MEASURING CHOCOLATE CRAVING IN ADULTS

By

Haley Medora Whitham

Thesis Presented to

The Faculty of Humboldt State University

In Partial Fulfillment of the Requirements for the Degree

Masters of Arts in Psychology: Academic Research

Committee Membership

Dr. William M. Reynolds, Committee Chair

Dr. Chris L. Aberson, Committee Member

Dr. Carrie Aigner, Committee Member

Dr. Chris L. Aberson, Graduate Coordinator

May 2017

Abstract

MEASURING CHOCOLATE CRAVING IN ADULTS

Present research finds that the experience of chocolate craving is unique from other foods (Bruinsma & Taren, 1999). Only two measures on chocolate craving exist, the Attitudes to Chocolate Questionnaire (ACQ; Benton et al., 1998) and the Orientation to Chocolate Questionnaire (OCQ; Cartwright et al., 2007). Both measures theoretically vary and include subscales that measure other eating components, such as guilt-driven restrictive eating. A need for a measure that focuses on the characteristics of chocolate craving and consumption exists. Thus, the Chocolate Craving Inventory (CCI; Whitham & Reynolds, 2014) was created. The purpose of the present study was to examine the reliability and validity of this new scale. A sample of 530 participants completed the survey. As hypothesized, the CCI is a sound measure that exhibited a high internal consistency reliability of .95. The Craving subscale of the ACQ demonstrated strong relationship with the CCI and Approach subscale of the OCQ demonstrated a strong relationship with the CCI. Further evidence for convergent validity was verified by the following measures: the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien et al., 1986) and the Food Cravings Questionnaire-Trait-revised (FCQ-T-r; Cepeda-Benito et al., 2001). Discriminant validity was found between the CCI and measures of depression and social desirability. An exploratory factor analysis revealed a three-factor solution of craving, emotional eating, and daily interference.

Acknowledgements

Thank you to my family for your support throughout the journey; you celebrated me at my best and offered guidance and encouragement at my worst. For Jeff, my rock, my voice of reason, and my biggest fan, I could not have done this without you. Thank you to Dr. Reynolds. Your guidance, support, and knowledge is invaluable. You pushed me to become a better writer and researcher. Also, thank you to my patient committee, Dr. Aberson and Dr. Aigner. Your feedback encouraged and challenged me to think critically about my project and develop a study I am proud to present. Lastly, I would like to give a nod to the musical genius of Simon and Garfunkel, Bob Dylan, and Van Morrison. Your songs on repeat kept me sane during this process. It's been a long journey, and I am so grateful to each and every one of you.

Table of Contents

List of Tables

List of Appendices

Chapter One: Introduction

According to a history overview by Bruinsma and Taren (1999) chocolate originates from Mexico and was cultivated by the Mayas, Incas, and Aztecs. The seeds, commonly known as cocoa beans, are harvested from a cocoa tree, *Theobroma cocoa* (Lima, Almeida, Nout, & Zweitering, 2011). Once discovered, chocolate was brought to Europe by Spanish explorers, where it was known as a luxury good only enjoyed on special occasions. Chocolate was viewed as a divine substance, deemed as a "gift of the gods" (Schmidt & Shapiro, 2012). Chocolate's derivative, cocoa beans, are rich in antioxidants known as polyphenols—the most powerful are flavanols. Over the years, methodic over-processing and artificial additives continually minimize the impending health benefits of chocolate. Up to 75% of polyphenols are ruined from refinement (Visoli et al., 2009). Today, cocoa mass (made by processed cocoa beans) is combined with cocoa butter and sugar to manufacture chocolate (Parker, Parker, & Brochtie, 2006).

The consumption of chocolate increases during specific times of the year, in particular, the holiday months. Chocolate is most commonly paired with Valentine's Day (Close & Zinkhan, 2006). Schmidt and Shapiro (2012) project that Americans alone spend approximately $700 million on chocolate for Valentine's Day each year and universally, people spend an approximate $90 billion on chocolate annually. Studies have consistently found chocolate as one

of the most popularly craved foods in North America (Hormes & Timko, 2011; Rozin, Levine, & Stoess, 1991; Zellner, Garriga-Trillo, Centeno, & Wadsworth, 2004).

Two measures of chocolate craving exist, the Attitudes to Chocolate Questionnaire (ACQ; Benton, Greenfield, & Morgan, 1998) and the Orientation to Chocolate Questionnaire (OCQ; Cartwright et al., 2007). The original 24-item ACQ consists of the following subscales: craving (10 items), guilt (10 items), and functional approach (4 items). Example items on each subscale of the ACQ include: "My desire for chocolate often seems overpowering" (craving), "After eating chocolate I often wish I hadn't" (guilt), and "I eat chocolate only when I am hungry" (functional approach). The 14-item OCQ consists of three subscales: avoidance (2 items), approach (6 items), and guilt (6 items). Example items on each subscale of the OCQ include: "I did things to take my mind off chocolate" (avoidance),"I wanted to eat chocolate so much that one bite would not have been enough" (approach), and "I felt dissatisfied with myself after eating chocolate" (guilt). Both scales, the ACQ and the OCQ, are consistently studied with measures of problematic and disordered eating, such as the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, Fritjers, Bergers, & Defares, 1986), the Food Thought Suppression Inventory (FTSI; Barnes, Fisak, & Tantleff-Dunn, 2010), and the Eating Attitudes Test (EAT-26; Garner, Olmstead, & Polivy, 1983). Chocolate cravings are also found to correlate with emotional eating and

other general craving measures. Additional measures are needed to further clarify and investigate this relationship.

To supplement for the lack of existing scales, the Chocolate Craving Inventory (CCI; Whitham & Reynolds, 2014) was created. An initial pilot study was conducted to examine the psychometric properties of the CCI. The sample consisted of 100 college students. The analysis provided evidence for internal consistency reliability (α = .96) and test-retest reliability (r_{tt} = .86). Validity of the CCI was examined using measures of food craving, depression, and personality. Convergent validity was found between the CCI and general food craving. In addition, discriminant validity was established between the CCI and both depression and extraversion measures.

The current investigation further examines the psychometric properties of the CCI. It is anticipated that a sample of 400 participants will be used. Analyses of internal consistency, item-to-total correlations, and test-retest reliability will be conducted. Criterion, convergent, and discriminant measures will be used to examine the validity of the CCI. Factor analysis will also be utilized to examine the factor structure of the CCI. It is expected that three theoretical domains will be extracted. Those include: craving, emotional eating, and daily interference.

Chapter Two: Literature Review

Craving

Addictive eating behavior is often marked by cravings (Hormes & Rozin, 2010; Meule & Kubler, 2012; Rozin & Stoess, 1993). Rogers and Smit (2000) use the term craving to quantify problematic, addictive food-related behavior. Craving is seen as a "subjective state that individuals can recognize and report on." Among most literature, the term craving is defined as a strong urge for a particular substance characterized by fixation, loss of control, and attempts at obtainment (Pelchat, 2002; Hormes & Rozin, 2010; Rozin et al., 1991). Yet, still ways to define and measure food cravings vary in current research. There is also some dispute about what influences and maintains food cravings, particularly those for chocolate.

Rogers and Smit (2000) propose a biopsychosocial approach to understanding why we crave and how we crave certain foods. These researchers suggest craving is a product of psychological processes that work in conjunction with biological**,** social, and cultural factors. For instance, chocolate is appealing for its hedonic properties, yet social setting and/or culture may affect whether or not one chooses to indulge. Mela (2001, 1999) proposes that sensory hedonic likes, situation (perceived appropriateness and cues), and current internal state can help to determine what kind of food is eaten, the frequency of having it, and the conditions in which it is enjoyed.

Chocolate Craving

Psychologists have hypothesized a number of factors that contribute to the onset and maintenance of chocolate craving. It is these components that help define chocolate craving. The want/longing for chocolate was first conceptualized in terms of a general food craving- a person's urge or desire for a particular substance (Benton et al., 1998). Yet, repeatedly, differences found in both gender and culture, suggest that that chocolate craving is unique and unlike cravings for other foods (e.g., Hormes, Orloff, & Timko, 2014; Osman & Sobal, 2006; Zellner, Garriga-Trillo, Centeno, & Wadsworth, 2004). Today, researchers agree that cravings for chocolate are multidimensional and are made up of a variety of components, including negative emotion, guilt, and loss of control (Benton et al., 1998; Cartwright et al., 2008; Muller, Dettmer, & Macht, 2008). A theory by Cartwright et al., 2007 proposes that chocolate craving should be defined by a state of ambivalence. Researchers believe that chocolate is eaten as a product of both attraction and repulsion working together. For instance, a person can experience a temporary lift in mood from chocolate, but at the same time have thoughts about it being an unhealthy treat. These competing forces make the want for chocolate more salient, which can lead to consumption. According to Fletcher, Pine, Woodbridge, and Nash (2007) it is the "love-hate relationship" with chocolate that leads to effortful restriction that can actually increase intake. Regardless, existing research by Rogers and Smit (2000) suggest

that chocolate craving differs from general food craving and thus, should be studied as unique construct.

Measuring Chocolate Craving

Existing studies often employ dichotomous and open-ended question formats to distinguish between cravers and non-cravers. However, this unidimensional approach is neither a reliable nor valid assessment of chocolate craving. In response, measures were created to explore the fundamental attributes of chocolate craving. Currently only two scales are frequently used to study chocolate cravings. Cartwright et al. (2007) created the 14-item Orientation to Chocolate Questionnaire (OCQ). The OCQ subscales are theoretically modeled after approach and avoidance inclinations. According to this model, craving is defined as a multidimensional construct where the experience of a craving is on a spectrum ranging from *weak* to *extreme*. Due to variations in intensity, feelings of both approach (the desire to consume) and avoidance (the desire to restrict intake) can occur simultaneously. With both activated, a state of ambivalence can arise increasing the likelihood of chocolate consumption and binging. Feelings of guilt may accompany an episode of overconsumption. To test this model, researchers ran three separate analyses to examine the factor structure of the OCQ. First testing a one-factor structure with approach and avoidance inclinations, and guilt combined. Then a second analysis testing the approach and avoidance constructs separately. In this analysis guilt was assumed to be part of the avoidance factor. The final test assumed that each factor (approach,

avoidance, and guilt) predicted different components of chocolate craving. The three-factor structure was the best fit. It exhibited high item-to-total correlations for each separate construct ($r > .75$). As previously identified, the three subscales were: approach (6 items), guilt (6 items), and avoidance (2 items). Cartwright and Stritzke (2008) verified high internal consistency reliability for each subscale of the OCQ: approach ($\alpha = .89$), avoidance ($\alpha = .86$), and guilt ($\alpha = .96$).

Benton et al. (1998) created the 24-item Attitudes to Chocolate Questionnaire (ACQ) to measure chocolate craving on three domains: craving, guilt, and cravings for functional use (e.g., eating chocolate to curb hunger). Researchers generated 80 statements based on exploratory interviews and literature on food and drug craving. These statements captured aspects of lack of control, anticipation of pleasure, anticipation of a negative situation, negative affect relief, cravings, and weight/body image. Each statement was followed by a 100 mm line where participants where asked to indicate where they fell on a spectrum of *very much like me* to *not at all like me*. Factor analysis utilizing Principal Component Analysis and Varimax rotation yielded the three-factor structure. The 10-item craving subscale ($\alpha = .91$) measures the tendency to turn to chocolate for comfort during emotional and stressful time periods. The 10-item guilt subscale ($\alpha = .91$) measures a person's negative feelings or emotions after consuming chocolate. And the 4-item functional approach subscale ($\alpha = .51$) assesses if chocolate craving and consumption occur to serve a purpose (e.g., eating when exercising to keep energy up). Due to the poor reliability of the

functional approach subscale, current studies vary on the use of either the two-factor or three-factor model.

Chocolate Craving and Problematic Eating

Cartwright and Stritzke (2008) examined the Orientation to Chocolate Questionnaire (OCQ) and its relationship to chocolate intake and patterns of disordered eating. The sample consisted 312 psychology undergraduates (79.5% female) from a university in Australia. The average age of the sample was 19.75 years (*SD* = 5.72). Measures included the 14- item OCQ, the Dutch Eating Behavior Questionnaire (DEBQ; van Strien et al., 1986), and the Eating Attitudes Test (EAT-26; Garner et al., 1982). The DEBQ consists of three subscales: restrained eating, emotional eating, and external eating. The EAT-26 measures two constructs, bulimia and dieting. Using confirmatory factor analysis researchers found support for the three-factor model of the OCQ with subscales on guilt (6 items), approach (6 items), and avoidance (2 items). The approach subscale of the OCQ negatively predicted restrained eating and dieting. In contrast, the same subscale (approach) positively predicted emotional eating and external eating. The guilt subscale of the OCQ positively predicted restrained eating, emotional eating, bulimia, and dieting. The avoidance subscale of the OCQ positively predicted one construct, restrained eating. Evidence suggests that the approach subscale of the OCQ positively relates to constructs that promote chocolate consumption, while the guilt and avoidance subscales positively relate to constructs that measure restrictive eating patterns.

Van Gucht, Soetens, Raes, and Griffith (2014) used the Attitudes to Chocolate Questionnaire (ACQ) to examine cravings, eating behavior, and food-related thought suppression. Measures included the ACQ, the Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985) and the 15-item Food Thought Suppression Inventory (FTSI; Barnes et al., 2010). High internal consistency reliability was found for the two-factor structure of the ACQ. This included subscales on craving (α =. 90) and guilt (α = .91). The TFEQ consists of three subscales that demonstrated adequate internal consistency reliabilities: cognitive restraint (α = .89), disinhibition (α = .73), and hunger (α = .75). The FTSI demonstrated high internal consistency reliability, α = .94. Evidence for convergent validity was found between the ACQ subscales, guilt (r = .55, p < .01) and craving (r = .43, p < .01), and the FTSI. A strong significant relationship (r = .64, p < .01) was found between the TFEQ cognitive restraint subscale and the guilt subscale of the ACQ. Moderate significant relationships were identified between the both the guilt (r = .51, p < .01) and craving (r = .51, p < .01) subscale of the ACQ and the TFEQ disinhibition subscale. Overall, women scored higher on both subscales of the ACQ, guilt (d = 1.12, p < .001) and craving (d = 0.89, p < .001). In summary, results suggest that guilt (measured by the ACQ) related to constructs on food-related restraint (measured TFEQ cognitive restraint subscale). In addition, both guilt and craving (measured by the ACQ) related to aspects of lack of control/impulsivity (measured TFEQ disinhibition subscale) and food-related thought suppression

(measured by the FTSI).

Cramer and Hartleib (2001) examined the psychometric properties of the 24-item Attitudes to Chocolate Questionnaire (ACQ) in a two-part study. In study one, researchers used confirmatory factor analysis to evaluate the three-factor structure of the ACQ. The sample consisted of 710 psychology students (75% female) from a university in Central Canada. Ethnicity of the sample was 67% Caucasian, 9% Asian, 6% African American, 3% from the First Nations, and 15% other (6 participants omitted information). Participants completed the 24-item ACQ using 5-point Likert scale (*strongly disagree* to *strongly agree*). A confirmatory factor analysis supported the two-factor structure of the ACQ. Results yielded a 12-item craving subscale (α = .91) and a 10-item guilt subscale (α = .88). With support for only two subscales, the third subscale measuring functional approach to chocolate craving was dropped. Two of the items from the third subscale were added to the craving subscale ("I eat chocolate as a reward when everything is going really well for me" and "I eat more chocolate in the winter when it is colder").

