ratings for overall weight and overall 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, the mean of the weight and appearance dissatisfaction ratings for each time point was calculated creating a new variable, *state body dissatisfaction*.

The experimental design required that the trying on of the bathing suit and making evaluations of oneself induced body dissatisfaction. We conducted a 2 X 2 Analyses of Covariance (ANCOVA) using the state body dissatisfaction post-manipulation ratings (VASsbd3) as the dependent variable and the state body dissatisfaction ratings assessed at baseline (VASsbdbase) as the covariate. The means of the ratings show that trying on the bathing suit ( $M = 65.85, SE = 1.76$ ) produced greater body dissatisfaction than evaluating the purse ( $M = 54.73, SE = 1.78$ ), indicating that the manipulation was successful,  $F(1, 132) = 19.74, p < .001$ . No main effect was found for the smoking manipulation,  $F(1, 132) = 2.28, p = .13$ , nor was an interaction found between the two factors,  $F(1, 132) = 1.02, p = .31$ .

### *Primary Analyses*

*Smoking urge.* Similar 2 X 2 ANOVAs were conducted with the two factors of the QSU-Brief (see Tables 4 and 5). The first factor, which measures urge in anticipation of smoking producing pleasure, evidenced no main effects for either manipulation (body image:  $F(1, 132) = .64, p = .42$ ; smoking cue:  $F(1, 132) = .03, p = .87$ ) nor was there an interaction effect,  $F(1, 132) = .719, p = .40$ . Neither the bathing suit nor the displayed cigarettes affected the participant's urge to experience pleasure from her cigarette.

The second factor of the QSU-Brief measures urge in anticipation of smoking relieving negative affect. A main effect was found for the body image manipulation,  $F(1, 132) = 4.16, p < .05, \eta_p^2 = .03$ . Consistent with our primary hypothesis, trying on the bathing suit produced greater urges to smoke than evaluating a purse did. No main effect was found for the smoking cue manipulation,  $F(1, 132) = 1.19, p = .28, \eta_p^2 < .01$ , nor was an interaction between the two manipulations found,  $F(1, 132) = .10, p = .76$ .

The secondary measure of smoking urge, the one-item VAS scale (VASurge3), was evaluated with a 2 X 2 ANCOVA while covarying out the baseline urge rating (VASurgebase). No main effect for the body image manipulation,  $F(1, 132) = 1.44, p = .23$ , or the smoking cue manipulation,  $F(1, 132) = .34, p = .56$ , was found, nor was there an interaction effect,  $F(1, 132) = .01, p = .94$ . Neither the bathing suit nor the presented pack of cigarettes affected the one-item urge score.

Table 4

*Means(Standard Deviations) of QSU-Brief Factor 1 Scores*

<u>Smoking cue manipulation</u>	<u>Body image manipulation</u>		<u>Marginal means</u>
	<u>Suit</u>	<u>Purse</u>	
Cigarette	27.26 (6.27)	25.09 (8.74)	26.18
Stapler	26.36 (8.02)	26.42 (7.17)	26.39
<u>Marginal means</u>	<u>26.81</u>	<u>25.76</u>	

*Note.* Rating scale ranged from 0 to 35.

Table 5

*Means(Standard Deviations) of OSU-Brief Factor 2 Scores*

Smoking cue manipulation	Body image manipulation		Marginal means
	Suit	Purse	
Cigarette	15.91 (8.55)	13.36 (7.37)	14.64
Stapler	17.97 (10.50)	14.52 (7.11)	16.24
<b>Marginal means*</b>	<b>16.94</b>	<b>13.94</b>	

*Note.* \*  $p < .05$ . Rating scale ranged from 0 to 35.

*Smoking behavior.* In addition to the self-reported urge, we had various topographical measures of smoking behavior. Similar 2 X 2 ANOVAs were conducted with the body image manipulation and smoking cue manipulation as the two fixed factors, and measures of immediate smoking behavior (latency to smoke, number of puffs, puff duration, inter-puff interval, and total smoking time) as the dependent variables. Two participants did not give consent to view their videotape and three more participants' smoking behavior were not recorded due to mechanical difficulties. Based upon the observations of the two independent raters, the data for 30 were excluded from the latency analysis either because of experimenter error (e.g., experimenter re-entered the room interrupting the initiation of lighting the cigarette) or because the participant encountered a disruptive confound (e.g., broken lighter, having to open a new pack of cigarettes). Other participants (n=26) were excluded from other topographical analyses due to unclear smoking behavior or smoking more than one cigarette. In both cases, statistical analyses indicated the participants excluded were fairly balanced across experimental conditions (Kruskal-Wallis  $\chi^2 = .56, p = .91$  for latency; Kruskal-Wallis  $\chi^2 = 1.00, p = .80$  for other topographical measures).



Means and standard deviations for each group on all topographical measures analyzed are reported in Table 6. Analysis of latency to light a cigarette following the manipulations did not reveal a main effect for either the smoking cue manipulation,  $F(1, 103) = .11, p = .74$ , or body image manipulation,  $F(1, 132) = .001, p = .97$ .

Analyses of secondary measures of smoking behavior indicated a significant main effect for number of puffs due to the body image manipulation,  $F(1, 106) = 4.45, p = .04$ . Specifically, participants who tried on the bathing suit took more puffs on their cigarette ( $M = 14.77, SE = .64$ ) than those who evaluated a purse ( $M = 12.82, SE = .67$ ). No main effect was found for the smoking cue manipulation,  $F(1, 106) = .97, p = .33$ . No other behavioral measures had significant findings.

Table 6

*Smoking Topographical Data Presented by Condition (Means and Standard Deviations)*

Variable	Suit/Cigarette	Suit/Stapler	Purse/Cigarette	Purse/Stapler
Latency to Smoke (seconds)	7.52 (5.63)	7.29 (3.76)	7.82 (4.76)	7.16 (5.52)
Number of Puffs*	13.68 (3.92)	15.86 (6.58)	13.00 (2.94)	12.64 (4.78)
Average Puff Duration (seconds)	1.37 (0.31)	1.63 (1.72)	1.56 (0.46)	1.49 (0.61)
Average Inter-Puff Interval (seconds)	21.93 (7.35)	20.89 (7.72)	22.12 (8.49)	23.10 (8.46)
Total Time Smoking 1 <sup>st</sup> Cigarette (seconds)	283.17 (94.36)	310.63 (124.79)	273.35 (83.19)	267.36 (90.19)

*Note: \*Significant difference for the body image manipulation ( $p < .05$ ).*

### *Moderation*

For our second aim, we had hypothesized that the level of trait body dissatisfaction (TBD), and trait self-objectification (TSOQ) would moderate the effect of the body image manipulation on smoking motivation, such that the manipulation would have the greatest impact among women who were higher in either variable. TBD was measured by the summation of standardized scores of the EDE-Q WC, EDE-Q SC, and EDI-BD. No significant moderation results were found for either variable using the methods outlined by Baron and Kenny (Baron & Kenny, 1986). However, when examining the individual scores comprising the TBD, there was a trend toward significance for the EDE-WC to serve as a moderator ( $R^2$  change = .02,  $F(1, 129) = 3.68$ ,  $p = .06$ ). Neither EDE-SC nor EDI-BD were significant.

