

Summer 8-15-2015

Manipulation of Negative Social Evaluative Fears on Body Dissatisfaction and Eating Behaviors: Does Fear of Social Evaluation Lead to Disordered Eating?

Cheri A. Levinson

Washington University in St. Louis

Follow this and additional works at: https://openscholarship.wustl.edu/art_sci_etds



Part of the [Psychology Commons](#)

Recommended Citation

Levinson, Cheri A., "Manipulation of Negative Social Evaluative Fears on Body Dissatisfaction and Eating Behaviors: Does Fear of Social Evaluation Lead to Disordered Eating?" (2015). *Arts & Sciences Electronic Theses and Dissertations*. 569.
https://openscholarship.wustl.edu/art_sci_etds/569

This Dissertation is brought to you for free and open access by the Arts & Sciences at Washington University Open Scholarship. It has been accepted for inclusion in Arts & Sciences Electronic Theses and Dissertations by an authorized administrator of Washington University Open Scholarship. For more information, please contact digital@wumail.wustl.edu.

WASHINGTON UNIVERSITY IN ST. LOUIS

Department of Psychology

Dissertation Examination Committee:

Thomas Rodebaugh, Chair

Deanna Barch

Alexis Duncan

Eric Lenze

Thomas Oltmanns

Denise Wilfley

Manipulation of Negative Social Evaluative Fears on Body Dissatisfaction and Eating

Behaviors: Does Fear of Social Evaluation Lead to Disordered Eating?

by

Cheri Alicia Levinson

A dissertation presented to the
Graduate School of Arts & Sciences
of Washington University in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

August 2015

St. Louis, Missouri

Table of Contents

List of Figures.....	iii
List of Tables	iv
Acknowledgements.....	v
Abstract.....	vi-vii
Introduction.....	1
Hypotheses.....	15
Methods.....	20
Results.....	28
Discussion.....	43
References.....	58
Tables.....	73
Figures.....	79

List of Figures

Figure 1: The interaction between social appearance anxiety condition and trait fear of negative evaluation predicting grams of potato chips and unhealthy food consumed.....	79
Figure 2: The quadratic relationship between total grams of food consumed and fear of negative evaluation.....	80
Figure 3: Interactions when the quadratic relationship of fear of negative evaluation (FNE2) is included in regression.....	81
Figure 4: The quadratic interaction between fear of negative evaluation and condition.....	82
Figure 5: The interaction between SAA condition and trait SAA predicting state body dissatisfaction.....	83
Figure 6: The interaction between restraint and G2-SAA predicting state body dissatisfaction..	84
Figure 7: A Model of Negative Evaluation Fears, Eating, and Body Dissatisfaction.....	85
Figure 8: A Model of the relationship between negative evaluation fears, state social anxiety, and state body dissatisfaction.....	86
Figure 9: The interaction between restraint and fear of negative evaluation predicting total grams of food intake.....	87
Figure 10: The quadratic interaction between restraint and fear of negative evaluation.....	89
Figure 11: The 3-way interaction between restraint, fear of negative evaluation, and emotional eating predicting food consumption.....	90

List of Tables

Table 1: Descriptive statistics and zero-order correlations between group, trait fear of negative evaluation, trait social appearance anxiety, total grams of food, state social anxiety, state body dissatisfaction, restraint, and emotional eating.....	73
Table 2: Means and standard deviations of food amounts consumed by condition.....	75
Table 3: Mean (and standard deviation) Levels of State Construct From Manipulation Check...	76
Table 4: Bonferroni planned comparisons between state stress, fear of negative evaluation, and social appearance from manipulation check measure. FNE = fear of negative evaluation condition; SAA = social appearance anxiety condition; control = control condition.....	77
Table 5: Multiple regression with total grams of food as dependent variable.....	88
Table 6: Significant individual difference effects on total grams of food, unhealthy food, and healthy food.....	91

Acknowledgments

I would like to acknowledge everyone who has helped support me along the way.

First, I would like to thank my husband, Justin Wallen, who has provided tremendous support along the way, including relocating to allow me to complete my doctoral studies, and providing endless support, understanding, and encouragement. I also want to thank my family, particularly my mother, who has provided support to me throughout my entire life and encouraged me to pursue my dreams.

I would like to express gratitude to my advisor, Dr. Thomas Rodebaugh, for taking a chance on me and for the wonderful training he has provided over the last six years. I would also like to thank my dissertation committee members for their indispensable help on this project.

I want to thank all of the research assistants in the Anxiety and Psychotherapy Laboratory who have made my work possible. Particularly, Sima Kaplan and Elizabeth Riley who went above and beyond and made data collection on this project, and many other projects, possible.

Finally, I want to thank NIMH, PEO, APA, and Washington University for providing me crucial financial support and resources. I have been very blessed to receive support from so many sources.

ABSTRACT OF THE DISSERTATION

Manipulation of Negative Social Evaluative Fears on Body Dissatisfaction and Eating Behaviors: Does Fear of Social Evaluation Lead to Disordered Eating?

by Cheri Alicia Levinson

Doctor of Philosophy in Psychology

Washington University in St. Louis, 2014

Professor Thomas Rodebaugh, chair

Social anxiety and eating disorders are highly comorbid. Researchers have suggested that there may be shared vulnerabilities that underlie the development of these disorders. Two of these proposed vulnerabilities are fear of negative evaluation and social appearance anxiety (i.e., fear of negative evaluation specifically focused on one's appearance). Regarding disordered eating, previous self-report research has found that social appearance anxiety may be especially relevant for body dissatisfaction, whereas fear of negative evaluation may be relevant for drive for thinness. In the current study I manipulated fear of negative evaluation and social appearance anxiety using a speech task in 160 undergraduate females. Results indicated that participants in the fear of negative evaluation condition increased food consumption, whereas participants high in trait social appearance anxiety and in the social appearance anxiety condition experienced the highest amounts of state body dissatisfaction. Participants in both conditions experienced elevated state social anxiety. Additionally, I found that restraint interacted with fear of negative evaluation to produce eating. These results are discussed within an emotion regulation framework. Overall, these results support the idea that fear of negative evaluation and social

appearance anxiety are shared vulnerabilities for eating and social anxiety disorders, but that the way these variables interact with the environment and with other individual differences may lead to disorder specific behaviors. Clinicians may want to consider incorporating exposures that evoke evaluation fears into treatments for individuals with disordered eating.

Manipulation of Social Evaluative Fears on Body Dissatisfaction and Eating Behaviors:

Does Fear of Social Evaluation Lead to Disordered Eating?

Conceptions of Comorbidity

Research has suggested that all mental disorders represent clusters of illness with overlapping risk factors and that these overlapping risk factors may contribute to the high comorbidity rates between disorders (Fyer & Brown, 2009; Hyman, 2003; Klein, Lewinsohn, Rohde, Seeley, & Shankman, 2003; Wickramaratne & Weissman, 1993). Indeed, investigation of the comorbidity between mental disorders has confirmed that there are common underlying, genetically-based vulnerabilities, such as neuroticism and negative affect, that confer risk (Barlow, 2003; Clark, 2005; Fyer & Brown, 2009).

Two categories of disorders that are highly comorbid are eating disorders and anxiety disorders (Pallister & Waller, 2008). It has been estimated that more than 45% of patients with eating disorders (EDs), meet criteria for at least one type of anxiety disorder (Pallister & Waller, 2008). Pallister and Waller (2008) suggest three potential explanations for the high comorbidity between anxiety and EDs: (a) anxiety might be a risk factor for EDs, (b) EDs might be a risk factor for anxiety, or (c) the two kinds of disorders may have common shared vulnerabilities. Of all the anxiety disorders, social anxiety disorder has the highest prevalence in individuals with EDs (Godart et al., 2000), suggesting that comorbidity between social anxiety disorder and EDs is a common problem warranting further investigation of potential underlying vulnerabilities shared between the disorders.

Social Anxiety Disorder (SAD)

SAD is the second most common type of anxiety disorder and the fourth most common mental disorder in the population with lifetime prevalence rates estimated at 12.1 % (Kessler et al., 2005). At the core of SAD is the fear that others will evaluate or judge the individuals' behavior; thus individuals with SAD may come to fear and avoid social situations in which their behavior could be evaluated (Hofmann & Barlow, 2002). Common situations that individuals with SAD fear are public speaking, maintaining or initiating conversations, participating in small groups, and many other social interaction and performance situations (Hofmann & Barlow, 2002). SAD is associated with extreme impairment: Individuals with SAD obtain lower levels of education, exhibit poor overall physical health (Acarturk, de Graaf, ten Have, & Cuijpers, 2008), are less likely to be married (Buist-Bouwman, 2006) and have significant impairments in friendships (Rodebaugh, 2009; Rodebaugh, Fernandez, & Levinson, 2012).

Eating Disorders (EDs)

EDs include the diagnoses of anorexia nervosa, bulimia nervosa, and binge eating disorder (BED)(American Psychiatric Association, 2000) and epidemiological studies estimate that they affect approximately 6% of women in the United States (lifetime prevalence: Hudson, Hiripi, Harrison, & Kessler, 2007). In up to 20% of cases, EDs remain chronic (Hudson et al, 2007). Indeed, EDs are associated with severe impairments (Klump, Bulik, Kaye, Treasure, & Tyson, 2009). For example, individuals with EDs have increased mortality rates (Berkman, Lohr, & Bulik, 2007; Katzman, 2005; Kaye, Strober, & Jimmerson, 2004; Mehler & Schulte, 1997) report increased absences at work and school (Keel, Mitchell, Miller, Davis, & Crow, 2000), have higher utilization of health care (Mitchell, Specker, deZwaan, 1991), complications with pregnancy (Bulik et al., 1999), and decreased economic stability (Klump et al., 2009).

To reduce this impairment and prevent development of EDs it is imperative to identify factors that place individuals at risk for ED onset. In addition to broad environmental (e.g., peer victimization and childhood sexual abuse (Kaltiala-Heino et al., 2000, Wonderlich et al, 1997) and genetic risk factors (Bulik et al., 1999), some well-researched risk factors for EDs are body dissatisfaction, perfectionism, drive for thinness, weight/shape concerns, and negative affect (Striegel-Moore & Bulik, 2007; Stice, 2002). Individuals who score highly on measures of these risk factors are at high risk for development of an eating disorder and individuals who score highly on measures of body dissatisfaction, drive for thinness, and weight/shape concerns are often considered to exhibit *disordered eating*.

Eating Disorder and Social Anxiety Comorbidity

SAD has the highest occurrence of all anxiety disorders in treatment seeking individuals with eating disorders and is significantly more common among individuals with eating disorders than control groups (Godart et al., 2000). The lifetime prevalence of SAD has been reported as 33.9% among individuals with anorexia nervosa (AN) (Halmi, Eckert, Marchi, & Sampugnaro, 1991) and as 17% among individuals with bulimia nervosa (BN) (Brewerton, Lydiard, Herzog, & Brotman, 1995), whereas the lifetime prevalence rate of SAD in the general public has been reported at 12.1% (Ruscio et al., 2008). In the largest study to date exploring comorbidity between bulimia nervosa, anorexia nervosa, and anxiety disorders (this study did not include binge eating disorder), approximately 20% of individuals with an eating disorder also met criteria for SAD (Kaye, Bulik, Thornton, Barbarich, & Masters, 2004). Additionally, among individuals with EDs, SAD is a barrier for help-seeking, a negative prognostic factor for treatment outcomes, and decreases engagement in effective treatments (Goodwin & Fitzgibbon,

2002; Buckner, Schmidt, & Eggleston, 2006; Buist-Bouwman et al., 2006). Further, individuals with SAD are more likely to report disordered eating than controls (Godart et al., 2000).

Clearly, the evidence suggests that comorbidity between SAD and EDs is a problem warranting further investigation. However, researchers do not yet understand if social anxiety leads to disordered eating (or vice versa) or if the two disorders share common underlying vulnerabilities (Pallister & Waller, 2008). If social anxiety is a risk factor for EDs, it may be possible to prevent the development of an eating disorder with early intervention or prevention of SAD. Alternatively, if SAD and EDs share common underlying vulnerabilities, it may be possible to develop treatments or prevention efforts that address the shared vulnerabilities. The research thus far has examined several vulnerabilities that may be shared across SAD and EDs. One of these broad vulnerabilities is stress.

Stress and Eating

Research has found that stress is a risk factor for disordered eating in animal research, in self-report data, and in experimental manipulations (Oliver & Wardle, 1999; Oliver, Wardle, & Gibson, 2000; Wallis & Hetherington, 2009). In animal research, the tail pinch task has been found to cause between 66 to 100 percent of rats to gnaw, eat, or lick at food when their tails were pinched (Antelman et al., 1975; Nemeroff et al., 1978). Electric shock has also been found to either increase or decrease eating in animals (Siegal & Brantley, 1951; Sterritt, 1962; Ullman, 1951). Moreover, severity, duration, total amount of time, and shock level can affect eating outcomes (Greeno & Wing, 1994). Thus, even in animals, in which most behavior is usually assumed to be simpler than in humans, the type of stressor is important when predicting eating patterns.

In human participants, Oliver and Wardle (1999) administered a self-report measure of stress-induced eating and stress and found that self-reported stress was correlated with self-reported snacking behavior in 73 percent of respondents. This effect was not dependent on gender or dieting status. These authors also found that intake of *meal-type* foods (e.g., fruit, vegetables, meat) decreased during stressful periods. However, the type of stressor precipitating the eating episodes was not examined. Other self-reported individual differences such as restraint, disinhibition, and emotional eating have been found to predict eating (especially of high-fat content foods) on self-report measures (Wallis & Hetherington, 2008; Weinstein, Shide, & Rolls, 1997; Zellner et al., 2006).

To further examine these results in the laboratory, Oliver, Wardle, and Gibson (2000) compared two groups of healthy participants: One group was told they would be giving a four-minute, video-taped speech (the stress condition) and one group read neutral text. Individuals who scored highly on the emotional eating scale from the Dutch Eating Behaviors Questionnaire (Van Strien, Rookus, Frijters, Bergers, Defares, 1986) and who were in the stress condition ate significantly more sweet-fatty foods (i.e., milk chocolate, vanilla ice cream) than non-emotional eaters in the stress group and individuals in the control group. These authors conclude that stress may impair healthy eating choices in emotional eaters (more so than in non-emotional eaters). Wallis and Hetherington (2009) randomly assigned twenty-six women participants to either complete an ego-threatening word (e.g., worthless) or neutral word (e.g., wavering) Stroop task. After completion of the Stroop task participants were presented with a tray with dried fruit, chocolate, and a glass of water. Contrary to the authors' expectations, similar amounts of both foods were eaten in either condition, and restrained eaters did not vary in the amount of chocolate they consumed. Restrained eaters ate less of the dried fruit in the ego-threatening

condition, suggesting they were successfully able to restrain from a “healthy” snack. However, this study has several limitations, including a small sample size and a range of restriction scores lower than in research that has used similar methods (Wallis & Hetherington, 2004). It may be possible that a Stroop task does not induce enough (or the type) of stress that produces eating effects.

In a review of the experimental literature published through 1992, examining several types of stressors, Greeno and Wing (1994) found that restraint (the ability to restrain from food intake) interacted with stress to produce overeating. They examined seven studies evaluating the effects of nine different stressors. In restrained eaters, negative mood induced with negative adjectives, watching a stressful video, unsolvable puzzles that are used to prime thoughts about one’s intelligence, and giving a speech, produced increased eating in restrained eaters (Frost, Goolkasian, Ely, & Blanchard, 1982; Heatherton, Herman, & Polivy, 1991; Herman & Polivy, 1975; Schotte, Cools, & McNally, 1990). However, other studies found that threat of shock, watching a stressful video, and unsolvable puzzles not linked to intelligence did not produce increased eating in restrained eaters (Cools, Schotte, & McNally, 1992; Heatherton, Herman, & Polivy, 1991; Herman, Polivy, Lank, & Heatherton, 1987). Thus, it appears that there are mixed results on what type of stressor predicts eating in restrained eaters.

It may be that interpersonal stressors are particularly relevant for inducing eating. For example, Stroud, Kraff, Wilfley, and Salovey (2000) found that in undergraduate women, restrained eaters ate more ice cream after an interpersonal exclusion task. In this study, participants were gradually excluded by two confederates. In the control condition, participants were given a non-interpersonal word task. These authors showed that women in the exclusion condition who were restrained eaters ate more ice cream than restrained eaters in the control

condition. They also found that this interpersonal stressor task significantly increased tension, systolic blood pressure, and diastolic blood pressure, and significantly decreased positive affect more so for women than for men. These authors conclude that it may be interpersonal stress that drives disordered eating patterns.

In a clinical and comparison sample (17 obese women with BED, 31 obese non-BED women), Laessle and Schulz (2009) randomly assigned participants to a stress or non-stress condition. In the stress condition participants completed the Trier Social Stress Test (TSST), which consists of an anticipation phase, free speech assignment, and mental arithmetic (Kirschbaum, Pirke, & Hellhammer, 1993). In the control conditions, participants read a newspaper. They found a main effect for individuals in the stress condition, such that all individuals ate faster in the stress condition. They also found that individuals with BED in the stress condition had the highest eating rates. These results are compelling because they showed that stress affects eating overall and especially in women with an eating disorder.

From a review of the literature three important points emerge: (a) stress induces eating behaviors in some individuals (b) eating behavior after stress may be dependent on the type of stressor (c) individual differences such as restraint and emotional eating help determine which individuals will over or under eat because of stress.

Stress and Social Anxiety

Research conducted on social anxiety and stress often focuses on social stressors that may evoke fears of evaluation, such as giving a public speech or exclusion. Within individuals with SAD, public speaking paradigms, such as the stress tasks used in the eating research, have been shown to produce fears of evaluation and to activate fear processing in the amygdala (LeDoux, 2000; Tillfors et al., 2001), suggesting that there are biological signals that can be

measured in individuals with SAD (or high levels of social anxiety) when experiencing evaluative tasks. For example, Cornwell, Johnson, Berardi, and Grillon (2006) recruited forty-five healthy participants with no psychiatric diagnoses to participate in either a five-minute virtual reality speech or a less stressful, non-social counting task. They found that individuals high in fear of negative evaluation had higher startle reactivity during the anticipation of the public speech. However, this was not true of individuals high in general anxiety (i.e., it was specific to social anxiety).

Tillfors et al., (2001) recruited 18 individuals diagnosed with SAD and 6 individuals without SAD (comparison group) to give a 3 minute speech while in a PET scanner. Individuals gave the speech in two conditions: Once while with an audience and once while alone (stress group versus control group). Participants were videotaped in the audience condition, but not in the control group. These authors found that subjective anxiety (reported via the STAI; Spielberger et al., 1983) was increased in the SAD group in the audience condition. Also in the audience condition, they found enhanced amygdala activity and decreased brain blood flow in the orbito-frontal and insular cortices in individuals with SAD, suggesting that during evaluation, individuals with SAD both self-report higher levels of anxiety and show enhanced brain activation in emotional arousal areas of the brain (the amygdala) and decreased activation in the areas of the brain that would help regulate the emotion (the frontal cortex).

These signals can also be measured in an undergraduate sample: Oaten, Williams, Jones, and Zadro (2008) tested the effects of ostracism using a computer stimulation in undergraduate students. They found that individuals who were ostracized (versus non-ostracized controls) reported higher levels of ostracism and ate more unhealthy cookies. They also found that after a

forty-five minute delay, only participants high in fear of negative evaluation who were ostracized continued to feel ostracized and continued eating more cookies.

This review of the literature shows that in both research on eating and social anxiety, social stressors such as public speaking and exclusion lead to increased feelings of social anxiety and increased eating, and that there are biological correlates of these feelings. Arguably, giving a public speech and exclusion can be thought of as a form of stress that may evoke negative social evaluative fears. In other words, it may be that negative social evaluation fears drive the stress from these paradigms and that it may be these fears (rather than general stress) that may produce eating behaviors and the associated stress.

Self-regulation, Eating, and Social Anxiety

One way to conceptualize the relationship between stress and eating is through a self-regulatory perspective. Self-regulation (or self-control) is the exertion of control over behavior by the self (Muraven & Baumeister, 2000). Stressors such as noise, crowding, and bad odors have been shown to impair self-control and decrease performance (e.g., Glass, Singer, & Friedman, 1969; Sherrod, 1974). It may be that certain individual differences (such as restraint or emotional eating) predispose individuals to over or under eat when self-regulation is preoccupied with processing stress. Indeed, Muraven and Baumeister (2000) discuss the above reviewed study (Heatherton et al., 1991) as a failure of self-control. Muraven and Baumeister (2000) speculate that dieting is an exercise that requires strong self-control and when dieters (individuals high in restraint) are faced with a stressor they are susceptible to eating more because their self-control strength is depleted. Baumeister, Bratslavsky, Muraven, and Tice (1998) designed an experiment to test the proposition that regardless of dieting status, when an individual already has low levels of self-control remaining, they will over eat. In this experiment,

participants were asked to restrain from eating for several hours and were then exposed to the sight of cookies and chocolate candies. Some participants were allowed to eat the cookies and others were allowed to only eat a bowl of radishes. Participants in the radish group showed less persistence on a subsequent unsolvable puzzle task than did participants who were allowed to eat the cookies. Baumeister et al. (1998) assert that these results support the idea that sustaining self-control (not allowing oneself to eat the cookies) impairs performance in other areas (persistence on the puzzle).