In study two, researchers examined relationships between the Attitudes to Chocolate Questionnaire (ACQ) and constructs on anxiety, depression, problematic eating, self-esteem, and social desirability. The sample consisted of 96 psychology students (65% female) from the same university. Measures included the 6-item short form of the Spielberger State-Trait Anxiety Inventory (STAI; Marteau & Bekker), the Centre for Epidemiologic Studies of Depression

Scale (Radloff, 1977), the Eating Attitudes Test (EAT-26; Garner et al., 1983), the Obsessiveness Scale (Butcher, Graham, Williams, & Ben-Porath, 1989), the Rosenberg Self Esteem Scale (Rosenberg, 1965), and the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960). Low correlations were found between the craving subscale of the ACQ and measures of depression (r = .21, $p < .05$), obsession (r = .39, $p < .001$), and self-esteem (r = -.34, $p < .001$). Low correlations were also found between the guilt subscale of the ACQ and measures of anxiety (r = .28, $p < .01$), depression (r = .24, $p < .05$), obsession (r = .32, $p < .01$), self-esteem (r = -.31, $p < .01$), and social desirability (r = 0.06, p = n.s.). A moderate relationship was found between the guilt subscale of the ACQ and disordered eating (r = .53, $p < .001$). Consistent with the first study, researchers found further support for a two-factor model of the ACQ. The craving (α =. 88) and guilt (α = .87) subscales of the ACQ demonstrated high internal consistency reliability. Test-retest reliability was measured after a three-month period (n = 47). Low to adequate test-retest reliability was found for both the craving (r = .69, $p < .001$) and guilt (r = .68, $p < .001$) subscales.

Muller, Dettmer, and Macht (2008) examined the validity of the German version of the Attitudes to Chocolate Questionnaire (ACQ). The sample consisted of 227 participants (49% female). Chocolate consumption was measured by the amount of chocolate eaten per week (*no chocolate*, *1-4 pieces*, *½ bar [16 pieces]*, *one bar*, or *several bars*). Respondents were asked to rate the frequency of their chocolate cravings on a 5-point scale (*never* to *always*). The

two-factor structure of the ACQ was used. High internal consistency reliability was found for the craving (α = .90) and guilt (α = .86) subscales. An additional measure was included, the German version of the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien et al., 1986). The DEBQ consists of three subscales: restrained eating (α = .91), emotional eating (α = .92), and external eating (α = .81). Women's scores on craving subscale of the ACQ demonstrated moderate correlations with chocolate consumption per week (r = .52, p < .001) and frequency of chocolate cravings (r = .59, p < .001). These findings were similar to men's scores on the craving subscale of the ACQ. Men's scores on the craving subscale of the ACQ demonstrated moderate correlations with chocolate consumption per week (r = .54, p < .001) and the frequency of chocolate cravings (r = .66, p < .001). Significant correlations were found between the ACQ and the DEBQ in both men and women. Women's scores on the guilt subscale of the ACQ showed a low relationship with emotional eating (r = .34, p < .001), but demonstrated a moderate relationship with restrained eating (r = .66, p < .001). On the craving subscale of the ACQ, women's scores indicated moderate relationships with both emotional (r = .53, p < .001) and external eating (r = .43, p < .001). Similar to women, men's scores on the guilt subscale of the ACQ demonstrated a low relationship with emotional eating (r = .23, p < .05), however, a moderate relationship with restrained eating (r = .51, p < .001). In addition, a moderate relationship was identified in the male sample between the craving subscale of the ACQ and both emotional (r = .45, p < .001) and

external eating ($r = .40$, $p < .001$) subscales.

Cartwright et al. (2007) examined the psychometric properties of the Orientation to Chocolate Questionnaire (OCQ) and its relationship to chocolate consumption and characteristics disordered eating. The sample consisted of 602 children from 11 schools located in Western Australia. Of the sample, 149 participants (53% female) were in sixth grade, 189 (51% female) were in seventh grade, and 219 (56% female) were in eighth grade. Fifty-one participants did not complete enough items on each scale and were excluded from the analysis. Measures included the 14-item OCQ and three items on body satisfaction (weight, shape, and dieting behavior). Confirmatory factor analysis was used to examine the three-factor structure of the OCQ. The model of best fit included subscales on: guilt (6 items), approach (6 items), and avoidance (2 items). The use of a hierarchical multiple regression analysis demonstrated that the approach subscale of the OCQ positively predicted chocolate consumption and the avoidance subscale of the OCQ negatively predicted chocolate consumption. The guilt subscale was a stronger predictor of dieting behaviors than the avoidance subscale of the OCQ. In addition, high scores on the guilt subscale of the OCQ significantly predicted body image dissatisfaction.

Rodgers, Stritzke, Bui, Franko, and Chabrol (2011) conducted a study to further clarify the findings above. Researchers examined the relationship between the Orientation to Chocolate Questionnaire (OCQ) and aspects of disordered eating (body dissatisfaction, drive for thinness, bulimia, and

emotional eating). The sample consisted of 247 female students from a university in France. Measures included were, the 14-item OCQ, the French version of the Eating Disorders Inventory (EDI; Garner, Olmstead, & Polivy, 1983), and the French translation of the Three Factor Eating Questionnaire-R18 (TFEQ-R18; de Lauzon, 2004). The EDI was used to measure body dissatisfaction, bulimia, and drive for thinness. The TFEQ was used to measure emotional eating. Evidence supported a three-factor structure of the OCQ. High internal consistency was found for each subscale: approach (α = .80), guilt (α = .92), and avoidance (α = .95). Adequate test-retest reliability (n = 114) was identified for each subscale of the OCQ after a two-week period: approach (r = .77), guilt (r = .83), and avoidance (r = .71). The approach subscale was a positive predictor of bulimia and emotional eating. The guilt subscale was a positive predictor of body dissatisfaction, drive for thinness, bulimia, and emotional eating. The avoidance subscale was a negative predictor of bulimia and a positive predictor emotional eating. Similar to prior research, the approach subscale predicted constructs that promote chocolate consumption, while the guilt and avoidance subscales related to restrictive eating patterns. Approach and guilt subscales were both positive predictors of bulimia; one possible explanation is that bulimia is a two-part eating disorder qualified by binging (consumption) and purging (attempts to restrict food consumption).

The studies above have explored the reliability and validity of the Attitudes to Chocolate Questionnaire (ACQ) and the Orientation to Chocolate

Questionnaire (OCQ); still these results need further clarification. Evidence supports that ACQ and OCQ are reliable measures, yet their validity is questionable. In summary, Muller et al. (2008) identified moderate relationships between restrained eating and guilt-related feelings toward chocolate cravings, r = .66 (female sample) and r = .51 (male sample). In the same study, moderate relationships were found between both emotional and external eating and chocolate craving (r > .40). Van Gucht et al. (2014) found food-related thought suppression demonstrated moderate relationships with both chocolate craving (r = .43) and guilt (r = .55). Cramer and Hartleib (2001) found discriminant relationships between chocolate craving and chocolate-related guilt and measures of depression, anxiety, self-esteem, and social desirability. Yet, the guilt construct of the ACQ demonstrated a moderate correlation with disordered eating (r = .53). Similar moderate relationships were identified with OCQ and measures of problematic eating (Cartwright et al., 2007; Cartwright & Stritzke, 2008; Rodgers et al., 2008). Cartwright et al. (2007) found that the approach subscale of the OCQ was a positive predictor of chocolate consumption, while the avoidance subscale of the OCQ was a negative predictor. In addition, the guilt subscale of the OCQ was a positive predictor of both dieting behaviors and body image dissatisfaction. Cartwright and Stritzke (2008) verified these relationships. The approach subscale of the OCQ was a positive predictor of chocolate craving and consumption (measured by constructs on emotional and external eating). While the guilt subscale of the OCQ positively predicted

related constructs on problematic and disordered eating (e.g., restrained eating, emotional eating, bulimia, and dieting). To further examine these relationships, research on chocolate cravings and related characteristics are reviewed below.

Overview of Chocolate Studies

Weingarten and Elston (1991) in an early survey of chocolate consumption found that in a sample of 1,138 college students, 97% of women and 68% of men experienced cravings. Of the foods identified, 53% of participants ($n = 603$) reported chocolate as their "most intensely craved item." Women craved chocolate significantly more than men (39% vs. 14%, $p < .001$). While chocolate craving was identified in both groups, the frequency of chocolate craving was twice as much in females.

Hetherington and MacDiarmid (1993) conducted an exploratory study on self-identified 'chocolate addicts'. Participants were sent a modified craving questionnaire with items on dieting (*Are you currently dieting?*) and food cravings (*Have you ever experienced food cravings?*). Participants also indicated the frequency and strength of their cravings. Seventy-five people responded to the ad, 72% ($n = 54$) completed the first questionnaire, and 67% ($n = 50$) participated in a follow-up interview. In line with predictions, 94% of the sample reported craving chocolate the most and 20% reported craving no other food except chocolate. Frequency of cravings was 13.6 ± 1.9. On average, participants reported approximately six cravings per week with an average consumption of 12 bars ($SD = 1.6$) that ranged from 1 to 70 bars per week (a

standard block of chocolate was equivalent to 60g). When participants were asked what type of chocolate was their favorite, 76% (*n* = 38) preferred milk chocolate, 8% (*n* = 4) preferred dark chocolate, and 4% (*n* = 2) preferred white chocolate. In contrast, 12 % (*n* = 6) reported no preference in chocolate type. In a follow-up interview, researchers asked participants what factors "stimulated" their cravings for chocolate. Participants reported the following as a motivation: mood (*n* = 18), watching others or viewing advertisements (*n* = 18), hunger (*n* = 4), out of habit (*n* = 2), or no stimulus (*n* = 6).

Chocolate Craving and Culture

Osman and Sobal (2006) examined food and chocolate cravings between Spanish and American samples. Among the Spanish sample (*n* = 256, 80% female), 75% of males and 83% of females reported ever craving sweet food. Conversely, significant differences were identified between the American men and women sample (*n* = 306, 70% female), 52% of males reported ever craving sweet food compared to 75% of females, $p < .001$. Chocolate cravings were measured with the craving subscale of the Attitudes to Chocolate Questionnaire (ACQ; Benton et al., 1998) and an additional yes/no question (Do you ever crave chocolate?). The craving subscale consists of ten types emotional responses to chocolate. Researchers summed each participant's score on the Benton scale across the ten ratings of emotional responses to chocolate cravings. To examine the relationship between the Benton scale and the dichotomous question researchers ran a correlation between both measures. Responses were

significantly correlated to scores on the Benton scale for both Spanish (r = -.38) and American (r = -.52) samples. Chocolate cravings were significantly higher in woman across both Spanish and American populations. In the Spanish sample, 78% of men reported craving chocolate compared to 90% of women, $p < .05$. Of the American sample, 59% of men reported chocolate cravings compared to 91% of women, $p < 001$.

A study by Zellner et al. (2004) examined differences in chocolate cravings across gender and culture. The sample consisted of 95 American undergraduates (81% female) and 188 Spanish undergraduates (69% female) from multiple universities in Madrid, Spain. Participants first answered the following questions: (1) Are there any times when you particularly crave chocolate? (2) If so, indicate the time, and then a direct question for women only: (1) Do you tend to crave chocolate at a particular point during your menstrual cycle? (2). In response, American women (40%) reported significantly more chocolate cravings prior to their menstrual cycle than Spanish women (4%), $p < .001$. When asked directly about their premenstrual chocolate cravings, 60% of American women reported significantly more chocolate cravings compared to 24% of Spanish women, $p < .001$. In addition, both samples were asked to indicate when their most frequent chocolate cravings occurred: 21.5% of Spanish women reported after eating, followed by 16% during exams or while studying, and 2% *at night*. When American women were asked the same question 40% reported

premenstrually, 13% *at night*, and 5% after eating. None of the American women indicated craving chocolate during exams or while studying. Men were also included in the study from both samples. Interestingly, a comparison of genders indicated that American men and women demonstrated differences in situations where they craved chocolate the most. In comparison, Spanish men and women reported the same two situations.

Rodriquez, Warren, Moreno, Cepeda-Benito, Gleaves, Fernandez, and Vila (2006) adapted the Food Craving Questionnaire-Trait (FCQ-T; Cepeda-Benito, Gleaves, Williams, & Erath, 2001) to measure chocolate cravings in samples from Britain and Spain. English students (n = 239) between the ages of 18 and 51 (M = 20.57, SD = 4.93) were recruited through the University of Sheffield in England. Spanish students (n = 373) between the ages of 18 and 32 (M = 20.3, SD = 2.4) were recruited through the Universidad de Granada in Spain. The adapted measure, the Food Chocolate Cravings Questionnaire-Trait (FCCQ-T) demonstrated an overall reliability alpha of .97 for both British and Spanish samples. The British population reported significantly higher scores on seven of the nine subscales of the FCCQ-T: *intentions to eat chocolate* (d = 0.49, p < .001), *positive reinforcement* (d = 0.54, p < .001), *negative reinforcement* (d = 0.37, p < .001), *craving as a physiological state* (d = 0.22, p = .009), *emotion-dependent craving* (d = 0.72, p < .001), *environment-dependent cravings* (d = 0.22, p = .004), and *guilt-loaded chocolate cravings* (d = 0.63, p < .001). The authors note

"per capita chocolate consumption is over five times greater in Britain than in Spain".

Chocolate Craving and Mood

Parker and Crawford (2007) examined chocolate cravings in a sample of 2,692 respondents in Australia (70.8% female; *M* age = 40) between the ages of 18 and 77. Of the sample, 73.6% of participants had previously taken antidepressants medication and 78.3% sought professional help for their depressive episodes. Participants were recruited via an invitation on the researchers' *mood disorder consumer information website*. Persons completed measures on: symptoms/treatment of depression, ratings of depressive symptoms and coping, food cravings (e.g., *importance of chocolate when depressed*) and personality (e.g., *neuroticism* and *extraversion*). Out of 2,692 participants, 54.4% reported experiencing more cravings when depressed. Of those, 44.9% reported specific cravings for chocolate ($p < .001$). Of those that craved chocolate, 60.8% rated chocolate as significantly alleviating anxiety and irritation. Personality markers of the construct of neuroticism (i.e., irritability, rejection sensitivity, anxious worrying, self-criticism, and self-focused) were significantly higher in chocolate cravers ($p < .001$). When researchers examined the potential for chocolate cravings to predict atypical depression (criterion B accessory symptoms; DSM-IV), only two self-comforting items were significantly endorsed, cravings for comfort foods and warming up behavior.

Rose, Koperski, and Golomb (2010) recruited 1,018 adults between the

ages of 20 and 85 (31.8% female) from San Diego, California. Volunteers were screened for known health problems (e.g., cardiovascular disease, diabetes) and the current use of antidepressant medication. Volunteers who were healthy and not using antidepressant medication were allowed to participate. Of the original sample, 931 participants completed a depression scale and an adapted Statin Study Questionnaire- Chocolate (SSQ-C; *How many times a week do you consume chocolate?*). Of those participants, 839 completed the Hutchinson Food Frequency Questionnaire (FFQ). On the FFQ amount of chocolate was categorized into three serving sizes: *small* (14g), *medium* (28g), and *large* (42g). The FFQ was adapted to measure frequency of chocolate consumption (*times per month*) and rate of chocolate consumption (*servings per month*). Participants also completed the Center for Epidemiologic Studies Depression Scale (CES-D) with cut-off scores: 16 or higher as a positive screening and 22 or higher indicating *probable major depression*. Significantly higher chocolate consumption was found in those with a cut-off score of 16 or higher and a cut-off score of 22 or higher on all three chocolate measures. Researchers controlled for hypothesized addictive substances in chocolate (e.g., caffeine, fat, carbohydrates, and energy intake) and found no significant relationship between these variables and mood symptoms. Results indicated that mood relates specifically to chocolate and no other food type with similar properties.