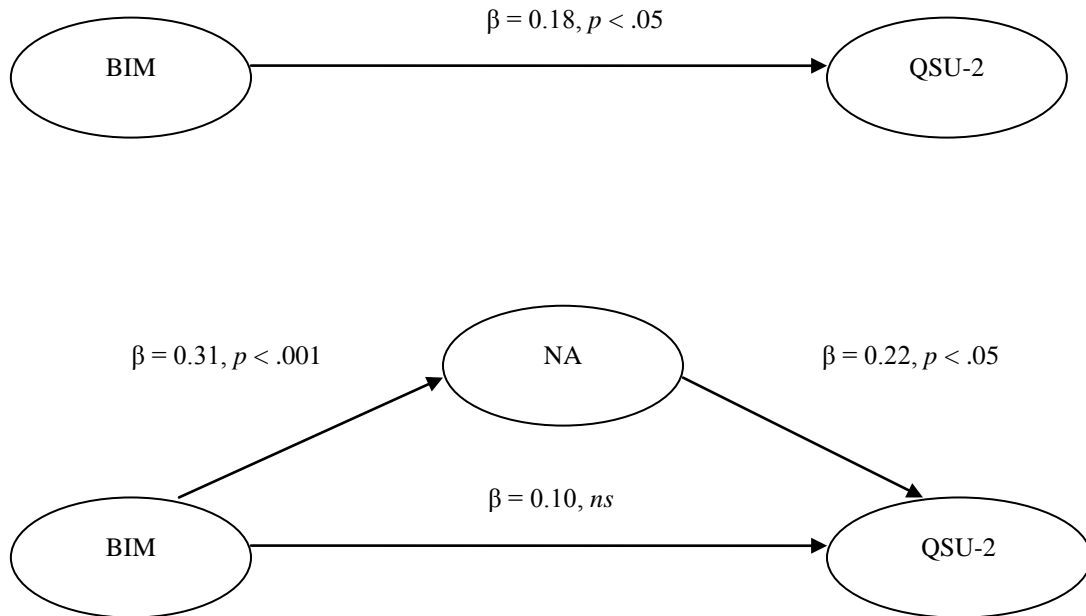
Additionally, body mass index (BMI) was explored to evaluate the impact of actual body weight versus perceived body weight in moderating the manipulations and smoking urge. No significant moderation results were found.

Analyses were conducted to examine moderation effects of TBD and TSOQ on the relationship between the body image manipulation and state body dissatisfaction. No significant results were found.

### *Mediation*

For our final aim, mediation analyses were conducted to examine whether the body image manipulation indirectly enhanced smoking motivation by increasing levels of state negative affect. 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. Results of both procedures were statistically significant ( $p < .05$ ), 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 reported smoking urge ( $\beta = .18$ ,  $R^2 = .03$ ,  $p < .05$ ). 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 ( $\beta = .22$ ,  $sr^2 = .22$ ,  $p < .05$ ). These three steps established that mediation was satisfied, supporting the results of the 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 ( $\beta = .10$ ,  $sr^2 = .10$ ,  $p = .24$ ). (See Figure 2.) No mediation effects were found for negative affect on number of puffs.



*Figure 2.* This shows the four steps needed to support a mediational relationship of negative affect (as measured by the change in PANAS-negative affect from baseline to post-manipulation) between the body image manipulation and Factor 2 of the QSU-Brief.

Appetite and weight control expectancies were to be examined as a possible mediator of the body image manipulation on smoking motivation. However, no main effect was found for the body image manipulation on the expectancies,  $F(1, 132) = .02, p = .89$ . Therefore, no other mediation analyses were conducted.

The change in state body dissatisfaction (VASsbd3-VASsbdbase) was also evaluated as a mediator of the relationship between the body image manipulation and smoking motivation. Although the first two steps were met, we did not find a significant effect of state body dissatisfaction on either urge ( $\beta = .05, sr^2 = .04, p = .62$ ) or number of

puffs, ( $\beta = -.12$ ,  $sr^2 = -.12$ ,  $p = .22$ ). Therefore, state body dissatisfaction does not serve as a mediator.

QSU Factor 2 was examined as a possible mediator between the body image manipulation and number of puffs. The first two steps of mediation were met. Although the third step, which examines the effect of urge on smoking behavior while controlling for the body image manipulation, was not significant, a trend toward a significant mediation was found ( $\beta = .18$ ,  $sr^2 = .17$ ,  $p = .08$ ).

#### *Additional Analyses*

Post-hoc, exploratory analyses were conducted to determine if affect and body dissatisfaction ratings, which had been impacted significantly in the swim suit condition only, improved after participants smoked a cigarette. A 2 (Suit/Purse) X 3 (Baseline/Post-Manipulation/Post-Smoking) mixed-factor repeated measures ANOVA was conducted with the body image manipulation as the between-subjects factor and time of VAS affect rating as the within-subjects factor. Results indicated a significant interaction,  $F(2, 130) = 12.81$ ,  $p < .001$ . To better understand the interaction, paired t-tests were conducted with the baseline (VASaffectbase) and post-smoking ratings (VASaffect4) to determine whether there was a significant difference between the two time points (i.e., whether those in the suit condition returned to their baseline affect levels). Independent t-tests were conducted between the two body image conditions to determine whether differences existed between the groups. Results indicated that after smoking a cigarette, those in the suit condition returned to baseline levels of negative affect,  $t(66) = -1.59$ ,  $p = .12$ , and were indistinguishable from those in the purse condition,  $F(1, 132) = .36$ ,  $p = .55$ .

