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Prevalence and types of food cravings in a culturally diverse urban university

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PREVALENCE AND TYPES OF FOOD CRAVINGS IN A CULTURALLY DIVERSE
URBAN UNIVERSITY

A Thesis

Presented to

The Faculty of Nutrition and Food Science

San Jose State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science

By

Heidi M. Kromschroder

December 2006

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ABSTRACT

PREVALENCE AND TYPES OF FOOD CRAVINGS IN A CULTURALLY DIVERSE URBAN UNIVERSITY

by Heidi M. Kromschroder

Food cravings are a new and growing field of research due to their proposed affiliation with eating disorders, depression, and obesity. However, previous studies have focused on a mainly female Caucasian sample population. Due to the growing diversity in the United States, these studies are not applicable to, or reflective of, the society in which we live. Pertinent to the research is a lack of an operational definition of food cravings and a set of criteria to be considered a craver. The debate continues as to the origin of food cravings and how to test the proposed theories. These differences make it difficult to compare the results of existing studies and to develop a clear idea of where future research should focus. This thesis sets out to provide a comprehensive review of food cravings leading to a perspective regarding the direction food cravings research should focus on in the future.

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Preface

The journal article was written and formatted according to the publication guidelines outlined by the journal *Appetite*. The remainder of the project was written according to the *Manual of the American Psychological Association* (6th edition, 2002).

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CHAPTER ONE

INTRODUCTION & REVIEW OF LITERATURE

Introduction

Research on food cravings over the past thirty years has focused on explaining who has food cravings and why they occur. They are a phenomenon whose origin is unknown and experience is subjective. Not only is the occurrence of food cravings subjective, there is no official operational definition agreed upon by the scientific community. This is most pertinent to how research has been conducted in the past, how studies are compared, and where future research should focus. With no common definition, various instruments have been developed to measure food cravings and their intensity without a universal criterion for who is considered a food craver. Also, three major theories as to why people experience food cravings have been proposed without strong support for any one theory. Instead, much overlap between the theories can be recognized but rarely acknowledged by the research reviewed. This paper will examine the current research on food cravings as well as uncover areas that need to be investigated further.

Review of Literature

Definitions of Food Cravings

Preliminary definitions. Before defining food cravings, the definitions of food, hunger, and eating should be clarified. Food has been defined as “a primary reinforcer alleviating the negative effects of hunger and energy deficit, and produces pleasurable effects in the absence of such deprivation” (Macdiarmid & Hetherington, 1995, p. 129). However, food does not always produce pleasurable effects when consumed, making this definition based on the psychology of food rather than the physiological need. For the

purpose of this thesis, food will be defined as the primary source of energy and substrate to the body that maintains growth, reproduction, and tissue repair. A distinction between hunger and appetite should be clarified here since the terms are often used interchangeably. Hunger, which is often a trigger to search for food, is a physiological response regulated mainly by the hypothalamus. Appetite determines whether food is consumed, and how much and what foods are consumed. However, hunger is not necessary to have an appetite for food and may increase or decrease depending on a persons appetite (Whitney & Rolfes, 2002). Eating is the actual process of putting food in the mouth (Neufeltd, 1996) and can be considered “a pleasurable activity” that is not dependent on hunger or an energy deficit (Macdiarmid & Hetherington, 1995, p. 130).

Food cravings. The definition of food cravings in the reviewed research often depends on the reason that food cravings occur. Macdiarmid and Hetherington (1995) define craving as “the desire to eat in the absence of physiological need for food, for example when already satiated, and is therefore stimulus induced” (p. 136). However, this definition is too narrow since it characterizes food cravings as relying on a stimulus without a physiological basis, which may not always be the case. Gendall, Joyce, Sullivan, and Bulik (1998) define food cravings as manifesting from a “strong motivation to go out of ones’ way (if necessary) to obtain a specifically desired food” (p. 353). This definition is based more on an intrinsic state that does not necessarily need to be cued by a stimulus. It also implies that a food craving always results in the consumption of the craved food. As will be discussed further on in the paper, food cravings are not synonymous with food consumption.

The most commonly cited definition in the literature is based on the notion that cravings are “an intense desire for a particular substance” (Christensen & Pettijohn, 2001, p. 137; Gendall, Joyce, & Sullivan, 1997, p. 63; Weingarten & Elston, 1990, p. 231). From that base, food cravings are “an intense desire to eat” or “consume” a specific or particular food (Kemps, Tiggemann, Woods, & Soekov, 2003, p. 31; Lafay et al., 2001, p. 195; Martin, O’Neil, & Pawlow, 2006; Pelchat, 2002, p. 347; Pelchat, Johnson, Chan, Valdez, & Ragland, 2004, p.1486). Food cravings thus differ from hunger in that they can only be satisfied by eating a particular food or food type; whereas, hunger is alleviated merely by the ingestion of any food (Martin et al., 2006). However, this definition merely defines what a food craving is and leaves room to hypothesize the basis for and the outcome of food cravings. Several studies (Gendall, Joyce, Sullivan et al., 1998; Martin et al.; Pelchat, 2002; Zellner, Garriga-Trillo, Rohm, Centeno, & Parker, 1999) expand upon this definition and include that the craving is difficult to resist or that extreme measures will then be taken to obtain the craved food. This addition pertains more to disinhibition (loss of self-control when it comes to food consumption) rather than food cravings.

There is often also a requirement of having these cravings a certain number of times in a given time period (usually once a week for at least six months) to be considered a “craver” (Gendall & Joyce, 2000; Lafay et al., 2001; Pelchat, 2002). Therefore, not only does the definition differ but also there are inconsistencies in the requirements to be considered a “craver.” As reported by Gendall, Joyce, and Sullivan (1997), the definition used in a study can drastically change the results dependent on who

is included. As reported by Weingarten and Elston (1990), an operational definition of food cravings within the scientific literature has yet to become a priority and a reliance on the lay definition has been accepted. An operational definition is necessary in order to better compare results of past, present, and future studies.