Chocolate Craving and Gender

In a study by Hormes et al. (2014) gender differences were examined in

food/chocolate craving. The sample consisted of 645 undergraduates from two mid-Atlantic universities (37.2% male, *M* age = 19.40, *SD* = 2.45). The sample was 72.4% White, 11.3% African-American, 10.4% Asian/Pacific Islander, 3.3% Hispanic, and 2.6% other. To distinguish between chocolate cravers and non-chocolate cravers participants were asked to report general food cravings, chocolate cravings, frequency of cravings (*never*, *once a month or less, a few times a month, a few times a week, daily or several times a day*) and intensity. In addition, women were asked if they felt their chocolate cravings were more likely to occur at any particular point during their menstrual cycle. The Attitudes to Chocolate Questionnaire (ACQ) was used to assess chocolate craving. Researchers used the original three subscales of the ACQ: craving (α = .91), guilt (α = .92), and functional approach (α = .75). Chocolate cravers (identified by a *yes*/*no* question format) reported significantly higher scores on the ACQ than non-chocolate cravers, $d = 1.54$, $p < .001$. No significant differences were found between gender and general food cravings. However, when gender and chocolate craving were examined, 86% of women reported significantly more chocolate cravings, $d = 0.67$, $p < .001$. Women reported that their chocolate cravings were more frequent, $t(466) = 3.40$, $p = .001$, $d = 0.34$ and intense, $t(465) = 4.58$, $p < .001$, $d = 0.46$. Sixty percent of women chocolate cravers believed that their cravings were linked to their menstrual cycle. Women also scored significantly higher on guilt ($d = 0.72$) and functional approach ($d = 0.53$), $p < .001$. In addition, chocolate cravers completed the Food Craving Questionnaire

(FCQ-T). Chocolate cravers scored significantly ($p < .001$) higher on five of the nine subscales of the FCQ-T: *anticipation of relief from negative emotional states that may result from eating* ($d = .35$), *intentions to consume craved food* ($d = 0.42$), *cravings as a physiological state* ($d = 0.41$), *lack of control* ($d = 0.44$), and *emotions experienced before or during food cravings* ($d = 0.49$).

Existing studies suggest gender differences in chocolate craving may also be attributed chocolate cravings before or during a woman's menstrual cycle (Bruinsma & Taren, 1999; Rozin et al., 1991). Hormes and Rozin (2009) recruited Alumnae from University of Pennsylvania for a study on chocolate craving and menstruation. The sample consisted of 280 participants (93.9% Caucasian). Researchers placed participants in three mean age groups depending on graduation date: 46 ($n = 89$; *M* age = 45.81, $SD = 0.93$), 63 ($n = 154$; *M* age = 63.35, $SD = 2.49$) and 82 ($n = 37$; *M* age = 81.76, $SD = 1.87$). Participants were asked questions on dieting (Are you currently on a diet to lose weight*?*), menstruation (Do you have regular monthly periods?), menopause (If you do not have regular monthly periods, are you: in menopause, past menopause, or other*?*), and the use of birth control (Are you currently using hormonal birth control, such as the pill or the patch? and If you are in menopause, are you on any form of hormone replacement therapy*?*). Chocolate cravings were measured using a 9-point Likert scale (*dislike extremely* to *like extremely*). Significant differences were found between different age groups and chocolate cravings ($X^2 = 5.43$, $p = .03$) — 90.2% (average age group 45), 75.8% (average age group

65) and 80.6% (average age group 80) craved chocolate. The two older age groups were combined to examine the relationship between pre-menopausal and post-menopausal women— 90.2% pre-menopausal women (n = 55) and 76.8 % post-menopausal women (n = 126) experienced chocolate cravings.

Hormes and Timko (2011) examined sample characteristics of those with menstrual cravings compared to those with non-cyclic cravings. Students were recruited through the university department subject pool (M age 19.57, SD = 2.97). The sample consisted of 97 participants that were 50.5% Caucasian, 35.1% Asian, 5.0% Hispanic, 1.0% African American, and 8.2% other. The participants completed the following measures: the Restraint Scale (RS; Herman & Polivy, 1988), the Attitudes to Chocolate Questionnaire (ACQ), the Eating Attitudes Test (EAT-26; Garner et al., 1983), and the Eating Inventory (EI) with Rigid (RC) and Flexible Control (FC; Stunkard & Messick, 1985; Westenhoefer, Stunkard, & Pudel, 1999). Comparison groups were determined by a yes/no question (Do cravings tend to peak at a specific time during the month?*)*. Over 28% of the sample reported that their cravings related to their menstrual cycle. Menstrual cravers reported significantly higher scores on the guilt subscale of the ACQ than non-cyclic cravers, d = 0.66. On the RS, menstrual cravers scored significantly higher on dietary restraint, d = 1.03 and both of its subscales, Weight Fluctuation and Concern for Dieting. Menstrual cravers also reported less flexible control over chocolate intake than non-cyclic cravers.

Chocolate Craving Inventory (CCI)

Most existing research has used either the Attitudes to Chocolate Questionnaire (ACQ), or the Orientation to Chocolate Questionnaire (OCQ) to study chocolate cravings. To provide an alternative measure, the Chocolate Craving Inventory (CCI; Whitham & Reynolds, 2014) was constructed. The CCI was initially developed as a 36-item measure to examine eating behavior with chocolate. Items were created based on the above reported and tested characteristics of chocolate craving. Based on item-to-total scale correlations, six items were dropped, resulting in a 30-item measure. High internal consistency reliability (α = .96) and test-retest reliability (r_{tt} = .86) was found for the CCI. Items generated for CCI were designed to capture the following domains: craving (11 items), emotional eating (11 items), and daily interference (6 items). In addition, two reverse-coded items on craving were added to control for response bias. Items include craving/loss of control (e.g., "I have a strong compulsive urge to eat chocolate", "When I see others eating chocolate I feel the need to have some"), emotional eating (e.g., "I usually eat chocolate when things don't go my way", "I usually feel better after eating chocolate") and daily interference (e.g., "I will go out of my way to get chocolate", "When I crave chocolate I can't stop thinking about it until I get some").

The pilot sample consisted of 100 students at Humboldt State University. Sixty-two participants were female and 24 participants were male (14 missing information). Participants completed a survey packet with the CCI and other

measures in exchange for extra credit in an undergraduate psychology course. Twenty participants retook the survey one-week later to provide evidence for test-retest reliability. Convergent validity was measured using the 15-item Food Cravings Questionnaire-Trait-revised (FCQ-T-r; Meule, Hermann, & Kubler, 2014). Discriminant validity was identified using the 9-item short form of the Hamilton Depression Inventory (HDI; Reynolds & Kobak, 1995) and the 20-item Extraversion Scale (Goldberg, 1999). Evidence for convergent validity was found between the CCI and the FCQ-T-r, $r = .45$, $p < .01$. Discriminant validity was found between the CCI and measures of extraversion ($r = .09$) and depression ($r = .02$). Consistent with chocolate craving literature, women had higher scores on the CCI than men, $t = 3.06$, $p = .003$, $d = 0.77$.

This preliminary investigation suggests that the CCI is a reliable measure. However, the CCI lacks evidence for validity with other chocolate craving scales. This study will be conducted to further explore the construct validity of the CCI. The two existing chocolate craving measures, the Attitudes to Chocolate Questionnaire (ACQ) and the Orientation to Chocolate Questionnaire (OCQ) will be used to examine criterion validity. Convergent validity of the CCI will be evaluated based on relationships with measures of problematic eating, food-related thought suppression, and general food craving. Discriminant validity will be explored between the CCI and constructs of depression and social desirability. This research can add to the existing pool of knowledge on chocolate craving and it's unique nature.

Chapter Three: Statement of Purpose

Literature suggests that the experience of chocolate craving is unique from those for other foods (Bruinsma & Taren, 1999; Rozin et al., 1991). However, cravings for chocolate remain ambiguously defined and measured across literature. The Attitudes to Chocolate Questionnaire (ACQ; Benton et al., 1998) and the Orientation to Chocolate Questionnaire (OCQ; Cartwright et al., 2007) are the few known measures of chocolate craving. Yet, the present factor structure of these scales contains other components of chocolate craving that do not relate to its consumption (Hormes et al., 2014). They include problematic eating components, such as feelings of guilt and avoidance behaviors of chocolate craving that relate to restrictive and disordered eating patterns (Van Gucht et al., 2014). Conceptually, these characteristics are necessary to theoretically understand the clinical nature of chocolate craving and its correlates, but not to measure its relationship to consumption (Cramer & Hartlieb, 2001; Cartwright & Stritzke, 2008).

To supplement for the lack of measures focused on this, existing studies (e.g., Rodriquez et al., 2006; Meule & Hormes, 2015) have focused on adapting related craving and food constructs, such as the Food Chocolate Craving Questionnaire- Trait (FCCQ-T; Benito-Cepida et al, 2001) that do not maintain components of restrictive and disordered eating. Others modify or shorten existing scales of the ACQ (Osman & Sobal, 2006) and utilize only those items that relate to craving and consumption.

In response to the limited existence of reliable and valid chocolate craving and consumption measures, the Chocolate Craving Inventory (CCI; Whitham & Reynolds, 2014) was developed. Initial analyses, during a psychology tests and measurements course, suggest that the CCI is both a reliable and valid measure. The present study explores the psychometric properties of the CCI in both an online and in-person sample. Validity, including criterion, convergent, and discriminant will be evaluated. To understand the factors that make up chocolate craving, an exploratory factor analysis will be conducted and analyzed.

Reliability

Hypothesis 1. The CCI will demonstrate high internal consistency reliability, $\alpha > .90$.

High internal consistency reliability was found for the CCI in a small college sample ($N = 100$), $\alpha = .96$ (Whitham & Reynolds, 2014). A larger sample should yield similar results.

Hypothesis 1b. The CCI will exhibit moderate to high test-retest reliability, rtt > .80.

Test-retest reliability was found for the CCI in a small subsample of university students ($N = 20$), $r_{tt} = .86$ (Whitham & Reynolds, 2014).

Validity

Hypothesis 2. The CCI will demonstrate evidence for criterion validity with the 10-item craving subscale of the Attitudes to Chocolate Questionnaire. A correlation of around .60 will be found based on a 95% CI that suggests the

correlation between the two measures will between .51 and .68; r (400) = .60, p < .01, [.51, .68].

Existing empirical evidence demonstrates that Attitudes to Chocolate Questionnaire is both a reliable and valid measure for assessing chocolate cravings (Benton et al., 1998). The craving subscale measures a person's tendency to turn to chocolate for comfort when they experience negative emotions (e.g., sad, stressed, irritated). Theoretically, both the craving subscale of the ACQ and the CCI are measuring chocolate craving and consumption. Given this, they should demonstrate a strong correlation with each other.

Hypothesis 2b. The CCI will demonstrate evidence for criterion validity with the 6-item approach subscale of the Orientation to Chocolate Questionnaire. A correlation of around .60 will be found based on a 95% CI that suggests the correlation between the two measures will between .51 and .68; r (400) = .60, p < .01, [.51, .68].

Existing empirical evidence demonstrates that Orientation to Chocolate Questionnaire is both a reliable and valid measure for assessing chocolate cravings on three dimensions: approach, avoidance, and guilt (Cartwright et al., 2007). However, each subscale is studied separately with related constructs. The approach subscale is repeatedly found to be a positive predictor of chocolate craving and consumption (Cartwright & Stritzke, 2008; Cartwright et al., 2007). Theoretically, the CCI is also designed to measure chocolate craving and consumption. Given this, a strong relationship is expected between the two

related measures.

Hypothesis 3. A moderate positive correlation will be found between the CCI and convergent measure, the Food Thought Suppression Inventory (FTSI). A correlation of around .50 will be found based on a 99% CI that suggests the correlation between the two measures will between .40 and .59; r (400) = .50, p < .01, [.40, .59].

Empirical evidence finds moderate relationships (r ranging from .43 to .55) exist between the FTSI and both subscales of the ACQ (Van Gucht et al., 2014). Theoretically, to refrain from craving chocolate a person may engage in thoughts to suppress this urge or want.

Hypothesis 3b. A moderate positive correlation will be found between the CCI and two subscales of the Dutch Eating Behavior Questionnaire (DEBQ), the emotional eating subscale and the external eating subscale. A correlation of around .50 will be found based on a 99% CI that suggests the correlation between each measure and the CCI will between .40 and .59; r (400) = .50, p < .01, [.40, .59].

A moderate relationship (r = .53, p < .001) was found between the emotional eating subscale of the DEBQ and the craving subscale of ACQ (Muller et al., 2008). In addition, a moderate relationship (r = .43, p < .001) was found between the external eating subscale of the DEBQ and the craving subscale of the ACQ. Rodgers et al. (2011) have identified similar associations. Given this recurring relationship we would expect a moderate correlation to exist

between similar items of the CCI and both DEBQ subscales.

Hypothesis 3c. A moderate positive correlation r (400) = .40, p < .01, [.29, .50] will be found between the CCI and convergent measure, the Food Cravings Questionnaire-Trait-revised (FCQ-T-r). A correlation of around .40 will be found based on a 99% CI that suggests the correlation between the two measures will between .40 and .59; r (400) = .50, p < .01, [.40, .59].

In the initial analysis, the CCI demonstrated a moderate relationship with the FCQ-T-r, r = .45, p < .001. Both the CCI and FCQ-T-r are measures of food craving and thus, should be related. The FCQ-T has been used to examine the relationship between chocolate and non-chocolate cravers. Chocolate cravers were found to score significantly higher on subscales of the FCQ-T than non-cravers (Hormes et al., 2014). Due to related characteristics in all food cravings, we should expect a low moderate relationship to exist between chocolate cravings and general food cravings.

Hypothesis 4. A low correlation be found between the CCI and discriminant measure, the Hamilton Depression Inventory (HDI; Reynolds & Kobak, 1995). A correlation of around .50 will be found based on a 99% CI that suggests the correlation between the two measures will be between .40 and .59; r (400) = .30, p < .01, [.18, .41].

Although researchers study depression and its relationship to chocolate cravings, a strong correlation between the two constructs has not been found (Cramer & Hartlieb, 2011). A person who experiences depression as a state

might reach to chocolate for temporary relief, however, this does not mean that most persons who are depressed will crave chocolate (Parker et al., 2006).

Hypothesis 4b. A low correlation will be found between the CCI and the Marlowe Crowne Social Desirability Scale- short form (MCSD-SF; Reynolds, 1982). A correlation of around .50 will be found based on a 99% CI that suggests the correlation between the two measures will be between .40 and .59; r (400) = .30, $p < .01$, [.18, .41].

Social desirability is an unrelated construct to chocolate cravings. Prior research finds a low relationship between chocolate cravings and social desirability (Cramer & Hartleib, 2001).

Gender Differences

Hypothesis 5. It is hypothesized that women will score higher on the CCI than men.

Research finds that chocolate cravings are consistently more prevalent in women (Hormes et al., 2014; Hormes & Rozin, 2009; Hormes and Timko, 2011). In numerous studies, women score higher on chocolate craving scales and their related measures used to assess validity. In the initial analysis, women scored significantly higher than men on the CCI, $t = 3.06$, $p = .003$, $d = 0.77$

Factor Analysis

Research question. What is the factor structure of the CCI?

Items generated for CCI were designed to capture three domains: craving (11 items), emotional eating (11 items), and daily interference (6 items).

Exploratory factor analysis will explain if items appear to load on factors similar to these domains.

Table 1. *Summary of Expected Values Between the CCI and Measures of Validity*

Validity Types (N = 400)	r	CC 99% [lower bound, upper bound]
Criterion Validity		
ACQ Craving	.60	[.51, .68]
OCQ Approach	.60	[.51, .68]
Convergent Validity		
DEBQ Emotional Eating	.50	[.40, .59]
DEBQ External Eating	.50	[.40, .59]
FTSI	.50	[.40, .59]
FCQ-T-r	.40	[.29, .50]
Discriminant Validity		
HDI	.30	[.18, .41]
MCSDS	.30	[.18,.41]

Note. The 0.99 CI hypotheses for rho are based on the Fisher r-to-z transformation.