Similarly, it may be that maintaining self-control when undergoing a stressful situation impairs ability to restrain from over or under eating. One of these stressors (or individual differences) that may predispose individuals to over or under eat may be negative social evaluative fears. This stress may be activated by priming negative evaluative fears in all individuals, but may be amplified by high trait level fears. For example, when an individual high in fear of negative evaluation has that fear activated, it may be difficult to regulate intake of food because self-control or coping skills (self-regulation) are preoccupied with regulation of such fears. Or alternatively, when an individual is preoccupied with self-regulation of eating (i.e., because of a diet), it may be difficult to maintain self control when in a stressful social situation, especially for individuals high in fear of negative evaluation. Further, it could be that there are reciprocal relationships between self-regulation of eating and negative evaluation fears that maintain their relationship with over eating.

Fear of Negative Evaluation (FNE) and Social Appearance Anxiety (SAA)

Two negative social evaluative fears that may impair self-regulation are fear of negative evaluation (FNE) and social appearance anxiety (SAA). FNE is the fear that one will be negatively judged and rejected because of that judgment. SAA is the fear that one will be

negatively judged specifically on characteristics' of one's appearance (Hart et al., 2008).

Researchers have shown that FNE and SAA are highly correlated, yet distinct social anxiety constructs (Hart et al., 2008; Levinson & Rodebaugh, 2011). Researchers have also shown that fear of negative evaluation is a moderately heritable trait (Stein, Jang, & Liveslay, 2002).

Fear of Negative Evaluation, Social Anxiety, and Eating

In the social anxiety literature, FNE is understood as a cognitive vulnerability for, or core feature of, social anxiety (Haikal & Hong, 2010; Heimberg, Brozovich, & Rapee, 2012).

Heimberg et al. (2012) outline a model of social anxiety in which the primary threat stimulus is the audience, and the primary threatening outcome is negative evaluation from the audience.

Thus, social anxiety stems from heightened fears of negative evaluation in social situations that have the potential for the individual to be evaluated.

Haikal and Hong (2010) recruited 52 individuals who were assigned to either a high social evaluation situation (a video-taped 3 minute speech that would be evaluated by a communication expert) or a low social evaluation situation (a video-taped 3 minute speech with no evaluation). They found that individuals with high levels of FNE exhibited the highest levels of self-reported anxiety during the speech. Additionally, independent raters rated individuals with higher levels of FNE as having high levels of performance deficits during the speech. These results suggest that individuals high in FNE are likely to feel and exhibit more anxiety when in a social evaluative situation.

FNE has also been linked to eating behaviors. Indeed, research on social anxiety and disordered eating often focuses specifically on FNE, rather than other social fears common in social anxiety disorder, and most research has examined FNE as a mediator between social anxiety and disordered eating (Bulik, Beidel, Duchmann, Weltzin, 1991; Gilbert & Meyer, 2003;

Gilbert & Meyer, 2005; Vander Wal & Thomas, 2004; Vander Wal, Gibbons, & del Pilar Grazioso, 2008; Wonderlich-Tierney & Vander Wal, 2010). Gilbert and Meyer (2003) tested the cross-sectional relationship between FNE, social comparison, and three measures of disordered eating from the EDI-2: Body dissatisfaction, drive for thinness, and bulimic symptoms. They found that FNE predicted drive for thinness over and above depression and social comparison, whereas social comparison predicted bulimic symptoms. Depression was the only significant predictor of body dissatisfaction. The relationship between drive for thinness and FNE has been replicated in our laboratory (Levinson & Rodebaugh, 2012). Gilbert and Meyer (2005) replicated their 2003 cross sectional results and examined the longitudinal relationship between FNE, body dissatisfaction, drive for thinness, and bulimic symptoms. They did not find a significant relationship for FNE predicting drive for thinness. However, they did find that over time FNE predicted bulimic symptoms.

Vander Wal and Thomas (2004) found that weight classification (average, overweight, or obese) and FNE predicted body image dissatisfaction and eating attitudes and behaviors (as measured via the Children's Eating Attitude Test; Maloney, McGuire, & Daniels, 1989) over and above age, cognitive behavioral problem solving, and cognitive avoidance in 139 Hispanic and African American girls in the 4th and 5th grade. Vander Wal, Gibbons, and del Pilar Grazioso (2008) found similar results in a Guatemalan sample of female girls: They found support for a model in which FNE predicted internalization of media ideals and body-esteem satisfaction, which in turn predicted eating attitudes and behaviors. Finally, Wonderlich-Tierney and Vander Wal (2010) tested the relationship between social anxiety (measured via the Social Phobia and Anxiety Inventory, SPAI; Turner, Beidel, Dancu, & Stanley, 1989), FNE, disordered eating (via the Eating Attitudes Test; Garner & Garfinkel, 1979), social support, and coping styles. They

found that the SPAI was not correlated with disordered eating, whereas FNE was significantly correlated with disordered eating. They also found that the relationship between FNE and disordered eating was mediated by an emotional oriented coping style, whereas the relationship between social anxiety and disordered eating was moderated by social support. However, this study was limited by a small sample size: It seems plausible that there was not enough power to detect the relationship between the SPAI and disordered eating.

Overall, this research provides evidence that FNE has a clear link with both social anxiety and disordered eating. In regard to social anxiety, FNE is thought of as a core vulnerability for social anxiety disorder and individuals high in FNE exhibit greater anxiety and performance deficits. In the eating literature, FNE predicts disordered eating in cross sectional studies and in one longitudinal study. Other measures of social anxiety (e.g., SPAI) have not been found to correlate with disordered eating, whereas FNE has been found to correlate with disordered eating using two separate measures of disordered eating (EAT-26 and EDI-2). FNE correlates with disordered eating in college students, children, and in diverse populations (e.g., African-American, Hispanic, and Guatemalan samples). However, all of the studies thus far have mostly relied on self-reported fear of negative evaluation or have conceptualized fear of negative evaluation as general stress. It would be a useful next step to explicitly test if fear of negative evaluation versus general stress predicts eating behaviors.

Social Appearance Anxiety, Social Anxiety, and Eating

In addition to general FNE, fear of negative evaluation of one's appearance, or social appearance anxiety (SAA), may be of specific relevance for eating disorders. SAA has been shown to be a unique construct that is highly related to social anxiety and disordered eating (Hart et al., 2008; Levinson & Rodebaugh, 2011). Moscovitch (2009) proposed that perceived flaws in

appearance may be one of the core fears causing individuals with SAD to fear public criticism. Further, Rieger et al., (2010) proposed that social evaluation of appearance leads to psychological symptoms in those individuals who place greater emphasis on their physical appearance (as in those with eating disorders). In a clinical sample, Koskina, Van den Eynde, Meisel, Campbell, and Schmidt (2011) found that individuals with a diagnosis of bulimia nervosa ($n = 30$) had significantly higher levels of SAA than healthy controls ($n = 40$) and Claes et al., (2011) found that SAA was related to BMI, drive for thinness, and body dissatisfaction in 60 women diagnosed with an eating disorder.

In non-clinical samples, SAA predicts social anxiety over and above neuroticism, depression, negative affect, extraversion, body dissatisfaction, self-esteem, and trait anxiety (Hart et al., 2008; Levinson & Rodebaugh, 2011) and predicts disordered eating over and above social interaction anxiety, fear of scrutiny, fear of negative evaluation, body mass index, and fear of positive evaluation (Levinson & Rodebaugh, 2012). Specifically, SAA appears to have a robust relationship with body dissatisfaction (Levinson & Rodebaugh, 2012). The evidence suggests that SAA is an important construct for both social anxiety and disordered eating. However, SAA has not been explicitly manipulated in an experimental design, though there is evidence from self-report measures that SAA predicts disordered eating over and above FNE and other social fears (Levinson & Rodebaugh, 2012).

Current Study

Taken together, this research suggests that fear (coming from stressful social situations), and in particular social evaluation fears, may be a risk factor for both disordered eating and social anxiety. As reviewed above, there are several potential explanations for social anxiety and eating comorbidity (Waller & Pallister, 2008). It could be that social anxiety causes disordered

eating and that negative social evaluation fears mediate the relationship between social anxiety and disordered eating. However, given the research discussed above, it may not be social anxiety per se that causes disordered eating, but rather underlying vulnerabilities such as fear of negative evaluation and social appearance anxiety, common to both disorders, that produce symptoms of both social anxiety and disordered eating (Levinson & Rodebaugh, 2012). One way to test if these negative evaluative fears have a causal relationship with social anxiety and disordered eating is with an experimental manipulation. In the current study I will test if a manipulation of two types of negative social evaluative fears (FNE and SAA) lead to disordered eating and social anxiety.

In the current study I use an analogue sample that consists of undergraduate women. I have chosen this sample because disordered eating is extremely prevalent in undergraduate women and eating disorders frequently emerge during these years (Taylor et al., 2006; Schwitzer, Bergholz, Dore, & Salimi, 1998). Indeed, in previous data collection in my laboratory we have found that 20-23% of participants exhibited clinically significant disordered eating (Levinson et al., 2013). Further, since this is the first study to test these mechanisms experimentally, it is necessary to collect a large sample. Therefore, using undergraduate women increased the feasibility of the study and allows for tests of the mechanisms. The limitations of using an analogue sample and considerations for future research are discussed in the discussion.

Main Hypotheses

Manipulation Check: Individuals in each condition will experience higher levels of the corresponding state construct.

I will use a manipulation check to test if each condition is evoking the hypothesized state construct. For example, I will test if individuals in the SAA condition experience higher levels of

state social appearance anxiety over and above general stress and state fear of negative evaluation. If the manipulation check is supported, I will continue with analyses as planned. If the manipulation check is not supported, I will conceptualize each condition as dependent on what was manipulated during the speech. For example, if the SAA condition is producing fear of negative evaluation, but not social appearance anxiety, then that condition will be conceptualized as evoking fear of negative evaluation. Alternatively, if the conditions are evoking stress additively (i.e. the control condition is the least amount of stress, FNE condition is more stress, and SAA is the most stress), I will conceptualize the conditions as increased levels of stress from increased evaluation (not specific to appearance anxiety or fear of negative evaluation). However, I do not expect that these two alternatives will be true.

Stress Experimental Manipulation.

Hypothesis 1: Trait FNE and the FNE condition will predict food consumption and social anxiety after a public speaking task.

I will activate fear of negative evaluation by having participants give a short speech that is audio recorded and told they will be evaluated on their performance. There will also be a control manipulation and a manipulation of social appearance anxiety (SAA condition). Experimental manipulations, such as giving public speeches, have consistently shown that individuals either over eat or under eat in the presence of stress or fear activation (Gluck, Geliebter, Hung, & Yahav, 2004; Greeno & Wing, 1994). Public speaking tasks have been shown produce fears of evaluation and to activate fear processing in the amygdala (LeDoux, 2000; Tillfors et al., 2001). Such results suggest that utilizing a public speaking task should activate fear (specifically social fears), which may affect eating consumption. Further, research has found that fear of negative evaluation may have a specific relationship with drive for thinness but not

body dissatisfaction (Gilbert & Myers, 2003; Levinson & Rodebaugh, 2012). Thus, I would expect that evoking fear of negative evaluation should induce over eating, similar to the way that restraint induces over eating. In other words, in individuals high in drive for thinness, self-regulation may be preoccupied with behaviors related to drive for thinness (i.e. restrained eating) and when fear of negative evaluation is activated, self-control will be depleted and increased eating may occur.

I expect that there will be a main effect for the FNE condition compared to the control and the SAA condition and for trait level FNE on eating behavior. Alternatively, there may be no main effect of condition but rather trait level FNE and FNE condition may interact. Specifically, individuals who are high in trait level fear of negative evaluation and in the fear of negative evaluation condition should consume more calories than in the social appearance anxiety and control condition. However, an alternative hypothesis is that individuals may eat fewer calories, because some research has suggested that under eating (in addition to over eating) is also a response to stress. However, I hypothesize that individuals will over eat, because most research supports over rather than under eating. I will also test if FNE predicts unhealthy (potato chips and chocolate) versus healthy (pretzels and fruit) differently because of research suggesting that stress eaters consume more fatty type, snack foods (chocolate) and less meal type foods (fruit or vegetables) (Oliver, Wardle, and Gibson, 2000). I also expect that participants high in trait-FNE and individuals in the FNE condition will exhibit higher levels of state social anxiety than in the control condition. Further, I expect that there will be an interaction between trait FNE and the FNE condition, such that individuals high in FNE and in the FNE condition will exhibit high levels of state social anxiety.

Hypothesis 2: Trait SAA and the SAA condition will predict state body dissatisfaction and social anxiety after a public speaking task

I will also use a public speaking paradigm to activate social appearance anxiety. In this condition participants will be videotaped and told that they will be evaluated on their appearance during the speech. Trait level social appearance anxiety has been found to predict body dissatisfaction, but not drive for thinness (Levinson & Rodebaugh, 2012). Thus, I predict that both trait level SAA and the SAA condition will predict state body dissatisfaction after the speech. However, it is also plausible that there will be no main effect of condition but that there will be an interaction between condition and trait level SAA (i.e., I expect that trait level SAA and the SAA condition will interact to predict state body dissatisfaction, such that individuals high in trait SAA and in the SAA condition will exhibit high levels of state body dissatisfaction). I also expect that participants high in trait SAA and individuals in the SAA condition will exhibit higher levels of state social anxiety than in the control condition. Further, I expect that there will be an interaction between trait SAA and the SAA condition, such that individuals high in SAA and in the SAA condition will exhibit high levels of state social anxiety.

Hypothesis 3: Both negative evaluation conditions will predict higher food intake, social anxiety, and body dissatisfaction as compared to the control condition.

When participants from the SAA and FNE condition are combined, I hypothesize that individuals in the negative evaluation conditions will eat more food and have higher levels of state social anxiety and body dissatisfaction than individuals in the control condition.

Ancillary Research Hypotheses:

Validation of the Manipulation Task.

Hypothesis 4: Trait FNE will correlate with state social anxiety experienced before the FNE manipulation over and above trait SAA.

To test if the FNE condition is a valid manipulation of fear of negative evaluation I will test if trait level fear of negative evaluation predicts state social anxiety before and after the speech over and above trait level SAA. I hypothesize that trait FNE will predict state social anxiety over and above SAA.

Hypothesis 5: Trait SAA will correlate with state social anxiety experienced during the SAA manipulation over and above trait FNE.

To test if the SAA condition is a valid manipulation of social appearance anxiety I will test if trait level social appearance anxiety predicts state social anxiety over and above trait level FNE. I hypothesize that trait SAA will predict state social anxiety over and above FNE.

Individual Differences.

Hypothesis 6: Individuals high in restraint and high in trait FNE will eat more (this may also be true for trait SAA).

Given that research has often found that restraint predicts over eating when an individual is stressed (Frost, Goolkasian, Ely, & Blanchard, 1982; Greeno & Wing, 1994; Heatherton, Herman, & Polivy, 1991; Herman & Polivy, 1975; Schotte, Cools, & McNally, 1990), I expect that individuals high in restraint will eat more than individuals low in restraint when in a negative social evaluative condition. Baumeister and colleagues (1998) found that when an individuals' self-regulation is already occupied, they are likely to perform less well and be less able to continue self-regulating at a high level. Thus, I also hypothesize that trait FNE will operate similarly to restraint because individuals high in FNE will be more likely to have to use (or to have already used) high levels of self-regulation to restrain from eating because they will

be preoccupied with fears of negative evaluation activated during the speech. My main hypothesis is that there will be an interaction between trait FNE and restraint, such that individuals high in restraint and high in FNE eat more calories. I expect this result because individuals will be regulating at two levels (restraining from food and processing negative evaluation fears). I also expect that this result may be more salient for unhealthy foods versus healthy foods.

Hypothesis 7: Individuals high in emotional eating and high in FNE will eat more (this may also be true for SAA).

Research has also found that individuals high in emotional eating (EE) eat more when stressed (Oliver, Wardle, and Gibson, 2000). Similarly to restraint, I expect that individuals high in EE will eat more especially when they are high in FNE because they will be regulating both emotions and negative evaluation fears.

Methods

Power

In previous experimental studies examining the interaction between an individual difference (restraint or emotional eating) and experimental manipulation of stress, effect sizes have been fairly large for the interaction term: $\eta^2 = .14-.25$ (Oliver, Wardle, & Gibson, 2000; Laessle & Schulz, 2009). A power analysis was conducted using G*Power version 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). Using these estimates from previous literature for the most conservative, but still large, effect size (.14) for power at .80, I need to recruit 109 participants. For the largest reported effect size (.25) I would need only 58 participants for power at .80. However, because both of these studies tested only two groups (stress versus no stress), included gender, and because FNE- and SAA-based manipulations have not previously been used, I will

use the most conservative estimate (109 participants) and add an additional 41 participants to increase power, which is the largest sample size I can collect that is feasible. The final sample size is expected to be ~150 participants (~50 per condition). Additionally, if needed, to increase power to detect differences from any type of negative evaluation condition versus a control condition I will combine both negative evaluation groups (FNE and SAA) and compare them to the control group (see Hypothesis 3). This hypothesis replicates previous studies that have tested only two groups (a control versus stress group) interaction with an individual difference (Oliver, Wardle, & Gibson, 2000; Laessle & Schulz, 2009). Based on these studies, I should have adequate power to detect differences between the three groups and excellent power to detect effects between the two groups while still maintaining feasibility.

Participants

Participants were 160 female undergraduates recruited from the Psychology Participant Pool at Washington University. Women participants (and not men) were recruited because disordered eating is highly prevalent in women, more so than in men (Hudson, Hirpi, Pope, & Kessler, 2006). Additionally, college women are at heightened risk for the development of an eating disorder (Woodside & Garfinkel, 1992). An all woman sample provides relatively greater power than a sample including both genders because there is a wider range in eating behaviors and higher prevalence of disordered eating in women. In a sample of both men and women, gender tests would be crucial. To appropriately power tests of gender would require at least twice as many participants, which was not feasible. Participants were compensated with 1.5 credit hours of research participation (for one and a half hour of participation).

Self-report Measures

Demographics. Participants filled out a demographic form with the following information: age, ethnicity, and level in school.

The Brief Fear of Negative Evaluation (BFNE; Leary, 1983) is a 12-item version of the original Fear of Negative Evaluation Scale (Watson & Friend, 1969). The items assess trait level fear of negative evaluation, which has been theorized to be a central component of social anxiety. Example items are *I am afraid others will not approve of me* and *I am usually worried about what kind of impression I am making on someone*. The BFNE has been shown to correlate with other measures of social anxiety and has excellent psychometric properties when the four reverse scored items are excluded, as they were here (Rodebaugh et al., 2004). This measure was used to assess trait-level fear of negative evaluation. Internal consistency in this sample was excellent ($\sigma = .91$).

The Social Appearance Anxiety Scale (SAAS; Hart, Flora, Palyo, Fresco, Holle, & Heimberg, 2008) is a 16-item measure developed to assess anxiety about being negatively evaluated by others because of one's overall appearance, including body shape (trait social appearance anxiety). Research on the psychometric properties of the SAAS demonstrated high test-retest reliability, good internal consistency, good factor validity, incremental validity (e.g., it was a unique predictor of social anxiety above and beyond negative body image indicators), and divergent validity (Hart et al., 2008; Levinson & Rodebaugh, 2011). Example items from the SAAS are *I am concerned people would not like me because of the way I look* and *I get nervous when talking to people because of the way I look*. This measure was used to assess trait-level social appearance anxiety. Internal consistency in this sample was excellent ($\sigma = .94$).

Dutch Eating Behavior Scale (DEBQ; Van Strien, Frijters, Bergers, Defares, 1986) is a 32-item measure eating behaviors. Two of the subscales are restraint and emotional eating. These

scales have high internal consistency, external, and factor validity (Van Strien et al., 1986). Example items from the DEBQ are *If you have put on weight, do you eat less than you usually do?* and *Do you have a desire to eat when you are feeling lonely?*. This measure was used to assess individual differences in restraint and emotional eating. Internal consistency for restraint and emotional eating was excellent ($\sigma = .94$).

Hunger Measure. Hunger was measured with one item that assesses current hunger level on a seven-point Likert scale ranging from 1 = not at all to 7 = extremely as used in Oliver, Wardle, and Gibson (2000).

Subjective Units of Distress Scale (SUDS; Wolpe, 1988) is a behavioral measure often used during exposure treatment and behavioral assessment to measure anxiety. SUDS ratings can range from 0 (completely calm) to 100 (highest anxiety felt or imagined). Other reference points include 25 (noticeable, but not bothersome anxiety), 50 (bothersome anxiety), and 75 (very bothersome anxiety). The SUDS scale will be used to gain state social anxiety measures at two-minute intervals before and after the speech and to measure peak levels of social anxiety during the speech.

Physical Appearance State Anxiety Scale (PASTAS; Reed, Thompson, Brannick, & Sacco, 1991) is a 16-item measure of state appearance anxiety and body dissatisfaction. It has two subscales: weight and non-weight scales. The PASTAS instructs individuals to rate how anxious, tense, or nervous they feel about body parts such as thighs, waist, and legs. This measure was combined with the adapted Eating Disorder Inventory-2 to assess body dissatisfaction before and after the speech task. Internal consistency in this sample was excellent ($\sigma = .90$).