Similar analyses were conducted with the time of VAS state body dissatisfaction rating as the within-subjects factor, and the results indicated a significant interaction,  $F(2, 130) = 11.35, p < .001$ . Comparison analyses to understand the interaction indicated that among those in the suit condition, smoking a cigarette improved body satisfaction to a level significantly *better* than at baseline,  $t(66) = 2.13, p = .04$ . A significant improvement compared to baseline was also found for the purse condition,  $t(65) = 2.38, p = .02$ . Again, no significant difference was found between the two groups on body dissatisfaction after smoking a cigarette,  $F(1, 132) = .00, p = .99$ . Means and standard deviations can be seen in Table 7.

Table 7

*Means (Standard Deviations) on VAS Measures at Baseline, Post-Manipulation, and Post-Smoking*

	Body Image Manipulation		<i>p</i>
	Suit	Purse	
VAS affect			
Baseline	58.19 (18.36)	57.17 (17.18)	ns
Post-manipulation	47.27 (24.00)	55.00 (18.85)	< .001
Post-smoking	62.54 (16.78)	60.86 (17.12)	ns
VAS state body dissatisfaction			
Baseline	57.69 (25.45)	56.74 (23.93)	ns
Post-manipulation	66.30 (25.75)	54.33 (25.01)	< .01
Post-smoking	53.31 (23.22)	53.21 (26.18)	ns

*Note:* VAS affect range: 0 – not happy at all to 100 – extremely happy. VAS state body dissatisfaction range: 0 – extremely satisfied with overall body to 100 – extremely dissatisfied with overall body.

## Chapter Four

### Discussion

The current study builds upon past correlational and descriptive research, which has demonstrated a relationship between weight concerns/body image dissatisfaction and smoking among women, while addressing the limitations of the only other experimental study that has demonstrated a causal relationship between a situational increase in body image dissatisfaction and a situational increase in smoking urge (Lopez et al., 2008).

This study employed what was expected to be more powerful body image and smoking cue manipulations, utilized more psychometrically sound measures of smoking urge and negative affect, and included behavioral measures of smoking urge. Through these modifications, this study attempted to replicate our previous experimental findings (Lopez et al., *in press*), while exploring additional mediators and moderators to better understand the relationship between the manipulations and the resultant smoking motivational indices. This study, similar to that conducted by Lopez and colleagues (2008), focused on college-student women, as this is a prime demographic for body image distortion, weight-control behaviors, and smoking.

#### *Body Image Manipulation*

*Urge.* The primary aim of this study was to determine whether situational increases in body dissatisfaction were sufficient to increase smoking motivation, as indexed by self-reported urges to smoke and topographical measures of smoking



behavior. As hypothesized, participants in the suit condition experienced an increase in body dissatisfaction and reported significantly greater smoking urges, specifically those urges in anticipation of smoking decreasing negative affect. This result replicates our previous findings that demonstrated an effect of a body image manipulation on self-reported urge (Lopez et al., 2008) and is consistent with a causal relationship between these two variables.

*Topography.* In the current study, we found that those individuals who tried on a bathing suit took more puffs from their cigarette than did those women who evaluated a purse. This is supported by research suggesting that individuals cope with negative affect by increasing their smoking behavior (Conklin & Perkins, 2005; Westling et al., 2006).

No effects were found for any other topography measures, including latency, which has been a commonly used behavioral measure of smoking motivation due to its fairly consistent results (Conklin & Perkins, 2005; Payne et al., 1991; Rose et al., 1983). One must consider that a significant portion of the sample was excluded from these behavioral analyses, decreasing the power to detect latency effects. Furthermore, it is possible that the manner in which the participants were presented with their cigarettes and were cued to smoke affected the results. Most studies measuring latency provide the participant with a single cigarette and use a discreet cue that signals the participant to initiate the acquisition, igniting, and smoking of their cigarette. The current study required that the participant change rooms just prior to the smoking task, and thus for convenience, they were presented with their entire pack of cigarettes. Unfortunately, this increased variance due to some participants having to “pack” and unwrap their pack of cigarettes prior to smoking. Some participants began preparing to smoke (i.e., removing

the cigarette and placing it in her mouth, holding the lighter in preparation for the cue) while the experimenter was still in the room or before the experimenter closed the door (i.e., cue indicating the participant could begin smoking). Others were more conservative and did not interact with their pack of cigarettes until after the door completely shut. These nuisance variables interfered with the execution of the behavioral measures, particularly with respect to latency, reducing confidence in the findings. Future studies should take stronger steps to standardize the presentation of cigarettes prior to measuring latency.

The delay between the manipulation and the topographical assessment may also have led to a dissipation of differential topography. However, previous research examining the sustained effect the body image manipulation has demonstrated that even after changing back into their clothing and engaging in a thought listing task 10 minutes later, women who tried on a swimsuit expressed greater body-focused cognitions than those in the neutral condition (Quinn et al., 2006). The current study had a time delay of only slightly longer (closer to 15 minutes), but it is possible this difference was critical.

Although a main effect for number of puffs was found, more specific measurements of the participants' smoking (e.g., puff volume, blood nicotine level) were not measured, and thus we cannot determine whether these individuals inhaled greater amounts than those in the control condition. Cigarettes are designed to allow for varied puffing behavior, which allows for variations in tar and nicotine yields. One study by Hammond and his colleagues (Hammond et al., 2005) has demonstrated compensatory behavior through puff behavior to increase nicotine content. Future studies may want to use a smoking topography device (e.g., CReSS or CReSSmicro) or biochemical

assessment (e.g., plasma nicotine) to assess smoke exposure and nicotine ingestion more accurately as a consequence of the body image manipulation. Although there is concern that using a topography device alters natural smoking behavior, research comparing conventional smoking to smoking while using a device suggests that these devices provide a valid and reliable index of naturalistic smoking behavior as well as an indirect measure of smoke exposure (Lee et al., 2003).

*Moderators.* Neither trait body dissatisfaction nor trait self-objectification significantly moderated the effects of the body image manipulation on smoking motivation or on state body dissatisfaction. This was surprising, as past research has indicated that participants who are higher in these variables experience greater effects from experimental manipulations meant to threaten their self-evaluation (for a review, see Groesz et al., 2002; Miner-Rubino et al., 2002). Our previous study (Lopez et al., 2008), did find a moderating effect, but only in the absence of a smoking cue and with a fairly subtle body image manipulation. The intensity of the current study's manipulation may have affected the women more generally, thereby obscuring any influence of moderator variables. One must also consider the possibility that the current study was not powered sufficiently to detect these interaction effects. Based upon the comparison of partial-eta squares of the body-image manipulation between the current study and our previous study (Lopez et al., 2008), there was a decrease in the effect size for the current study. Yet, the current study used a between-subjects design, which limits power.