Chapter Four: Method

Sample Characteristics

Participants. Five hundred and thirty participants (367 females; 159 males; 4 missing) completed the survey. Of those that answered (n = 519), there was an average age of 23.55 years (SD = 10.17). The majority of the sample was still in college; 35.8% of the participants were Freshmen, 17.7% were Sophomores, 16.6% were Seniors, 15.5% were Juniors, and 2.8% were in Graduate school. A smaller percentage, 11.1%, identified as "Not in School."

Survey type. Survey data was collected in two ways, through a paper-and-pencil survey administered at a college campus, as well as a digital survey, hosted by a third-party site, *SurveyMonkey*. Approximately 83.4% of the participants (n = 442) completed the paper-and-pencil survey, while 88 participants completed the online survey. An Independent samples t-test was used to examine potential differences between the survey types and significant differences in age were found ($p < .01$). Participants in the online sample were, on average, older (M = 39.2, SD = 16.0) than the participants who completed the paper-and-pencil version of the survey (M = 20.3, SD = 3.5). See Table 2 below for a breakdown of additional demographic statistics across samples.

Table 2. *Demographic Information for Paper-Pencil, Online, and Total Sample*

	Paper-Pencil		Online		Total		
Gender	Male	Female	Male	Female	Male	Female	Total
	(*n* = 129)	(*n* = 309)	(*n* = 30)	(*n* = 58)	(*n* = 159)	(*n* = 367)	(*n* = 530)
Age *M*	21.2	20.0	41.3	37.8	25.1	22.9	3.6
SD	(4.4)	(3.1)	(14.3)	(16.8)	(11.0)	(9.8)	(10.2)
African American	7.0	5.5	16.7	17.2	8.8	7.4	7.7
Asian	3.9	5.2	13.3	19.0	5.7	7.4	6.8
Latino	28.7	38.8	13.3	8.6	25.8	34.1	31.7
Native American	2.3	2.3	13.3	3.4	4.4	2.5	3.0
White	48.8	35.9	3.3	6.9	40.3	31.3	34.2
Multi-racial	1.6	4.5	6.7	6.9	2.5	4.9	4.2
Other	3.9	2.9	16.7	22.4	9.3	5.0	3.4

Note. Of total sample, four participants did not provide gender information, ten participants did not provide age information, and thirty-four participants did not identify and ethnicity

Instrumentation

The CCI was the primary measure in this study (Appendix A). Criterion validity was addressed using subscales of the Attitudes to Chocolate Questionnaire (ACQ; Benton et al., 1998) and the Orientation to Chocolate Questionnaire (OCQ; Cartwright et al., 2007). Measures on general food craving, problematic eating (i.e., emotional eating and external eating), and food-related thought suppression were used to examine convergent validity. Further, to discriminant validity was explored using measures of depression and social desirability.

Criterion Measures

Attitudes to Chocolate Questionnaire (ACQ). The original ACQ is a 24-item scale (Benton et al., 1998) that measures chocolate craving on three subscales: a 10-item craving subscale (α = .91), a 10-item guilt subscale, (α = .91), and 4-item functional approach to chocolate cravings subscale (α = .51). A study by Cramer and Hartleib (2001) only found support for the craving subscale (α = .91) and the guilt subscale (α = .88). Van Gucht et al. (2014) provided additional support for these findings, craving (α =. 90) and guilt (α = .91). In the present study, the craving subscale of the ACQ is utilized as a criterion measure (Appendix B). Items on this subscale include, "I eat chocolate to cheer me up when I am down," and "I eat chocolate as a reward when everything is going really well for me."

Orientation to Chocolate Questionnaire (OCQ). Cartwright et al. (2007) created the 14-item Orientation to Chocolate Questionnaire (OCQ). Three subscales on the OCQ exist: a 6-item approach subscale, a 6-item guilt subscale, and 2-item avoidance subscale. High internal consistency reliability has been identified for each subscale of the OCQ: approach (α = .89), avoidance (α = .86), and guilt (α = .96; Cartwright and Stritzke, 2008). For the purpose of this study the approach subscale of the OCQ was used to examine the criterion validity of the CCI (Appendix C). Items on this subscale include, "I often go into a shop for something else and end up buying chocolate," and "Even when I do not really want any more chocolate I will often carry on eating it."

Convergent Measures

Dutch Eating Behavior Questionnaire (DEBQ). The DEBQ (van Strien et al., 1986) is a 33-item measure that consists of subscales on three eating types: restrained (α = .95), emotional (α = .94), and external (α = .80). Internal consistency reliability of the DEBQ subscales has been verified in more recent studies: restrained eating (α = .91), emotional eating (α = .92), and external eating (α = .81). For the purpose of this study only the emotional eating and external eating subscales will be used to examine convergent validity of the CCI. Example items on the 13-item emotional eating subscale include, "Do you have the desire to eat when you are irritated?" and "Do you have the desire to eat when you are approaching something unpleasant to happen?" And example items on the 10-item external eating subscale include, "If you see others eating, do you also have

the desire to eat?" and "If food tastes good to you, do you eat more than usual?" See Appendix E for scale.

Food Thought Suppression Inventory (FTSI). The FTSI (Barnes et al., 2010) is a 15-item scale that measures food-related thought suppression. Respondents are asked to rate each item on a 5-point Likert scale (strongly disagree to strongly agree). Using exploratory factor analysis with principle axis rotation a single factor solution was identified for the FTSI with factor loadings ranging from .65 to .87. High internal consistency reliability was found for this measure, $\alpha = .96$. Example items include, "There are foods I prefer not to think about" and "I wish I could stop thinking about certain foods." Criterion validity tested for the FTSI includes scales on eating pathology and dieting. Participants who score high on the FTSI were found to score higher on compensatory behaviors related to eating disorders and dieting (Appendix D).

Food Cravings Questionnaire-Trait-revised (FCQ-T-r). The FCQ-T-r (Meule et al., 2014) is a 15-item measure that assesses stable food cravings in adults. The FCQ-T-r is designed to measure five dimensions of craving: lack of control over eating, thoughts or preoccupation with food, intentions to plan and consume food, emotions before or during food craving, and cues that may trigger food craving. The FCQ-T-r has demonstrated high internal consistency reliability, $\alpha = .94$ and test-retest reliability after a three-week period, $r_{tt} = .80$. Example items on the FCQ-T-r include, "If I eat what I am craving, I often lose

control and eat too much" and "I find myself preoccupied with food." (Appendix F).

Discriminant Measures

Hamilton Depression Inventory (HDI). The HDI (Reynolds & Kobak, 1995) will be used to measure depression symptomology. The HDI was created to measure aspects of depression that are normally assessed through a clinician-administered interview. The HDI has proven to be a sound measure demonstrating high internal consistency ($\alpha = .91$) and test-retest reliability (rtt = .96). Validation for the HDI has been found in measures of depression, suicidal ideation, anxiety, self-esteem, and hopelessness. The HDI asks respondents to best select items that describe their behavior or how they have been feeling in the past two weeks. An example item on this measure is, "In the past two weeks, how often have you been bothered by feeling depressed (i.e., sad, blue, 'down in the dumps')?" if participants choose "Not at all or rarely" they are instructed to skip the next three items specifically designed to probe the question further, otherwise they are asked to circle one of the following responses: 1. Occasionally, 2. Often (about half the time), 3. Very Often, or 4. Almost all the time. The HDI is copyrighted and will not be included in the Appendix.

Marlowe-Crowne Social Desirability Scale- short form (MCSDS-SF). The MCSDS-SF (Reynolds, 1982) is a 13-item scale that measures social desirability with true-false response format. The MCSDS-SF has demonstrated evidence for internal consistency reliability, $\alpha = .76$. A strong relationship (r =

.93) was found between the MCSDS-SF and the original 33-item MCSDS (Marlow-Crowne, 1960). Example items include, "I'm always willing to admit to it when I make a mistake" and "I am sometimes irritated by people who ask favors of me." (Appendix H).

Additional Measures

Sample characteristics were collected using a demographics form (Appendix I). This form was used to examine the relationship between gender, culture, and chocolate cravings. Items included sample characteristics on: gender, age, ethnicity, and chocolate craving. Information about an individual's relationship and living situation were also recorded. Additional lifestyle questions included those on: exercise, health, and substances use. Questions on characteristics of chocolate consumption (amount and frequency) were also included. As well as whether one identifies as "addicted to chocolate." Additional items on menstrual-related chocolate cravings were included. These items pertain to chocolate cravings before, during, and after menstruation.

Procedure

HSU students. Students were recruited through psychology courses offered at HSU. All students registered on the Psychology Department's Research Participation Pool. A consent form was attached to each lab-administered survey—students were asked to read and sign it to participate in the study. Participants under 18 were not permitted to take the survey. To avoid any link to identity, on the top of the survey packet students entered a unique study

ID—the last two letters of their last name and their day of birth as two digits. This ID system will allow for students to register for a retest approximately one week after taking the initial survey. The survey took participants approximately 50 minutes to complete. Students were allowed to leave any time during the study without penalty. All surveys are kept anonymous and will be safely stored for at least five years after the publication of results. Upon completion of the survey, participants were provided with a debriefing form with the university's provided services and contact information.

Online participants. An online version of the paper-and-pencil questionnaire was created using a custom survey design tool. These participants were recruited online from group forums and networking sites, such as *Facebook*. They completed a digital version of the survey hosted on *SurveyMonkey*. Participants were also recruited through Amazon's *Mechanical Turk* (MTurk), a website that allows for thousands of people to complete "tasks" (i.e., surveys) in exchange for a small monetary reward. The online database links "workers" (paid task completers) to "requesters" (task creators). The primary investigator of the study acted as the requester. A $100 deposit was added into the requester account and a compensation amount of 50 cents was automatically awarded to each participant (worker) upon completion of the study. Evidence supports that higher monetary awards should be given for longer surveys to increase participation (Buhrmester, Kwang, & Gosling, 2011).

Data Analysis

A statistical software program, IBM SPSS 22 was used to examine the data. The data was cleaned and recoded. In addition, frequencies and descriptives were evaluated for possible extreme outliers and missing data.

Outliers. Several extreme outliers were found after evaluating box-plots for each scale and if applicable, were deleted. If a cluster of outliers existed, all were included, as these scores are more plausible than an extreme singular outlier. It is important to note that each statistical analysis was ran both with and without the extreme outliers to ensure that statistical significance of the results was not influenced. No outliers affected the statistical significance of the results. Despite no effect on the statistical significance of each analysis, the extreme outliers were still deleted to combat lack of normality in the data.

Transformations. With large data sets, such as this one, assumptions can be more relaxed. All but one scale, the DEBQ External Eating subscale, needed to be transformed. If the data was negatively skewed after evaluating a histogram with a normal curve line, then the computational transformation formula was reflected. In addition, the data minimums and maximums were evaluated to check for minimum scores of "0". If a scale included "0" as a response option, then the computational transformation formula included a "+1". Only HDI (Reynolds & Kobak, 1986) needed to be reflected (see Appendix L for Table of transformations).

Hypotheses

Hypothesis 1 statistical Test. Internal consistency will be examined by Cronbach's coefficient alpha and item-to-total correlations (rit below .30 will be dropped).

Hypothesis 1b statistical test. Test-retest reliability will be assessed through a Pearson Correlation between time one and time two or a week later of survey administration to the same participants.

Hypotheses 2 and 2b statistical test. Pearson correlations will be used to examine the relationship between the CCI and expected criterion subscales of both the ACQ and OCQ.

Hypotheses 3, 3b, and 3c statistical test. Pearson correlations will be used to examine the relationship between the CCI and the following convergent measures: FTSI, DEBQ, and
FCQ-T-r.

Hypotheses 4 and 4b statistical test. Pearson correlations will be used to examine the relationship between the CCI and the following discriminant measures, the HDI and MCSD-SF.

Hypothesis 5 statistical test. Gender differences will be assessed through an independent samples t-test ($p < .05$). An effect size statistic, Cohen's d, will also be calculated to assess the difference between men and women.

Factor analysis. To evaluate factor structure of the CCI an exploratory factor analysis (principle axis factoring) will be used. Oblique factor rotation will be applied.

Potential Benefits to Participants and Risks

After completing the survey, some participants have been more aware of their own food cravings and possible problematic eating habits. Thus, encouraging self-exploration on these topics and possible help-seeking behavior. Due to lack of experimental manipulation the risks of the study were minimal. Students who completed the paper-and-pencil version of the survey were provided a debriefing form listing the university's offered counseling services and contact information (Appendix L). Online participants were provided a webpage version of a similar debriefing form. If participants have any additional comments, concerns, or questions, both the paper-and-pencil and online survey provided the contact information (Appendix J) of the principle investigator.

Chapter Five: Results

Reliability

Hypothesis 1 analysis. The internal consistency reliability of the CCI was examined using Cronbach's coefficient alpha and scale item-to-total correlations. Item-to-total correlations ranged from .32 to .77, and were above the specified cut-off criteria (rit > .30). As a result, no items of the CCI were dropped. The lowest item-to-total correlation, .32 was a reverse-coded item. The CCI demonstrated excellent internal consistency with an alpha of .95.

Hypothesis 1b analysis. The test-retest reliability (n = 71) of the CCI was examined using a Pearson Correlation Coefficient. Good test-retest reliability (r = .87, p < .01) was identified between time one of the CCI (M = 96.1, SD = 16.1) and time two of the CCI (M = 98.4, SD = 16.4).

Validity

Once the pre-requisite of reliability was met for the CCI, three forms of validity were assessed, criterion, convergent, and discriminant.

Hypothesis 2 analysis. The Attitudes to Chocolate Questionnaire is made up of three subscales: Craving, Guilt, and Functional response to chocolate. For the purpose of this study, only the craving subscale was evaluated. As hypothesized, a Pearson Correlation demonstrated a strong criterion relationship with the ACQ Craving subscale (r = .84, p < .01). Evidence for criterion validity exists between the two measures.

Hypothesis 2b analysis. The Orientation to Chocolate Questionnaire is

made up of three subscales: Avoidance, Approach, and Guilt. For this study, only the Approach subscale of the OCQ was evaluated. As hypothesized, a Pearson Correlation Coefficient demonstrated a strong criterion relationship between the CCI and the OCQ Approach subscale ($r = .72$, $p < .01$). Evidence for criterion validity exists between the two measures.

Hypothesis 3 analysis. The 15-item Food Thought Suppression Inventory (FTSI) measures a person's efforts at food-related thought suppression. A Pearson Correlation demonstrated a low-moderate relationship between the CCI and the FTSI, $r = .39$, $p < .01$, [.29, .48]. According to the hypothesized relationship, r (400) = .50, $p < .01$, [.40, .59], convergent validity was not met.

Hypothesis 3b analysis. For the Emotional Eating subscale of the DEBQ a Pearson Correlation coefficient demonstrated a moderate relationship with the DEBQ Emotional Eating subscale of .48, $p < .01$, [.39, .56] was found. According to the hypothesized relationship, convergent was shown between the two measures.

Hypothesis 3c analysis. A Pearson Correlation coefficient demonstrated a moderate relationship between the CCI and the External Eating subscale of the DEBQ, $r = .45$, $p < .01$, [.36, .54]. According to the hypothesized relationship, evidence for convergent validity was found. A Pearson Correlation coefficient demonstrated a moderate relationship between the CCI and the FCQ-T-r ($r = .51$, $p < .01$, [.42, .59]). According to the hypothesized relationship, evidence for convergent validity was found.