Eating Disorder Inventory-2 (EDI-2; Garner, Olmsted, & Polivy, 1983) is a 91-item self-report questionnaire designed to measure psychological features commonly associated with anorexia nervosa and bulimia nervosa. It has been shown to have good internal consistency and good convergent and discriminant validity (Garner et al., 1983) and is frequently used by clinicians for the assessment of eating disorder symptoms (Brookings & Wilson, 1994). In the current study the 9-item body Dissatisfaction (BD) will be adapted so that the directions ask for the participant to rate the following behaviors “based on how you feel right now.” Example items are *I think my stomach is too big* and *I feel satisfied with the shape of my body*. The BD subscale includes items that assess dissatisfaction with overall body shape as well as the size of specific regions of the body, such as hips, stomach, and thighs. This measure was combined with the PASTAS to measure body dissatisfaction before and after the speech task. Internal consistency in this sample was excellent ($\sigma = .91$).

Food Measure. Bowls of pretzels, M & Ms, potato chips, and dried fruit were weighed with a food scale before and after participants were given the opportunity to snack from each bowl, which created a measure of grams of food eaten (Wallis & Hetherington, 2009). Food was also divided in to healthy (pretzels and fruit) and unhealthy (potato chips and M&M) composites.

Body Measures. Body fat content and Body Mass Index (BMI) were measured at the end of the session. Body fat content was measured using a Baseline Body Fat Monitor Model 12-1122 (Fabrication Enterprises, 2007), height with a wall hanging height chart, and weight was measured using an Omron HBF-400 scale (Omron Health Care Inc, 2009). Height and weight were used to calculate BMI. These body measures have shown to be reliable in a previous study from our laboratory. A subset of participants ($n = 27$) were administered these body measures at two time points one week apart. All measures at Time 1 and Time 2 were highly correlated:

Body fat ($r = .86$), height ($r = .99$), weight ($r = .92$), thereby demonstrating good test-retest reliability. BMI and body fat content were measured to test for any apparent effects that could be due to body measures. For example, it could be that individuals high in body fat content become nervous in the negative evaluation conditions because they are concerned about evaluation of their body weight rather than concern about negative evaluation of their appearance (more generally).

Manipulation Check Measure. An adapted measure of state social appearance anxiety, state fear of negative evaluation, and stress was administered at the end of the speech. This measure tested if individuals in each condition were experiencing the corresponding state construct (i.e. individuals in the fear of negative evaluation condition should score higher on the state fear of negative evaluation measure than on the social appearance anxiety measure). There are two different sections of this measure. Section 1 asks participants to rate how they are feeling *right now*. This section creates subscales of *general state* fear of negative evaluation ($\sigma = .96$), social appearance anxiety ($\sigma = .91$), and stress ($\sigma = .91$). Section 2 asks participants to rate how they felt during the speech. This section creates subscales of *state* fear of negative evaluation ($\sigma = .93$), social appearance anxiety ($\sigma = .94$), and stress ($\sigma = .85$) *during the speech*. Please see Appendix 1 for the items on this measure.

Procedure

Participants took part in a one session, one and a half hour experiment that was advertised as an experiment about public speaking and personality. Participants were asked to eat normally the day before the experiment and to not eat for the hour before their participation. Participants were consented and completed a short questionnaire packet consisting of the measures listed above. The experimenter explained the SUDS scale and then explained the speech task. Participants

were given a list of speech topics that they could choose to prepare their speech on and were given 2 minutes to prepare the speech. Participants were asked to fill out the Time 1 state measures of anxiety and body dissatisfaction before beginning the speech (but after preparation). Participants then gave a six minute speech. SUDS levels were recorded two minutes before the speech, right before the speech, and after the speech. Participants were also asked for their peak SUDS level during the speech.

Manipulation of FNE, SAA, and control condition. Participants were randomly assigned to one of three conditions that used a speech task to elicit: (1) fear of negative evaluation (FNE) ($n = 52$), (2) social appearance anxiety (SAA) ($n = 55$), or (3) stress ($n = 53$) associated with speaking (Control). Participants in the FNE condition were instructed to treat the audio recorder as the audience and told that their speech will be audio-taped and rated later for quality and content of their performance. This speech should theoretically elicit fears of negative evaluation but not of appearance evaluation because they are told their performance will be rated only on the basis of audio information (not on their physical appearance). Experimenters did not sit in with the participants so that they did not receive any appearance evaluation during the speech. Participants in the SAA condition were instructed to treat the experimenter *and the 2 cameras* as an audience. They were told that their speeches will be rated later specifically on *physical appearance* of the speaker during the speech. This speech should theoretically elicit fears specific to appearance evaluation. Participants in the Control condition were instructed to give a speech but were not told that it would be rated at a later time (nor were they told it would be recorded). This condition should control for stress related to giving a speech but should not elicit FNE or SAA because there was no observation or recording of the speech. At the end of the

speech participants filled out Time 2 state anxiety and body dissatisfaction measures and the manipulation check measure.

Eating Behavior Dependent Variable. Pretzels, M & Ms, potato chips, and dried fruit were given to participants in bowls after completion of the Time 2 packet. Each bowl was weighed before and after it was left in the room with the participant to measure grams of food eaten. Participants were also given a bottle of water that was weighed before and after consumption; however, results using water as a dependent variable were not reported on for conciseness. After the speech the experimenter left the room and told the participant that they were leaving “*to shut off the recording equipment and prepare for the final part of the session.*” During this time participants were able to snack from the bowls of food. Participants were left with the food and water for ten minutes. Participants were given magazines to read while the experimenter was gone. When the experimenter returned they administered Time 3 affect ratings. The experimenter then administered body measures and debriefed the participant.

Post-hoc analyses. Post-hoc structural equation modeling analyses were conducted using Mplus Version 6.1 (Muthén&Muthén, 1998-2012). The MLM estimator was used because of concerns of normality violations. MLM estimates standard errors and a mean-adjusted chi-square test statistic that are robust to non-normality using the satorra-bentler chi-square. Available *n* dropped to 156 because of missing data on 2 questionnaires, which is less than 5% of the sample. Therefore, listwise deletion was used with these cases. Model fit was evaluated using the: (a) comparative fit index (CFI; Bentler, 1990), (b) Tucker-Lewis incremental fit index (TLI; Tucker & Lewis, 1973), (c) root mean square error of approximation (RMSEA; Steiger& Lind, 1980), and (d) standardized root mean square residual (SRMR; Bentler, 1990). The magnitudes of these indices were evaluated with the aid of recommendations by Hu and Bentler (1999). Essentially,

for the CFI and TLI, values of .90 and above were considered adequate, whereas values of .95 or above were considered very good; for the RMSEA and SRMR, values of .08 and below were considered adequate and .05 or less very good. After establishing an acceptable model fit, I tested for mediation. Bootstrapping was used to test for indirect effects. As recommended by Hayes (2009), 5000 draws were implemented.

Results

Participant Characteristics

Participants ($N = 160$) were mostly Caucasian ($n = 111, 69.4\%$). Other ethnicities reported were Asian ($n = 23, 14.4\%$), Black ($n = 9, 5.6\%$), Hispanic ($n = 6, 3.8\%$), multi-racial ($n = 11, 6.9\%$), and 1 participant reported ethnicity as not listed. Participants had a median age of 19.01 ($SD = 1.10$) and most participants were in their 1st year of undergraduate school ($M = 1.70$, $median = 1.00$, $SD = .95$). Participants' social anxiety scores (as measured by the Straightforward Social Interaction Anxiety Scale; Mattick & Clark, 1998; Rodebaugh et al., 2011) ranged from very low (0) to very high (65), with a mean score of 25.00. 32.9 % of participants scored above a 28, which has been suggested as a cut-off score for probable social anxiety disorder. Participants disordered eating scores (as measured by the Eating Disorder Inventory-2; Garner, Olmsted, & Polivy, 1983 and the Dutch Eating Behaviors Questionnaire; Van Strien, Frijters, Bergers, Defares, 1986) ranged from very low to very high. Scores on drive for thinness ranged from 2 to 30 ($M = 14.41$, $SD = 6.72$). The upper quartile of participants on drive for thinness scored above 19. Scores on restraint ranged from 10 to 50 ($M = 26.5$, $SD = 9.47$). The upper quartile of participants on restraint scored above 34.

Descriptive Statistics, Zero-order Correlations, and Transformations

All variables were checked for normality and outliers. Total grams of food was non-normally distributed and therefore was transformed using a square root transformation. Condition was dummy coded into 2 variables (FNE = 1, SAA and control = 0 and SAA = 1, FNE and control = 0) for use in multiple regression. In the remaining analyses I refer to the first dummy variable (FNE = 1, other conditions = 0) as group 1 (G1-FNE) and the second dummy variable (SAA = 1, other conditions = 0) as group 2 (G2-SAA). G1-FNE compares the participants that received the FNE manipulation versus all other manipulations and G2-SAA compares participants that received the SAA manipulation versus all other manipulations. As can be seen in Table 1, the G1-FNE condition was positively correlated with grams of food consumed and negatively correlated with state body dissatisfaction, whereas the G2-SAA condition was positively correlated with state social anxiety and body dissatisfaction. Both trait social appearance anxiety and trait fear of negative evaluation were positively correlated with state social anxiety and state body dissatisfaction, but not with grams of food consumed. Please see Table 1 for all descriptive statistics and inter-correlations between condition, total grams of food, state social anxiety, state body dissatisfaction, trait fear of negative evaluation, trait social appearance anxiety, emotional eating, restraint, hunger, BMI, body fat content, state stress, state FNE, and state SAA. Please see Table 2 for a description of average food amounts consumed in each condition (before transformation). As can be seen in this table, participants in the G1-FNE group were consistently eating more food than in the other two groups (G2-SAA and control). Participants in the G2-SAA group consumed more or less food than the control group depending on the type of food. For example, compared to the control group, participants in G2-SAA ate more total food and more unhealthy food, whereas they ate less pretzels when divided into subtypes of food.

Manipulation Check

Recall that the goal of the manipulation was to evoke state FNE, state SAA, and state stress. Therefore, I tested if there were different levels of overall state fears dependent on condition. A MANOVA across conditions indicated that there was a significant multivariate effect on *state* stress, SAA, and FNE, $F(3, 149) = 2.96, p = .008$; Wilk's $\lambda = .89, \eta^2 = .06$. Follow up pair-wise comparisons showed that there was a significant difference between the SAA condition and all other conditions, such that all state fears were higher in SAA. Please see Table 3 for a list of all means and standard deviations stratified by condition. Please see Table 4 for a list of all pair-wise comparisons and mean differences between the conditions.

Next, I tested if there were different levels of state fears *during the speech* dependent on condition. A MANOVA across conditions indicated that there was a significant multivariate effect on *state* stress, SAA, and FNE *during the speech*, $F(3, 155) = 9.753, p < .001$; Wilk's $\lambda = .71$, partial $\eta^2 = .16$. Follow up pair-wise comparisons indicated that between the SAA condition and control condition there were significantly higher levels of all state fears during the speech in the SAA condition. Additionally, there were higher levels of state social appearance anxiety and state stress during the speech in the SAA condition than in the FNE condition. However, there was no difference in state FNE in the FNE and SAA condition (partially as hypothesized). Please see Table 3 for a list of all means and standard deviations stratified by condition. As can be seen in Table 3, in all 3 conditionals overall, levels of state FNE were higher than state SAA or state stress, in all conditions. Please see Table 4 for a list of mean differences and comparisons between conditions.

Overall, these results partially, but not fully, support hypothesized effects of the manipulation. As in the additive alternative hypothesis, participants in the SAA condition had the

highest levels of all state fears. However, participants in the FNE condition had the same level of state FNE as in the SAA condition. Therefore, I will conceptualize the SAA condition as having the highest level of all state fears and the FNE condition as having high levels of FNE, but not high levels of SAA. In other words, SAA is highest in the social appearance anxiety condition, and FNE is as high in the FNE condition as it is in the SAA condition (there is no significant difference between FNE *during* the speech between the SAA and FNE condition). Therefore, the FNE condition can be thought of as evoking both state stress and state FNE, but not state SAA. Since hypotheses regarding the manipulation were not fully supported, I will conduct post-hoc analyses including the state fear variables to test for the possibility that condition indirectly produces food intake and body dissatisfaction through state levels of fear, regardless of which condition the participant completed.

Hypothesis 1

Food as Outcome.

Main hypothesis. The primary hypothesis of this research was that fear of negative evaluation would produce eating and social anxiety, and that social appearance anxiety would produce body dissatisfaction and social anxiety. To test the hypothesis that trait fear of negative evaluation, participants who experienced the FNE condition, or an interaction between condition and trait fear of negative evaluation would produce eating, I turned to multiple regression. Each of the dummy coded condition variables (G1-FNE and G2-SAA), trait fear of negative evaluation (FNE), and the interaction between condition (G1-FNE and G2-SAA) and trait FNE were entered into multiple regression. As hypothesized, there was a significant main effect of G1-FNE, such that G1-FNE was associated with increased eating (part $r = .16$, $b^* = .19$, $p = .044$). There was no significant main effect of trait FNE (part $r = -.11$, $b^* = -.19$, $p = .168$). There

was no significant interaction between trait FNE and condition predicting total food consumption ($p > .238$). There were no substantive changes when restraint was included as a main effect or interaction term.

Does fear of negative evaluation affect specific food types differently? When separate foods were analyzed, G1-FNE predicted only consumption of potato chips (part $r = .19$, $b^* = .22$, $p = .017$). There was also a marginally significant interaction (part $r = .15$, $b^* = .23$, $p = .057$) such that participants who were in G2-SAA and high in trait FNE consumed the most grams of potato chips.

Do negative evaluation fears increase eating in both healthy and unhealthy foods? When food groups were combined into healthy (fruit and pretzels) and unhealthy (potato chips and M & Ms) food groups there was a significant main effect for G1-FNE (part $r = .18$, $b^* = .21$, $p = .025$) and a significant interaction between G2-SAA and trait FNE predicting unhealthy food that was consistent with the pattern seen in the interaction predicting consumption of potato chips. Please see Figure 1 for a depiction of these interactions. There were no significant main effects or interactions when healthy food was the dependent variable.

Do participants high in trait fear of negative evaluation both over and under eat? Finally, because it was hypothesized that participants high in trait FNE might consume *more* or *less* food, I entered fear of negative evaluation and the square of fear of negative evaluation (FNE2) to test if there were quadratic effects of this fear on total grams of food. There was a significant quadratic effect for FNE2 (part $r = -.20$, $b^* = -.20$, $p = .013$), such that both individuals high and low on fear of negative evaluation consumed fewer grams of food. Please see Figure 2 for a graph of this relationship. However, it may be that this relationship holds only for a certain type of foods (as with G1-FNE and unhealthy foods). Therefore, I tested the quadratic relationship of

FNE and FNE2 with both healthy and unhealthy foods. The quadratic relationship held *only* for healthy food (part $r = -.21$, $b^* = -.22$, $p = .008$) and not for unhealthy food (part $r = -.09$, $b^* = -.09$, $p = .279$). I then entered condition, in addition to the quadratic relationship, to test if there was an interaction between condition and FNE2 predicting total grams of food. When condition (G1-FNE and G2-SAA), FNE2, and the interactions between the FNE2/ FNE and condition were entered to predict grams of food, the quadratic effect of FNE2 predicted total grams of food consumed (part $r = -.17$, $b^* = -.30$, $p = .040$). Additionally, there was an interaction between G2-SAA and FNE (part $r = .16$, $b^* = .24$, $p = .046$) and a marginally significant quadratic interaction between FNE2 and G1-FNE (part $r = .15$, $b^* = .24$, $p = .061$). When only G1-FNE (and not G2-SAA) was included in the regression, the quadratic interaction between FNE2 and G1-FNE was significant (part $r = .17$, $b^* = .23$, $p = .033$). As can be seen in figure 3, participants who were high in trait FNE and in G2-SAA consumed the most food. As seen in the quadratic interaction in figure 4, participants who are high and low in fear of negative evaluation and in G2-FNE consumed the most food, whereas participants high and low in FNE in any other condition consumed the least amount of food.

Social Anxiety as Outcome. To test the hypothesis that G1-FNE and trait level FNE (and potentially the interaction of G1-FNE and trait FNE) would predict state social anxiety I used multiple regression. G2-SAA (part $r = .26$, $b^* = .30$, $p < .001$) and trait FNE (part $r = .25$, $b^* = .24$, $p < .001$) predicted state social anxiety. Against hypothesis, the interaction between condition and trait FNE was not significant (all $ps > .298$). When trait FNE and state FNE (from the manipulation check measure) and their interaction were entered into multiple regression with social anxiety as the dependent variable, only state FNE was a significant predictor (part $r = .39$, $b^* = .44$, $p < .001$).

Hypothesis 2

Body Dissatisfaction as Outcome. To test the second primary hypotheses that trait social appearance anxiety, G2-SAA, and the interaction between G2-SAA and trait social appearance anxiety would predict state body dissatisfaction, I also used multiple regression. As hypothesized, there was a significant interaction between trait SAA and G2-SAA (part $r = .25$, $b^* = .35$, $p = .002$). As can be seen in Figure 5, participants who were both in G2-SAA and high in trait SAA exhibited the highest levels of state body dissatisfaction. There were no significant changes to the predictors when restraint was included as a covariate or an interaction. There was a significant main effect of restraint (part $r = .35$, $b^* = .54$, $p < .001$) and an interaction between restraint and G2-SAA (part $r = -.18$, $b^* = -.23$, $p = .026$) such that participants in G2-SAA and high in restraint exhibited the highest levels of state body dissatisfaction (see Figure 6).

Social Anxiety as Outcome. Next, I tested the hypothesis that G2-SAA and trait SAA would predict state social anxiety. Both G2-SAA (part $r = .25$, $b^* = .26$, $p < .001$) and trait SAA (part $r = .16$, $b^* = .30$, $p = .043$) predicted social anxiety. However, no interaction was significant ($ps > .323$). When trait SAA, state SAA, and their interaction were entered into multiple regression, only state SAA (part $r = .29$, $b^* = .39$, $p < .001$) was a significant predictor of social anxiety.

Preliminary Conclusions. Overall results from the first two primary hypotheses supported two main findings. First, participants who were in G1-FNE consumed more food, whereas participants in G2-SAA and who were high in trait SAA experienced heightened body dissatisfaction. Second, participants high in trait SAA and in G2-SAA (the interaction between trait and condition) experienced heightened body dissatisfaction, whereas participants experienced higher levels of state social anxiety when they were either high in trait SAA or in

G2-SAA (there was no interaction). Post-hoc analyses were conducted to test what mechanisms may be producing the differentiation between (a) eating and state body dissatisfaction and (b) state body dissatisfaction and state social anxiety.

Post-hoc analyses on primary two hypotheses.

What social fears cause individuals to eat versus to feel dissatisfied with their body? Model 1. I tested a combined model, including both eating and state body dissatisfaction to delineate (a) if the condition effects were specific to each disordered eating outcome and (b) what potential mechanisms may drive the relationship between the condition effects and disordered eating outcomes (i.e., why did participants increase eating in G1-FNE, but not in G2-SAA). I included all paths that had a significant effect on an outcome variable (G1-FNE, G2-SAA, the interaction between G2-SAA and trait SAA) and the two trait fears (FNE and SAA). I hypothesized, based on the initial findings, that participants may increase eating when they experience increased levels of state FNE, but that when they also experience increased state levels of SAA, they may decrease eating. This hypothesis would explain why participants consumed increased grams of food when FNE was primed, but not SAA (as for participants in G1-FNE), even though there was more total stress (all fear states were elevated) in the G2-SAA condition. In other words, there was less food consumed in G2-SAA versus G1-FNE even though there was more total fear in G2-SAA. It may be that fear of negative evaluation initially increases the urge to eat, but that when one feels evaluated specifically on one's appearance, this urge decreases because one's thoughts are directed to appearance and how to regulate (potentially through decreasing eating) appearance evaluation concerns.

Model fit. Model fit was excellent (CFI = 1.00, TLI = 1.00, RMSEA = 0.00, SRMR = .02).

Please see Figure 7 for the hypothesized model and path estimates.

Indirect effects: Testing for Mechanisms. As hypothesized, there was a significant indirect effect from G2-SAA to food intake through state SAA (Estimate = $-.30$, 95% CI = $-.553$ to $-.043$), such that G2-SAA indirectly decreased food intake through heightened state SAA. There was a significant indirect effect from the interaction term (G2-SAA by trait SAA) to food intake through state SAA (Estimate = $-.02$, 95% CI = $-.038$ to $-.004$). There were significant indirect effects from trait SAA to food intake through both state SAA (Estimate = $-.03$, 95% CI = $-.048$ to $-.004$) and state FNE (Estimate = $.02$, 95% CI = $.003$ to $.036$): However, it should be noted, as hypothesized, state FNE and state SAA were in opposite directions, such that state FNE increased and state SAA decreased eating. There was a marginally significant indirect effect from trait FNE to food intake through state FNE (Estimate = $.02$, 95% CI = 0.00 through $.049$).

There was a significant indirect effect from G2-SAA to state body dissatisfaction through state SAA (Estimate = $.30$, 95% CI = $.089$ to $.519$). There was a significant indirect effect from the interaction term (G2-SAA by trait SAA) through state SAA (Estimate = $.02$, 95% CI = $.006$ to $.037$).