Tools Developed to Measure Food Cravings

Not only has there been debate over what food cravings are, who has them, and why they occur, an instrument that measures food cravings has yet to be agreed upon. Part of the reason is that tools used to identify food cravers and questions surrounding them are strongly based on the individual theories of food cravings. Also, most of the instruments are only utilized in the studies for which they were developed and have not been validated in studies by other researchers. Finally, several studies identify food cravers using a self-identification process, which is highly subjective. Following is a description and progression of the most commonly used food craving questionnaires available for review.

Foundation of food craving instruments. Much of the research has been based on one of four “founders” of food craving research: Herman and Polivy (1980), Stunkard and Messick (1985), Hill, Weaver, and Blundell (1991), and or Weingarten and Elston (1991). Herman and Polivy (1980) designed the Restraint Scale (RS), which is centered on the theory that restrained eaters deprive themselves of specific foods (such as chocolate) and will thus be more likely to crave these restricted foods (Polivy, Coleman, & Herman, 2005). The RS also accounts for a person’s “attitudes towards weight and eating as well as the frequency of dieting and weight fluctuations” (Nederkoorn et al.,

2000, p. 47). As will be discussed in the next section, a person's diet history may play a role in the occurrence of food cravings and whether or not a person succumbs to them.

The Three-Factor Eating Questionnaire (TFEQ) was developed in 1985 by Stunkard and Messick in order to have a tool that tested the human behavior of eating building on the RS tool. Stunkard and Messick (1985) proposed that the problems with the RS were that it did not measure the extent of obesity or overeating by level of restraint and it lacked construct validity. The TFEQ measures dietary or cognitive restraint, disinhibition of control, and perceived hunger as a way to interpret eating behavior. It was concluded that scores on the three factors of the TFEQ might call for different approaches to treat certain eating behaviors, thus broadening the scope of how to approach different eating behaviors (Stunkard & Messick, 1985).

Ridgway and Jeffrey (1998) studied the differences between the RS and the TFEQ's cognitive restraint factor (TFEQ-CR). Up to this point, the two tests had been used interchangeably, despite their being differences between how disinhibited eating is interpreted. Since the RS was thought to measure dieting failures (such as disinhibited eating), it was hypothesized that when the subjects' mood was manipulated that the RS would be a better measure of disinhibited eating. Subjects were selected utilizing their scores on the two tests and categorized into four groups: high on both tests, low on both tests, and two groups scoring alternately high on one test and low on the other test. Although mood manipulation had a significant effect on the subjects' mood, there was no difference found on disinhibited eating between the groups. Despite the lack of significant results, the authors continued to support their hypothesis utilizing Lowe's

three-factor model, thus proposing that the RS identifies individuals who are chronic dieters whereas the TFEQ-CR identifies current dieters and depending on the population you are studying, the questionnaire that you pick would be important. Further studies would need to be done to support this theory where Lowe's three-factor model of dieting behavior is part of the initial study rather than an afterthought.

The TFEQ and the RS have also been criticized for their length, which requires considerable time to complete. A remedy to this problem was a shortened version of the TFEQ scale (TFEQ-R18) that consists of only 18 questions as opposed to the original 51 questions. The TFEQ-R18 measures restrained, uncontrolled, and emotional eating as they pertain to current dietary patterns (Lauzan et al., 2004, p. 2373); however, it was developed using an obese population. Lauzan et al. studied the validity of the TFEQ-R18 when given to a population of teenage/young adult and adult non-obese individuals. It was concluded that the TFEQ-R18 was able to discern between eating behavior differences in the general population.

One problem with the RS, TFEQ, and TFEQ-R18 and their use in food craving studies is that it is assumed that food cravings stem from one of the identified eating behaviors. For example, if a subject were to score high on the restraint portion of the TFEQ scale and low on the other two portions (uncontrolled eating and emotional eating) and they had been either self-identified as a craver or identified by a different food-craving tool, it would then be determined that the cause of food cravings would be dietary restraint. Inferring this connection is based on a correlation, thus no proof as to the cause of food cravings can be determined using these instruments. These scales are being

utilized as supplemental instruments to determine associative relationships about food cravings and to make predictions as to who might be at risk rather than whether or not they exist or what causes them. Even though observational research is necessary, it causes a problem when associative relationships are accepted as cause and effect relationships when no appropriate research has been conducted to support such a claim. The problems with taking associations as facts will become clearer when specific studies are examined to explain theories of food cravings.

Hill et al. (1991) developed a food craving scale that was used in addition to the Dutch Eating Behavior Questionnaire and the TFEQ. This scale measures both the frequency and the intensity of food cravings. In order to not confuse the subjects as to the possible stigma surrounding the word “craving,” the word “urge” is used in its place until the final question. It is important to note here that most subjects (69%) found the terms “craving” and “urge” to mean the same thing. Of those that found them to be different, it was mostly due to the belief that cravings were stronger. Since the word urge is usually used in the definition of craving, it seems that this precaution would be unnecessary in further studies.

Weingarten and Elston (1991) developed a short craving questionnaire that addressed prevalence of food cravings, types and frequencies of specific craved foods, substitutes for the craved foods, percent of time the craved food is eaten, feelings after the craved food is eaten, and food cravings relationship to the menstrual cycle. The purpose of the questionnaire was to study food cravings within normal, female populations rather than ones with specific abnormalities (pregnancy, Addison’s disease,

premenstrual syndrome). Although the origin of food cravings cannot be assessed with this questionnaire, it gives insight into the phenomenology of food cravings within the general population.