Hypothesis 4 Analysis. A low relationship between the CCI and the HDI ($r = .15$, $p < .01$, [.04, .26]) was found, supporting discriminant validity.

Hypothesis 4b analysis. A low relationship between the CCI and the MCSDS ($r = -.06$, *n.s.*) was found. According to the hypothesized relationship, a discriminant relationship exists between the two measures.

Table 3. *Summary of Measure Reliability and Intercorrelations*

Measures	1	2	3	4	5	6	7	8	9
1. CCI	(.95)	.84	.72	.39	.48	.45	.51	.15	**-.06**
2. ACQ Craving		(.88)	.75	.40	.49	.49	.56	.14	**-.07**
3. OCQ Approach			(.88)	.38	.42	.50	.53	.16	-.10
4. FTSI				(.96)	.49	.40	.67	.32	-.21
5. DEBQ Emotional					(.96)	.57	.69	.35	-.29
6. DEBQ External						(.86)	.64	.25	-.24
7. FCQ-T-r							(.95)	.35	-.27
8. HDI								(.91)	-.30
9. MCSDS-SF									(.73)

Note. Non-significant relationships are in bold. All other correlations are significant at $p < .001$. Reliability coefficients are shown in diagonal. CCI = Chocolate Craving Inventory; ACQ = Attitudes to Chocolate Questionnaire Craving subscale; OCQ Approach = Orientation to Chocolate Questionnaire Approach subscale; FTSI = Food Thought Suppression Inventory; DEBQ Emotional and External = Dutch Eating Behavior Questionnaire Emotional and External Eating; FCQ-T-r = Food Craving Questionnaire-Trait-revised; HDI = Hamilton Depression Inventory; MCSDS-SF = Marlowe-Crowne Social Desirability Scale-Short Form.

Hypothesis 5 analysis. As hypothesized a sex difference was found in the sample (N = 525); women (M = 55.78, SD = 16.04) scored higher on the CCI than men (M = 49.47, SD = 15.57), t = 4.18, $p < .001$, d = 0.40.

Factor structure. To evaluate factor structure of the CCI, an exploratory factor analysis utilizing principle axis factoring was applied with Oblique factor rotation. The Kaiser-Meyer-Olkin Measure (KMO) sampling, adequacy was tested to verify if the CCI qualified for Factor Analysis. Results indicated that the recommended minimum criteria, a KMO above .60, was met and the factorability of the CCI was appropriate, KMO = .95. The Bartlett's test of Sphericity was significant (χ^2 (435) = 9286.93, $p < .001$)

The initial analysis produced a five-factor solution with eigenvalues above one, explaining approximately 61.61% of the variance. The first factor explained 41.75% of the variance, the second factor explained 7.58% of the variance, the third factor explained 4.97% of the variance, the fourth factor explained 3.72%, and the fifth factor explained 3.58% of the variance. With the five-factor solution in mind, the Scree Plot was evaluated. The Scree Plot indicated that factors began to level off around a three or four-factor approach.

Following the initial analysis, a fixed-factor analysis was conducted five times. Each time, the residual correlation matrices of the fixed-factor solutions were evaluated to determine the appropriate number of factors for the CCI. Ideally, all correlations should be small (lower than .05); to reflect higher variance explained by the factor. If values are above .05 more factors may be

necessary. The one-factor solution contained many values in the residual correlation matrix above .05, indicating that another factor was needed. Following the one-factor evaluation, a two-factor solution was analyzed. While the matrix rendered fewer values above .05, the presence of some .05 values suggested that a third factor was necessary.

After conducting a three-factor, four-factor, and five-factor analysis, it was evident that the three-factor solution was the best fit. The three-factor solution contained a few values above .05, however, after running the four-factor and five-factor solutions those values remained. The three-factor structure was chosen as the best-fit solution for the CCI. Upon the examination of the three-factor solution, the CCI can be broken down into three meaningful factors, Craving (15 items), Daily Interference (5 items), and Emotional Eating (10 Items). The names (mentioned in the latter statement) of the factors were based on the CCI item-factor content. The Craving subscale of the CCI explained 40.2% of the variance, the Daily Interference subscale explained 6.0% of the variance, and the Emotional Eating subscale explained 3.4% of the variance. See Table 4.

Table 4. *Factor Loadings of Three-Factor Solution of the CCI*

	Factor			
	Craving	Interference	Emotional	Communality
I have a strong compulsive urge to eat chocolate	.75	.56	-.62	.67
I often consume a large amount of chocolate in one sitting	.74	.33	-.42	.57
When I eat chocolate I usually can't control how much I eat	.71	.36	-.48	.56
I feel I am addicted to chocolate	.68	.53	-.55	.62
I binge eat chocolate at least once a month	.68	.38	-.45	.51
I often feel upset when I can't get chocolate and I feel the need for some.	.67	.50	-.54	.58
I will eat chocolate after a large meal despite being full	.65	.27	-.55	.51
I will eat chocolate until I feel sick	.61	.43	-.29	.45
When I crave chocolate, I can't stop thinking about it until I get some	.60	.43	-.47	.49
I will go out of my way to get chocolate (i.e., drive across town)	.60	.49	-.44	.49

	Factor			
	Craving	Interference	Emotional	Communality
I keep a large supply of chocolate at home for times when I need it	.59	.49	-.46	.49
When I see others eating chocolate I feel the need to have some	.58	.22	-.53	.44
I associate chocolate with strong positive feelings or memories	.56	.20	-.55	.45
I rarely eat chocolate	.53	.10	-.53	.49
When there is chocolate around it is easy for me to ignore it	.43	.06	-.37	.37
My chocolate cravings often get in the way of things I need to do	.42	.76	-.34	.61
My need for chocolate will distract me from getting things done	.51	.76	-.37	.60
I lose my train of thought when I am having intense chocolate cravings	.59	.67	-.45	.57
I will cancel plans with friends or family to eat chocolate in private	.23	.66	-.16	.41
My cravings for chocolate distract me from my daily responsibilities	.46	.65	-.40	.54

	Factor			
	Craving	Interference	Emotional	Communality
I eat chocolate to help my mood when I am having a bad day.	.56	.29	-.88	.76
When I am sad I often feel the need for chocolate	.55	.28	-.87	.76
When I am upset or anxious I feel the need for chocolate	.52	.37	-.85	.72
During times of stress when I feel highly emotional, I crave chocolate	.50	.24	-.75	.58
I crave chocolate when I am tired	.57	.35	-.67	.58
I usually eat chocolate when things don't go my way	.53	.53	-.63	.55
When I feel out of control, eating chocolate helps me	.61	.52	-.63	.58
I usually feel better after eating chocolate	.48	.19	-.60	.44
When I have trouble sleeping I crave chocolate more than usual	.45	.48	-.55	.51
One week out of the month my chocolate craving becomes intense	.49	.26	-.53	.38

	Factor			
	Craving	Interference	Emotional	Communality
Eigenvalue	12.5	2.3	1.5	
% Explained	41.8	7.6	5.0	

Note. Priniciple Axis Factoring with Oblimin rotation. Factors explain 49.5%.

Supplemental Analyses

Chocoholic groups. To further validate the CCI, evidence for contrasted groups validity was explored. A one factor Analysis of Variance (ANOVA) was conducted with the CCI and a grouping variable that asked participants, "Do you consider yourself a chocolate addict (chocoholic)?" This variable was made up of four response levels, *Yes-Definitely* (*n* =19), *Yes-Probably (n*= 77), *Not Really (n*= 226*),* and *Definitely Not (n* =195*).* The analysis revealed a group effect, F (3, 513) = 132.7, $p < .001$, $\eta^2 =$. 44. See Table 5 for a summary of results.

A Bonferroni Post Hoc analysis was used to control for the possibility of an inflated alpha (Type 1 Error). Significant differences were identified between *Yes-definitely and* two other groups, *Not really* and *Definitely*, both at a $p <$. 001. Significant differences were also identified between *Yes-probably* and the same two responses, the *Not really* and *Definitely not*, both at a $p < .001$. A significant difference was found between the *Not really* and *Definitely not*, $p < .001$. The CCI difference between the *Yes-definitely* and *Yes-probably* was statistically significant at $p < .05$. Results indicate that groups who identify themselves as chocolate addicts report higher scores on the CCI than non-chocolate addicts. Table 5 shows the linear trend in CCI scores between groups based on the degree of self-reported chocolate addiction.

Table 5. *CCI Mean and Standard Deviation (SD) for Perceived Chocolate Addition Groups*

	CCI Scores		
Addicted to Chocolate?	*N*	*M*	*SD*
Yes-definitely	19	77.7	15.2
Yes-probably	77	69.2	14.0
Not really	226	57.0	12.9
Definitely not	195	41.9	10.1

Note. A Bonferroni Post Hoc test revealed significant differences ($p < .001$) between Yes-definitely vs. Not really and Definitely not; Yes-probably vs. Not really and Definitely not; Not really vs. Definitely not.

CCI subscales. Supplemental analyses were conducted to examine the relationships between the CCI factor subscales and previously hypothesized validity measures. First, the CCI subscales were computed and then analyzed for normality. Square root transformations were applied to the CCI Craving and Emotional Eating subscales. An Inverse transformation was applied to the Daily Interference subscale. The Square root transformation for the CCI Craving subscale reduced the skew and kurtosis ratios below three, meeting the assumptions for data normality. While both transformations for the CCI Emotional Eating and Daily Interference subscales greatly improved the normality of data, the 3:1 ratios for skew and kurtosis were not met. However, all three transformations were used for the data analysis of these subscales (see table in Appendix M). The transformed subscales chosen for the supplemental analyses are in bold.

CCI Craving subscale. Theoretically, the highest relationships should be between the CCI Craving subscale and direct measures of chocolate craving, the ACQ Craving and the OCQ Approach subscales. As shown in Table 6 results were confirmed. The ACQ Craving subscale demonstrated the strongest relationship with the CCI Craving subscale, $r = .81$, $p < .01$, 99% CI [.77, .85] and the OCQ Approach subscale was strongly related strongly with the Craving subscale of the CCI, $r = .74$, $p < .001$, 99% CI [.69, .79]. As expected, a discriminant relationship between the CCI Craving subscale and the HDI and MCSD-SF was found (see Table 6).

CCI Emotional Eating subscale. Strong relationships were found between the Emotional Eating subscale of the CCI and ACQ Craving subscale, $r = .78$, $p < .001$, 99% CI [.73, .82], and the OCQ Approach subscale, $r = .64$, $p < .001$, 99% CI [.57, .70]. These results are not surprising. Items on the ACQ Craving subscale measure a strong component of emotional eating and therefore, should correlate almost as strongly as they did with the Craving subscale of the CCI. The differentiator lies in the CCI's additional relationships, a high correlation between the CCI Emotional Eating subscale and the DEBQ Emotional Eating subscale was found, $r = .51$, $p < .001$, 99% CI [.42, .59]. Discriminant validity was further supported for the CCI given the HDI and MCSD-SF's low relationships with the CCI Emotional Eating subscale (see Table 6).

CCI Daily Interference subscale. The CCI Daily Interference subscale demonstrated the highest relationships, among all other CCI subscales, with the FCQ-T-r, $r = .64$, $p < .001$, 99% [.56, .69], and the DEBQ Emotional Eating subscale, $r = .56$, $p < .001$, 99% CI [.48, .63]. As found for the prior two subscales, a discriminant relationship between the CCI Daily Interference subscale and the HDI and MCSD-SF was found (see Table 6).

Chocolate craving and menstrual cycle. An independent samples t-test was used to understand the relationship between menstrual cycle chocolate cravings and the CCI. This survey included a dichotomous, yes-no question for women: "Do your chocolate cravings become more frequent and intense prior or during your menstrual cycle?" A significant difference in CCI scores was found, *t*

(335) = 4.76, $p < .001$, $d = 0.53$. Women who agreed ($n = 210$) with the statement ($M = 58.9$, $SD = 15.6$) demonstrated higher scores of the CCI than women ($n = 127$) who disagreed ($M = 50.7$, $SD = 15.5$).

Table 6. *Summary of CCI Subscale Reliabilities and Correlations*

	CCI		
	Craving	Emotional	Daily Interference
ACQ Craving	.81	.78	.49
OCQ Approach	.74	.64	.50
DEBQ Emotional	.43	.51	.56
DEBQ External	.47	.39	.21
FTSI	.36	.35	.38
FCQ-T-r	.51	.46	.64
HDI	.13	.18	.24
MCSD-SF	.06	.07	.25
α	.91	.84	.91

Note. All correlations are significant at $p < .001$. CCI = Chocolate Craving Inventory; ACQ = Attitudes to Chocolate Questionnaire Craving subscale; OCQ Approach = Orientation to Chocolate Questionnaire Approach subscale; DEBQ Emotional and External = Dutch Eating Behavior Questionnaire Emotional and External Eating; FCQ-T-r = Food Craving Questionnaire-Trait-revised.

Chapter Six: Discussion

The purpose of this study was to examine the reliability and validity of a measure of chocolate craving and consumption, the Chocolate Craving Inventory (CCI; Whitham & Reynolds, 2014). As a pre-requisite to validity, strong internal consistency reliability of the CCI was expected. Three forms of validity were assessed, criterion, convergent, and discriminant. Measures dedicated to chocolate craving, including the ACQ Craving subscale (Benton et al., 1998) and the OCQ Approach subscale (Cartwright et al., 2007), were utilized to explore the criterion validity of the CCI. Convergent validity was examined using measures of general food craving, disordered eating, and food-related thought suppression. Measures of depression and social desirability were used to establish discriminant validity. An exploratory factor analysis utilizing Principle Axis Factoring was applied with oblique rotation to examine the factor structure of the CCI.

Existing questionnaires of chocolate craving report to examine why and how people crave chocolate by measuring associated feelings and experiences, such as guilt, and behaviors, such as avoidance and approach (Benton et al., 1998; Cartwright et al., 2007). These factors assist in understanding the nature of chocolate craving, but are not sufficiently broad in the measurement of the need for chocolate consumption. For example, guilt, a common denominator of the two existing chocolate measures is repeatedly found to relate to restrictive eating patterns (Cartwright & Stritzke, 2008; Cramer & Hartleib, 2001; Van Gucht et

al., 2014). The CCI was designed to measure the driving components of chocolate craving and consumption, without items that relate to limiting or avoidant thoughts or actions. The CCI evaluates an individual's craving and consumption of chocolate, through three subscales: Craving, Emotional Eating, and Daily Interference.

Psychometric Properties of the CCI

Internal consistency reliability. Reliability of the CCI was determined by how well each of the 30 items relate to the overall CCI total scale. Thus, higher item-to-total scale correlations show stronger relationships with craving items. While it depends on the nature of the item (i.e., reverse coded items tend to be lower) a suggested cut-off point for item deletion is an item-to-total correlation of .30 or lower. All items on the CCI were above the suggested cut-off point (ranging from .32 to .79). The two lowest item-to-total correlations were reverse scored and kept in the scale to control for response validity. Those items include, "I rarely eat chocolate," and "When there is chocolate around it is easy for me to ignore it." A strong Cronbach's coefficient alpha of .94 suggests that items on the CCI consistently measure the same construct.

Test-retest reliability. Within a college sub-sample of 71 participants, high test-retest reliability (r = .87) was found for the CCI. Evidence for test-retest reliability suggests the CCI is a reliable and stable measure over time.

Criterion Validity

Criterion-related validity of the CCI was examined through subscales of

two existing chocolate craving measures. Although both measures, the ACQ and the OCQ, consist of multiple subscales, only the ACQ Craving subscale and the OCQ Approach subscale were used in this study. These scales include items that focus on the drives of chocolate craving and consumption.