*Mediators.* The demonstrated causal relationship between induced body dissatisfaction and increased smoking urges on Factor 2 of the QSU was mediated by body dissatisfaction-induced negative affect. This result suggests that trying on a bathing

suit enhanced smoking urges via increases in negative affect. This supports the research demonstrating negative affect as both a consequence of threats to body satisfaction and as a trigger for smoking motivation.

No significant mediation effect was found for smoking expectancies of cigarettes' utility to control appetite and weight, possibly because expectancies were assessed explicitly. Some researchers have demonstrated that implicit assessments predict drug use better than explicit measures (Stacy et al., 2004), and they may uniquely predict certain clinical outcomes, such as relapse (Cox et al., 2002). It is also possible that the items that comprise the Appetite/Weight Control factor utilized in this study do not accurately assess the beliefs about cigarettes' effectiveness with regard to weight and appearance. Specifically, three of the five questions address appetite control, which may only be accessed when needed, such as when under conditions of dietary restraint (Copeland & Carney, 2003). Additionally, other beliefs associated with body dissatisfaction and cigarettes' utility in aiding these concerns (e.g., "Smoking makes me thinner," "Smoking makes me more attractive") may have better predictive power for this particular paradigm.

#### *Smoking Cue Manipulation*

*Urge and topography.* This study also examined whether the presence and availability of smoking cues (compared to neutral cues) would interact with the body image manipulation's effect on the smoking motivation measures, but no significant interaction was found. More surprisingly, a main effect for the smoking cue manipulation, which has been reliably found in numerous studies (for a review, see

Carter & Tiffany, 1999), was not significant for either smoking urges or any topographical measures.

One cause for the non-significant findings may have been our choice of a subtle smoking cue manipulation to decrease the possibility that our hypothesized effects of the body image manipulation would not be obscured by an overpowering stimulus. In our procedure, the cue exposure merely consisted of the experimenter casually placing the participant's pack of cigarettes on the corner of the table while informing her that she would be able to smoke soon. Past research has indicated that lit cigarettes evoke greater urges to smoke (e.g., Hutchison et al., 1999; Sayette & Parrott, 1999) than unlit cigarettes (e.g., Juliano & Brandon, 1998). Also, this study presented the cigarette pack rather than an individual cigarette, which might have elicited even stronger urges. Additionally, the participants were not instructed to engage in any urge-related imagery (e.g., Shadel et al., 2001; Tiffany & Drobles, 1990) or any other task that would promote focusing their attention on the smoking stimuli. However, unlike most other cue reactivity studies, the primary effect of interest was that of the body image threats, and the basis for including the smoking cue was to evaluate any synergistic effects that may have occurred. Research has demonstrated that when primary tasks require greater cognitive effort (i.e., cognitive load), there is limited cognitive capacity available for the secondary task (Wickens, 1984). Therefore, when attending to subtly-presented smoking cues is not the principal task, and they are paired with another manipulation that requires cognitive effort, little to no effect may be evidenced by the smoking stimuli. This is supported by a study that found no effect on a cognitive task with restrained eaters when chocolate was casually presented and the participants were told they would be able to eat it soon (Green

et al., 2000). An effect was only demonstrated when the participants were encouraged to engage in imagery, focusing their attention on that stimuli (Green et al., 2000). It may be important in future studies to examine the effect smoking cues have when they are secondary to other salient cues.

Furthermore, the smoking cue manipulation was immediately followed by the presentation of the body image manipulation stimuli. Smoking urge was not assessed until 10 to 15 minutes later, when the participant had finished evaluating the body image stimuli. After urge was assessed, another 10 minutes elapsed before the participant completed the smoking behavior task. Other smoking cue research has measured urge immediately after presentation of the cue, and thus it is possible that the impact of the smoking cue had dissipated over time or was replaced by the impact of the body image cue by the time urge was measured. Some researchers have speculated that the availability heuristic (Tversky & Kahneman, 1974) may bias participants' responses on urge ratings if the urge content is emphasized at the end of the cue presentation (c.f., Maude-Griffin & Tiffany, 1996). Future studies could examine whether any effect is elicited if the smoking cue is presented after the body image manipulation, but immediately prior to the urge and topography ratings.

We had attempted to enhance the impact of the smoking cues by providing smoking availability instruction. Although past research has demonstrated that greater urges are elicited when a smoker believes she will be able to smoke soon (Carter & Tiffany, 2001; Juliano & Brandon, 1998), these studies typically include older, more nicotine-dependent smokers than those used in the current study. Furthermore, other studies have a longer abstinence requirement and the participants are led to believe that

they will be in the lab for numerous hours without smoking. Participants in our study were aware at the outset that the entire procedure would last about an hour to an hour and a half. The participants received the smoking cue mid-way during the study, and thus all participants, irrespective of their smoking cue condition, may have been affected by the realization that she would be able to smoke soon as a consequence of the study ending (Juliano & Brandon, 1998). For this paradigm, it may be important to have participants remain in the lab for a lengthy period or at least believe the study will be lengthy for the availability information to be effective. However, amount of perceived or actual time of study involvement may affect the sample of individuals willing to participate, and therefore could impact the generalizability of the findings.

Another issue to consider is the role the environment may have played in affecting the smoking cue manipulation. Research has demonstrated that environments that have been associated with smoking can induce increased urges (Conklin, 2006). Therefore, one might assume that while there are some contexts that can increase urges (e.g., places in which the individual usually smokes), there are possibly some contexts that may attenuate urges, such as places in which smoking is forbidden (e.g., church). Availability research has demonstrated that individuals are able to temper their reactivity to salient cues if they are aware that smoking is not an option (e.g., Juliano & Brandon, 1998). As of July 1, 2003, the state of Florida enacted a smoke-free workplace law forbidding smoking in all indoor locations (with the exception of stand-alone bars), possibly decreasing reactivity to smoking cues presented indoors. The additional suggestion of viewing the tasks as “similar to those one might engage in a mall” may have conjured expectancies of behavior at a shopping mall, which does not include

smoking. Moreover, our lab is part of a cancer-screening center, which might have the unwanted effect of further decreasing smoking cue reactivity in our lab. Although not assessed formally, antidotal evidence supports this, as some participants voluntarily commented on their discomfort with smoking indoors, a behavior they did not engage in outside of the lab. More research needs to be conducted with cues that are true to smokers' experiences, both those that elicit and attenuate reactivity. These future studies can help to clarify the impact indoor, smoke-free laws have on laboratory cue reactivity paradigms, especially for this population of less-nicotine dependent, college students.