Progression to more recent food craving instruments. Cepeda-Benito, Gleaves, Williams, and Erath (2000) constructed two food craving questionnaires that psychometrically measure food cravings as a continuous variable. Their eventual goal was that these instruments would be of use when treating people diagnosed with eating disorders; however, the populations used to validate these questionnaires were “normal” college students. The Food Craving Questionnaire-State (FCQ-S) measures how different psychological states (i.e. food deprivation, stress) affect food cravings, and the answers to these questions are expected to change over relatively short periods of time. The Food Craving Questionnaire-Trait (FCQ-T) assesses whether or not food cravings are present in certain individuals or populations (i.e. persons with eating disorders, obese persons), which would not be expected to change over short periods of time. The idea of whether the FCQ-T would be affected by obese persons who lost weight or those that no longer had eating disorders was not addressed.

Cepeda-Benito et al. (2003) further validated the FCQ-S and FCQ-T in a mostly female, college population in Spain. The results showed that these two questionnaires were both reliable and valid measures of food cravings. The results also showed that there was a strong association between food cravings and symptoms of eating disorders.

Lafay et al. (2000) developed a food craving questionnaire to assess the eating and craving behavior of subjects participating in the Fleurbaix Laventie Ville Sante

study. Their questionnaire was based on the ones developed by Hill et al. (1991) and Weingarten and Elston (1991). It assesses whether or not food cravings are experienced, the prevalence of the food cravings, mood states, and types of foods craved during these experiences. Strengths of this questionnaire are that it is short and easy to fill out. Limitations include that it only assesses whether or not food cravings occur and not what may cause or trigger them, it has not been validated in other studies, and it has been translated from French to English which may not be as clear grammatically if used for an English speaking population. Since the cause of food cravings cannot be determined by a questionnaire, this questionnaire may help determine the progression of future studies to show predicted causes of food cravings.

White et al. (2002), developed the Food-Craving Inventory (FCI) to measure specific food cravings. The validity and reliability was tested and showed food cravings to be a “single construct with four correlated dimensions related to specific food cravings” (White et al., 2002, p. 113). These four craving dimensions are dietary fats, sweets, starches, and fast-food fats; however, most of the subjects in the study craved more than one of the dimensions. The authors believed that the small subgroup that did have specific cravings may be important in exploring the underlying causes of food cravings: biological, physical, and behavioral. However, the macronutrient contents of the specific foods were not analyzed so it seems unlikely that this information could be useful in determining a physiological or biological need for a specific food type and many of the foods could be categorized in more than one group. For example, brownies and cookies were categorized as sweets, but due to their high fat content they could also

be grouped with the high fat foods. Also, it cannot be assumed that it is the macronutrient content of the foods that is important in such a categorization when several foods such as chocolate contain several different biologically active compounds. A similar argument could be posed for how most of the foods included on the FCI were categorized. It does raise questions as to whether the hedonic aspects of specific foods differ among individuals thus making them more likely to be craved. The FCI does not address the basis of food cravings, but it does psychometrically measure them. The FCIs use on obese subjects has been validated in studies by White and Grilo (2005) and Martin et al. (2006), but has been difficult to compare since the Martin et al. reported only a group mean for each food craving dimension and not specific foods craved. Thus, specific foods that were craved the most, irrespective of food dimension, could not be compared.

Who Experiences Food Cravings

Food cravings in the general population. Food cravings are experienced by much of the population at some point in the lifespan. Weingarten and Elston (1991) reported that 68% of men and 97% of women have experienced a food craving at least once a year. Weingarten and Elston, Lafay et al. (2001), and Cepeda-Benito, Fernandez, and Moreno (2003) found women experience food cravings more than men, and the research has thus focused on a mainly female population.

Food cravings, women, and disordered eating. Women have historically been associated with eating disorders and disordered eating, which may also explain the prevalence of women participants in the food craving research (Fedoroff, Polivy, &

Herman, 2003; Gendall, Joyce, & Sullivan, 1997; Gendall, Joyce, Sullivan, et al., 1997; Gendall et al, 1998; Gendall & Joyce, 2000; Hill & Heaton-Brown, 1994; Hill, Weaver, & Blundell, 1991; Nederkoorn & Jansen, 2002; Macdiarmid & Hetherington, 1995; Nederkoorn, Smulders, & Jansen, 2000; Polivy, Coleman, & Herman, 2005). Studies have shown that women who experience food cravings are more likely to have an eating disorder (predominantly bulimia nervosa) or eating-disorder symptomology (Fedoroff et al., Gendall et al., Gendall, Sullivan, Joyce, et al.,). Gendall et al. found that women who were self-identified “cravers” and experienced binge eating reported having a food craving before most of their binge eating episodes and were more likely to fit the criteria for bulimia nervosa when compared to nonbinging cravers and controls. Since it was not distinguished which came first, this could indicate that those who experience cravings and disordered eating patterns may be at greater risk for developing an eating disorder; or cravings may manifest after the development of eating disorders. Thus, further research about the prevalence of cravings in patients with bulimia nervosa would need to be studied to confirm this finding.

White and Grilo (2005) found that obese subjects diagnosed with binge eating disorder were more likely than obese subjects to crave sweets, suggesting that this might be a unique experience for those with binge eating disorder. However, both groups craved sweets and fast food fats more when compared to starches and dietary fats. The aromatic and or flavor qualities of these foods were not addressed as possible explanations for this occurrence. Also, since those with binge eating disorder were treatment seeking, the results are not generalizable.