Chocolate craving. The Craving subscale of the ACQ measures the tendency for someone to crave chocolate in times of emotional distress (Benton et al., 1998). This subscale is related to the consumption of chocolate (i.e., amount and frequency) and various consumption-promoting behaviors, such as emotional and external eating (Muller et al., 2008; Van Gucht et al., 2014). The CCI also examines components that drive chocolate craving and consumption. Thus, it was hypothesized that a criterion relationship would be found ($r >$. 60). Following the analysis, results indicate that scales were strongly related to one another (r = .84), proving evidence for criterion validity.

Approach behaviors towards chocolate. The OCQ views chocolate craving as a state of ambivalence and it consists of competing thoughts of approach and avoidance resulting in guilt (Cartwright et al. 2007). Two of these subscales, Avoidance and Guilt, are not driving forces in chocolate consumption, but rather characteristic of restrictive and disordered eating (Cartwright et al., 2007, Cartwright & Stritzke, 2008). The OCQ Approach subscale is a moderate predictor of chocolate consumption (Cartwright et al., 2007, Rodgers et al., 2011). The Approach subscale of the OCQ and the CCI demonstrated a strong criterion relationship (r = .72). This can be explained by the similar items maintained on

each construct, for instance, the Approach subscale of the OCQ includes items such as, “I often go into a shop for something else and end up buying chocolate.” The CCI includes items that conceptually measure similar thoughts and behaviors, such as, “My chocolate cravings often get in the way of things I need to do.” This evidence suggests that the CCI is measuring chocolate craving.

Convergent Validity

The construct validity of the CCI was evaluated by hypothesized measures of convergent and discriminant validity. Convergent validity of the CCI was examined by conceptually related measures of eating behavior. Specifically, with scales of problematic eating (FTSI; Barnes et al., 2010), disordered eating (the DEBQ Emotional and External Eating subscales; van Strien et al., 1986), and general food craving (the FCQ-T-r; Meule et al., 2014).

Emotional eating. Relationships between food, in particular chocolate, and emotional eating have been found (Cartwright & Stritzke, 2008). Emotional eating is considered a result of negative or unpleasant feelings experienced by an individual (i.e., an upsetting life event or the unmet needs of an individual that cause anguish) and scales include items that measure the desire to eat when emotionally upset (Van Strien et al., 1986). To measure this component of craving, the DEBQ Emotional Eating subscale was used. An example item on the DEBQ Emotional Eating subscale includes, “Do you have the desire to eat when you are emotionally upset?” A moderate relationship between the CCI and the Emotional Eating subscale of the DEBQ was found (r = .48). Muller et al. (2008)

found similar r's ranging from .45 (in men) to .53 (in women) between emotional eating and chocolate craving. Other predictive analyses, identifying a beta of .35, between emotional eating and chocolate craving provide support this relationship (Cartwright & Stritzke, 2008). These results provided evidence for convergent validity between emotional eating and chocolate craving measured by the CCI.

External eating. External eating is the inclination to crave food when it is near, such as when friends are eating, or when one is next to a food establishment (Van Strien et al., 1986). A common measure used to understand this relationship is the DEBQ External Eating subscale, which contains example items, such as, "If you see or smell something delicious, do you have a desire to it?" (Van Strien et al., 1986). A hypothesized moderate relationship, a *r* of .45, between the CCI and the External Eating subscale of the DEBQ was found in this study. These results are consistent with findings by Muller (2008) where *r*'s ranging from .40 (in men) to .43 (in women) were found with the ACQ. Cartwright and Stritzke (2008) found a beta of .41 between external eating and chocolate craving. Consistent with findings in previous research, the current results support the convergent validity of the CCI.

Food-related thought suppression. Food-related thought suppression is often studied with measures of eating pathology and food craving. A study by Van Gucht et al. (2014) found a moderate relationship, *r* of .43, between food-related thought suppression and chocolate craving. It was hypothesized that as evidence of validity, a moderate relationship would exist between the FTSI and

the CCI. This relationship was not supported. A low-moderate relationship with an r of .39 was found between the CCI and the FTSI. This could be for several reasons. Prior measures of chocolate craving contain items related to chocolate craving guilt. Van Gucht et al. (2014) found a high moderate relationship, *r* of .55, between food-related thought suppression and the guilt subscale of the ACQ. Because the CCI was not designed to measure guilt as a component of chocolate craving, the relationship between food-related thought suppression and the CCI may be more modest.

General food craving. Food craving questionnaires consistently demonstrate a moderate relationship with chocolate craving scales and have been recently adapted to measure specific cravings for chocolate (Hormes & Meule, 2015). Evidence supporting this relationship was found by Hormes et al. (2014) where chocolate cravers scored higher on five of the nine components of the FCQ-T, with effect sizes ranging from .35 to .49. The FCQ-T is commonly used to explore this relationship and is composed of subscales conceptually related to chocolate craving, such as lack of control, preoccupation, emotional dependence, and environmental dependence (Rodriguez et al., 2007). A convergent relationship was hypothesized between the CCI and the FCQ-T-r. As expected a moderate relationship of $r = .51$ between the FCQ-T-r and the CCI was found, providing evidence for convergent validity.

Convergent relationships between the CCI and emotional eating, external eating, and general food cravings were found in this study. However, a

convergent relationship between the CCI and food-related thought suppression was not supported. It could be that food-related thought suppression relates to restrictive eating patterns, resulting in less chocolate consumption. More suitable measures should be used.

A recent study by Meule and Hormes (2015) adapted the Food Cravings Questionnaire-Trait (FCQ-T-r) to measure chocolate craving. High reliability exists for the chocolate version of the FCQ-T-r (alpha of .94). Given the high reliability and established validity of the chocolate version of the FCQ-T-r with an existing chocolate measure (the ACQ), future research should explore a convergent relationship between the CCI and the adapted FCQ-T-r chocolate craving measure. The adapted FCQ-T-r subscales, lack of control (alpha of .91) and thoughts about chocolate (alpha of .91) should be used to explore food-related thoughts around chocolate.

Discriminant Validity

Discriminant validity of the CCI was examined with two theoretically unrelated construct; a measure of depression, the HDI (Reynolds & Kobak 1995) and a measure of social desirability, the MCSDS-SF (Reynolds 1982).

Depression. A low correlation was found (r = .13) between the CCI and the HDI. This is consistent with research by Cramer and Hartleib (2001), with a measure of chocolate cravings (the ACQ Craving subscale) and depression (r = .21). At first glance, it is reasonable to believe that if someone eats chocolate to relieve negative emotions, they are more likely to consume it when they are

feeling depressed. Rose et al., (2010) found that out of 2,692 participants, 54.4% experienced more cravings when depressed, and of those, 44.9% reported specific cravings for chocolate. The majority of those that crave chocolate noted that it significantly alleviated anxiety and irritation. However, feelings of acute unhappiness, sadness, and distress (such as high anxiety) are more likely emotional states, while depression is more chronic and long-term. Thus, this discriminant relationship between the two measures may exist because while chocolate craving may alleviate initial feelings of discomfort in some persons, it is unlikely to alleviate clinical levels of depression.

Social desirability. A very low, non-significant relationship was found (r = -.06) between the CCI and the MCSDS-SF. This relationship is consistent with previous research on chocolate craving and social desirability. In a study by Cramer and Hartleib (2001), a non-significant relationship between the ACQ and social desirability (r = .06) was found. As social desirability, should be relatively unrelated to chocolate craving, this result supports discriminant validity.

Gender Differences

Research suggests that women experience chocolate cravings more frequently and more intensely (Hormes et al., 2014). This study found that women score significantly higher (M = 55.78) on chocolate cravings, measured by the CCI, than men (M = 49.47). Many factors may contribute to this outcome, including body image, biological predispositions (such as menstruation), and other social norms. Given this distinction it was expected that women would

show higher scores on the CCI.

Factor Analysis

An exploratory factor analysis yielded three meaningful factors. These factors are best described under the following descriptions: craving, emotional eating, and daily interference. The CCI Craving subscale consists of 15 items and explained the highest percentage of variance at 40.2%. Ten items loaded onto the CCI Emotional Eating subscale and explained 3.4% of variance and the CCI Daily Interference subscale explained 6.0% of variance.

Validity for the CCI was examined with the three factor subscales: Craving, Emotional Eating, and Daily Interference. Results support criterion and convergent relationships with the subscales and theoretically related constructs of chocolate craving, emotional eating, external eating, and general craving. Evidence for discriminant validity was found across all three CCI subscales with depression and social desirability.

The CCI Craving subscale exhibited excellent internal consistency reliability with and Cronbach's alpha of .91. Strong relationships with the ACQ Craving subscale (r = .81) and the OCQ Approach subscale (r = .78) were found. These relationships further provided evidence for the validity with chocolate craving; suggesting that the CCI craving subscale is a viable subscale of the CCI.

The CCI Emotional Eating subscale showed high internal consistency reliability with a Cronbach's alpha of .84. Similar to the above results, strong relationships between the CCI Emotional Eating subscale and the ACQ Craving

subscale (r = .78) and the OCQ Approach subscale (r = .64) were found. These relationships provide evidence for validity with chocolate craving and emotional eating. However, these relationships were similar to those between the CCI Craving subscale and to measures of chocolate craving, the ACQ Craving and OCQ Approach subscale. This suggests that the CCI Craving subscale and the CCI Emotional Eating subscale may be measuring very similar components of chocolate craving. Still, validity for the CCI Emotional Eating subscale is expressed with the strong relationship to the ACQ Craving subscale and the moderate-strong relationship with the OCQ-Approach subscale.

A Cronbach's alpha of .91 was found for the CCI Daily Interference subscale. A moderate-strong relationship of .64 was found between the CCI Daily Interference subscale and the FCQ-T-r. This supports the validity of the third factor of the CCI subscale. Daily Interference items on the CCI represent craving characteristics that are often identified in general food-craving measures, like the FCQ-T-r. Similar items on the CCI Daily Interference subscale and the FCQ-T-r measures are reflected. Results indicate that the CCI Daily Interference subscale is a valid measurement for assessing a key characteristic of chocolate cravings.

Supplemental Analyses

Contrasted-Groups validity. Evidence for contrasted-groups validity was found and, suggest that participants who are more likely to perceive themselves as a "chocoholic" or "addicted to chocolate" scored significantly higher (M =

69.0) on the CCI that those who do not (M = 41.9). These results provide further evidence for the CCI as a measure of chocolate craving and consumption. The strength of this relationship, measured by an eta-squared of .44, revealed strong effect of the grouping variable with CCI scores. Thus, evidence for contrasted-groups validity of the CCI was found.

Menstrual cravings. Previous research suggests that chocolate craving may be associated with a woman's menstrual cycle (Bruinsma & Taren, 1999; Rozin et al., 1991). Hormes and Timko (2011) examined this relationship with the ACQ Guilt subscale and found a meaningful effect with a Cohen's *d* of .66 where menstrual cravers scored significantly higher on the ACQ Guilt subscale than non-cravers. In the present study, this relationship was explored. Results indicated that women who self-reported more chocolate cravings prior or during their menstrual cycle scored higher on the CCI. A Cohen's *d* of .53 was found for this relationship, consistent with findings in other research.

Limitations and Future Research

The creation of the CCI is a stepping-stone in understanding chocolate craving and consumption. Although the CCI exhibited excellent internal consistency reliability and evidence for validity across existing chocolate craving and problematic eating measures, additional studies are needed to further define and explore the nature of chocolate craving and its factors. Several limitations existed in this study, those include: sample size, homogeneity of demographics, differences in sample characteristics, and construct validity.

Sample characteristics.

A fewer participants were collected in the online study (n = 88) than the in-person sample (n = 438) and significant differences in age between both groups were found. The age of the online sample was higher than that of the college sample. In the online sample the average age of women was 37.8 years and the average age of men was 41.3 years; in comparison, for the in-person sample, the average age of women was 20.0 years and the average age of men was 21.2 years. These age differences indicate that middle-aged and older participants were not well represented in this sample. Further previous research efforts examine the effect menstruation has on chocolate cravings. Given biological changes in women over time (i.e. pre-menopausal versus post-menopausal) a range of ages is important. To establish external validity of the CCI, broader percentages in age (especially in women) and ethnicity should be studied.

Homogeneity of demographics. Another limitation was the homogeneity of demographics in the college sample. This limitation can lower the generalizability of the present findings. Over 80% of the sample consists of college students that attend a small state university in Northern California; 69.2% of the participants were female. Further, the sample was 34.2 percent White and 31.7 percent Latino. Less than a quarter of the sample (20.4%) identified as other ethnicities, including: African American (3.0%), Asian (6.8%), Native American (3.0%), Bi or Multiracial (4.2%), and Other (3.4%). Prior research found cultural differences can play a role in the craving of chocolate (Rodriquez et al., 2007).

To attain a more representative participant sample, the CCI should be administered across multiple settings consisting of varied social and geographical characteristics. Future research should further explore a larger sample with a wider range of culture differences.

Conclusion

Strong internal consistency reliability (alpha of .95) was found for the CCI. Evidence of validity for the CCI was also shown. Criterion relationships with two existing reliable and valid subscales of chocolate craving indicated that the CCI is measuring previously identified components of chocolate craving. Construct validity of the CCI was found through theoretically related measures of food craving and problematic eating. However, hypothesized measure of food-related thought suppression did not demonstrate evidence for convergent validity. Discriminant validity of the CCI between measures of depression and social desirability was found.

Additional evidence for contrasted-groups validity was shown between the CCI and grouping variable of self-identified chocolate addiction. Persons that reported themselves as chocolate addicts showed higher scores on the CCI. Support for validity was found between the CCI and gender and with menstrual cycle cravings. Chocolate cravings were found more prevalent in women than men. Women reported more intense chocolate cravings closer to their menstrual cycle. These show evidence for construct validity of the CCI. Further evidence for construct validity was also found for each of the CCI's subscales: Craving,

Emotional Eating, and Daily Interference.

The CCI is the first chocolate craving construct that strictly measures feelings and behaviors that related to chocolate craving and consumption. Unlike other chocolate craving scales, the CCI does not define or measure chocolate craving through associated guilt and avoidance behaviors. Evidence from the present study, suggests that the CCI is a reliable and valid measure of chocolate craving. Future research should further explore the test-retest reliability of the CCI, validity with other measures of food craving, and with more diverse samples.

References

Barnes, R. D., Fisak, B., & Tantleff-Dunn, S. (2010). Validation of the food thought suppression inventory. *Journal of Health Psychology, 15*, 373-381. doi: 10.1177/1359105309351246

Benton, D., Greenfield, K., & Morgan, M. (1998). The development of the attitudes to chocolate questionnaire. *Personality and Individual Differences*, *24*, 513-520. doi: 10.1016/j.appet.2014.01.078

Bruinsma, K., & Taren, D. L. (1999). Chocolate: food or drug? *Journal of the American Dietetic Association*, *99*, 1249-1256. doi:10.1016/S0002-8223(99)00307-7

Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk a new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, *6*, 3-5. doi: 10.1177/1745691610393980

Butcher, J.N., Graham, J. R., Williams, C. L., & Ben-Porath, Y. (1989). *Development and Use of the MMPI-2 Content Scales*. Minneapolis, M. N.: University of Minnesota Press.