#### *Factors That May Have Influenced Manipulation Effects*

Other factors, such as menstrual cycle phase, stage of change toward cessation, and level of nicotine dependence, may have attenuated the effect of the body image manipulation and influenced our ability to find a significant effect of the smoking cue manipulation. Some research has indicated that menstrual cycle phase can have an effect on women's responsivity to smoking cues, such that those women in the follicular (preovulatory) phase of the cycle report lower overall craving (e.g., Allen et al., 1999; Franklin, 2004). Cycle phase may be even more salient with body image threats as phases, such as the luteal (premenstrual) phase, may increase body image dissatisfaction due to bloating and acne. Future studies may want to assess cycle phase, either through self-report or through bioverification of hormonal levels, as well as birth control and other hormonal use.

This study did not assess the participants' interest in or attempts at quitting smoking. Because smokers vary in their level of motivation to quit (Herzog & Blagg, 2007), and motivation has been shown to affect reactivity to smoking cues (Abrams et al.,



1988; McDermut & Haaga, 1998), it may be important to assess quitting motivation in future studies.

Finally, our sample was of less dependent smokers, as evidenced by their low nicotine dependence scores and low baseline carbon monoxide readings. Previous studies have indicated that cue-provoked urges are positively correlated with nicotine dependence (e.g., Sayette et al., 2001). These participants were similar to those in the previous study by (Lopez et al., 2008). In that study, all participants were required to smoke upon entering the lab. The current study attempted to increase reactivity and thus required at least one-hour of abstinence prior to beginning the study. However, because college students tend to be light smokers, one hour may not be enough abstinence to avoid dampened subsequent urge responding. Future studies need to evaluate the shortest optimal abstinence time for which less nicotine dependent smokers will evidence cue reactivity. Furthermore, other studies may raise the inclusion criterion for number of cigarettes smoked per day. The latter would likely increase the nicotine dependence and conditioning histories of the sample, which could produce greater cue-reactivity (Niaura et al., 1988a). However, the cost would be a less representative sample of college-aged female smokers (e.g., King et al., 2007).

#### *Post-Hoc Analyses*

*Post-smoking affect.* Although not a main component to the study, post-smoking affect and body dissatisfaction VAS ratings were evaluated for the two body image manipulation groups. Results indicated that after smoking, self-reported negative affect for participants in the suit condition returned to baseline levels and was indistinguishable from post-smoking negative affect for participants in the purse condition. Many

individuals claim smoking serves to help them cope with their negative affect (Copeland et al., 1995), and they claim their smoking behavior increases as a result of negative mood (McKennell, 1970). However, Shiffman and colleagues (Shiffman et al., 2002) found that smoking was unrelated to affect in heavy smoking adults. These mixed findings are coupled with the fact that few studies have been able to answer the question of whether smoking can attenuate negative affect induction or alleviate current negative mood (for a review see Kassel et al., 2003). Parrott and Garnham (1998) have found decreases in negative affect after smoking when the mood is due to withdrawal. Another study, however, presented participants with images and music that induced negative mood, and the results did not support the hypothesis that smoking relieves negative affect under conditions of negative mood (Conklin & Perkins, 2005). The body image manipulation used in this study may have greater ecological validity in true negative affect induction than the passive listening to negative-affect inducing classical mood and viewing negatively-valenced images. As such, these two tasks may induce different “types” of negative mood, on which smoking may have a differential impact.

*Post-smoking body dissatisfaction.* Results demonstrated that after smoking, state body dissatisfaction improved significantly. The participants’ satisfaction with their body was actually higher than at baseline for women in both the suit and purse conditions, leaving the groups indistinguishable from one another after smoking. These results offer a promising insight into the rewarding aspects of smoking behavior both in the presence and absence of a body image challenge.

*Limitations of post-hoc findings.* These findings, although interesting, must be interpreted cautiously, as the design of the study did not control for other possible

explanations for these results. We cannot discount the fact that the participants were aware that the study was almost complete by the time they engaged in the smoking task. This alone may have improved their affect. However, one would hypothesize that this awareness would be equivalent between the groups, and thus a significant difference between the groups should still be evident due to carryover effects from the body image manipulation, and it is not clear how this awareness would affect body dissatisfaction ratings.

Conversely, it is possible that the effect of the body image manipulation was not sustained by the time the participants completed their VAS measures after smoking or that the smoking task served as a distraction preventing the women from ruminating on their negative thoughts. Future studies should compare affect and body dissatisfaction ratings before and after smoking in women whose body image is threatened, but include a control group that engages in a non-smoking task of comparable interest and engagement (or merely an equal passage of the time). Subsequent studies could dismantle the effects of nicotine delivery versus smoking behavior.

#### *Treatment Implications*

Overall, the results of this study, along with the findings from Lopez and colleagues (2008), suggest that threats to body image satisfaction (i.e., trying on a bathing suit or viewing images of thin women) can act as triggers to smoke among college women and lead to greater smoking urges and increased smoking behavior. Studies of actual smoking relapse suggest that cue reactivity may be related to relapse (Niaura et al., 1988a) and thus cue exposure therapy should have clinical efficacy. Cue exposure treatment is based on Pavlovian extinction: repeated presentation of drug-related cues in

the absence of drug administration should eventually extinguish the cravings to the stimuli. Unfortunately, a meta-analysis by Conklin and Tiffany (2002) showed poor results for cue exposure therapy for a variety of drug addictions, including cigarette smoking. At this point, cue exposure therapy focuses on the drug and its paraphernalia, but it has been suggested that that cue-exposure paradigms should be expanded to include extinction to upstream cues and to interoceptive (cognitive and affective) cues. Findings from this line of research suggest that exposure stimuli might also include threats to one's body image and induction of body dissatisfaction. The dysfunctional cognitions associated with body dissatisfaction induction should also be incorporated.

Cognitive-behavioral treatments (CBT) for smoking cessation should also include body dissatisfaction and weight concerns as direct targets of therapy (Croghan et al., 2006; King et al., 2007; Levine et al., 2003; Perkins et al., 2001). Additionally, as the results of this study indicate negative affect mediates the relationship between the body image manipulation and subsequent increases in smoking motivation, CBT for smoking cessation should also focus on the negative affect associated with body dissatisfaction. This is especially important, as nicotine replacement therapy in college students has not been effective at decreasing those urges in association with relief of negative affect (QSU Factor 2; Morissette et al., 2005).