This model suggests that the mechanisms from G1-FNE to food intake are still unknown. However, from trait SAA, G2-SAA, and the interaction between SAA and G2-SAA, state SAA decreases food intake, whereas state FNE increases food intake. In comparison, from trait SAA, G2-SAA, and the interaction between SAA and G2-SAA, increased body dissatisfaction is associated with increased state SAA, whereas state FNE does not influence state body dissatisfaction. Overall, suggesting that state FNE is relevant for food intake, whereas state SAA is relevant for both food intake and state body dissatisfaction in differing directions. State SAA decreases food intake, whereas it increases state body dissatisfaction.

Why does social appearance anxiety cause individuals to feel dissatisfied with their body versus socially anxious? Model 2. I tested a model with state body dissatisfaction and state social anxiety as outcomes, to test if the mechanisms producing social anxiety and body dissatisfaction differed. Model fit was excellent (CFI = 1.00, TLI = 1.00, RMSEA = 0.00, SRMR = .01). Please see Figure 8 for a depiction of the model.

Indirect Effects: Testing for Mechanisms. As in Model 1, there was a significant indirect effect from G2-SAA to state body dissatisfaction through state SAA (Estimate = .29, 95% CI = .079 to .498). There was also a significant indirect effect from the interaction term (trait SAA by G2-SAA) to state body dissatisfaction through state SAA (Estimate = .02, 95% CI = .005 to .036). There were no significant unique indirect effects on social anxiety. However, from trait SAA to social anxiety the sum of indirect effects of state SAA and state FNE was significant (Estimate = .37, 95% CI = .117 to .627).

This model shows that condition effects of G2-SAA and the interaction between trait SAA and G2-SAA on *state body dissatisfaction* are explained by state levels of SAA, whereas there is a direct effect of condition (either condition) and trait SAA on state social anxiety that is not explained by state social appearance anxiety (with the exception that both state SAA and state SAA combined have an indirect effect on state social anxiety through trait SAA). Several conclusions can be drawn from this model: (a) state body dissatisfaction may be produced from state levels of SAA through either priming SAA or having trait levels of SAA that interact with an environment that is highly evaluative (b) state social anxiety may be produced directly from any type of evaluative environment, trait SAA, or by elevating both state SAA and state FNE. Overall this model suggests that while there are similar mechanisms (state SAA) that lead to state social anxiety and body dissatisfaction, ultimately these outcomes are produced through

different combinations of the mechanisms (as in state SAA and state FNE combined to produce an indirect effect from trait SAA to state social anxiety). This model also suggests that state SAA may be more relevant for body dissatisfaction, whereas state FNE impacts state social anxiety.

When Model 1 and Model 2 were estimated as a combined model (with food intake, state body dissatisfaction, and state social anxiety as outcomes), there were no substantial changes to the direct or indirect effects, with the exception that the indirect effect from G2-SAA to food intake through state SAA trended toward significance only ($p = .064$).

Hypothesis 3

Does fear of negative evaluation, regardless of type of evaluation fear, have an effect on food intake, body dissatisfaction, and social anxiety over and above BMI and body fat content?

Next, I tested if I would find an overall effect of *negative evaluation fears* on food intake, state body dissatisfaction, and state social anxiety when controlling for body fat content and BMI. First, I combined the two negative evaluation conditions (SAA and FNE) and compared those to the control group. There was a significant overall effect between conditions (control and combined negative evaluation conditions) $F(3, 150) = 12.783, p = .024$; Wilk's $\lambda = .94$, partial $\eta^2 = .06$. Further examination revealed that (over and above BMI and body fat content) individuals in a negative evaluation condition ($M = 75.62$) had significantly higher levels of state social anxiety than did the control condition ($M = 61.68$), $p = .005$. However, there were no differences between conditions on total grams of food or state body dissatisfaction, though their means were in the expected direction. This result suggests that priming any type of negative evaluation fear (versus just stress) increases state social anxiety, but not food intake and body dissatisfaction. Therefore, it may be that specific negative evaluation fears increase food intake and body dissatisfaction: I test this hypothesis next.

Do specific negative evaluation fears have differential effects on food intake, body dissatisfaction, and social anxiety over and above BMI and body fat content? When a MANOVA was conducted between all 3 conditions separately (including BMI and body fat content), results were consistent with the results from multiple regression. There was a significant overall effect for the SAA condition, $F(3, 154) = 5.93, p < .001$; Wilk's $\lambda = .90$, partial $\epsilon^2 = .10$ and a marginal effect for the FNE condition $F(3, 154) = 2.46, p = .065$; Wilk's $\lambda = .95$, partial $\eta^2 = .05$.¹ Tests of between subjects effects indicated a significant effect on state body dissatisfaction and social anxiety in the SAA condition and a significant effect on total grams consumed in the FNE condition. This result, adds further evidence to the idea that state social anxiety increases when priming either SAA or FNE, whereas SAA produces state body dissatisfaction and FNE produces increases in food consumption. Additionally, there were no substantial changes when body fat content and BMI were included in the post-hoc models presented above.

Validation of the Manipulation Task

Hypothesis 4

To test if G1-FNE is a valid manipulation of fear of negative evaluation, I tested if trait FNE correlated with state social anxiety experienced before and after the FNE manipulation over and above trait SAA. Against hypothesis, in participants who experienced the fear of negative evaluation manipulation, trait social appearance anxiety (part $r = .30, b^* = .37, p = .032$) predicted social anxiety over and above trait fear of negative evaluation (part $r = -.01, b^* = .00, p = .977$). However, state FNE during the speech (part $r = .53, b^* = .53, p < .001$) did predict social anxiety over and above state SAA during the speech (part $r = .10, b^* = .09, p = .468$). Therefore, the hypothesis was partially supported: Trait level FNE did not predict social anxiety

over and above trait SAA, but state level FNE *did* predict social anxiety over and above state SAA.

Hypothesis 5

To test if the G1-SAA is a valid manipulation of social appearance anxiety, I tested if trait SAA correlated with state social anxiety experienced before and after the SAA manipulation over and above trait FNE. As hypothesized, in participants who received the social appearance anxiety manipulation, trait social appearance anxiety (part $r = .39$, $b^* = .50$, $p = .004$) predicted social anxiety over and above fear of negative evaluation (part $r = -.01$, $b^* = -.01$, $p = .944$). Additionally, state social appearance anxiety (part $r = .28$, $b^* = .50$; $p = .033$) predicted social anxiety over and above state fear of negative evaluation (part $r = .05$, $b^* = .08$, $p = .735$).

Individual Differences and Food Consumption

Hypothesis 6 and 7: Original Exploratory Hypotheses

Do restraint and emotional eating interact with negative evaluation fears to produce eating? Finally, I tested if individual differences that have been shown to predict eating (i.e., restraint) would interact with the negative social evaluation fears to predict food consumption after a stressful task. I tested if individuals high in restraint or emotional eating and high in trait FNE (or trait SAA) would experience increased food intake. As hypothesized, in hierarchical multiple regression, there was a significant interaction between fear of negative evaluation and restraint (part $r = .19$, $b^* = .33$. $p = .020$) predicting total grams of food intake. As can be seen in Figure 9, participants who were high in restraint and low in fear of negative evaluation were able to restrain from eating (they consumed the least amount of food). However, participants who were high in restraint and high in fear of negative evaluation consumed almost as much food as participants who were low in both restraint and fear of negative evaluation. Against hypothesis

the interaction between emotional eating and fear of negative evaluation was not significant, though it trended toward significance (part $r = -.16$, $b^* = -.29$, $p = .063$). There were no significant interactions between restraint and social appearance anxiety. There were no other significant 2-way interactions or any significant 3 or 4 way interactions. Please see Table 5 for a complete summary of all effects from this regression.

Exploratory Post-hoc analyses. Results for Hypothesis 1 showed there was a quadratic effect of fear of negative evaluation on eating. I also found that differentiating between healthy versus unhealthy foods produced differing effects (i.e., the quadratic effect was only significant in healthy foods). Therefore, I tested two additional individual difference hypotheses: (a) does the original hypothesized effects (the interaction of restraint and fear of negative evaluation) predict total food consumption over and above the quadratic effect, (b) do these individual differences predict healthy versus unhealthy food intake differently?

Inclusion of the quadratic effect. To test if there were interactions between the individual differences (restraint and emotional eating) and trait fear of negative evaluation, I entered restraint, emotional eating, fear of negative evaluation, FNE2 (the square of FNE), and all possible interactions into a regression predicting total grams consumed. Consistent with previous analyses there remained a significant main effect of FNE2 (part $r = -.20$, $b^* = -.21$, $p = .017$) and the interaction between restraint and FNE (part $r = .25$, $b^* = .33$, $p = .003$). As can be seen in Figure 10, there was also a 2-way interaction between FNE2 and restraint (part $r = -.19$, $b^* = -.32$, $p = .020$), such that individuals low in restraint and low in trait FNE consumed the most food, whereas individuals high in restraint and low in FNE consumed the least amount of food. Individuals high in FNE, regardless of level of restraint consumed equal amounts of food. Finally, there was also a significant 3-way interaction between fear of negative evaluation,

restraint, and emotional eating (part $r = .20$, $b^* = .29$, $p = .014$), such that participants low in restraint, high in emotional eating, and low in fear of negative evaluation ate the least amount of food and participants low in emotional eating, high or low in restraint, and high in fear of negative evaluation consumed the most food (please see Figure 11). This three way interaction supports results from Hypotheses 1, such that high levels of fear of negative evaluation are associated with high levels of food intake regardless of other individual differences, whereas as those low in fear of negative evaluation behave in ways consistent with the other individual differences (i.e., participants low in restraint consume more food when they are low in fear of negative evaluation, as one would expect of an individual who is low in restraint).

Do the individual differences predict healthy versus unhealthy food intake differently?

Next, I tested the same regression, but with unhealthy food as the dependent variable. The only significant main effect was restraint (part $r = -.27$, $b^* = -.35$, $p < .001$). FNE2 was no longer significant. Consistent with the previous regression, both the interaction between restraint and fear of negative evaluation (part $r = .17$, $b^* = .22$, $p = .041$) and the 3-way interaction between fear of negative evaluation, restraint, and emotional eating was significant (part $r = .19$, $b^* = .26$, $p = .026$). There were no other significant interactions: There was no 2-way interaction between FNE2 and restraint.

Finally, I tested this same regression with healthy food as the dependent variable. In this regression there were main effects of restraint (part $r = .20$, $b^* = .27$, $p = .015$) and FNE2 (part $r = -.20$, $b^* = -.22$, $p = .016$). There was a 2-way interaction between restraint and fear of negative evaluation (part $r = .20$, $b^* = .27$, $p = .017$) and FNE2 and restraint (part $r = -.26$, $b^* = -.44$, $p = .002$). Consistent with results from Hypothesis 1, the quadratic relationship of FNE and its interaction with restraint only holds for healthy food, whereas the interaction between trait FNE

and restraint holds across all food types. Please see Table 6 for a comparison between these three regressions.

Discussion

Overall, results suggest that both fear of negative evaluation and social appearance anxiety are important social fears for social anxiety, eating, and body dissatisfaction. The results reported here suggest that in individuals high in *trait* social appearance anxiety (i.e., individuals who generally worry about negative evaluation on their appearance) priming social appearance anxiety, which then evokes *state* social appearance anxiety, produces state increases in body dissatisfaction. Further, these results show that state fear of negative evaluation may *increase* eating and state social appearance anxiety may *decrease* eating. Nevertheless, it should be noted that this decrease in eating could be temporary. For example, research has shown that restraint or dieting often precedes bingeing, especially after an interpersonal stressor (Frost, Goolkasian, Ely, & Blanchard, 1982; Heatherton, Herman, & Polivy, 1991; Herman & Polivy, 1975; Jacobi et al., 201; Schotte, Cools, & McNally, 1990; Wilfley, Pike, & Striegel-Moore, 1997). However, before interpreting these results, it is first important to consider the limits of the experiment.

Manipulation Check

Results from the manipulation check showed that participants in the social appearance anxiety condition had the highest levels of all state fears and participants in the fear of negative evaluation condition had the same level of state fear of negative evaluation as participants in the social appearance anxiety condition. Thus, when considering the results between groups I conceptualized the social appearance anxiety condition as having the highest level of all state fears (though the same level of fear of negative evaluation as in the fear of negative evaluation condition) and the fear of negative evaluation condition as having high levels of fear of negative

evaluation, but not high levels of social appearance anxiety. Therefore, I conducted post-hoc tests examining if state fears carried the effects that condition had on the outcome variables (food intake, state body dissatisfaction, state social anxiety). I also assumed that participants in the social appearance anxiety condition were experiencing all state fears, whereas participants in the fear of negative evaluation condition were not experiencing high levels of state social appearance anxiety (but were experiencing high fears of negative evaluation).

State Body Dissatisfaction

Results regarding state body dissatisfaction are the most clear, suggesting that individuals who are feeling evaluated on their appearance (i.e., those participants who were in the social appearance anxiety condition as compared to the other conditions) and who are high on trait social appearance anxiety are likely to experience elevated levels of state body dissatisfaction. Body dissatisfaction is a well-established risk factor for eating disorders, especially bulimia nervosa (Attie & Brooks-Gunn, 1989; Killen et al., 1996; Stice & Shaw, 2002) and body dissatisfaction is sometimes thought of as the prodromal stage of development of an eating disorder (Stice, Ng, & Shaw, 2010). It may be that over an extended period of time individuals who have elevated trait social appearance anxiety and are in highly appearance evaluative environments develop higher body dissatisfaction, which then leads to the development of an eating disorder. This study is the first empirical demonstration that social appearance anxiety directly leads to state body dissatisfaction. However, more research is needed to test a full model in which social appearance anxiety leads to body dissatisfaction, which then leads to disordered eating over time.

Differentiation between Body Dissatisfaction and Social Anxiety

These data also suggest that social appearance anxiety produces social anxiety. Participants who were told they would be evaluated on their appearance and participants who were high in trait level social appearance anxiety exhibited the highest levels of state social anxiety. However, there was no interaction between trait level social appearance anxiety and condition. This result is interesting because it suggests that social appearance anxiety plays a role in both state social anxiety and state body dissatisfaction, but potentially through different mechanisms. For social anxiety, having high trait levels of social appearance anxiety and/or experiencing a situation in which one is evaluated on one's appearance produces state levels of social anxiety. However, for state body dissatisfaction, one must experience both high levels of trait social appearance anxiety and an appearance evaluative environment. This finding is consistent with research that has found that individuals with eating disorders report higher levels of critical comments about their shape, weight, and food than matched controls (i.e., they are more likely to be in a highly appearance evaluative environments) (Pike et al., 2005).

Post-hoc analyses (Model 2) supported the idea that state fears differ in how they affect body dissatisfaction and social anxiety. Results showed that there were indirect effects through state social appearance anxiety on state body dissatisfaction from both trait social appearance anxiety and the interaction term between trait social appearance anxiety and participants in the social appearance anxiety condition. However, there were no indirect effects of state social fears on social anxiety, only direct effects from both conditions and state fear of negative evaluation. These post-hoc analyses suggest that for social anxiety, high levels of state fear of negative evaluation are associated with high levels of social anxiety symptoms, whereas for state body dissatisfaction, state social appearance anxiety carried the indirect effects. Additionally, there was an indirect effect between trait social appearance anxiety and social anxiety symptoms

through both state social appearance anxiety and state fear of negative evaluation, but these state fears did not have unique indirect effects on social anxiety. Although preliminary, these results may in part explain why some individuals develop only social anxiety disorder, whereas others develop both social anxiety disorder and disordered eating. It may be that disordered eating (in addition to social anxiety disorder) develops when both of these variables (trait social appearance anxiety and an appearance evaluative environment) are present (and experience heightened state social appearance anxiety), whereas social anxiety disorder may develop when only one pathway is present: An environment that evokes evaluation fears (i.e., participants in both the FNE and SAA condition experienced more social anxiety than in the control group) or high levels of trait social appearance anxiety. This idea is consistent with theory suggesting that there are multiple risk factors that interact with each other that precede the development of EDs, such as weight concern, low self-esteem, and disturbance in interpersonal relationships (Wilfley, Pike, & Striegel-Moore, 1997) and that critical comments about eating and weight are one of the most potent risk factors for the development of disordered eating and body dissatisfaction (Jacobi et al., 2011).

Food Intake

Results pertaining to food intake are not as clear. Overall my results suggest that negative evaluation plays a role in food intake, though its role appears to be complex, and potentially dependent on additional variables that are not yet fully apparent. This lack of clarity could be explained by the fact that food intake is an extremely complex process that involves characteristics of the food such as health perception, nutritional value, and taste, in addition to characteristics within the person (i.e., hunger, emotion, dieting status) (Glanz, Basil, Mailbach, Goldberg, & Snyder, 1998). Participants who were told they would be evaluated on their content

and performance of their speech, but were not evaluated on their appearance, increased food consumption versus participants in the other two conditions. However, this effect was not dependent on trait level fear of negative evaluation (e.g., there was no interaction between trait and condition). This result was stronger when the outcome was foods that were operationalized as unhealthy (potato chips and chocolate) and disappeared for foods that were healthy (pretzels and fruit). This finding is consistent with an emotion regulation perspective and with research by Oliver & Wardle (1998) and Oliver, Wardle, and Gibson (2000) who found that participants who were either self-reported stress eaters or in a stress condition consumed more fatty type, snack foods (i.e., chocolate) and less meal type foods (i.e., fruit or vegetables). Physiologically, individuals may be conditioned to prefer snack foods that are high in sugar and carbohydrates that increase blood sugar levels, which may result in a temporary feeling of calmness (Anderson, Catherine, Woodend, & Wolever, 2002; Parker, Parker, & Brotchie, 2006). However, I should note that though these foods are conceptualized (and probably perceived by participants) as healthy, they were in fact, as calorie-dense as the unhealthy foods. Additionally, when only examining unhealthy foods, participants in the social appearance anxiety condition with high levels of trait fear of negative evaluation consumed the highest amounts of unhealthy foods. Participants in this condition were experiencing high levels of all fears. Consequently, participants who were experiencing heightened negative mood and were high in trait fear of negative evaluation consumed increased amounts of unhealthy foods.

Analyses showed that in addition to a main effect of fear of negative evaluation condition, there was a quadratic effect for trait level fear of negative evaluation, such that individuals who were high or low on trait fear of negative evaluation consumed the least food. This result held only for healthy foods (and not for unhealthy foods), suggesting that there is a quadratic

relationship between food intake and fear of negative evaluation specifically for healthy foods. When condition was included with the quadratic term, results showed a near significant interaction, such that participants in the fear of negative evaluation condition consumed more food if they were either high or low on trait fear of negative evaluation, whereas participants in any other condition consumed less food if they were high or low on trait fear of negative evaluation. Taken together, these results suggest that fear of negative evaluation can either increase or decrease food intake dependent on mood state and the type of food present (healthy versus unhealthy). This quadratic effect is similar to the inverted u-curve theory of anxiety and performance that suggests that anxiety enhances performance when it is not at too low or too high levels (Yerkes & Dodson, 1908). Similarly, it was shown that high and low fear of negative evaluation (anxiety) does not increase eating. However, as noted above, this decrease in eating could be temporary as research has suggested that restrained eating can eventually lead to bingeing ((Frost, Goolkasian, Ely, & Blanchard, 1982; Heatherton, Herman, & Polivy, 1991; Herman & Polivy, 1975; Jacobi et al., 201; Schotte, Cools, & McNally, 1990; Wilfley, Pike, & Striegel-Moore, 1997). It would be interesting to test if eating is decreased after a similar task at a later time period (i.e., if eating was measured 1 hour after the manipulation).

Differentiation between food intake and state body dissatisfaction

Overall, there were significant effects from group to both food intake and state body dissatisfaction. However, the question of *what* exactly produced the relationship between groups and food intake and body dissatisfaction remains. Post-hoc analyses (Model 1) modeling all group variables, trait and state fears, and the interaction between trait social appearance anxiety and group helped to clarify these findings. When all of these variables were modeled, the FNE condition (participants coded as in the fear of negative evaluation condition versus all other

conditions) still retained a direct effect on food intake. There were no indirect effects from the FNE condition to food intake, suggesting that the mechanisms that increased eating in this condition were not state levels of negative evaluation fear: The mechanism that produced this direct effect is still unknown. Future research should continue to test what might explain this relationship. There were, however, indirect effects from trait social appearance anxiety through both state fear of negative evaluation and state social appearance anxiety, such that having increased state fear of negative evaluation increased eating and having increased state social appearance anxiety *decreased* eating. A decreased eating effect associated with heightened state social appearance anxiety was also supported in the indirect effects from the SAA condition to food and from the interaction between social appearance anxiety and SAA condition to food.

Taken together, these results suggest that those participants who experienced appearance evaluation *decreased* eating because of heightened state social appearance anxiety (especially for those participants also high in trait level social appearance anxiety), whereas participants who experienced only state fear of negative evaluation increased eating. These findings may help explain why participants in the FNE condition consumed more than those in the SAA condition: Perhaps evaluation fears initially *increase* eating up to the point where one feels evaluated on appearance (which may then *decrease* eating because of attempts to regulate fears of appearance evaluation by restraining from food). These findings are consistent with research on the risk factors of eating disorders, which suggest that concerns related specifically to shape and weight increase the risk for the development of an eating disorder (Jacobi et al., 2004; Pike et al., 2005). In this case, social appearance anxiety, which is specific to appearance, decreases eating in the short term and serves as a signal to regulate stress through means other than eating (perhaps

because attention is focused on one's appearance), whereas general evaluation fears increases eating.