It has also been shown that restrained eaters experience food cravings at a higher frequency (Fedoroff et al., 2003; Gendall et al., 1998; Gendall, Joyce, Sullivan, et al., 1997; Polivy, Coleman, & Herman, 2005) than unrestrained eaters. According to the RS (Restraint Scale), those who show patterns of switching between dieting and overeating are considered restrained eaters (Nederkoorn et al., 2000; Nederkoorn & Jansen, 2002). Several studies, though, have shown no relationship between restraint and frequency of food cravings (Harvey, Wing, & Mullen; 1993; Hill & Heaton-Brown, 1994; Hill, Weaver, & Blundell, 1991; Macdiarmid & Hetherington, 1995; Nederkoorn et al., 1995; Nederkoorn & Jansen, 2002; Weingarten & Elston, 1991).

BMI and food cravings. Being overweight is often associated with dieting, restrained eating, and food cravings. Gendall et al. (1998) found that women who self-identified themselves as “cravers” had significantly higher BMIs than a control group of women. However, the BMIs were based on a group mean with a large standard deviation (cravers = 28.0 ± 7.4 , controls = 25.4 ± 6.4). These mean BMIs indicate that both groups would be classified as overweight, but some subjects in both groups would have healthy weights while others would be considered obese. Several studies have found no difference in BMI and considered it insignificant when compared to intensity or frequency of cravings (Lafay et al., 2001; Hill & Heaton-Brown, 1994; Hill, Weaver, & Blundell, 1991; Macdiarmid & Hetherington, 1995; Nederkoorn & Jansen, 2002).

Mood disorders and food cravings. Some studies have looked at the prevalence of mood disorders in those that experience food cravings as compared to controls. Macdiarmid and Hetherington (1995) found that self-identified ‘chocolate addicts’ were

more depressed than controls (determined by using Beck's Depression Inventory).

Although both groups craved chocolate, the 'chocolate addicts' reported to crave and eat chocolate at a significantly higher frequency than controls.

Gendall, Sullivan, Joyce et al. (1997) also found that cravers (determined by the experimenters using their food cravings questionnaire) were significantly more likely to have a "lifetime diagnoses of any mood disorder" when compared to noncravers (p. 549). A further study by Gendall et al. (1998) found that recruited 'cravers' who were also classified as binge eaters were significantly more likely to experience major depression and social phobia when compared to recruited cravers that did not binge, and the controls. This might indicate that those who are depressed or who have a mood disorder along with disordered eating habits (such as bingeing) are more likely to experience or recognize cravings and a variety of abnormal behaviors.

Cravers were also more likely to experience depression (Christensen & Pettijohn, 2001) using the Profile of Mood States. When carbohydrate cravers were divided into the types of foods craved (sweet vs. non-sweet carbohydrates), only the sweet carbohydrate group was significantly correlated with depression. However, sweet taste can come from a variety of substances such as sugars, glycols, alcohols, and aldehydes (Brown, 2004), and is not an exclusive property of carbohydrates. Thus, it may not have been the carbohydrates that the sweet carbohydrate cravers were craving, but rather a different substance that produces a sweet taste. As will be discussed in the next section, the type of food craved might be used as a form of self-medication.

Addiction and food cravings. Those who experience food cravings have been shown to be more likely to have a history of addictive behaviors such as alcohol abuse or dependence (Gendall, Sullivan, Joyce, et al, 1997). It was also observed that as the cravings increased, so did the likelihood of alcohol abuse or dependence. However, since no specific addictive qualities to food could be cited to support this finding, the novelty-seeking trait in cravers that was reaching statistical significance was utilized to explain the relationship between food cravings and alcohol abuse or dependence. It was cited by the authors that this novelty-seeking trait has been strongly associated with appetitive drives that are common in addicts and those with eating disorders. Rates of eating disorders and the novelty-seeking trait (which did not reach statistical significance) were used to explain why eating disorder symptomology and alcohol abuse or dependence reached a statistically significant difference between cravers and noncravers. This also returns to the idea that those with eating-disorder symptomology (i.e. dieting, bingeing) are more likely to experience food cravings than those that do not.

Expanding the relevance of food craving populations. To date the food craving research has focused on a mainly Caucasian female population. Continual focus on this group does not apply to the growing diversity in the United States or California, thus a more multicultural approach needs to be taken. Zellner et al. (1999) found that hedonic values of foods and the foods that were craved differed between students attending college in the United States and Spain. This difference was explained to be due to the exposure to different foods in the two countries, which could indicate that cravings are culture specific or a learned behavior based on regional hedonic values of food. White

and Grilo (2005) suspected that one of the limitations of their study was that the two subject groups were from different geographic regions of the United States (the South and the Northeast) and could have different food preferences that affected foods craved and the results. The authors suggested that the FCI be tried in various geographic and cultural regions to see if specific food cravings differ. Further, Yeh et al. (1998) found that the hedonic values and taste preferences differed between Chinese living in Taiwan or the People's Republic of China and those in the United States; whereas they were similar for Koreans and Thais living in the United States and their respective countries. Not only do hedonic values differ between cultures, but also between those with the same culture and living in different regions. Thus, what is craved may differ on a multicultural or acculturation basis.

White et al. (2002), developed the FCI using a "multicultural" population. Despite these efforts to be more inclusive, the percentages of the different races (64.1% white, 30.3% African American, 2.4% Asian, 1.1% Hispanic, and 2.1% other) are not representative of the diversity seen in California and many other regions within the United States. Also, no attempt was made to determine whether or not specific food cravings correlated with specific races.

Why People Experience Food Cravings

The most cited theories as to the origin of food cravings are physiological, learning, and psychological (White et al., 2002). However, these theories are difficult to define or explain as a single construct. Instead, the explanations for the results of studies tend to focus on one theory and fail to discuss how the other theories may interplay.