### *Limitations*

*Sample composition.* The sample of women who participated in the current study were primarily Caucasian, had low levels of nicotine dependence, and had a body mass index (BMI) higher than seen in other research with college students in general (e.g., Quinn et al., 2006), all of which could affect the generalizability of the findings to other

college women. However, research has demonstrated a greater association of college student smoking among Caucasians (King et al., 2007; Patterson et al., 2004; USDHHS, 1998), and the current sample was comparative to the campus racial and ethnic composition of the university at which this study was conducted (70% Caucasian, 13% African American, 5% Asian and Pacific Islander, 0.5% American Indian, and 10% Hispanic). Moreover, the participants were recruited across campus, not just within a specific department, increasing the variability of the individuals included.

The average BMI of our smoking participants appears higher ( $M = 25.07$ ,  $SD = 5.82$ ) than that of general female students at other American universities (e.g.,  $M = 22.76$ ,  $SD = 2.41$ ; Quinn et al., 2006). This is surprising, as research with the general population has typically found smokers to weigh *less* than nonsmokers. However, research with college smokers has not found a significant difference in body weight based on smoking status, and findings actually suggest that current smoking is associated with obesity-promoting behaviors (Carroll et al., 2006). Moreover, one study by King et al. (2007) found higher mean BMIs, similar to our sample, in groups significantly associated with current smoking status.

Therefore, we believe that our findings are generalizable to the population of college female smokers. However, applying these results beyond this population should be done cautiously even though past descriptive and correlational research reviewed above has demonstrated that women throughout the life span relate their smoking behavior with concerns of weight. College smokers may be dissimilar from older individuals or those with different educational backgrounds (Pierce et al., 1989).

*Effect sizes.* The experimental effects of the body image manipulation may have been influenced by whether the manipulation increased state self-objectification and subsequently increased body shame, both effects demonstrated in other research employing this paradigm. Additionally, the manipulation depended upon the participants socially comparing themselves to the models depicted in the three comparison images displayed. According to Wilcox and Laird (2000), an individual can choose either to socially compare herself to the model or to identify with the model. It is possible that identification with the model may have occurred with some participants, and thus body satisfaction was enhanced rather than challenged, reducing the impact of the manipulation. Furthermore, the study assessed weight dissatisfaction (part of the composite state body dissatisfaction score). This may be misleading, as it confounds those women who were dissatisfied with their weight due to feeling too thin with those who felt too overweight. It is assumed that smoking motivation is driven more by concerns about being overweight rather than underweight. Nonetheless, overall effects of the manipulation on smoking motivation variables, as well as mediation effects of smoking expectancies, may have been affected.

Although numerous explanations have been given as to why small or no effects for our manipulations were found, we cannot discount the possibility that the effects are legitimately small. However, this does not negate the theoretical or public health significance of the finding. An increase in smoking motivation was elicited by having a woman try on a bathing suit, not dissimilar to a task she does every day when getting dressed. Lopez et al. (2008) found a similar effect by displaying an image of a thin model for a mere 17 seconds. These findings suggest the potential impact this has when

one considers that the compounding of relatively small risk factors may produce larger effects (c.f. Forehand et al., 1998). Similarly, cumulative effects over time may aggregate to produce significant impact on real-world outcomes (Abelson, 1985). In the case of threats to body image and its effect on smoking motivation, college women encounter numerous situations that can lead to self-objectification and increased body dissatisfaction, including media images, body-related comments, and even the anticipation of male gaze (e.g., Calogero, 2004; e.g., Swim et al., 2001; Wolf, 1991). Therefore, although the two brief laboratory-based body image manipulation studies may indeed model the immediate naturalistic effects of challenges to young women's body image, they cannot be expected to capture fully the totality and cumulative impact of repetitive real-world exposure to body image threats. 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 research on the causal relationship of body image threats on smoking motivation.

### *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. This study, building upon some of the original study's limitations, found similar results, providing greater support that threats to one's body image can increase subjective ratings of smoking urge and smoking behavior. This study also was able to demonstrate that negative affect mediates the relationship between the body image

challenge of trying on a bathing suit and the subsequent increases in smoking urge. Finally, although very preliminary, exploratory analyses suggest that smoking a cigarette may alleviate negative affect that is a consequence of body image threats, bringing one's mood back to baseline levels and equivalent to smoking individuals who did not suffer any body image challenges. Even more striking is the finding that women, after having smoked, felt more satisfied with their bodies than they did at baseline, whether or not they tried on a bathing suit. Future research needs to explore how this relates to the frequency and intensity of smoking among women, as well as how this affects the development or maintenance of tobacco dependence.

The implication from these studies is that future extinction-based cue-exposure treatments may need to include stimuli that negatively impacts body satisfaction, while cognitive-behavioral therapies for smoking cessation may focus on body dissatisfaction and weight concerns as well as their negative sequelae. Although this research is most relevant to young, college women similar to the current sample, as these women are in a transitory period of their smoking behavior, future studies may want to examine this effect in other women 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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## Appendices



## Appendix A: Correlations Between Various Predictor and Dependent Variables

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. BIM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. SCM	.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. EDE-WC	-.09	-.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. EDE-SC	-.04	-.05	.93**	-	-	-	-	-	-	-	-	-	-	-	-	-
5. EDI-BD	-.14	-.01	.74**	.73**	-	-	-	-	-	-	-	-	-	-	-	-
6. TBD	-.10	-.06	.96**	.95**	.89	-	-	-	-	-	-	-	-	-	-	-
7. TSOQ	-.01	-.11	.32**	.36**	.21*	.32**	-	-	-	-	-	-	-	-	-	-
8. BMI	-.13	.00	.34**	.27**	.48**	.39**	-.09	-	-	-	-	-	-	-	-	-
9. VASsbd3	.23**	.10	.63**	.62**	.62**	.67**	.22*	.21*	-	-	-	-	-	-	-	-
10. App/Wgt	-.01	.02	.30**	.28**	.17	.27**	.07	-.10	.24**	-	-	-	-	-	-	-
11. NA post	.24**	-.03	.43**	.44**	.27**	.40**	.25**	.03	.42**	.24**	-	-	-	-	-	-
12. QSU-B F.1	.07	-.01	.30**	.34**	.22**	.31**	.22*	.00	.31**	.15	.38**	-	-	-	-	-
13. QSU-B F.2	.18*	-.09	.42**	.43**	.31**	.41**	.22*	.08	.45**	.32**	.45**	.73**	-	-	-	-
14. VASurge3	.11	-.01	.24**	.29**	.17	.25**	.18*	-.09	.31**	.24**	.42**	.79**	.66**	-	-	-
15. # of Puffs	.20*	-.10	.05	.07	.07	.07	.06	.15	.06	-.02	.04	.25**	.21*	.25*	-	-
16. FTND	-.07	.03	.31**	.36**	.30**	.35**	.24**	.06	.26**	.08	.29**	.40**	.35**	.36**	.12	-