Individual Differences and Food Intake

Both restraint and emotional eating have been shown to predict eating when individuals are stressed (Oliver, Wardle, and Gibson, 2000), therefore these individual differences were tested with the negative evaluation fears. As hypothesized there was a significant interaction between trait fear of negative evaluation and restraint. This result held when the quadratic relationship of fear of negative evaluation was included in the regression and it held for total grams of food, healthy, and unhealthy foods. Participants who were high in restraint were only able to restrain (i.e., consume few grams of food) if they were also low in fear of negative evaluation, whereas participants high in restraint and high in fear of negative evaluation consumed about the same amount of grams as participants low in restraint. This pattern was also seen in the three-way interaction between restraint, emotional eating, and fear of negative evaluation. Participants high in fear of negative evaluation consumed more grams of food, whereas participants low in fear of negative evaluation behaved in ways consistent with the other individual differences (e.g., restraint). Finally, this result is consistent with results from the post-hoc analyses, suggesting that state levels of fear of negative evaluation increase eating. It seems likely that individuals who are high in restraint (or emotional eating) and are also high in fear of negative evaluation (or experiencing heightened state levels of fear of negative evaluation) have difficulty regulating and restraining from food when they are engaging in regulation strategies related to their negative evaluation concerns. This interpretation is consistent with Muraven and Baumeister's (2000) theory that food restriction is an exercise that requires strong self-control and when dieters are faced with a stressor they are susceptible to eating more because their self-control strength is

depleted. Though I should note that participants high in emotional eating did not increase eating, but rather had no change in eating or decreased eating. It may be that emotional eating is measuring importance given to regulating emotion by eating or that this was a spurious finding. Since this finding is not clear, I do not further interpret its implications. Therefore, future research will be needed to clarify the role of emotional eating, which was not as clear as the role of restraint in this data.

Limitations

These results should be considered with the limitations of the study in mind. First, there could be concerns about the external validity of the manipulation task. For participants in both the SAA and FNE condition, trait social appearance anxiety, rather than trait fear of negative evaluation predicted state social anxiety. Though this concern can be partially alleviated by the fact that state levels of fear of negative evaluation (but not state social appearance anxiety) did predict social anxiety in the fear of negative evaluation condition. As discussed above, there was differentiation between the three groups, though hypotheses were not fully supported (i.e., there were the highest levels of state fears in the SAA condition, but equally high levels of state FNE in both the SAA condition and FNE condition). Taken together, these results suggest that though there was some evidence for the validity of the task, state social appearance anxiety and fear of negative evaluation may be more difficult to manipulate (or to measure in a manipulation check) as separate constructs than originally hypothesized. It may be that future research should test manipulations that are more clearly differentiated, such as having participants give a speech to evoke fear of negative evaluation and having body measures taken (i.e., as in Levinson & Rodebaugh, 2011) to evoke trait social appearance anxiety. It may also be that general fear of negative evaluation is always elevated in the presence of social appearance anxiety (which is

thought of as a more specific form of general fear of negative evaluation; Hart et al., 2008). Although, based on all of the results, it does appear that there were unique effects based on which condition the participant was in (i.e., the FNE condition produced eating and the SAA condition produced body dissatisfaction). As seen in my post-hoc analyses, it may be that experiencing state fear of negative evaluation increases stress and therefore initially increase eating, but that also increasing state social appearance anxiety increases body dissatisfaction and decreases eating (i.e., because of fears of how one's body will look if one eats). Therefore, it may be that when experiencing state social appearance anxiety, it is also necessary to experience state fear of negative evaluation.

Another major limitation of this research is that I used a non-clinical, student sample (analogue sample). A student sample was needed (for feasibility purposes) to utilize an experimental design with the goal to begin to identify specific causal mechanisms. However, it is possible that in a clinical or population-based sample these results would differ. For example, I would expect in a sample that compares individuals diagnosed with SAD or eating disorders to a sample of participants that do not have a diagnosis of SAD or eating disorders, that I may find stronger effects for individuals with these disorders. In a population sample, I may find similar results as an undergraduate sample because both of these samples should have normal distributions of these traits. Some researchers have recently argued that it is useful to utilize a normative sample when studying (possibly genetically based) traits and that studying only the extremes of traits limits the breadth of our knowledge for the entire population (Plomin, Haworth, & Davis, 2009). Indeed, there is support for fear of negative evaluation as a genetically based, moderately heritable, trait (Stein, Jang, & Liveslay, 2002).

Another possible limitation of this sample is that it is primarily white women. It is possible that there could be ethnic differences in a more diverse population-based sample given that there is research suggesting there are some ethnic differences in the prevalence of eating disorders (Franko, Becker, Thomas, & Herzog, 2007), though some population-based research has suggested that ethnicity does not protect against the development of disordered eating (French et al., 1998). However, it would be useful for future research to test if ethnicity plays a role in these social fears.

A final limitation of this experiment is that I measured food intake, which may be different than disordered eating. Nevertheless, I expect that food intake after a stressful event influences eating that can become disordered. For example, I found that individuals who were high in restraint and high in trait fear of negative evaluation consumed about the same amount of food as those who were low in restraint. It seems plausible that individuals who want to restrain from eating, but then are in a stressful social situation and are not able to regulate their food intake, may be likely to engage in compensatory behaviors such as purging or over exercising. For example, imagine an individual who has a goal to restrain from eating but must attend a work social. At this work social, she becomes stressed and eats more food than is consistent with her goal to restrain. She then turns to purging as a way to compensate for her failure to regulate food during this social situation. Of course, this theory needs to be tested in future research (i.e., do those who fail to regulate food intake in a social situation then go on to use disordered compensatory behaviors).

Future Research

Future research should also test the long-term effects of fear of negative evaluation and social appearance anxiety. For example, I measured eating immediately after the manipulation. It

may be that these fears activate disordered eating or body dissatisfaction after longer periods. Oaten, Williams, Jones, and Zadro (2008) found that, after an ostracism task, participants high in fear of negative evaluation ate more food (than those low in fear of negative evaluation) 45 minutes after the manipulation. Future research could extend the amount of time after the current manipulation and test if similar effects are found for a speech manipulation. Additionally, future researchers could have participants use an ecological momentary assessment (EMA) device after they participate in a similar manipulation. This design would allow for assessment of real-time eating behaviors and state level anxiety and body dissatisfaction. Another limitation of the current study is that it was lab based and some participants may change their eating behavior because of the setting. Using an EMA device after a lab manipulation would help offset this limitation. A final future direction for this research will be to have raters code the audio and video taped speeches to test if there are observable differences between the social appearance anxiety and fear of negative evaluation condition.

Broad Clinical Implications

Though there are many unanswered questions, the current research can inform current clinical treatments. The current study shows two main themes: First, a situation in which one is evaluated can produce eating in addition to state social anxiety and second, a situation in which one is evaluated specifically on one's appearance can lead to state body dissatisfaction and state social anxiety. It may be useful to focus therapy on identifying when these processes are activated and how they are linked to eating and body dissatisfaction, which could potentially decrease disordered eating. For example, if a client is aware that when she is in an evaluative situation, she may regulate by utilizing food, a clinician could plan with the client alternative emotion regulation strategies (i.e., breathing or stepping out and calling a friend) to use in such a

situation. Further, it may be possible to separate the cognitive link between evaluation of one's appearance and body dissatisfaction using techniques such as cognitive restructuring. For example, it is possible to be evaluated on appearance (or fearing that one will be evaluated on appearance) without becoming more dissatisfied with how one looks. Identifying distorted thoughts, utilizing cognitive restructuring and coping statements could decrease distorted thinking around this issue. Additionally, identifying that this type of evaluation (in individuals high in appearance evaluation concerns) leads to state body dissatisfaction can prepare the individual to use alternate behaviors when feeling dissatisfied with their body. It may be unpleasant to experience body dissatisfaction, but it is the actual behavior produced from the state that creates impairment. Teaching patients to identify the trigger for the fear and to then use alternate behaviors could prevent disordered eating. Underlying all of these suggestions is the idea that practice with social situations in which evaluation is present (or is feared to be present) could potentially prevent disordered eating. Teaching the patient to sit with unpleasant state anxiety and body dissatisfaction may in turn decrease harmful behaviors. For example, negative affect has been shown to be an antecedent to bingeing (e.g., Wolfe, Wood Baker, Smith, & Weeder, 2009). It could be that when this negative affect is spurred by evaluation, therapy that focuses on practicing with this experience of negative evaluation could prevent such binges. Therefore, it could be useful for clinicians to incorporate exposures that simulate feelings of evaluation and body dissatisfaction into therapy sessions so that patients can gradually learn to tolerate these experiences and to begin to practice them outside of therapy. Future research should test if such social exposures decrease both state social anxiety and body dissatisfaction over time.

Incorporating Evaluation Fears into Current Eating Disorder Prevention and Treatment

Above I discussed some potential ideas for exposures and cognitive therapy that stem from this research and could be helpful for women with eating disorders. Ideally, we want to prevent eating disorders before they occur. Student Bodies Intervention is a structured, Internet-based cognitive behavioral program for the prevention of eating disorders (Taylor et al., 2006). It has been shown to significantly reduce weight and shape concerns and to decrease the risk of onset of an eating disorder. Additionally, it is easily accessible and highly feasible, given that it is an Internet-based program. Participants in this program use self-monitoring and completion of homework assignments that focus on reducing weight and shape concerns, enhancing body image, promoting healthy weight regulation, and increasing education on risk factors for eating disorders. It could be useful to add a module on negative evaluation fears (or incorporate into an existing module) on how to: (a) use cognitive restructuring to examine the link between evaluation and body dissatisfaction, (b) use exposures to practice with judgment fears, and (c) identify when judgment fears become a trigger for eating.

Finally, for women who have developed an eating disorder, Interpersonal Psychotherapy (IPT) has been shown to be an efficacious treatment for both bulimia nervosa and binge eating disorder (Tanofsky-Kraff & Wilfley, 2010). IPT for eating disorders focuses on four interpersonal problem areas that often seen within women with EDs: Interpersonal deficits, interpersonal role disputes, role transitions, and grief. It seems plausible that incorporating an additional domain of interpersonal functioning (or incorporating into an existing domain) that focused on negative evaluation (both generally and specific to appearance) could further enhance the efficacy of IPT. For example, patients could discuss their concerns about evaluation and judgment and practice with exposures or role plays that test these concerns. Future research should test if such an addition would enhance the current version of IPT. Additionally, it may be

that one reason why IPT has been successful is that focusing on interpersonal relationships is similar to interpersonal exposures (i.e., patients who undergo IPT are by default exposing themselves to previously frustrating and anxiety provoking interpersonal situations). Therefore, IPT may be addressing fears of negative evaluation by focusing on the existing four interpersonal domains. Future research should test this proposition.

Conclusions

Overall, these results suggest that negative social evaluative fears are stressors that lead to eating, state social anxiety, and state body dissatisfaction. These results support previous research suggesting that social appearance anxiety may be specific for body dissatisfaction, whereas fear of negative evaluation may be specific for outcomes such as drive for thinness and de-regulated eating (Levinson & Rodebaugh, 2012). Additionally, these results provide preliminary support for the idea that social anxiety and disordered eating share vulnerabilities, but that the way that these vulnerabilities interact may be what produces disorder specific behaviors. It is my hope that these results can lead to the development of interventions that can relieve the suffering associated with social anxiety and eating disorders.

References

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.
- Antelman, S. M., & Szechtman, H. (1975). Tail pinch induces eating in sated rats which appears to depend on nigrostriatal dopamine. *Science*, *59*, 731-733.
- Anderson, G.H., Catherine, N.L., Woodend, D.M., & Wolever, T.M. (2002). Inverse association between the effect of carbohydrates on blood glucose and subsequent short-term food intake in young men. *The American Journal of Clinical Nutrition*, *76*, 1023-1030.
- Acarturk, C., de Graaf, R., van Straten, A., ten Have, M., & Cuijpers, P. (2008). Social phobia and number of social fears, and their association with comorbidity, health-related quality of life and help seeking: A population-based study. *Social Psychiatry and Psychiatric Epidemiology*, *43*, 273-279.
- Attie, I., & Brooks-Gunn, J. (1989). Development of eating problems in adolescent girls: A longitudinal study. *Developmental Psychology*, *25*, 70-79.
- Barlow, D.H., (2003). *Anxiety and its disorders: The nature and treatment of anxiety and panic*, 2nd ed. New York: Guilford.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, TX: Psychological Corporation.
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, *74*, 1252-1265.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238-246.
- Berkman, N. D., Lohr, K. N., & Bulik, C. M. (2007). Outcomes of eating disorders: A systematic review of the literature. *International Journal of Eating Disorders*, *40*, 293-309.

- Berg, C., Shapiro, N., Chambless, D.L., Ahrens, A.H. (1998). Are emotions frightening? II: An analogue study of fear of emotion, interpersonal conflict, and panic onset. *Behaviour Research and Therapy*, *36*, 3-15.
- Brewerton, T. D., Lydiard, R. B., Herzog, D. B., & Brotman, A. W. (1995). Comorbidity of Axis I psychiatric disorders in bulimia nervosa. *Journal of Clinical Psychiatry*, *56*, 77-80.
- Brookings, J. B., & Wilson, J. F. (1994). Personality and family-environment predictors of self-reported eating attitudes and behaviors. *Journal of Personality Assessment*, *63*, 313-326.
- Buckner, J.D., Silgado, J. & Lewinsohn, P. M. (2010). Delineation of differential temporal relations between specific eating and anxiety disorders. *Journal of Psychiatric Research*, *44*, 781-787.
- Buist-Bouwman, M.A., De Graaf, R.R., Vollebergh, W.M., Alonso, J.J., Bruffaerts, R.R., Ormel, J.J. (2006). Functional disability of mental disorders and comparison with physical disorders: A study among the general population of six European countries. *Acta Psychiatrica Scandinavica*, *113*, 492-500.
- Bulik, C.M., Sullivan, P.F., Fear, J.L., Pickering, A., Dawn, A., McCullin, M. (1999). Fertility and reproduction in women with anorexia nervosa: A controlled study. *Journal of Clinical Psychiatry*, *60*, 130-135.
- Bulik, C. M., Sullivan, P. F., Wade, T. D., & Kendler, K. S. (2000). Twin studies of eating disorders: a review. *International Journal of Eating Disorders*, *27*, 1-20.
- Bulik, C. M., Beidel, D. C., Duchmann, E., & Weltzin, T. E. (1991). An analysis of social anxiety in anorexic, bulimic, social phobic, and control women. *Journal of Psychopathology and Behavioral Assessment*, *13*, 199-211.

- Claes, L., Hart, T.A., Smits, D., Van den Eynde, F., Mueller, A., & Mitchell, J.E. (2011).
Validation of the Social Appearance Anxiety Scale in eating disorder patients.
Manuscript under review.
- Clark, L. (2005). Temperament as a Unifying Basis for Personality and
Psychopathology. *Journal of Abnormal Psychology*, 114, 505-521.
- Cools, J., Schotte, D. E., & McNally, R. J. (1992). Emotional arousal and overeating in
restrained eaters. *Journal of Abnormal Psychology*, 707, 348-351.
- Cornwell, B. R., Johnson, L., Berardi, L., &Grillon, C. (2006). Anticipation of public speaking in
virtual reality reveals a relationship between trait social anxiety and startle reactivity.
Biological Psychiatry, 59, 664-666.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using
G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*,
41, 1149-1160.
- Franko, D. L., Becker, A. E., Thomas, J. J., & Herzog, D. B. (2007). Cross-Ethnic Differences in
Eating Disorder Symptoms and Related Distress. *International Journal Of Eating
Disorders*, 40, 156-164.
- French, S.A., Story, M., Neumark-Szainer, D., Downes, B., Resnick, M., Blum, R. (1998).
Ethnic differences in psychosocial and health behavior correlates of dieting, purging, and
binge eating in a population-based sample of adolescent females. *International Journal of
Eating Disorders*, 22, 315-322.
- Frost, R. O., Goolkasian, G. A., Ely, R. J., & Blanchard, F. A. (1982). Depression, restraint and
eating behavior. *Behaviour Research and Therapy*, 20, 113-121.

- Fyer, A.J., Brown, T.A., (2009). Stress-induced and fear circuitry anxiety disorders: Are they a distinct group? *Stress-induced and fear circuitry disorders: Advancing the research agenda for DSM-V*. Arlington, VA US: American Psychiatric Publishing, Inc., 125-135.
- Garner, D. M., Olmsted, M. P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders*, 2, 15-19.
- Garner, D.M., &Garfinkel, P.E. (1979). The eating attitudes test: An index of the symptoms of anorexia nervosa. *Psychological Medicine*, 9, 273-279.
- Gilbert, N., & Meyer, C. (2003). Social anxiety and social comparison: Differential links with restrictive and bulimic attitudes among nonclinical women. *Eating Behaviors*, 4, 257-264.
- Gilbert, N., & Meyer, C. (2005). Fear of negative evaluation and the development of eating psychopathology: A longitudinal study among nonclinical women. *International Journal of Eating Disorders*, 37, 307-312.
- Glass, D. C., Singer, J. E., & Friedman, L. N. (1969).Psychic cost of adaptation to an environmental stressor. *Journal of Personality and Social Psychology*, 12, 200-210.
- Glanz, K., Basil, M., Mailbach, E., Goldberg, J. & Snyder, D. (1998). Why Americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association*, 98, 1118-1126.
- Godart, N. T., Flament, M. F., Lecrubier, Y., & Jeammet, P. (2000). Anxiety disorders in anorexia nervosa and bulimia nervosa: Co-morbidity and chronology of appearance. *European Psychiatry*, 15, 38-45.

- Goodwin, R. D., & Fitzgibbon, M. L. (2002). Social anxiety as a barrier to treatment for eating disorders. *International Journal of Eating Disorders, 32*, 103-106.
- Greeno, C. G., & Wing, R. R. (1994). Stress-induced eating. *Psychological Bulletin, 115*, 444-464.
- Haikal, M., & Hong, R. Y. (2010). The effects of social evaluation and looming threat on self-attentional biases and social anxiety. *Journal of Anxiety Disorders, 24*, 345-352.
- Hart, T. A., Flora, D. B., Palyo, S. A., Fresco, D. M., Holle, C., & Heimberg, R. G. (2008). Development and examination of the Social Appearance Anxiety Scale. *Assessment, 15*, 48-59.
- Halmi, K.A., Eckert E., Marchi, P., Sampugnaro, V. (1991). Comorbidity of psychiatric diagnoses in anorexia nervosa. *Archives of General Psychiatry, 48*, 712-718.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*, 408-420.
- Heatherton, T. F., Herman, C., & Polivy, J. (1991). Effects of physical threat and ego threat on eating behavior. *Journal of Personality and Social Psychology, 60*, 138-143.
- Heimberg, R. G., Brozovich, F. A., Rapee, R. M. (2012). A cognitive-behavioral model of Social Anxiety disorder: Update and extension. In Hofmann, S. G., & DiBartolo, P. M. (Eds.), *Social Anxiety: Clinical, Developmental, and Social Perspectives*. New York, NY: Elsevier.
- Herman, C. P., & Polivy, J. (1975). Anxiety, restraint, and eating behavior. *Journal of Abnormal Psychology, 84*, 666-672.
- Herman, C. P., Polivy, J., Lank, C. N., & Heatherton, T. F. (1987). Anxiety, hunger and eating behavior. *Journal of Abnormal Psychology, 96*, 264-269.

- Hofmann, S. G., & Barlow, D. H. (2002). Social phobia (social anxiety disorder). In D. H. Barlow (Ed.), *Anxiety and its Disorders: The Nature and Treatment of Anxiety and Panic*, 2nd Edition (pp. 454-476). New York: Guilford Press.
- Hudson, J.E., Hirpi, E., Harrison, P.G., & Kessler, R.C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological Psychiatry*, *61*, 348-358.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1-55.
- Hyman, S.E. (2003). Foreward, in *Advancing the DSM: Dilemmas in Psychiatric Diagnosis*. Edited by Philips KA, First MB, Pincus HA. Washington, DC, American Psychiatric Association.
- Jacobi, C., Hayward, C., de Zwaan, M., Kraemer, H. C., & Agras, W. (2004). Coming to terms with risk factors for eating disorders: Application of risk terminology and suggestions for a general taxonomy. *Psychological Bulletin*, *130*, 19-65.
- Jacobi, C., Fittig, E., Bryson, S. W., Wilfley, D., Kraemer, H. C., & Taylor, C. B. (2011). Who is really at risk? Identifying risk factors for subthreshold and full syndrome eating disorders in a high-risk sample. *Psychological Medicine*, *41*, 1939-49.
- Kaltiala-Heino, R., Rimpelä, M., Rantanen, P., & Rimpelä, A. (2000). Bullying at school—an indicator of adolescents at risk for mental disorders. *Journal of adolescence*, *23*, 661-674.
- Katzman, D.K. (2005). Medical complications in adolescents with anorexia nervosa: A review of the literature. *International Journal of Eating Disorders*, *37*, S52-S59.