Although they are divided into their respective sections here, an overlap within each is unavoidable. For example, several studies in support of the learning theories are similar to the cognitive psychological theories in that both use sensory cues to study food cravings. Also, causality cannot be proven since most of the studies utilize questionnaires and are exploratory into the realm of cravings.

Psychological theories. There are two major psychological theories for why food cravings occur: affect-related and cognitive based. The affect-related theories are based on the notion that food cravings stem from a psychological or emotional disorder. The cognitive based theories support the idea that food cravings can be triggered and decreased through visuospatial imagery tasks.

Macdiarmid and Hetherington's (1995) research set out to see if the mood of 'chocolate addicts' as compared to a group of controls was altered after the consumption of chocolate. When compared to the control group, 'chocolate addicts' reported significantly higher levels of depression, guilt, and cravings before eating chocolate. Although both groups self-reported a slight increase in contentment after the consumption of chocolate and lower levels of hunger and craving, there was also a significant increase in guilt for the addict group. Thus, chocolate did not act as a negative reinforcer to diminish the sense of guilt in the addict group and may increase negative mood in addicts.

Gendall, Sullivan, Joyce et al. (1997), set out to determine characteristic differences between self-identified cravers and a group of controls. The significant differences discussed between cravers and noncravers were that cravers were

significantly more likely to binge, use weight control measures, and have a history of alcohol abuse or dependency; but, there was no difference in diagnosis of mood disorders and temperament scales. In a further study by Gendall et al. (1998), bingeing cravers had significantly higher rates of major depression and social phobia.

Christensen and Pettijohn (2001) wanted to see if carbohydrate cravings existed in the general population in relation to a dysphoric mood. Self-identified “carbohydrate cravers” reported that depression preceded sweet carbohydrate cravings. Depression was also assessed by validated instruments in the field and was significantly correlated with the carbohydrate cravers. Despite the authors initially addressing the fact that the carbohydrates craved by the subjects were not solely carbohydrates, the carbohydrate component of the foods craved was utilized to explain the occurrence of the “carbohydrate cravings” as a form of self-medication. Although addressed, carbohydrate cravings as a form of self-medication to increase assumed serotonin levels in the brain was not cited as a strong argument for such cravings. Rather, the positive and negative reinforcing attributes of consuming carbohydrates to relieve dysphoric mood was stressed. The authors concluded that a more psychological approach that includes reinforcing attributes of carbohydrate cravings, environmental factors, and imagery should be pursued in future research. However, caution should be taken when classifying subjects as carbohydrate cravers since the foods craved were not solely carbohydrates.

Gendall and Sullivan (2000) studied the effects of three meal types (high carbohydrate-low protein; high protein-low carbohydrate; mixed carbohydrate-protein) would have on appetite ratings, plasma amino acids (specifically looking at the

tryptophan:large neutral amino acids ratio), plasma insulin and glucose, and ad libitum intake due to cravings for women cravers. Each subject received each meal type in random order. As would be expected, plasma amino acids, insulin, and glucose levels were significantly different between the high carbohydrate-low protein meal, and the high protein-low carbohydrate meal. However, there was no significant difference between type of meal consumed and appetite, mood, or craving. There was a significant association between desire to binge and plasma tryptophan:large neutral amino acids ratio. Despite this finding, the difference between bingeing in response to a craving and outright bingeing could not be distinguished in subjects whom regularly experienced cravings. It was assumed that the negative mood was caused by a dietary induced reduction in serotonin levels that resulted in the carbohydrate craving even though the association with carbohydrate cravings did not reach statistical significance. Moreover bound tryptophan that crosses the blood-brain barrier and serotonin release were not measured; therefore, the assumption that negative mood could reversed by an increase in carbohydrate consumption is unfounded.

Kemps et al. (2004) cognitive psychological theory proposes that there is an imagery basis to food cravings and that food cravings can be reduced when given a concurrent visuospatial task, which would compete for the image of the craved food. This study (which consisted of two experiments) found that there was no difference in craving between dieters and nondieters; but, cravings were higher when presented with visual (experiment one) or auditory (experiment two) cues of a food item compared to a neutral item and that the concurrent visuospatial tasks reduced the images of the food-

related items. One difference between the two experiments was that dieters were found to have clearer images of food items compared to nondieters in experiment two.

A further study by Harvey et al. (2005), compared the strength of food cravings using imagery tasks that either utilized visual or auditory cues between dieters and nondieters. It was found that dieters had significantly more cravings than nondieters. However, there was also a significant main effect in that cravings increased after imagining a food item for all subjects and these cravings decreased more after the imagery task as compared to after the auditory task.

Kemps et al. (2005) compared self-identified chocolate cravers and noncravers. Similar procedures were used as in the two previous studies with the exception that the food images contained chocolate. It was found that cravings for the imagined chocolate containing foods decreased when presented with visuospatial tasks as opposed to auditory tasks. This shows further support that food cravings have an imaginal basis and that when presented with competing visuospatial tasks food cravings can be reduced. This is because both tasks utilize the same part of the brain, contrary to an auditory task. The authors proposed that since there is a correlation between food cravings and eating disorders (specifically binge eating and bulimia nervosa) that visual imagery could be utilized to decrease the number of food cravings and consequent bingeing episodes. However, the proposition for visual imagery as a form of treatment for bingeing is only speculative since no cause and effect relationship has been shown between food cravings and bingeing episodes. The authors cite research that successfully used visual imagery for smoking cessation suggesting that there are both psychological and physiological

aspects to food cravings. Substances in tobacco have been proven to have physiologically addictive qualities; whereas, no specific substances in food have been proven to be physiologically addictive. In future research, it would be important to distinguish between actual physiological addictions and addictive behaviors when comparing food cravings and smoking addiction.