*Note.* BIM = Body image manipulation; SCM = Smoking cue manipulation; EDE = Eating Disorders Examination; WC = Weight Concerns; SC = Shape Concerns; EDI – BD = Eating Disorders Inventory – Body Dissatisfaction; TBD = Trait Body Dissatisfaction; TSOQ = Trait Self-Objectification Questionnaire; BMI = Body Mass Index; VAS = Visual Analogue Scale; sbd = State Body Dissatisfaction; App/Wgt = Appetite and Weight Control expectancies factor; NA post= negative affect post-manipulation; QSU-B F. = Questionnaire of Smoking Urges – Brief Factor; FTND = Fagerström Test of Nicotine Dependence.

\* $p < .05$ , \*\* $p < .01$ .

## Appendix B: Demographic Questionnaire

### Demographic Questionnaire

The following questions are about yourself and your life situation. They are to help us better understand the people we serve. You are under no obligation to answer any question that you find objectionable, however, we would appreciate your answering as many as possible. All answers will be kept confidential.

Date: \_\_\_\_\_

1. What is your age? \_\_\_\_\_
2. What is your date of birth? \_\_\_\_\_
3. What is your current year in school?
  - Freshman
  - Sophomore
  - Junior
  - Senior
  - Other (Please explain) \_\_\_\_\_
4. What is your marital status?
  - Single
  - Married
  - Separated
  - Divorced
  - Widowed
5. With which racial category do you most identify yourself? (please check one)
  - American Indian/Alaska Native
  - Asian
  - Native Hawaiian or Other Pacific Islander
  - Black or African American
  - White
  - More than one race
  - Other
6. Are you Hispanic/Latino?
  - Yes
  - No

Appendix B: (Continued)

7. Are you currently pregnant
  - Yes
  - No
  
8. Does/did your father smoke?
  - Yes
  - No
  - I don't know
  
9. Does/did your mother smoke?
  - Yes
  - No
  - I don't know
  
10. What is the highest grade level completed by your father?
  - Did not graduate high school
  - High school graduate
  - Some college
  - Technical school/Associates degree
  - 4-year college degree
  - Some school beyond 4-year college degree
  - Professional degree (e.g. MD, JD, PhD)
  
11. What is the highest grade level completed by your mother?
  - Did not graduate high school
  - High school graduate
  - Some college
  - Technical school/Associates degree
  - 4-year college degree
  - Some school beyond 4-year college degree
  - Professional degree (e.g. MD, JD, PhD)
  
12. Parents' household income
  - Under \$10,000
  - \$10,000 - \$20,000
  - \$20,000 - \$30,000
  - \$30,000 - \$40,000
  - \$40,000 - \$50,000
  - \$50,000 - \$60,000
  - \$60,000 - \$70,000
  - \$70,000 - \$80,000
  - \$80,000 - \$90,000
  - Over \$90,000

## Appendix C: Smoking Status Questionnaire

### Smoking Status Questionnaire

1. Date of Birth: \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_  
Month Day Year
2. Sex: (check one)     Male     Female
3. Do you smoke cigarettes everyday?     Yes     No  
If No, stop here; If Yes, please continue
4. How many years have you been smoking daily? \_\_\_\_\_
5. How many cigarettes do you smoke per day on average? \_\_\_\_\_
6. Do you inhale? (circle one)    NEVER    SOMETIMES    ALWAYS
7. Do you smoke more during the first two hours of the day than during the rest of the day?  
 Yes     No
8. How soon after you wake up do you smoke your first cigarette?  
 Within 5 minutes  
 6-15 minutes  
 16-30 minutes  
 31-60 minutes  
 After 60 minutes (1 hour)
9. Which of all the cigarettes you smoke would you most hate to give up?  
 The first one in the morning  
 The one with breakfast  
 The one with lunch  
 The one with dinner  
 The last cigarette before going to bed  
 Other: \_\_\_\_\_
10. Do you find it difficult to refrain from smoking in places where it is forbidden (eg. in church, at the library)  
 Yes     No
11. Do you smoke if you are so ill that you are in bed most of the day?  
 Yes     No

## Appendix D: Visual Analogue Scales

### Personal Evaluation

Instructions: Please place an up-and-down line (“|”) on the scale where you feel it best represents how you feel **right now, in this very moment**.

1. How strong your urge to smoke a cigarette is AT THIS EXACT MOMENT.

No urge at all

Strongest urge ever

A horizontal line with vertical end caps, representing a scale from 'No urge at all' to 'Strongest urge ever'.

2. How you feel AT THIS EXACT MOMENT.

Extremely unhappy

Extremely happy

A horizontal line with vertical end caps, representing a scale from 'Extremely unhappy' to 'Extremely happy'.

3. How interested you are AT THIS EXACT MOMENT.

Not interested at all

Extremely interested

A horizontal line with vertical end caps, representing a scale from 'Not interested at all' to 'Extremely interested'.

4. How satisfied you are with your overall body weight AT THIS EXACT MOMENT.

Extremely dissatisfied

Extremely satisfied

A horizontal line with vertical end caps, representing a scale from 'Extremely dissatisfied' to 'Extremely satisfied'.

5. How excited you are AT THIS EXACT MOMENT.

Not excited at all

Extremely excited

A horizontal line with vertical end caps, representing a scale from 'Not excited at all' to 'Extremely excited'.

6. How satisfied you are with your overall appearance AT THIS EXACT MOMENT.

Extremely dissatisfied

Extremely satisfied

A horizontal line with vertical end caps, representing a scale from 'Extremely dissatisfied' to 'Extremely satisfied'.

7. How bored you are AT THIS EXACT MOMENT.

Not bored at all

Extremely bored

A horizontal line with vertical end caps, representing a scale from 'Not bored at all' to 'Extremely bored'.

Appendix E: Questionnaire for Candleholder Task

**Candleholder Evaluation**

Instructions: Circle the number that corresponds to how much you agree with each of the statements on the following pages.