- Kaye, W. H., Bulik, C. M., Thornton, L., Barbarich, N., & Masters, K. (2004). Comorbidity of anxiety disorders with anorexia and bulimia nervosa. *The American Journal of Psychiatry, 161*, 2215-2221.
- Kaye, W.H., Strober, M., Jimerson, D.C. (2004).The neurobiology of eating disorders. In: Charney DS, Nestler EJ, eds. *The Neurobiology of Mental Illness*. Oxford: Oxford University Press,1112-1128.
- Keel, P.K., Mitchell, J.E., Miller, K.B., Davis, T.L., Crow, S.J. (2000).Social adjustment over 10 years following diagnosis with bulimia nervosa. *International Journal of Eating Disorders, 27*, 21-28.
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication.*Archives of general psychiatry, 62*, 593.
- Killen, J. D., Taylor, C. B., Hayward, C., Haydel, K. F., Wilson, D. M., Hammer, L., et al. (1996). Weight concerns influence the development of eating disorders: A 4-year prospective study. *Journal of Consulting and Clinical Psychology, 64*, 936-940.
- Kirschbaum, C., Pirke, K., & Hellhammer, D. H. (1993). The "Trier Social Stress Test": A tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology, 28*, 76-81.
- Klump, K.L., Bulik, C.M., Kaye, W.H., Treasure, J. (2009). Tyson E. Academy for Eating Disorders position paper: Eating disorders are serious mental illnesses. *International Journal of Eating Disorders, 42*, 97-103.

- Klein, D.N., Lewinsohn, P.M., Rohde, P.P., Seeley, J.R., Shankman, S.S. (2003). Family study of co-morbidity between major depressive disorder and anxiety disorders. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences*. 33, 703-714.
- Koskina, A., Van den Eynde, F., Meisel, S., Campbell, I.C., Schmidt, U. (2011). Social appearance anxiety and Bulimia Nervosa. *Eating and Weight Disorders*.
- Kotov, R., Watson, D., Robles, J. P., & Schmidt, N. B. (2007). Personality traits and anxiety symptoms: The multilevel trait predictor model. *Behaviour Research and Therapy*, 45, 1485-1503.
- Laessle, R.G., Schulz, S. (2009). Stress-induced laboratory eating behavior in obese women with binge eating disorder. *International Journal of Eating Disorders*.42, 505-510.
- Lang, P.J., Levin, D.N., Miller, G.A., Kozak, M.J. (1983). Fear imagery and the psychophysiology of emotion: The problem of affective response integration. *Journal of Abnormal Psychology*.92, 276-306.
- LeDoux, J.E. (2000). Emotion circuits in the brain. *Annual Review of Neuroscience*.23,155-184.
- Levinson, C.A., Rodebaugh, T. L. (2011). Validation of the Social Appearance Anxiety Scale: Factor, convergent, and divergent validity. *Assessment*, 18, 350-357.
- Levinson, C.A., Rodebaugh, T. L. (2012). Social anxiety and eating disorder comorbidity: The role of negative social evaluation fears. *Eating Behaviors*, 13, 27-35.
- Levinson, C.A., Rodebaugh, T. L., White, E.K., Menatti, A.R., Weeks, J.W., Iacovino, J.A., Warren, C.A. (in press).Social appearance anxiety, perfectionism, and fear of negative evaluation. Distinct or shared risk factors for social anxiety and eating disorders? *Appetite*.

- Maloney, M. J., McGuire, J. B., & Daniels, S. R. (1988). Reliability testing of a children's version of the Eating Attitude Test. *Journal of the American Academy of Child & Adolescent Psychiatry*, 27, 541-543.
- Mehler, P.S., Gray, M.C., Schulte, M. (1997). Medical complications of anorexia nervosa. *Journal of Women's Health*.6, 583-541.
- Mitchell, J.E., Specker, S.M., de Zwaan, M. (1991). Comorbidity and medical complications of bulimia nervosa. *Journal of Clinical Psychiatry*. 52, 13-20.
- Moscovitch, D.A. (2009). What is the core fear in social phobia?: A new model to facilitate individualized case conceptualization and treatment. *Cognitive and Behavioral Practice*, 16, 123-134.
- Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, 126, 247-259.
- Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide*. (Sixth Edition ed.). Los Angeles, CA: Muthén & Muthén.
- Nemeroff, C. B., Osbahr, A. J. III, Bissette, G., Jahnke, G., Lipton, A., & Prange, A. J., Jr. (1978). Cholecystokinin inhibits tail pinch-induced eating in rats. *Science*, 200, 793-794.
- Oaten, M., Williams, K. D., Jones, A., & Zadro, L. (2008). The effects of ostracism on self-regulation in the socially anxious. *Journal of Social and Clinical Psychology*, 27, 471-504.
- Oliver, G., & Wardle, J. (1999). Perceived effects of stress on food choice. *Physiology & Behavior*, 66, 511-515.
- Oliver, G., Wardle, J., Gibson, L. (2000). Stress and food choice: A laboratory study. *Psychosomatic Medicine*. 62, 853-865.

- Pallister, E., & Waller, G. (2008). Anxiety in the eating disorders: Understanding the overlap. *Clinical Psychology Review, 28*, 366-386.
- Parker, G., Parker, I., & Brotchie, H. (2006). Mood state effects of chocolate. *Journal Of Affective Disorders, 92*, 149-159.
- Striegel-Moore, R. H., Fairburn, C. G., Wilfley, D. E., Pike, K. M., Dohm, F. A., & Kraemer, H. C. (2005). Toward an understanding of risk factors for binge-eating disorder in black and white women: a community-based case-control study. *Psychological Medicine, 35*, 907-917.
- Plomin, R., Haworth, C.M., Davis, O.S. (2009). Common disorders are quantitative traits. *Nature Review of Genetics, 10*, 872-878.
- Reed, D. L., Thompson, J., Brannick, M. T., & Sacco, W. P. (1991). Development and validation of the Physical Appearance State and Trait Anxiety Scale (PASTAS). *Journal of Anxiety Disorders, 5*, 323-332.
- Rieger, E., Van Buren, D., Bishop, M., Tanofsky-Kraff, M., Welch, R., & Wilfley, D. (2010). An eating disorder-specific model of interpersonal psychotherapy (IPT-ED): Causal pathways and treatment implications. *Clinical Psychology Review, 30*, 400-410.
- Rodebaugh, T. L., Woods, C. M., Thissen, D., Heimberg, R. G., Chambless, D. L., & Rapee, R. M. (2004). More information from fewer questions: The factor structure and item properties of the original and brief fear of negative evaluation scales. *Psychological Assessment, 16*, 169-181.
- Rodebaugh, T. L. (2009). Social phobia and perceived quality of friendship. *Journal of Anxiety Disorders, 23*, 872-878.

- Rodebaugh, T. L., Heimberg, R. G., Brown, P. J., Fernandez, K. C., Blanco, C., Schneier, F. R., & Liebowitz, M. R. (2011). More reasons to be straightforward: Findings and norms for two scales relevant to social anxiety. *Journal Of Anxiety Disorders, 25*, 623-630.
- Rodebaugh, T. L., Fernandez, K. C., & Levinson, C. A. (2012). Testing the effects of social anxiety disorder on friendship quality across gender and ethnicity. *Cognitive Behaviour Therapy, 41*, 130-139.
- Ruscio, A. M., Brown, T. A., Chiu, W., Sareen, J., Stein, M. B., & Kessler, R. C. (2008). Social fears and social phobia in the USA: Results from the National Comorbidity Survey Replication. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences, 38*, 15-28.
- Schotte, D. E., Cools, J., & McNally, R. J. (1990). Film-induced negative affect triggers overeating in restrained eaters. *Journal of Abnormal Psychology, 99*, 317-320.
- Sherrod, D. R., Hage, J. N., Halpern, P. L., & Moore, B. S. (1977). Effects of personal causation and perceived control on responses to an aversive environment: The more control, the better. *Journal of Experimental Social Psychology, 13*, 14-27
- Siegal, P. S., & Brantley, J. J. (1951). The relationship of emotionality to the consummatory response of eating. *Journal of Experimental Psychology, 42*, 304-306.
- Spielberger, C.D. (1983). *The State-Trait Anxiety Inventory manual*. California: Mind Garden.
- Steiger, J. H., & Lind, J. C. (1980). Statistically-based tests for the number of factors. *Annual Spring Meeting of the Psychometric Society*. Iowa City, Iowa.
- Stein, M. B., Jang, K. L., & Livesley, W. J. (2002). Heritability of social anxiety-related concerns and personality characteristics: a twin study. *The Journal of nervous and mental disease, 190*, 219-224.

- Sterritt, G. M. (1962). Inhibition and facilitation of eating by electric shock. *Journal of Comparative and Physiological Psychology*, 55, 226-229.
- Stice, E., & Shaw, H. E. (2002). Role of body dissatisfaction in the onset and maintenance of eating pathology: A synthesis of research findings. *Journal of Psychosomatic Research*, 53, 985-993.
- Stice, E., Ng, J., & Shaw, H. (2010). Risk factors and prodromal eating pathology. *Journal of Child Psychology and Psychiatry*, 51, 518-525.
- Striegel-Moore, R. H., & Bulik, C. M. (2007). Risk factors for eating disorders. *American Psychologist*, 62, 181-198.
- Stroud, L. R., Tanofsky-Kraff, M., Wilfley, D. E., & Salovey, P. (2000). The Yale Interpersonal Stressor (YIPS): Affective, physiological, and behavioral responses to a novel interpersonal rejection paradigm. *Annals of Behavioral Medicine*, 22, 204-213.
- Tanofsky-Kraff, M., & Wilfley, D. E. (2010). Interpersonal psychotherapy for bulimia nervosa and binge-eating disorder. *The treatment of eating disorders: A clinical handbook*, 271-293.
- Taylor, C. B., Bryson, S., Luce, K. H., Cunniff, D., Doyle, A. C., Abascal, L. B., ... & Wilfley, D. E. (2006). Prevention of eating disorders in at-risk college-age women. *Archives of General Psychiatry*, 63, 881.
- Tillfors, M., Furmark, T., Marteinsdottir, I., Fischer, H., Pissiota, A., Langström, B., Fredrikson, M. (2001). Cerebral blood flow in subjects with social phobia during stressful speaking tasks: a PET study. *American Journal of Psychiatry*, 158, 1220-1226.
- Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, 38, 1-10.

- Turner, S. M., Beidel, D. C., Dancu, C. V., & Stanley, M. A. (1989). An empirically derived inventory to measure social fears and anxiety: The Social Phobia and Anxiety Inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 1*, 35-40.
- Ullman, A. D. (1951). The experimental production and analysis of a "compulsive eating symptom" in rats. *Journal of Comparative and Physiological Psychology, 44*, 575-581.
- Vander Wal, J. S., & Thomas, N. (2004). Predictors of body image dissatisfaction and disturbed eating attitudes and behaviors in African American and Hispanic girls. *Eating Behaviors, 5*, 291-301.
- Vander Wal, J. S., Gibbons, J. L., & Grazioso, M. (2008). The socio-cultural model of eating disorder development: Application to a Guatemalan sample. *Eating Behaviors, 9*, 277-284.
- Van Strien, T., Rookus, M. A., Bergers, G. P. A., Frijters, J. E. R., & Defares, P. B. (1986). Life events, emotional eating and change in body mass index. *International Journal of Obesity, 10*, 29-35.
- Wallis, D. J., & Hetherington, M. M. (2004). Stress and eating: The effects of ego-threat and cognitive demand on food intake in restrained and emotional eaters. *Appetite, 43*, 39-46.
- Wallis, D.J., Hetherington, M.M. (2009). Emotions and eating: Self-reported and experimentally induced changes in food intake under stress. *Appetite, 52*, 355-362.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063-1070.
- Watson, D., & Friend, R. (1969). Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology, 33*, 448-457.

- Weinstein, S. E., Shide, D. J., & Rolls, B. J. (1997). Changes in food intake in response to stress in men and women: Psychological factors. *Appetite*, 28, 7-18.
- Wickramaratne, P.J., Weissman, M.M. (1993). Using family studies to understand comorbidity. *European Archives of Psychiatry and Clinical Neuroscience*, 243,150-157.
- Wilfley, D. E., Pike, K. M., & Striegel-Moore, R. H. (1997). Toward an integrated model of risk for binge eating disorder. *Journal of Gender Culture and Health*, 2, 1-32.
- Wolfe, B. E., Baker, C. W., Smith, A. T., & Kelly-Weeder, S. (2009). Validity and utility of the current definition of binge eating. *international Journal of Eating disorders*, 42, 674-686.
- Wolpe J. (1988). Subjective Anxiety Scale. In M. Hersen & A. S. Bellack (Eds.), *Dictionary of behavioral assessment techniques* (pp. 455-457). New York: Pergamo.
- Wonderlich, S. A., Brewerton, T. D., Jolic, Z., Dansky, B. S., & Abbott, D. W. (1997). Relationship of childhood sexual abuse and eating disorders. *Journal of the American Academy of Child & Adolescent Psychiatry*, 36, 1107-1115.
- Wonderlich-Tierney, A. L., & Vander Wal, J. S. (2010). The effects of social support and coping on the relationship between social anxiety and eating disorders. *Eating Behaviors*, 11, 85-91.
- Woodside, D., & Garfinkel, P. E. (1992). Age of onset in eating disorders. *International Journal of Eating Disorders*, 12, 31-36.
- Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit formation. *Journal of Comparative Neurology of Psychology*, 18, 459-482.
- Zellner, D. A., Loaiza, S., Gonzalez, Z., Pita, J., Morales, J., Pecora, D., & Wolf, A. (2006). Food selection changes under stress. *Physiology & Behavior*, 87, 789-793.

Footnotes

¹This effect (FNE condition) was significant when both body fat content and BMI were removed as covariates.

Table 1. Descriptive statistics and zero-order correlations between group, trait fear of negative evaluation, trait social appearance anxiety, total grams of food, state social anxiety, state body dissatisfaction, restraint, and emotional eating.

	G1	G2	Trait FNE	Trait SAA	Grams	State SA	State BD	Restr-aint	EE	Hung	BMI	BF	S-Stress	S-FNE	S-SAA
Mean (SD)	<i>n</i> = 52	<i>n</i> = 55	22.49 (7.10)	31.3 (12.83)	5.19 (2.46)	70.56 (31.29)	0.00 (1.84)	26.54 (9.47)	34.40 (11.34)	3.21 (1.53)	22.23 (2.99)	27.60 (7.53)	10.97 (4.82)	14.42 (6.19)	12.29 (4.97)
G1	X	-.50**	-.03	-.11	.16*	-.05	-.17*	-.16*	-.13	-.07	-.01	-.03	-.15	-.16*	-.20*
G2		X	.14	.17*	-.04	.27**	.25**	.17*	.10	.15	-.09	-.09	.26**	.28**	.32**
Trait FNE			X	.91	-.06	.28**	.42**	.12	.29**	.09	.10	-.01	.33**	.46**	.49**
Trait SAA				X	-.10	.42**	.55**	.30**	.38**	.08	.20*	.16*	.47**	.53**	.69**
Grams					X	-.06	-.02	-.17*	-.03	.25**	-.12	-.15	-.09	.05	-.10
State SA						X	.37**	.04	.21**	-.03	.02	.10	.62**	.48**	.50**
State BD							X	.91	.52**	.51**	.14	.34**	.26**	.54**	.66**
Restr-aint								X	.94	.28**	.04	.28**	.22**	.10	.17*
EE									X	.94	.18*	.20*	.15	.34**	.30**
Hung										X	.09	.03	.00	.09	.11
BMI											X	.95	.86**	.15	.02
BF												X	.86	.19*	.03

S- Stress	.91	.64**	.65**
S-FNE		.96	.79**
S- SAA			.91

Note. Cronbach's alphas are on the diagonal. G1 = participants coded 1 for FNE condition and 0 for other conditions; G2 = participants coded 1 for SAA condition and 0 for other conditions; FNE = fear of negative evaluation; SAA = social appearance anxiety; total grams = total grams of food intake; SA = social anxiety; BD = body dissatisfaction, EE = emotional eating; grams = total grams of food consumed square root transformed, hung = hunger, BMI = Body Mass Index, BF = Body Fat Content; S = state; BMI and BF alpha statistics are test-retest reliabilities from Levinson and Rodebaugh (2011), * $p < .05$, ** $p < .001$.

Table 2. Means and standard deviations of food amounts consumed by condition.

	Total Grams	Potato Chips	M & Ms	Dried Fruit	Pretzels	Unhealthy Foods	Healthy Foods
G1-FNE	37.69 (22.26)	7.29 (8.23)	9.81 (10.66)	12.86 (12.80)	7.73 (7.88)	17.09 (14.85)	20.60 (14.39)
G2-SAA	32.02 (24.51)	6.41 (9.55)	9.63 (14.43)	11.04 (11.94)	4.92 (6.15)	16.05 (19.70)	15.96 (12.68)
Control	29.26 (24.42)	4.23 (7.53)	7.56 (9.79)	9.58 (14.40)	7.89 (9.99)	11.79 (13.24)	17.47 (19.71)

Note. G1-FNE = fear of negative evaluation condition; G2-SAA = social appearance anxiety condition; unhealthy foods is a composite of potato chips and M & Ms; healthy foods is a composite of dried fruit and pretzels.

Table 3. Mean (and standard deviation) Levels of State Construct From Manipulation Check

	State stress	State FNE	State SAA	State Stress (during speech)	State FNE (during speech)	State SAA (during speech)
FNE	10.04 (4.14)	13.00 (5.06)	10.86 (3.62)	5.69 (2.53)	8.12 (3.04)	3.73 (1.50)
SAA	12.69 (5.42)	16.73 (6.59)	14.42 (6.05)	7.32 (2.99)	9.32 (3.82)	6.80 (2.97)
Control	10.16 (4.37)	13.14 (6.15)	11.30 (4.05)	5.19 (2.73)	6.89 (3.46)	4.64 (2.66)

Note. FNE = Fear of Negative Evaluation condition; SAA = Social Appearance Anxiety condition; control = control condition. Please note that the “state stress subscales” include 5 items, whereas the “during the speech” subscale include 3 items, therefore means are higher for the state subscales as a reflection of the change in measurement.

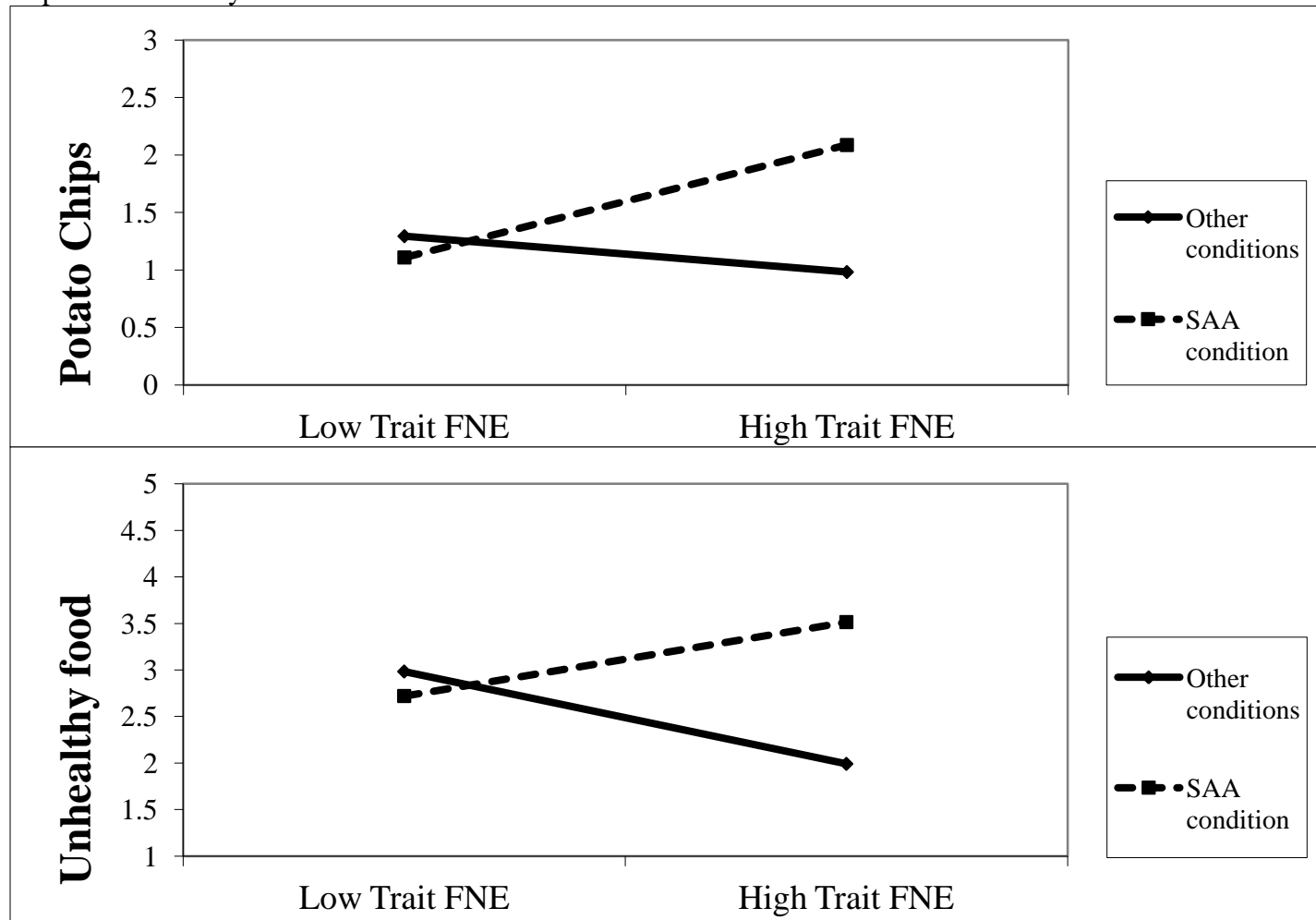
Table 4. Bonferroni planned comparisons between state stress, fear of negative evaluation, and social appearance from manipulation check measure. FNE = fear of negative evaluation condition; SAA = social appearance anxiety condition; control = control condition.