The findings of Kemps et al. (2004), Harvey et al. (2005), and Kemps et al. (2005) are further supported by research finding that triggers to food cravings have been found to be highly visual or imagery based (thinking about craved food, seeing craved food, or using sensory cues as stimulators of food cravings) (Fedoroff et al., 2003; Hill & Heaton-Brown, 1994; Pelchat et al., 2004; Nederkoorn & Jansen, 2002). It is also similar to the learning theories, discussed in the next section, in that food related sensory cues (mainly visual or olfactory) can increase food cravings for that food (Alsene, Li, Chaverneff, & de Wit, 2003; Fedoroff et al., 2003; Nederkoorn et al., 2000).

Learning theories. Nederkoorn et al. (2000) studied the effects food cues would have on cephalic phase responses, cravings, and food intake of a subjects preferred meal (entrée, dessert and candy bars). Although cephalic phase responses increased after food exposure (heart rate, blood pressure, salivation, and skin conductance), only increased blood pressure was significantly correlated with an increase in cravings. And, cravings were correlated with increased food intake (measured in kcal). Due to the increase in cravings after food cue presentation, the authors concluded that the results support a cue reactivity origin of food cravings that could be learned. It also shows that the increases in food cravings after cue exposure may be food specific and different for each person.

A further study by Nederkoorn and Jansen (2002) studied the effects that cue reactivity would have on the cravings and subsequent food intake for restrained and unrestrained eaters. Subjects were randomly assigned to either the food or control cue condition. After food cue exposure (as compared to control cue), unrestrained eaters had a significant increase in food cue reactivity (measured by heart rate, gastric power, and swallowing). Despite both groups reporting an increase in craving after the food cue, there was no significant correlation between food cue reactivity, cravings, and food intake. The authors concluded that the increase in food cue reactivity only seen by unrestrained eaters could be due to a normal reaction to food cues as the body prepares for digestion and absorption; and, restrained eaters may have conditioned themselves to suppress these physiological changes after food cues. However, this was not measured in the current study and the authors propose further studies should look into the possible cognitive suppression of food cue reactivity.

Fedoroff et al. (2003) studied the effects food cues would have on restrained versus unrestrained eaters and on their desire to consume the cued food after exposure. The subjects were evenly distributed among three cue conditions (no cue or smell, cookie cue, or pizza cue) and filled out the Visual Analogue Scale at the beginning, end, and between each new condition. The cue was presented for ten minutes after which subjects were given either pizza or cookies first to “taste test” and consume ad libitum; followed by the presentation of the other food with the same instructions. Subjects consumed significantly more of the food presented after that specific cue and there was a greater pizza intake than cookie intake (measured in grams). Restrained eaters consumed

significantly more of the cued food than the uncued food, which was greater than the intake in the same conditions for unrestrained eaters. Fedoroff et al. concluded that restrained eaters may consume food in response to certain cues and increase their consumption of that food, and unrestrained eaters may consume food in response to hunger and satiety cues. However, hunger and satiety were not measured, so it is possible that unrestrained eaters consume less than restrained eaters in response to food cues. Since all subjects consumed more of the food presented after that specific cue, food cravings may be food specific when triggered by the appropriate cue.

Physiological theories. The physiological theories have been explained two different ways. The first is based on the assumption that the body is constantly trying to maintain homeostasis. When there is a shift in this homeostatic state, such as caloric restriction, the body will respond by producing a specific craving in order to bring the body back to its homeostatic state. The other physiological theory stems from theories of addiction (such as smoking) in that your body has a physiological dependency on a substance. The theory holds that when this substance is restricted, cravings for it will increase. As previously stated, no specific food component has been identified as addictive creating an initial problem with the physiological theory.

Pelchat and Schaefer (2000) studied the effects of a monotonous diet on food cravings in both the young and elderly. The study was divided into three diet sections: baseline/unrestricted diet, monotonous liquid formula diet consisting of a vanilla beverage that met the Recommended Dietary Allowances (RDA) for each subject, and recovery/unrestricted diet. The young adult subjects were significantly more likely than

the elderly subjects to experience cravings during the monotonous period of the diet. Furthermore, elderly males experienced almost no cravings during any part of the experiment. It was concluded that the cravings could be due to the sensory perception that one was not receiving a nutritionally adequate diet due to the monotony, thus sending a signal to the body that there was a deficiency and supporting the homeostatic theory of food cravings. However, none of the subjects were nutritionally deficient since they were receiving the RDA for all nutrients, so the cravings were psychological manifestations possibly stemming from a desire for different foods and textures rather than physiologically based.

The effects of caloric restriction on food cravings have been studied on overweight subjects, restrained eaters and patients with type 2 diabetes (Harvey et al., 1993; Polivy et al., 2005; Martin et al., 2006). Harvey et al. compared two six month low-calorie weight loss diets and their effects on food cravings utilizing a list of foods allowed and prohibited on the diets in overweight patients with type 2 diabetes. These patients were controlling their diabetes either with diet alone, oral medication, or insulin. The subjects were randomly assigned to either a balanced low calorie diet (LCD, 1000-1200 kcal/day which followed the American Diabetes Association's diet recommendations) or a very low calorie diet (VLCD, 400-500 kcal/day with only very lean proteins and a protein supplement for snacks for three months, followed by a six week refeeding period and then six weeks of the LCD diet). Results indicated that compared to baseline, food cravings decreased with time and were even more pronounced in the VLCD group for low-fat, high-protein foods (which were exclusively

allowed) and for complex carbohydrates (which were not prohibited on the VLCD). The authors concluded that both over-consumption and total restriction of foods decrease food cravings in subjects on both LCD and VLCD, but the reasons as to why can only be speculative. First, could the subjects distinguish between a decrease in hunger and decrease in actual food cravings? Second, the list of foods used to measure the food cravings did not include commonly craved foods such as pizza and only measured the intensity rather than the frequency of food cravings. Thirdly, subjects did not over-consume low-fat, high-protein foods in total calories; rather, it was the only type of foods allowed in the first part of the VLCD. Thus, the diet was monotonous and over-consumption of any particular food was not apparent since total calorie consumption was very low.