Cartwright, F., Stritzke, W. G., Durkin, K., Houghton, S., Burke, V., & Beilin, L. J. (2007). Chocolate craving among children: Implications for disordered eating patterns. *Appetite, 48*, 87-95. doi: 10.1016/j.appet.2006.07.081

Cartwright, F., & Stritzke, W. G. (2008). A multidimensional ambivalence model of chocolate

craving: Construct validity and associations with chocolate consumption and disordered

eating. *Eating Behaviors*, *9*(1), 1-12. doi: 10.1016/j.eatbeh.2007.01.006

Cepeda-Benito, A., Gleaves, D. H., Williams, T. L., & Erath, S. A. (2000). The development and validation of the state and trait food-cravings questionnaires. *Behavior Therapy*, *31*, 151-173. doi: 10.1016/S0005-7894(00)80009-X

Close, A., & Zinkhan, G. M. (2006). A holiday loved and loathed: A consumer perspective of Valentine's Day. *Advances in Consumer Research*, *33*, 356-365. doi: 10.1002/mar.20147, 0.44

Cramer, K. M., & Hartleib, M. (2001). The attitudes to chocolate questionnaire: A psychometric evaluation. *Personality and Individual Differences*, *31*, 931-942. doi:10.1016/S0191-8869(00)00195-1

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, *24*, 349. doi: 10.1037/h0047358

De Lauzon, B., Romon, M., Deschamps, V., Lafay, L., Borys, J. M., Karlsson, J., ... & Charles,

M. A. (2004). The Three-Factor Eating Questionnaire-R18 is able to distinguish among different eating patterns in a general population. *The Journal of nutrition*, *134*(9), 2372-2380. doi: 134(9):2372-80.

Fletcher, B. C., Pine, K. J., Woodbridge, Z., & Nash, A. (2007). How visual images of chocolate affect the craving and guilt of female dieters. *Appetite*, *48*(2), 211-217. doi: 48(2):211-7

Garner, D. M., Olmstead, 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*, 15-34.

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower level facets of several five-factor models. *Personality Psychology in Europe*, *7*(1), 7-28.

Herman, C. P., & Polivy, J. (1975). Anxiety, restraint, and eating behavior. *Journal of abnormal psychology*, *84*(6), 666. doi: 10.1037/0021-843X.84.6.666

Hetherington, M. M., & MacDiarmid, J. I. (1993). " Chocolate addiction": A preliminary study of its description and its relationship to problem eating. *Appetite*, *21*, 233-246. doi: 10.1111/j.2044-8260.1995.tb01445.x

Hormes, J. M., Orloff, N. C., & Timko, C. A. (2014). Chocolate craving and disordered eating. Beyond the gender divide? *Appetite*, *83*, 185-193. doi:10.1016/j.appet.2014.08.018

Hormes, J. M., & Rozin, P. (2010). Does "craving" carve nature at the joints? Absence of a

synonym for craving in many languages. *Addictive behaviors, 35*(5), 459-463. doi: 10.1016/j.addbeh.2009.12.031

Hormes, J. M., & Timko, C. A. (2011). All cravings are not created equal. Correlates of menstrual versus non-cyclic chocolate craving. *Appetite, 57,* 1-5. doi:10.1016/j.appet.2011.03.008

Lima, L. J., Almeida, M. H., Nout, M. R., & Zwietering, M. H. (2011). Theobroma cacao L.,"the food of the gods": Quality determinants of commercial cocoa beans, with particular reference to the impact of fermentation. *Critical Reviews in Food Science and Nutrition, 51,* 731-761. doi: 10.1080/10408391003799913

Marteau, T. M., & Bekker, H. (1992). The development of a six- item short-form of the state scale of the Spielberger State—Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology, 31*, 301-306. doi: 10.1111/j.2044-8260.1992.tb00997.x

Mela, D. J. (2001). Determinants of food choice: Relationships with obesity and weight control. *Obesity Research, 9,* 249S-255S. doi: 10.1038/oby.2001.127

Mela, D. J. (1999). Food choice and intake: The human factor. *Proceedings of the Nutrition Society*, *58*, 513-521. doi: 10.1017/S0029665199000683

Meule, A., Hermann, T., & Kübler, A. (2014). A short version of the Food Cravings Questionnaire—Trait: The FCQ-T-reduced. *Frontiers in Psychology*, *5*. doi:10.3389/fpsyg.2014.00190

Meule, A., & Hormes, J. M. (2015). Chocolate versions of the Food Cravings Questionnaires.

Associations with chocolate exposure-induced salivary flow and ad libitum chocolate

consumption. *Appetite*, *91*, 256-265. doi: 10.1016/j.appet.2015.04.054

Muller, J., Dettmer, D., & Macht, M. (2008). The attitudes to chocolate questionnaire: Psychometric properties and relationship to dimensions of eating. *Appetite*, *50*, 499-505. doi: 10.1016/j.appet.2007.10.008

Osman, J. L., & Sobal, J. (2006). Chocolate cravings in American and Spanish individuals: Biological and cultural influences. *Appetite*, *47*, 290-301. doi: 10.1016/j.appet.2006.008

Parker, G., & Crawford, J. (2007). Chocolate craving when depressed: A personality marker. *The British Journal of Psychiatry, 191*, 351-352. doi: 10.1192/bjp.bp.106.033746

Parker, G., Parker, I., & Brotchie, H. (2006). Mood state effects of chocolate. *Journal of Affective Disorders, 92*, 149-159. doi:10.1016/j.jad.2006.02.007

Pelchat, M. L. (2002). Of human bondage: food craving, obsession, compulsion, and addiction. *Physiology & Behavior*, *76*, 347-352. doi:10.1016/S0031-9384(02)00757-6

Radloff, L. S. (1977). The CES-D scale a self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385-401. doi: 10.1177/014662167700100306

Reynolds, W. M. (1982). Development of reliable and valid short forms of the Marlowe-Crowne Social Desirability Scale. *Journal of Clinical Psychology, 38,* 119-125. doi: 10.1002/1097-4679(198201)38:1<119::AID-JCLP2270380118>3.0.CO;2-I

Reynolds, W. M., & Kobak, K. A. (1995). Reliability and validity of the Hamilton Depression Inventory: A paper-and-pencil version of the Hamilton Depression Rating Scale Clinical Interview. *Psychological Assessment, 7,* 472-483. doi:10.1037/1040-3590.7.4.472

Rodgers, R. F., Stritzke, W. G., Bui, E., Franko, D. L., & Chabrol, H. (2011). Evaluation of the French version of the Orientation Towards Chocolate Questionnaire: Chocolate-related guilt and ambivalence are associated with overweight and disordered eating. *Eating Behaviors*, *12*(4), 254-260. doi: 10.1016/j.eatbeh.2011.07.002

Rodríguez, S., Warren, C. S., Moreno, S., Cepeda-Benito, A., Gleaves, D. H., del Carmen Fernández, M., & Vila, J. (2007). Adaptation of the food-craving questionnaire trait for the assessment of chocolate cravings: Validation

across British and Spanish Women. *Appetite*, *49*(1), 245-250. doi: 10.1016/j.appet.2007.01.001

Rogers, P. J., & Smit, H. J. (2000). Food craving and food "addiction": A critical review of the evidence from a biopsychosocial perspective. *Pharmacology Biochemistry and Behavior*, *66*, 3-14. doi:10.1016/S0091-3057(00)00197-0

Rose, N., Koperski, S., & Golomb, B. A. (2010). Mood food: Chocolate and depressive symptoms in a cross-sectional analysis. *Archives of Internal Medicine*, *170*, 699-703. doi:10.1001/archinternmed.2010.78.

Rozin, P., Levine, E., & Stoess, C. (1991). Chocolate craving and liking. *Appetite*, *17*, 199-212. doi:10.1016/0195-6663(91)90022-K

Rozin, P., & Stoess, C. (1993). Is there a general tendency to become addicted? *Addictive Behaviors*, *18*, 81-87. doi:10.1016/0306-4603(93)90011-W

Schimitz, H., Shapiro, H. (2012). The future of chocolate. *Scientific American*, *306*, 60-65. doi:10.1038/scientificamerican0212-60

Stunkard, A. J., & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research*, *29*, 71-83. doi:10.1016/0022-3999(85)90010-8

Van Gucht, D., Soetens, B., Raes, F., & Griffith, J. W. (2014). The attitudes to chocolate questionnaire. Psychometric properties and relationship with

consumption, dieting, disinhibition and thought suppression. *Appetite, 76,* 137-143. doi:10.1016/j.appet.2014.01.078

Van Strien, T., Frijters, J. E., Bergers, G., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders, 5,* 295-315. doi: 10.1002/1098-108X(198602)5:2<295::AID-EAT2260050209>3.0.CO;2-T

Visioli, F., Bernaert, H., Corti, R., Ferri, C., Heptinstall, S., Molinari, E., ... & Paoletti, R. (2009). Chocolate, lifestyle, and health. *Critical Reviews in Food Science and Nutrition, 49,* 299-312. doi: 10.1080/10408390802066805

Weingarten, H. P. & Elston, D. (1991). A survey of cravings in a student sample. *Appetite, 17,* 167-175. doi:10.1016/0195-6663(91)90019-O

Westenhoefer, J., Stunkard, A. J., & Pudel, V. (1999). Validation of the flexible and rigid control dimensions of dietary restraint. *International Journal of Eating Disorders, 26,* 53-64. doi: 10.1002/(SICI)1098-108X(199907)26:1<53::AID-EAT7>3.0.CO;2-N

Zellner, D. A., Garriga-Trillo, A., Centeno, S., & Wadsworth, E. (2004). Chocolate craving and the menstrual cycle. *Appetite, 42,* 119-121. doi:10.1016/j.appet.2003.11.004

Appendix A: Chocolate Craving Inventory (CCI)

Please rate the items below as to how they best describe you.	Very like me	Like me	Unlike me	Very unlike me
1. When I am sad I often feel the need for chocolate	1	2	3	4
2. I eat chocolate to help my mood when I am having a bad day.	1	2	3	4
3. When I am upset or anxious I feel the need for chocolate	1	2	3	4
4. I crave chocolate when I am tired	1	2	3	4
5. When I have trouble sleeping I crave chocolate more than usual	1	2	3	4
6. My cravings for chocolate distract me from my daily responsibilities	1	2	3	4
7. I will eat chocolate after a large meal despite being full	1	2	3	4
8. When I eat chocolate I usually can’t control how much I eat	1	2	3	4
9. I usually feel better after eating chocolate	1	2	3	4
10. My chocolate cravings often get in the way of things I need to do	1	2	3	4
11. I usually eat chocolate when things don’t go my way	1	2	3	4

Please rate the items below as to how they best describe you.	Very like me	Like me	Unlike me	Very unlike me
12. I will cancel plans with friends or family to eat chocolate in private	1	2	3	4
13. When I crave chocolate I can't stop thinking about it until I get some	1	2	3	4
14. I will go out of my way to get chocolate (i.e., drive across town)	1	2	3	4
15. During times of stress when I feel highly emotional (i.e., irritable, angry, sad, upset…etc.) I crave chocolate	1	2	3	4
16. I have a strong compulsive urge to eat chocolate	1	2	3	4
17. I often feel upset when I can't get chocolate and I feel the need for some	1	2	3	4
18. I associate chocolate with strong positive feelings or memories	1	2	3	4
19. When I see others eating chocolate I feel the need to have some	1	2	3	4
20. I lose my train of thought when I am having intense chocolate cravings	1	2	3	4
21. When I feel out of control, eating chocolate helps me	1	2	3	4

Please rate the items below as to how they best describe you.	Very like me	Like me	Unlike me	Very unlike me
22. I often consume a large amount of chocolate in one sitting	1	2	3	4
23. I binge eat chocolate at least once a month	1	2	3	4
24. I will eat chocolate until I feel sick	1	2	3	4
25. One week out of the month my chocolate craving becomes intense	1	2	3	4
26. I feel I am addicted to chocolate	1	2	3	4
27. I keep a large supply of chocolate at home for times when I need it	1	2	3	4
28. My need for chocolate will distract me from getting things done	1	2	3	4
29. I rarely eat chocolate	1	2	3	4
30. When there is chocolate around it is easy for me to ignore it	1	2	3	4

Appendix 7: Attitudes to Chocolate Questionnaire (ACQ)

Choose the response that best describes your attitude.	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. I eat chocolate to cheer me up when I am down.	1	2	3	4	5
2. My desire for chocolate often seems overpowering.	1	2	3	4	5
3. I feel unattractive after I have eaten chocolate.	1	2	3	4	5
4. I often feel sick after eating chocolate.	1	2	3	4	5
5. I eat chocolate as a reward when everything is going really well for me.	1	2	3	4	5
6. I am often on one kind of diet or another.	1	2	3	4	5
7. The thought of chocolate often distracts me from what I am doing (e.g., watching TV).	1	2	3	4	5
8. I usually find myself wanting chocolate during the afternoon.	1	2	3	4	5

Choose the response that best describes your attitude.	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
9. I consider chocolate to be high in fat and to be of poor nutritional valued.	1	2	3	4	5
10. After eating chocolate I often wish I hadn't.	1	2	3	4	5
11. I feel guilty after eating chocolate.	1	2	3	4	5
12. I eat chocolate only when I am hungry.	1	2	3	4	5
13. Chocolate often preys on my mind.	1	2	3	4	5
14. I feel unhealthy after I have eaten chocolate.	1	2	3	4	5
15. I always look at the caloric value of a chocolate snack before I eat it	1	2	3	4	5
16. If I resist the temptation to eat chocolate I feel more in control of my life.	1	2	3	4	5
17. Nothing else but chocolate will satisfy my chocolate	1	2	3	4	5

Choose the response that best describes your attitude.	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
cravings.					
18. Even when I do not really want any more chocolate I will often carry on eating it.	1	2	3	4	5
19. I eat chocolate to keep my energy levels up when I am dong physical exercise.	1	2	3	4	5
20. I eat more chocolate in the winter when it is colder.	1	2	3	4	5
21. I often go into a shop for something else and end up buying chocolate.	1	2	3	4	5
22. I feel depressed and dissatisfied with life after eating chocolate.	1	2	3	4	5
23. I often eat chocolate when I am bored.	1	2	3	4	5
24. I like to indulge in chocolate.	1	2	3	4	5

Appendix C: Orientation to Chocolate Questionnaire (OCQ)

This questionnaire relates to YOUR ATTITUDES towards chocolate in the LAST MONTH. Please indicate how much you agree with the statements below by circling the number corresponding most closely to your attitude during the LAST MONTH. Your answers may range from AGREE NOT AT All (1) with the statement to AGREE VERY STRONGLY (9) with the statement.

I AGREE WITH THIS STATEMENT…	Not at all								Very Strongly
1. I wanted to eat chocolate as soon as I had the chance.	1	2	3	4	5	6	7	8	9
2. I deliberately occupied myself so I would not want chocolate.	1	2	3	4	5	6	7	8	9
3. I liked to indulge in chocolate.	1	2	3	4	5	6	7	8	9
4. I felt guilty after eating chocolate.	1	2	3	4	5	6	7	8	9
5. I considered myself weak when I gave in to my chocolate cravings.	1	2	3	4	5	6	7	8	9
6. My desire to have some chocolate seemed overwhelming.	1	2	3	4	5	6	7	8	9

I AGREE WITH THIS STATEMENT…	Not at all								Very Strongly
7. I felt unhealthy after I'd eaten chocolate.	1	2	3	4	5	6	7	8	9
8. I wanted to eat chocolate so much that one bite would not have been enough.	1	2	3	4	5	6	7	8	9
9. I did things to take my mind off chocolate.	1	2	3	4	5	6	7	8	9
10. I felt dissatisfied with myself after eating chocolate.	1	2	3	4	5	6	7	8	9
11. I was thinking about chocolate a lot of the time.	1	2	3	4	5	6	7	8	9
12. After eating chocolate I often wished I hadn't.	1	2	3	4	5	6	7	8	9
13. I usually found myself wanting chocolate in the afternoons.	1	2	3	4	5	6	7	8	9
14. I felt unattractive after eating chocolate.	1	2	3	4	5	6	7	8	9

Appendix D: Food Though Suppression Inventory (FTSI)

Directions: Please indicate your response by circling the number that best represents your experience.