Comparisons	Mean Difference	SE	95% CI	
			Lower Bound	Upper Bound
State FNE				
FNE vs SAA	-.374**	1.17	-6.57	-.91
SAA vs control	3.59**	1.17	.90	6.57
FNE vs control	-.14	1.19	-3.02	2.74
State SAA				
FNE vs SAA	-3.55**	.93	-5.81	-1.30
SAA vs control	3.11**	.94	.85	5.38
FNE vs control	-.44	.94	-2.72	1.85
State Stress (Control)				
FNE vs SAA	-2.66*	.92	.42	4.89
SAA vs control	2.53*	.92	.29	4.79
FNE vs control	-.13	.93	-2.39	2.15
State FNE (during speech)				
FNE vs SAA	-1.21	.67	-2.83	.41
SAA vs control	2.44**	.66	.83	4.05
FNE vs control	1.22	.68	-.41	2.86
State SAA (during speech)				
FNE vs SAA	-3.07**	.48	-4.22	-1.91
SAA vs control	2.16**	.47	1.01	3.31
FNE vs control	-.91	.48	-2.08	.25
State Stress (during speech)				
FNE vs SAA	-1.64**	.54	-2.93	-.34
SAA vs control	2.14**	.53	.85	3.43

FNE vs control .50 .54 -.80 1.81

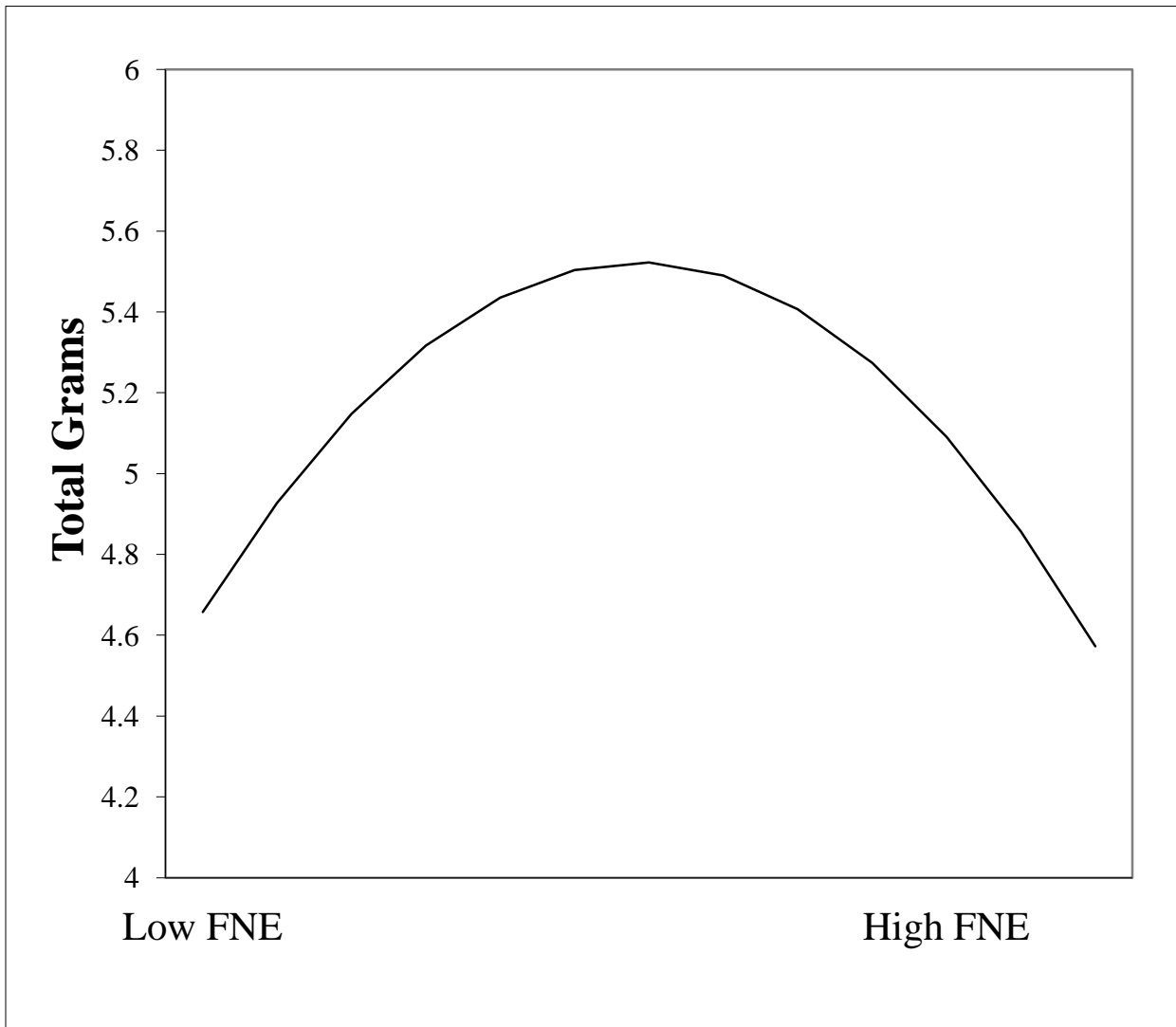
*Note.*FNE = fear of negative evaluation; SAA = social appearance anxiety; State = mood state after the speech; during the speech = mood state during the speech; * $p < .05$; ** $p < .001$.

Figure 1. The interaction between social appearance anxiety condition and trait fear of negative evaluation predicting grams of potato chips and unhealthy food consumed.



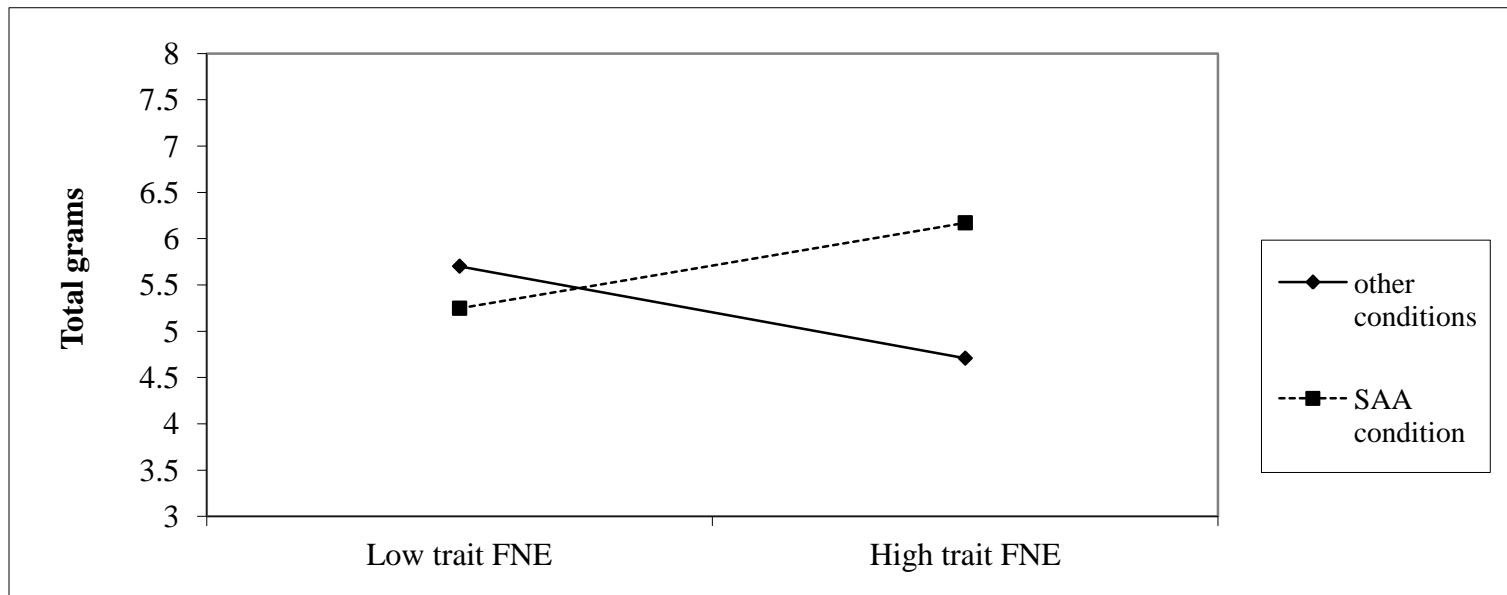
Note. FNE = Fear of negative evaluation; SAA = social appearance anxiety; Potato Chips and unhealthy food are square root transformed. Potato chips: $p = .017$, unhealthy food: $p = .025$.

Figure 2. The quadratic relationship between total grams of food consumed and fear of negative evaluation.



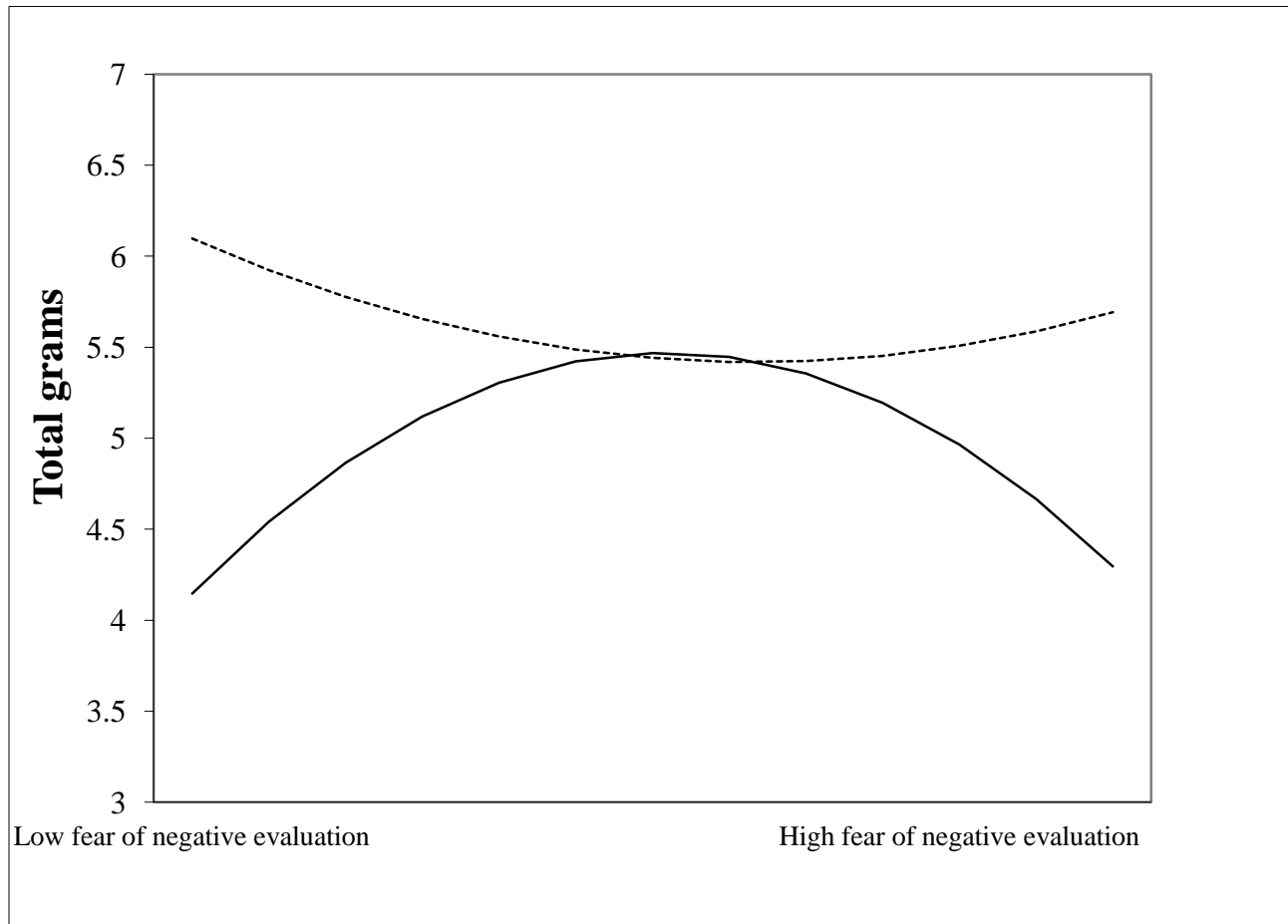
Note. FNE = fear of negative evaluation. $p = .013$.

Figure 3. Interactions when the quadratic relationship of fear of negative evaluation (FNE2) is included in regression.



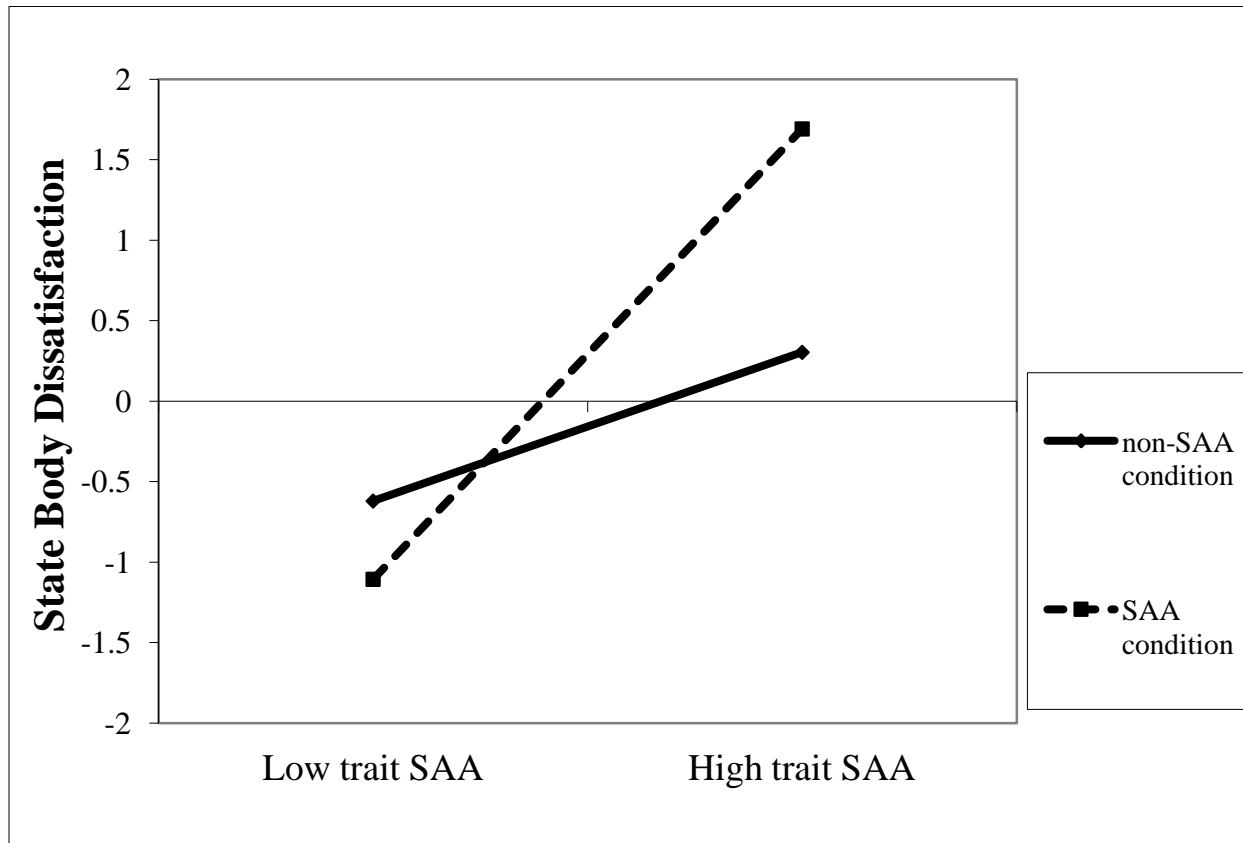
Note. FNE = Fear of negative evaluation; SAA = social appearance anxiety, $p = .046$.

Figure 4. The quadratic interaction between fear of negative evaluation and condition



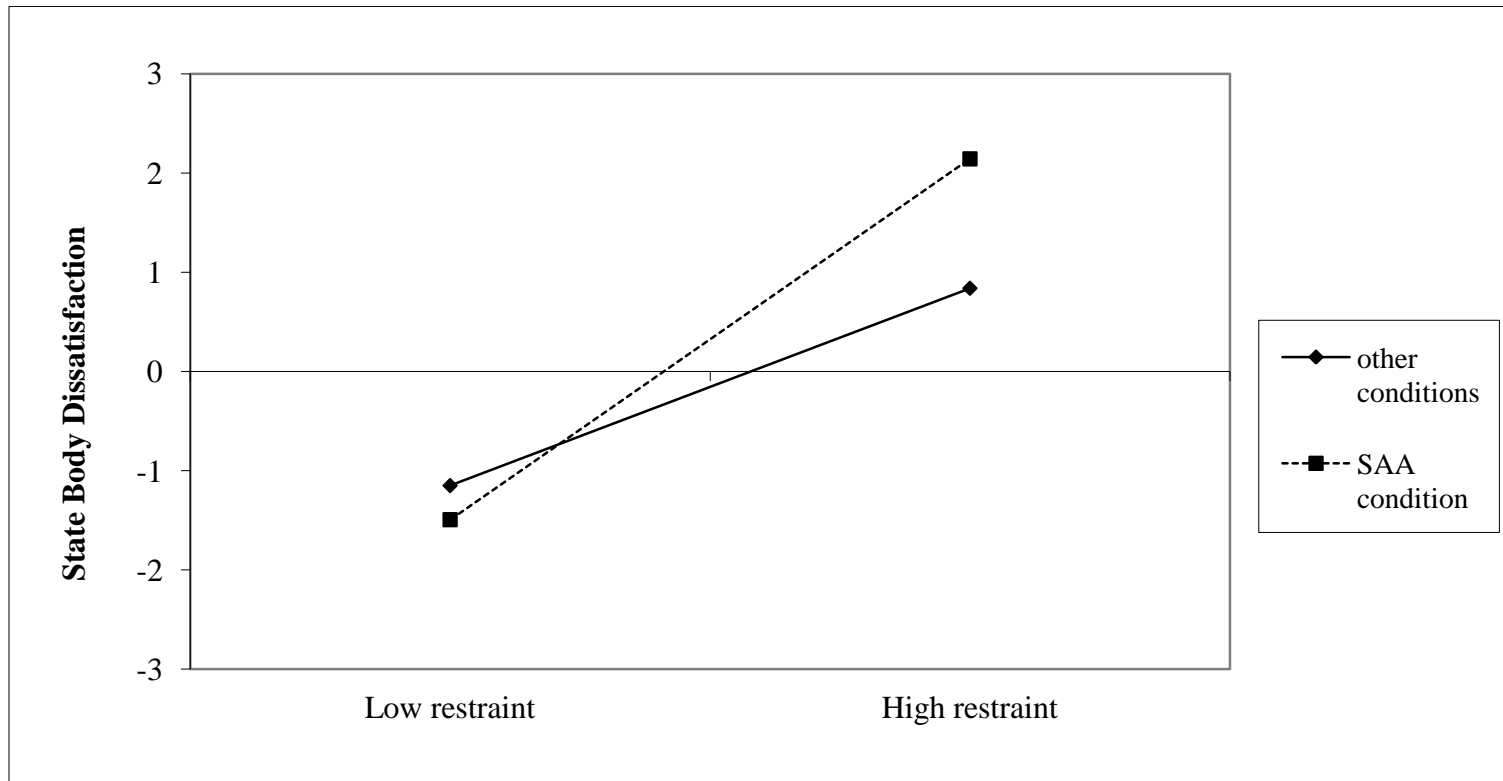
Note. Dashed line = Fear of negative evaluation condition; Solid line = all other conditions, $p = .061$.

Figure 5. The interaction between SAA condition and trait SAA predicting state body dissatisfaction.