	<b>Strongly disagree</b>			<b>Neither agree nor disagree</b>			<b>Strongly agree</b>
1. I like the style of the candleholder.	1	2	3	4	5	6	7
2. I like the color of the candleholder.	1	2	3	4	5	6	7
3. I like the material the candleholder is made of.	1	2	3	4	5	6	7
4. Buying a candleholder from a name brand store is important to me.	1	2	3	4	5	6	7
5. I use candleholders.	1	2	3	4	5	6	7

Appendix E: (Continued)

6. This is the type of candleholder I would normally choose to buy.	1	2	3	4	5	6	7
7. I like the candleholder I'm evaluating more than A.	1	2	3	4	5	6	7
8. I like the candleholder I'm evaluating more than B.	1	2	3	4	5	6	7
9. I like the candleholder I'm evaluating more than C.	1	2	3	4	5	6	7
10. I would buy this candleholder.	1	2	3	4	5	6	7

## Appendix F: Questionnaire for Fragrance Task

### Fragrance Evaluation

Instructions: Circle the number that corresponds to how much you agree with each of the statements on the following pages.

	<b>Strongly disagree</b>			<b>Neither agree nor disagree</b>			<b>Strongly agree</b>
1. I enjoy the fragrance.	1	2	3	4	5	6	7
2. I would wear this fragrance.	1	2	3	4	5	6	7
3. I like the shape of the bottle.	1	2	3	4	5	6	7
4. When buying a fragrance, I care about the brand name.	1	2	3	4	5	6	7
5. I like spray-on fragrances.	1	2	3	4	5	6	7



Appendix F: (Continued)

6. I usually wear fragrances.	1	2	3	4	5	6	7
7. I like the bottle I'm evaluating better than A.	1	2	3	4	5	6	7
8. I like the bottle I'm evaluating better than B.	1	2	3	4	5	6	7
9. I like the bottle I'm evaluating better than C.	1	2	3	4	5	6	7
10. I would buy this fragrance.	1	2	3	4	5	6	7

## Appendix G: Questionnaire for Bathing Suit Task

### Bathing Suit Evaluation

Instructions: Circle the number that corresponds to how much you agree with each of the statements on the following pages.

	<b>Strongly disagree</b>			<b>Neither agree nor disagree</b>			<b>Strongly agree</b>
1. I like the cut of this bathing suit.	1	2	3	4	5	6	7
2. I think the size is just right.	1	2	3	4	5	6	7
3. I like the way the straps fit.	1	2	3	4	5	6	7
4. I like the color of this bathing suit.	1	2	3	4	5	6	7
5. I like the way my bust looks in this bathing suit.	1	2	3	4	5	6	7

Appendix G: (Continued)

6. I like the back of this bathing suit.	1	2	3	4	5	6	7
7. I like the way my butt looks in this bathing suit.	1	2	3	4	5	6	7
8. Having a brand name is important to me when purchasing a bathing suit.	1	2	3	4	5	6	7
9. I like the way my legs look in this bathing suit.	1	2	3	4	5	6	7
10. This is the type of bathing suit I would normally choose to buy.	1	2	3	4	5	6	7
11. I like the bathing suit I'm evaluating better than A.	1	2	3	4	5	6	7

Appendix G: (Continued)

12. I like the bathing suit I'm evaluating better than B.	1	2	3	4	5	6	7
13. I like the bathing suit I'm evaluating better than C.	1	2	3	4	5	6	7
14. I look as good or better than those models wearing the suits displayed.	1	2	3	4	5	6	7
15. I would buy this bathing suit.	1	2	3	4	5	6	7

## Appendix H: Questionnaire for Purse Task

### Purse Evaluation

Instructions: Circle the number that corresponds to how much you agree with each of the statements on the following pages.

	Strongly disagree			Neither agree nor disagree			Strongly agree
1. I like the shape of this purse.	1	2	3	4	5	6	7
2. I think the size is just right.	1	2	3	4	5	6	7
3. This purse needs more pockets.	1	2	3	4	5	6	7
4. I like the color of this purse.	1	2	3	4	5	6	7
5. When buying a purse, I care about the brand name.	1	2	3	4	5	6	7

Appendix H: (Continued)

6. It is important to me to have a separate compartment for my cell phone on my purse.	1	2	3	4	5	6	7
7. I like the length of the strap on this purse.	1	2	3	4	5	6	7
8. I usually use purses.	1	2	3	4	5	6	7
9. I like the purse I'm evaluating better than A.	1	2	3	4	5	6	7
10. I like the purse I'm evaluating better than B.	1	2	3	4	5	6	7
11. I like the purse I'm evaluating better than C.	1	2	3	4	5	6	7
12. I would buy this purse.	1	2	3	4	5	6	7

Appendix I: Questionnaire for Smoking Task

Rating of Cigarette

Please rate the following questions from (1) *not at all* to (4) *very much* by circling the number that corresponds to your choice.

Brand of cigarette smoking: \_\_\_\_\_

1. How much do you like the taste of the cigarette?

(1) **not at all**            (2) **a little**            (3) **somewhat**            (4) **very much**

2. How much do you like the smell of the cigarette?

(1) **not at all**            (2) **a little**            (3) **somewhat**            (4) **very much**

3. How enjoyable is the cigarette?

(1) **not at all**            (2) **a little**            (3) **somewhat**            (4) **very much**

4. What other cigarette brands have you smoked?

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5. How much more do you enjoy the taste of this brand of cigarettes to others you may have smoked?

(1) **not at all**    (2) **a little**    (3) **somewhat**    (4) **very much**    (5) **I have never smoked any other brands**

6. How much more do you enjoy the smell of this brand of cigarettes to others you may have smoked?

(1) **not at all**    (2) **a little**    (3) **somewhat**    (4) **very much**    (5) **I have never smoked any other brands**

7. How much more enjoyable is this brand of cigarettes to others you may have smoked?

(1) **not at all**    (2) **a little**    (3) **somewhat**    (4) **very much**    (5) **I have never smoked any other brands**

### About the Author

Elena Lopez Khoury first became involved in psychology research in 1996 as an undergraduate at Duke University. There she received a Bachelor's of Science Degree in Psychology and Biology in 1997. She continued working on various research projects until she entered the Clinical Psychology Ph.D. program at the University of South Florida in 2001, earning her Master's Degree in 2004 and completing her clinical internship at the Vanderbilt/VA Consortium in 2008 as part of her program requirements.

While in the Ph.D. program at the University of South Florida, Mrs. Lopez Khoury served as a student representative as well as founded and served as president of the Psychology Student Diversity Committee. She also coauthored five publications in peer-reviewed journals, including two first-authorships, and made several poster and paper presentations at national and international conference meetings.