	Strongly Disagree	1	2	3	4	5	Strongly Agree
1. There are **foods** I prefer not to think about.		1	2	3	4	5	
2. Sometimes I wonder why I have thoughts about **food** that I do		1	2	3	4	5	
3. I have thoughts about **food** that I cannot stop		1	2	3	4	5	
4. There are images about **food** that come to mind that I cannot erase		1	2	3	4	5	
5. My thoughts frequently return to one idea about **food**		1	2	3	4	5	
6. I wish I could stop thinking of certain **foods**		1	2	3	4	5	
7. Sometimes my mind races so fast about **food** I wish I could stop it		1	2	3	4	5	
8. I always try to put **eating** problems out of mind		1	2	3	4	5	

	Strongly Disagree	1	2	3	4	5	Strongly Agree
9. There are thoughts about **food** that keep jumping into my head		1	2	3	4	5	
10. Sometimes I stay busy just to keep thoughts of **food** from intruding on my mind		1	2	3	4	5	
11. There are **foods** that I try not to think about		1	2	3	4	5	
12. Sometimes I really wish I could stop thinking about **food**		1	2	3	4	5	
13. I often do things to distract myself from my thoughts of **food**		1	2	3	4	5	
14. I have thoughts about **food** that I try to avoid		1	2	3	4	5	
15. There are many thoughts about **food** that I have that I don't tell anyone		1	2	3	4	5	

Appendix E: Dutch Eating Behavior Questionnaire (DEBQ)

Directions: Please answer the following questions as honestly as possible with you in mind.

	Never	Seldom	Sometimes	Often	Very Often
1. If you have put on weight, do you eat less than you usually do?	1	2	3	4	5
2. Do you try to eat less at mealtimes than you would like to eat?	1	2	3	4	5
3. How often do you refuse food or drink offered because you are concerned about you weight?	1	2	3	4	5
4. Do you watch exactly what you eat?	1	2	3	4	5
5. Do you deliberately eat foods that are slimming?	1	2	3	4	5
6. When you have eaten too much, do you eat less than usual the following day?	1	2	3	4	5
7. Do you deliberately eat less in order not to become heavier?	1	2	3	4	5
10. Do you have the desire to eat when you are irritated?	1	2	3	4	5
11. Do you have the desire to eat when you are irritated?	1	2	3	4	5

	Never	Seldom	Sometimes	Often	Very Often
12. Do you have a desire to eat when you have nothing to do?	1	2	3	4	5
13. Do you have a desire to eat when you are depressed or discouraged?	1	2	3	4	5
14. Do you have a desire to eat when you are feeling lonely?	1	2	3	4	5
15. Do you have a desire to eat when somebody lets you down?	1	2	3	4	5
16. Do you have a desire to eat when you are cross?	1	2	3	4	5
17. Do you have a desire to eat when you are approaching something unpleasant to happen?	1	2	3	4	5
18. Do you get the desire to eat when you are anxious, worried, or tense?	1	2	3	4	5
19. Do you have a desire to eat when things are going against you or when things have gone wrong?	1	2	3	4	5
20. Do you have a desire to eat when you are frightened?	1	2	3	4	5
21. Do you have a desire to eat when you are disappointed?	1	2	3	4	5

	Never	Seldom	Sometimes	Often	Very Often
22. Do you have a desire to eat when you are emotionally upset?	1	2	3	4	5
23. Do you have a desire to eat when you are bored or restless?	1	2	3	4	5
24. If food tastes good to you, do you eat more than usual?	1	2	3	4	5
25. If food smells and looks good, do you eat more than usual?	1	2	3	4	5
26. If you see or smell something delicious, do you have a desire to eat it?	1	2	3	4	5
27. If you have something delicious to eat, do you eat it straight away?	1	2	3	4	5
28. If you walk past the baker do you have the desire to buy something delicious?	1	2	3	4	5
29. If you walk past a snackbar or a café, do you have the desire to buy something delicious?	1	2	3	4	5
30. If you see others eating, do you also have the desire to eat?	1	2	3	4	5
31. Can you resist eating delicious foods?	1	2	3	4	5

	Never	Seldom	Sometimes	Often	Very Often
32. Do you eat more than usual, when you see others eating?	1	2	3	4	5
33. When preparing a meal are you inclined to eat something?	1	2	3	4	5

Appendix F: Food Craving Questionnaire-Trait-revised (FCQ-T-r)

Please rate how frequently each statement would be true for you in general.

	Never	Rarely	Sometimes	Often	Usually	Always
1. When I crave food, I know I won't be able to stop eating once I start	1	2	3	4	5	6
2. If I eat what I am craving, I often lose control and eat too much	1	2	3	4	5	6
3. Food cravings invariably make me think of ways to get what I want	1	2	3	4	5	6
4. I feel like I have food on my mind all the time	1	2	3	4	5	6
5. I find myself preoccupied with food	1	2	3	4	5	6
6. Whenever I have cravings, I find myself making plans to eat	1	2	3	4	5	6
7. I crave foods when I feel bored, angry, or sad	1	2	3	4	5	6
8. I have no will power to resist my food cravings	1	2	3	4	5	6

	Never	Rarely	Sometimes	Often	Usually	Always
9. Once I start eating, I have trouble stopping	1	2	3	4	5	6
10. I can't stop thinking about eating no matter how hard I try	1	2	3	4	5	6
11. If I give in to a food craving, I keep thinking about eating until I actually eat food	1	2	3	4	5	6
12. Whenever I have food craving, I keep thinking about eating until I actually eat the food	1	2	3	4	5	6
13. If I am craving something, thoughts of eating it consume me	1	2	3	4	5	6
14. My emotions often make me want to eat	1	2	3	4	5	6
15. It is hard for me to resist the temptation to eat appetizing food that are in my reach	1	2	3	4	5	6
16. I have a lot of self-control when it comes to eating	1	2	3	4	5	6

Appendix G: Marlow-Crowne Social Desirability Short From (MCSD-SF)

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide how it pertains to you. Please respond either TRUE (**T**) or FALSE (**F**) to each item. Be sure to answer all items.

1. It is sometimes hard for me to go on with my work if I am not encouraged	T	F
2. I sometimes feel resentful when I don't get my way	T	F
3. On a few occasions, I have given up doing something because I thought too little of my ability	T	F
4. There have been times when I felt like rebelling against people in authority even though I knew they were right	T	F
5. No matter whom I'm talking to, I'm always a good listener	T	F
6. There have been occasions when I took advantage of someone	T	F
7. I'm always willing to admit to it when I make a mistake	T	F
8. I sometimes try to get even rather than forgive and forget	T	F
9. I am always courteous, even to people who are disagreeable	T	F
10. I have never been irked when people expressed ideas very different than my own	T	F
11. There have been times when I was quite jealous of the good fortune of others	T	F
12. I am sometimes irritated by people who ask favors of me	T	F
13. I have never deliberately said something that hurt someone's feelings	T	F

Appendix H: Demographic Form

Age: ___

Sex: Male$_1$

Female$_2$

***Please circle your grade level:**

Fresh$_1$

Soph$_2$

Junior$_3$

Senior$_4$

Grad$_5$

***Ethnicity:**

African American$_1$

Asian$_2$

Hispanic$_3$

Native American$_4$

White$_5$

Multiracial$_7$

Other$_6$

***Please circle the frequency of your chocolate cravings in the last month:**

Never$_1$

Once or twice$_2$

Once a week$_3$

Twice a week$_4$

3-5 times a week$_5$

Almost every day$_6$

Everyday$_7$

***What type of chocolate do you prefer?**

White chocolate$_1$

Milk chocolate$_2$

Dark chocolate$_3$

No Preference (like all)$_4$

Do not like any chocolate$_5$

****Women Only:***

***When do you crave chocolate the most?**

A week before menstruation$_1$

During menstruation$_2$

A week after menstruation$_3$

***Do your chocolate cravings become more frequent and intense prior or during your menstrual cycle?**

Yes$_1$

If yes, please explain:

No$_2$

Appendix 8: Psychological Resources/Debriefing Form

Dear Participant,

We wish to thank you for completing this survey. Your participation has been of significant value in helping us understand chocolate craving in adults. Some of the questions ask about aspects of eating behavior and well-being that may be potential areas of concern for you. People sometimes, while completing the survey, become aware of behaviors and thoughts that may suggest the need to talk to a professional or see out further information.

This recognition and self-awareness can be a very useful outcome of complete this survey. If, after completing the survey, you recognize that there may be some things or feelings that are a potential issue for you, we urge you to contact a professional to talk about your concerns or to answer questions that you may have.

The following agencies and resources are available for you to contact:
American Psychological Association on eating disorders
www.apa.org/topics/eating/

National Eating Disorder Association
A non-profit organization advocating and supporting individuals and families affected by eating disorders.
www.nationaleatingdisorders.org/
Helpline at 1-800-931-2237 (toll free and confidential)

New Hope 24 Hour Telephone Counseling Center
(714) NEW-HOPE (714) 693-4673

For college students: http://www.ulifeline.org/
HSU Community Counseling Center (located on HSU campus)
(707) 826-3921
Clinic Location: BSS 208
Hours: M – W from 10am – 7pm, Closed Th & Fri.

North Country Clinic
(707) 822-2481

Open Door Clinic
(707) 443-7458

We thank you for your participation in this research study.

Appendix J: Consent Form

Dear Participant,

This study is being conducted to learn about chocolate craving among adults. We would appreciate your participation by completing the following questionnaires. The survey will take about 50 minutes to complete. Participation is voluntary. To participate, please read the information below and then sign your name at the bottom of the page. After you have finished with this page, please tear it off of the packet and it will be collected by a researcher. Your name will not be associated with your responses to the questionnaires. Please note that some of the questions ask about problematic eating and you may experience some mild emotional discomfort.

I understand that my participation is entirely voluntary and that I may decline to enter this study or may withdraw form participation at any time without consequence. I understand that identifying information will NOT be obtained or requested of me. My responses, therefore, will be completely anonymous. I understand that I will be asked for non-identifiable demographic information and that this information along with my survey responses will be stored electronically in a password-protected filing system.

If I have any questions regarding the survey and/or my participation I can contact Haley Whitham, HSU Graduate Student, at hmw40@humboldt.edu or Dr. William Reynolds, PhD HSU Psychology Professor at William.Reynolds@humboldt.edu or (707) 826-3162. If I have any concerns about this research project, or any dissatisfaction with any part of this study, I can contact the IRB Chair, Dr. Ethan Gahtan, at eg51@humboldt.edu or (707) 826-4545. If I have any concerns regarding my rights as a participant, I can report them to the IRB Institutional Official at Humboldt State University, Dr. Rhea Williamson, at Rhea.Williamson@humboldt.edu or (707) 826-5169.

I hereby acknowledge that I have read and understand the implications of this research. By indicating my consent below and continuing to the following questionnaires, I give my consent to participate, and therefore also declare that I am 18 years of age or older and thus eligible for participation in this study.

Appendix K: Transformations for Hypothesized Measures

Transformations for Hypothesized Measures of Validity

Scales	Transform	Skew	Std. E	Ration	Kurtosis	Std. E	Ratio
CCI							
	Orig.	.445	.106	4.20	-.522	.212	-2.46
	Sqrt.	.193	.106	1.82	-.863	.212	-4.07
	Log	-.039	.106	-0.38	-1.011	.212	-4.77
	Inverse	.459	.106	4.33	-.884	.212	-4.17
ACQ Craving							
	Orig.	-.249	.107	-2.33	-.600	.213	-2.82
	Sqrt.	.128	.107	1.20	-.718	.213	-3.37
	Log	.012	.107	0.11	-.795	.213	-3.73
	Inverse	.209	.107	1.20	-.842	.213	-3.95
OCQ Craving							
	Orig.	1.042	.107	9.74	.515	.214	2.41
	Sqrt.	.540	.107	5.05	-.615	.214	-2.87
	Log	.103	.107	0.96	-1.147	.214	-5.36
	Inverse	.529	.107	4.94	-1.181	.214	-5.52
DEBQ Emotional							
	Original	.569	.108	5.26	-.407	.215	-1.89
	Sqrt	.224	.108	2.07	-.912	.215	-4.24
	Log	-.086	.108	-0.80	-1.106	.215	-5.14
	Inverse	.610	.108	5.65	-.905	.215	-4.21
DEBQ External							
	Orig.	-.004	.108	-0.04	-.292	.215	-1.36
	Sqrt.	-.367	.108	-3.40	-.002	.215	-0.01
	Log	-.785	.108	-7.27	.821	.215	3.82
	Inverse	1.889	.108	17.49	5.486	.215	25.52
FTSI							
	Original	.935	.108	8.66	.066	.215	0.31
	Sqrt.	.613	.108	5.68	-.637	.215	-2.96
	Log	.325	.108	3.01	-1.066	.215	-4.96
	Inverse	.143	.108	1.32	-1.348	.215	-6.27
FCQ-T-r							
	Original	.917	.108	8.49	.761	.215	3.54

Scales	Transform	Skew	Std. E	Ration	Kurtosis	Std. E	Ratio
	Sqrt.	.434	.108	4.02	-.106	.215	-0.49
	Log	-.022	.108	-0.20	-.516	.215	-2.40
	Inverse	.842	.108	7.77	.084	.215	0.39
HDI							
	Original	.675	.108	6.25	-.123	.216	-0.57
	Sqrt	-.022	.108	-0.20	-.648	.216	-3.00
	Log	-1.012	.108	-9.37	1.016	.216	4.70
	Inverse	4.390	.108	40.65	20.348	.216	94.20
MCSD-SF							
	Orig.	-.099	.108	-0.92	-.474	.215	2.20
	Sqrt	-.278	.108	-2.57	-.370	.215	1.72
	Log	-.413	.108	3.82	-.176	.215	0.82
	Inverse	.852	.108	7.89	.513	.215	2.37

Note. All scales but one was transformed. Of those transformed, the 3:1 skewness and kurtosis guidelines for normal distribution were met for the Attitudes to Chocolate Questionnaire (ACQ), Food Cra6ving Questionnaire-Trait-revised (FCQ-T-r), and the Hamilton Depression Inventory (HDI). Additional transformations on the Chocolate Craving Inventory (CCI), the Orientation to Chocolate Questionnaire (OCQ). Dutch Eating Behavior Questionnaire (DEBQ) improved data normality. Food Thought Suppression Inventory (FTSI). Hamilton Depression Inventory (HDI). Marlowe-Crowne Social Desirability Scale - Short Form (MCSD-SF).

Appendix L: Transformations for the CCI Subscales

Transformation for CCI Subscales

Scale	Transform	Skew	Std. E	Ratio	Kurtosis	Std. E	Ratio
CCI Craving							
	Orig.	.619	.106	5.84	-.139	.212	-0.66
	Sqrt	.317	.106	2.10	-.630	.212	-2.97
	Log	.039	.106	0.37	-.867	.212	4.09
	Inverse	.460	.106	4.34	-.763	.212	3.60
CCI Emotional							
	Orig.	.338	.106	3.19	-.634	.212	3.00
	Sqrt	.046	.106	0.43	-.928	.212	4.38
	Log	-.220	.106	2.08	-1.024	.212	4.83
	Inverse	.670	.106	6.32	-.807	.212	3.81
CCI Interference							
	Orig.	1.11	.106	10.47	.279	.212	-1.32
	Sqrt	.939	.106	8.86	-.346	.212	-1.63
	Log	.796	.106	7.51	-.771	.212	-3.64
	Inverse	-.582	.106	5.49	-1.27	.212	-5.99

Note. The transformation of the CCI craving subscale met the 3:1 ratios for skewness and kurtosis. The transformation for the CCI Emotional Eating and Daily Interference subscale greatly improved the normality of the data, but did not meet the 3:1 ratios for skewness and kurtosis. All three transformations were used in the data analyses below.