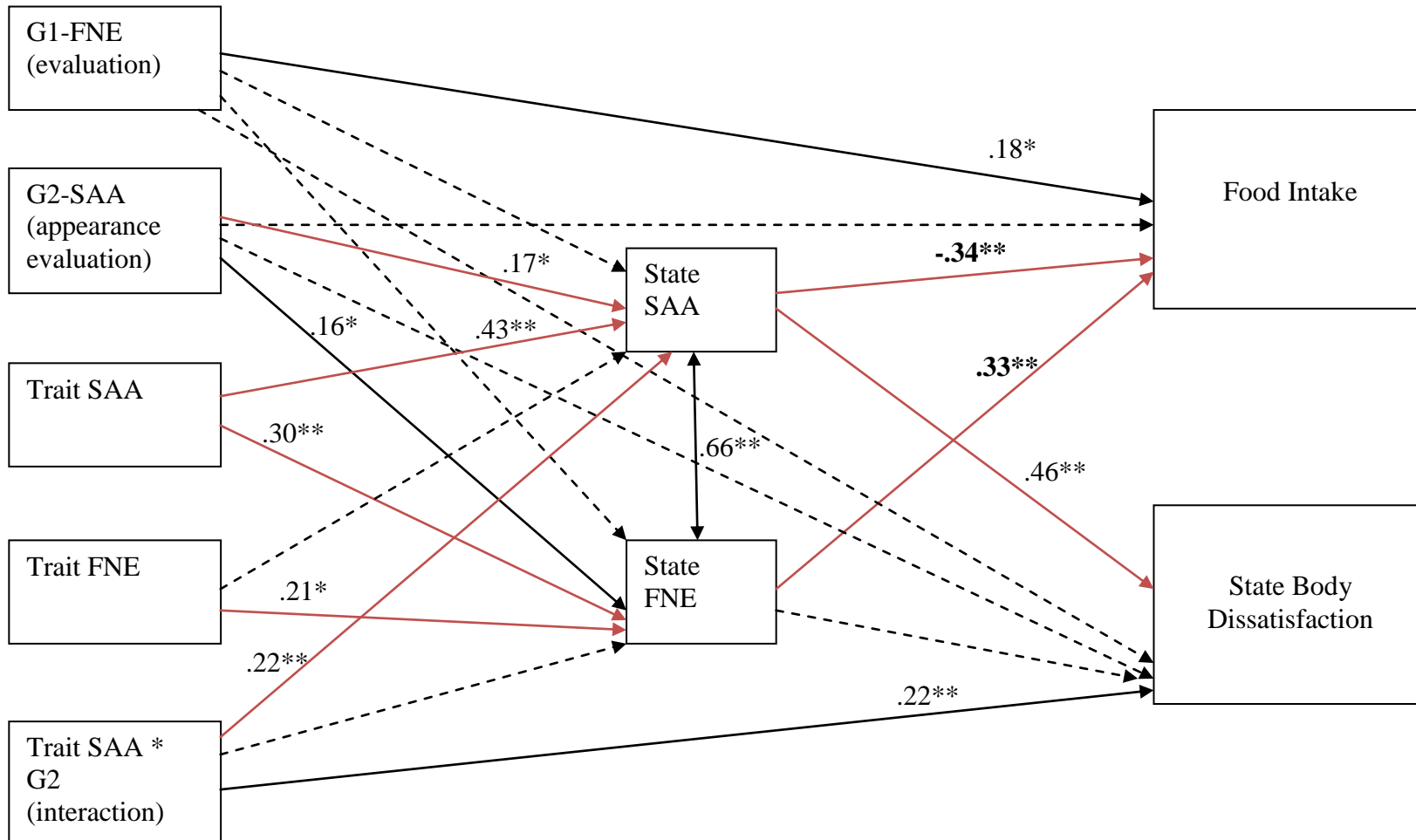
Note. SAA = Social appearance anxiety, $p = .002$.

Figure 6. The interaction between restraint and G2-SAA predicting state body dissatisfaction.



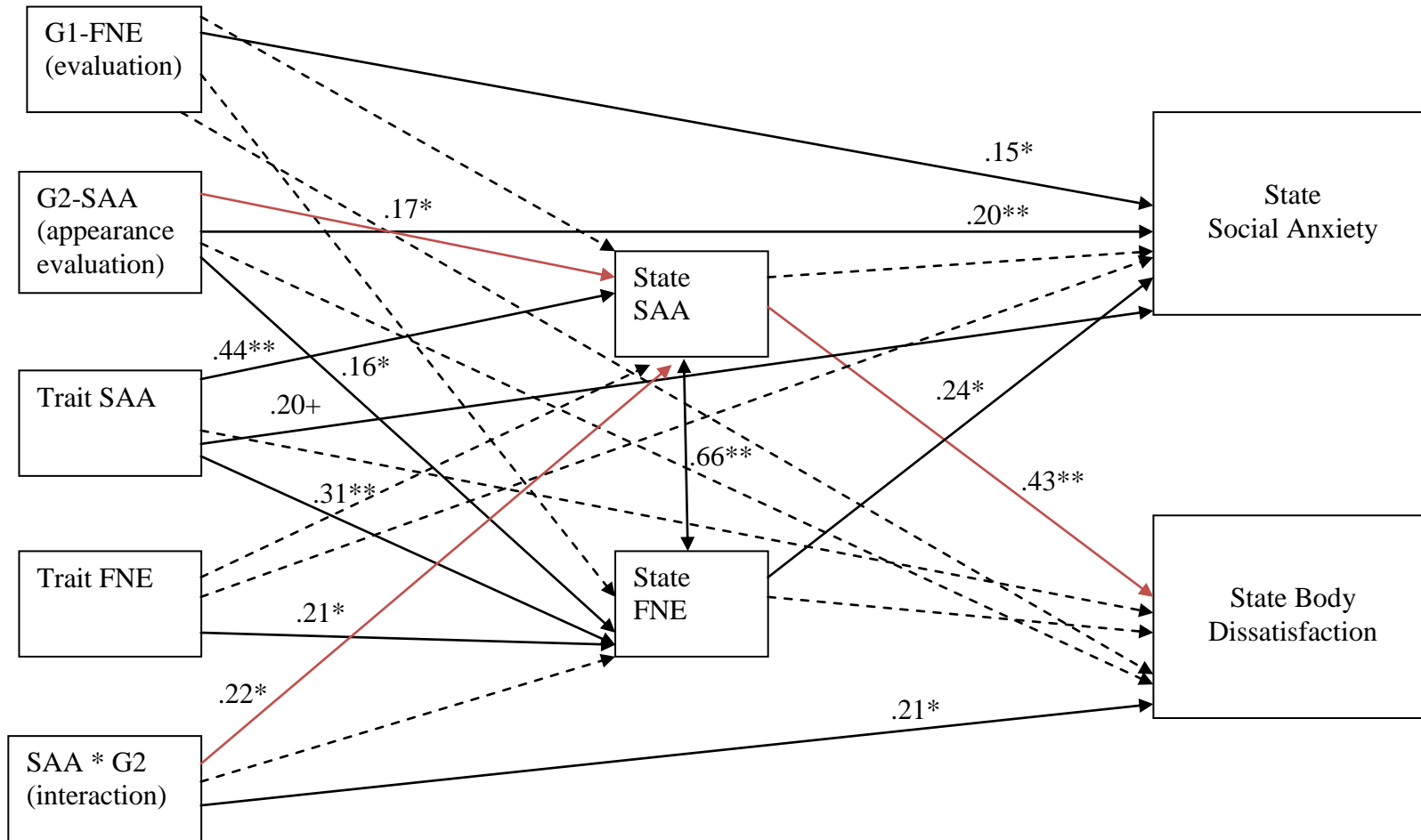
Note. SAA condition = participants coded as 1 for the social appearance anxiety condition and 0 for the fear of negative evaluation and control condition, $p < .001$.

Figure 7. A Model of Negative Evaluation Fears, Eating, and Body Dissatisfaction.



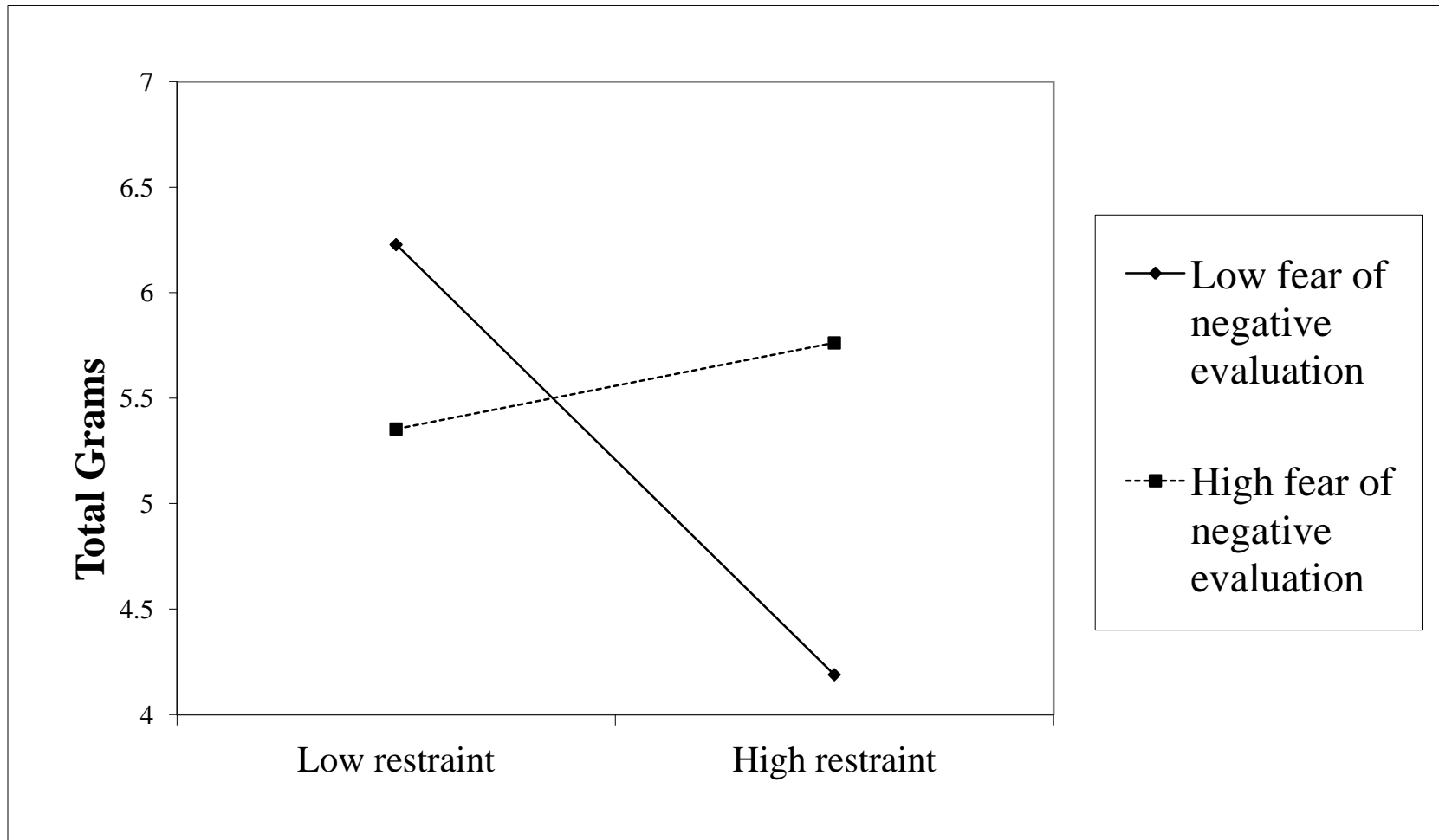
Note. G1-FNE = participants coded as 1 = FNE condition and 0 = SAA and control condition; G2-SAA = participants coded as 2 = SAA condition and 0 = FNE and control condition. SAA = social appearance anxiety; FNE = fear of negative evaluation, significant paths are bolded, non-significant paths are dashed, significant indirect effects are red. Bolded values show that state SAA decreases, whereas state FNE increases food intake. $*p < .05$, $**p < .01$.

Figure 8. A Model of the relationship between negative evaluation fears, state social anxiety, and state body dissatisfaction.



Note. G1-FNE = participants coded as 1 = FNE condition and 0 = SAA and control condition; G2-SAA = participants coded as 2 = SAA condition and 0 = FNE and control condition. SAA = social appearance anxiety; FNE = fear of negative evaluation, significant paths are bolded, non-significant paths are dashed, significant indirect effects are in red. $*p < .05$, $**p < .01$, $+ = < .10$.

Figure 9. The interaction between restraint and fear of negative evaluation predicting total grams of food intake.



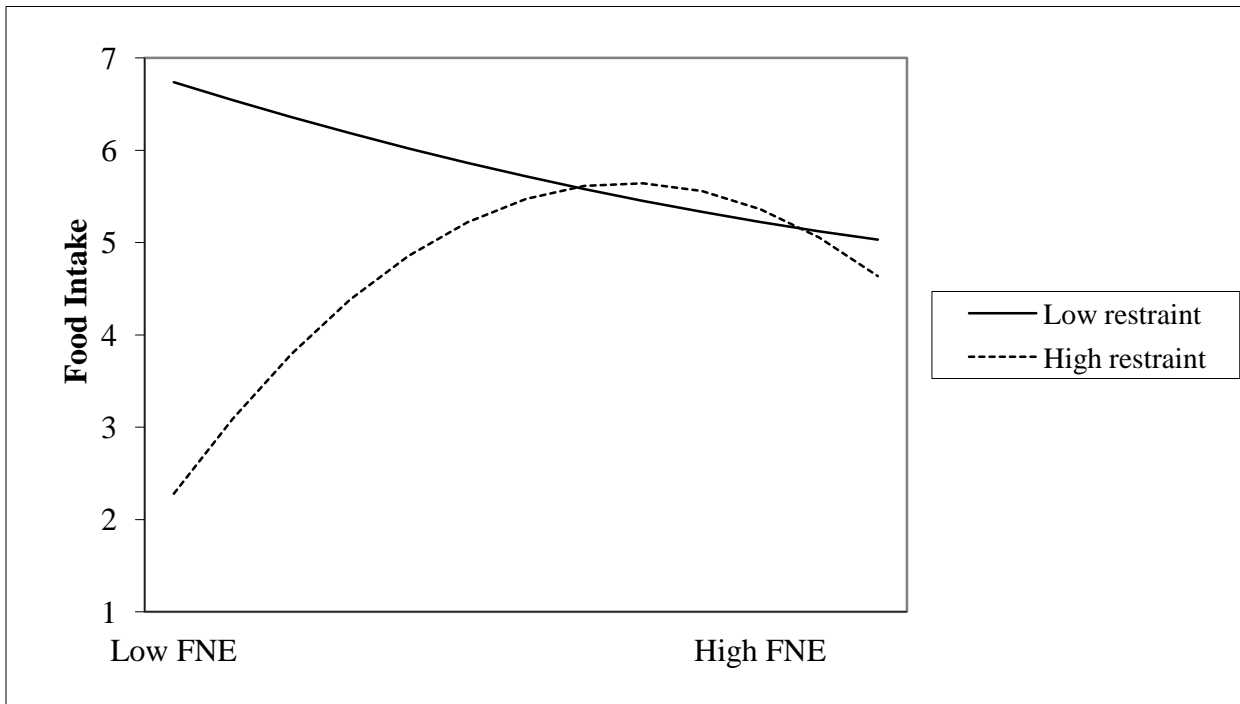
$p = .020$.

Table 5. Multiple regression with total grams of food as dependent variable.

Predictor	<i>b</i> *	Part <i>r</i>	Significance level
SAA	-.03	-.03	.754
FNE	.07	.05	.520
EE	-.18	-.11	.209
Restraint	-.17	-.12	.161
<i>FNE * EE</i>	-.28	-.16	.063
FNE * Restraint	.21	.19	.020
FNE * SAA	-.16	-.14	.108
<i>SAA * EE</i>	.21	.16	.062
SAA * Restraint	-.08	-.05	.546
EE * Restraint	-.16	-.11	.213
FNE * SAA * EE	-.08	-.05	.598
SAA * EE * Restraint	.13	.07	.390
FNE * EE * Restraint	.10	.05	.540
FNE * Restraint * SAA	-.12	-.07	.415
FNE * R * SAA * EE	-.05	-.02	.776

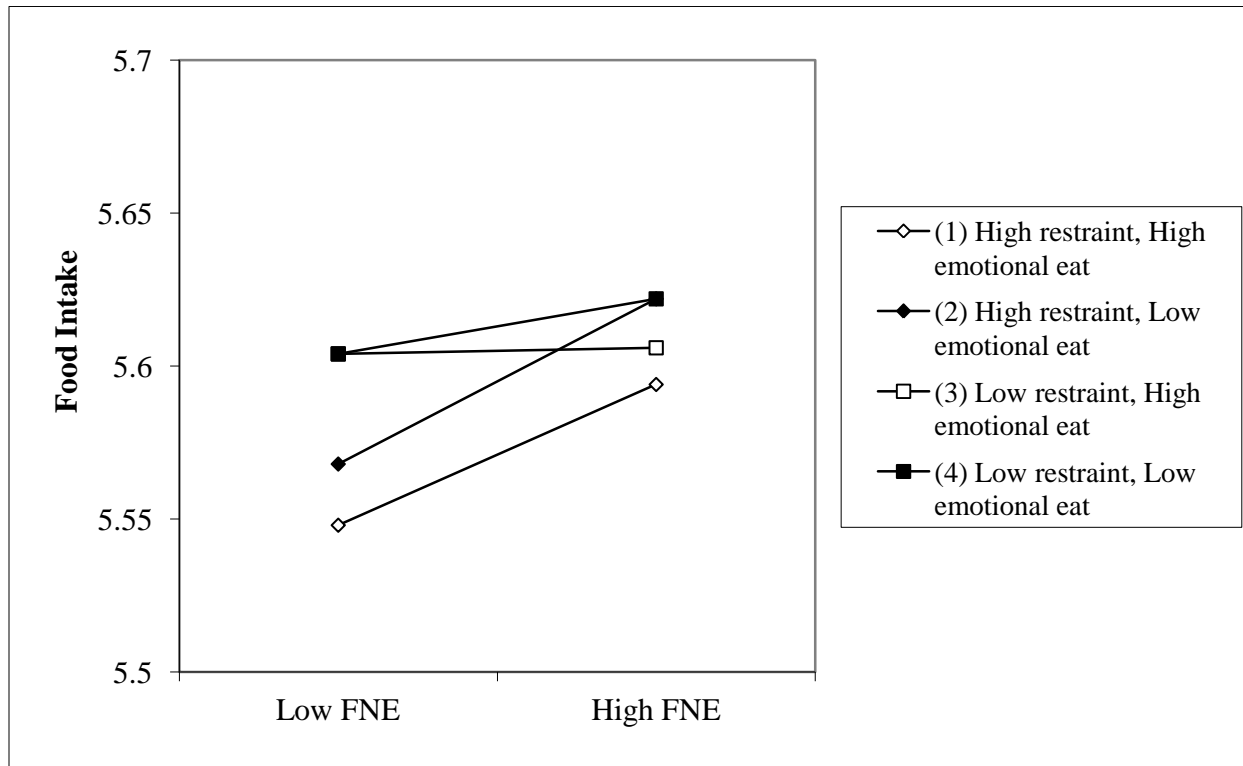
Note. SAA = Social appearance anxiety; FNE = fear of negative evaluation; EE = emotional eating; R = Restraint.

Figure 10. The quadratic interaction between restraint and fear of negative evaluation.



Note. FNE = fear of negative evaluation; food intake is square root transformed, $p = .020$.

Figure 11. The 3-way interaction between restraint, fear of negative evaluation, and emotional eating predicting food consumption.



Note. FNE = fear of negative evaluation. Food intake is square root transformed, $p = .014$.

Table 6. Significant individual difference effects on total grams of food, unhealthy food, and healthy food.

Predictor	Total grams	Unhealthy	Healthy
Restraint	-.05	-.35*	.27*
FNE2	-.21*	-.10	-.22*
Restraint * FNE	.33**	.22*	.27*
Restraint * FNE2	-.32*	-.06	-.44**
FNE * Restraint * EE	.29*	.26*	.19

Note. FNE2 = fear of negative evaluation squared; FNE = trait fear of negative evaluation; EE = emotional eating. * $p < .05$, ** $p < .01$

Appendix 1. Manipulation Check Measure: Items 1-6 state saa; items 7-12 state fine; items 13-18 state stress; items 19-21 state saa during the speech; items 22-24 state fine during the speech; items 25-27 state stress during the speech; Directions: Read each statement and then fill in the appropriate number to indicate how you feel *right now, at this moment* on a 1 (not at all) to 5 (extremely) scale.

1. I feel comfortable with the way I appear.
2. I am worrying about flaws in my appearance.
3. I am afraid that people find me unattractive.
4. I am nervous about the way I look.
5. I feel anxious that people may be talking about my appearance.
6. I feel anxious about my appearance.
7. I am worried about what other people will think of me.
8. I am afraid other people will notice my shortcomings.
9. I am worried about the kind of impression I am making.
10. I am afraid that people will find fault with me.
11. I am concerned about what other people will think of me.
12. I am afraid of being negatively evaluated.
13. I am finding it hard to wind down.
14. I am feeling a lot of nervous energy.
15. I feel agitated.
16. I am finding it difficult to relax.
17. I feel touchy.
18. I feel stressed.

Now, reflect back on your performance during the speech. Please read each statement and indicate how you felt **during the speech**. Please rate how you *felt during the speech* on a 1 (not at all) to 5 (extremely) scale.

19. I felt like people were judging my appearance.
20. I felt anxious about my appearance.
21. I was nervous about the way I looked.
22. I worry that I said the wrong things.
23. I am worried about what kind of impression I made.
24. I was afraid of what other people would think of me.
25. I was stressed.
26. I was touchy.
27. I felt agitated.