A similar study was conducted by Martin et al. (2006). It differed from Harvey et al. (1993) in that the VLCD was supplement based and was not exclusively low-fat, high protein; subjects were overweight and obese and able to self-select which diet to follow; the VLCD group was significantly more obese; and the frequency of specific food cravings was measured using the FCI three times for VLCD (at baseline, week six and week twelve) and twice for LCD (at baseline and week twelve). At week 12, both groups had a decrease in general food cravings compared to baseline and these decreases were significantly greater for VLCD in general and specific food cravings. Explanations for this marked decrease in food cravings for VLCD are similar to those proposed by Harvey et al., including decreased hunger (although it was not measured in the first two weeks) and decreased palatability and variety in the diet. Also, specific food cravings were

defined as those foods fitting into one of four categories (sweet foods, carbohydrates or starchy foods, high fat foods, and high fat fast foods) rather than the specific foods within those categories. As described earlier, these foods may not have been categorized appropriately and several of the foods could fit into more than one dimension. The results of Martin et al. and Harvey et al. do not support a physiological basis of food cravings since deprivation of several categories of foods decreased food cravings rather than increased them and there were no true nutritional deficiencies in any of the subjects.

Polivy et al. (2005) studied the effects of deprivation on food cravings between restrained and unrestrained female subjects after being randomly assigned to a deprivation group (chocolate or vanilla containing foods, or no deprivation/control) for one week. Subjects were then assigned to one of two experimental conditions: receiving chocolate or vanilla containing foods first in a taste test fashion. Eagerness to consume foods presented was measured using a timed algorithm that each subject could end independently. Restrained eaters consumed significantly more chocolate, were more likely to report craving for chocolate, and were more likely to blame amount of chocolate consumed on a negative affect compared to unrestrained eaters. Chocolate deprived subjects consumed significantly more chocolate and rated chocolate cravings higher than vanilla deprived or control groups. Polivy et al. concluded their results were supported more by the findings of Fedoroff et al. (2003) in that restrained eaters are more likely to have cravings and to over consume these craved foods. Thus, this study supports a cognitive psychology basis to food cravings rather than a physiological one since subjects were not deprived of specific nutrients. Rather they were deprived of a food or flavor

that they found desirable and may not eat due to their restrained eating habits. This study shows that people crave certain foods and these cravings increase when they restrain and/or deprive themselves of these foods.

Alsene et al. (2003) compared the role an 18 hour abstinence from cigarettes, food, both cigarettes and food, or no deprivation would have on food and cigarette cravings in a group of male and female cigarette smokers utilizing a within-subject design. After each deprivation condition, subjects rated their food and cigarette cravings, watched a series of visual presentations of cigarette, food and neutral items in one of two orders, and finished another rating of their food and cigarette cravings relative to their first. Cravings increased relative to deprivation condition: food cravings increased after food deprivation, cigarette cravings increased after cigarette deprivation, and both increased after food and cigarette deprivation relative to the other groups. After visual presentation, food and cigarette cravings increased in all four conditions, but to a greater extent for those that were in one a deprived condition. Alsene et al. concluded that cigarette cravings can be elicited by both abstinence due to a physiological addiction and by visual cigarette cue-presentations. Similarly, abstinence from food increases cravings for food due to deprivation state or hunger and by visual food cue-presentations. However, subjects were not considered heavy smokers, cravings for specific foods were not measured, and physiological causes (i.e. addictive substances) or changes that would accompany food and/or cigarette cravings were not measured. These results do not lend strong support for a physiological basis to food cravings since 18 hours of food deprivation will not result in nutrient deficiency. Instead, it would result in an increase in

hunger (which could be interpreted as a craving since food would be highly desired when hungry). Instead, these results are similar to that of Polivy et al. (2005) in that cue-reactivity increased cravings, supporting the cognitive psychology and learning theories of food cravings.

Conclusion

The study of food cravings and associated factors is a growing body of research although their cause has yet to be conclusively determined. One reason that the present research is so varied could be due to the definition used when classifying those who experience cravings. Although there is a move in the research to define food cravings as “an intense desire to eat” or “consume” a specific or particular food (Kemps et al., 2004, p. 31; Lafay et al., 2001, p. 195; Martin et al., 2006; Pelchat, 2002, p. 347; Pelchat et al., 2004, p.1486); it is still very subjective. An operational definition of food cravings that includes a numerical occurrence of cravings in order to be classified as a craver would help bring uniformity to the field in which different theories could be compared. For example, the definition could read as follows, “Food cravings are self-identified, intense desires to eat a specific food one or more times a week during the last six months.” It would be beneficial to the field to fashion the criteria of a food craver after the American Psychiatric Associations *Diagnostic and Statistical Manual of Mental Disorders*. That way, food cravings as a possible eating disorder could be distinguished from food cravings in popular nomenclature.

The majority of the research articles focused on college level women, suggesting that there are differences between men and women in regards to food cravings. Eating

disorders and disordered eating patterns have historically been more prominent in the lives of women than men. That could be why females have been the focus. Another explanation could be women are more worried about their eating behavior and cravings and researchers acted on this interest. The reasons could be numerous, but men cannot be disregarded in this field of research because of the high occurrence of food cravings in men as well. University populations have proven to be convenient to many types of research, but create a significant selection bias. Most of the samples thus far have focused on Caucasians. The use of a more diverse group of subjects (both ethnically and socioeconomically) would expand the current research to a larger and more relevant population.

The numerous instruments developed to study food cravings are often not utilized outside of the study for which they were developed. This also makes studies difficult to compare. The study of food cravings could be further understood if the instruments already developed were utilized on more diverse study populations. Some of these instruments, though, would need to be fine-tuned and translated to the appropriate language in order to be effective instruments. For example, the questionnaire developed by Lafay et al. (2001) has been translated from French into English; however, this version has not been validated in an English speaking population.

So far, there is no single theory that strongly supports a cause to food cravings. All three theories discussed have several limitations and assumptions that have not been supported by the data. The focus of the research discussed has been too narrow and a broader look at food cravings should be the direction of future studies. When you go

back and look at food preferences of people, it is evident that these preferences parallel several different aspects of food: hedonic, cultural, acculturation towards Western behaviors, and regional (Wansink et al., 2003; White et al., 2002; Yeh et al., 1998; Zellner et al., 1999). Instead of a specific nutrient and or food group, food cravings may be more specific to the individual or life experiences. Thus, specific foods craved in the general population have more of a psychological or learned basis rather than a physiological one. Even if food cravings were shown to have a physiological origin, specific foods craved to alleviate or satisfy the physiological basis to the food cravings would be subject to environmental, cultural and ethnic influences.

If the support for food cravings having a cognitive or imaginal basis is used to explain specific food cravings of different cultures (Kemps et al., 2004; Kemps et al., 2005; Harvey et al., 2005), desirable foods craved may be learned due to the hedonic values cultures place on specific foods. Further, since it has been shown that food cues increase cravings (Fedoroff et al, 2003; Nederkoorn et al, 2000; Nederkoorn & Jansen, 2002); these food cues could be culture specific and an increase in cravings would only be seen in foods that have been conditioned or preferred by an individual's cultural experiences.

The purpose of the study is to observe a more ethnically diverse population and to see whether relationships exist between food cravings and socioeconomic status, ethnicity, gender, BMI, diet history, and mood state. A three part questionnaire was designed to test the hypothesis that food cravings are specific to an individual's experiences. Specific food cravings of male and female subjects with different

ethnicities, levels of acculturation to Western tastes, and socioeconomic level were studied at a culturally diverse metropolitan university. The first part of the questionnaire included questions assessing basic background information about the population, such as gender, age, BMI, income, ethnicity, exercise habits, and general meal patterns. The food craving questionnaire developed by Lafay et al. (2001) was modified slightly to be better understood by the subjects. Two questions were also added in order to assess triggers to food cravings and substitutes for the craved foods. Finally, the FCI designed by White et al. (2002) was used as a model for the last section of the questionnaire, which included more culturally diverse foods.

CHAPTER TWO
JOURNAL ARTICLE

Authorship

“Prevalence and Types of Food Cravings in a Multicultural Urban College Community”

We certify that we participated substantially in the conception and design of this work and the analysis of this data as well as the writing of the manuscripts. We have reviewed the final version of the manuscripts, approve it for publication, and take public responsibility for its content. Neither this manuscript nor one with substantially similar content under our authorship has been published or is being considered for publication elsewhere, except as described in an attachment.

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Prevalence and Types of Food Cravings in a Culturally Diverse

Metropolitan University

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Research Briefs

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Abstract

Food cravings are a new and growing field of research due to their proposed association with eating disorders, depression, and obesity in homogeneous populations. The purpose of this study was to uncover the prevalence and types of food cravings experienced in a multicultural, urban university and to investigate whether relationships exist between food cravings and socioeconomic status, ethnicity, gender, BMI, diet history, and mood. Subjects filled out a self-report questionnaire that assessed demographics, dieting behaviors, and issues pertaining to food cravings. Over 90% of all subjects experienced a food craving at least once a month within the last six months. There were no significant differences in the occurrence of food cravings as a function of gender, BMI, ethnicity, or socioeconomic status, but specific foods craved were significantly different between cravers and noncravers. Also, specific foods craved were significantly different among ethnicities and were culture specific. Females and males reported significant differences in weight satisfaction, current dieting to loose weight, and controlling weight by watching food intake. In conclusion, food cravings are a common occurrence and may be learned dependent on ethnicity and level of acculturation. Futures studies and questionnaires should be more representative of the society in which we live.

Introduction

The study of food cravings is a new and growing field of research. Food cravings have been proposed to be associated with eating disorders, eating disorder symptomology, abnormal eating habits, depression, and obesity. However, several limitations exist in the field including the lack of an operational definition of food cravings, food cravings subjective nature, a narrow population studied, multiple instruments developed with rare usage by other research groups, and no clear theory as to the origin of food cravings.

Food cravings have most commonly been defined as an intense desire to eat a specific or particular food (Kemps, Tiggemann, Woods, & Soekov, 2004; Lafay et al., 2001; Martin, O'Neil, & Pawlow, 2006; Pelchat, 2002; Pelchat, Johnson, Chan, Valdez, & Ragland, 2004). This general definition is often modified by the statement that cravings may result in extreme measures to obtain the craved food (Gendall, Joyce, Sullivan, & Bulik, 1998; Zellner, Garriga-Trillo, Rohm, Centeno, & Parker, 1999). In addition, the number of self-reported cravings during a specified amount of time determines whether a subject is grouped as a craver or noncraver (Gendall & Joyce, 2000; Lafay et al.). The definition utilized in the current study was adapted from that used in the Lafay et al. study that classified food cravers as subjects who self-reported strong urges or intense desires to eat a specific or particular food at least once a week during the last six months.

To date, most of the research has focused primarily on a middle to upper class, Caucasian female population (Fedoroff, Polivy, & Herman, 2003; Gendall, Joyce, &

Sullivan, 1997; Gendall, Joyce, Sullivan, Fear, & Bulik, 1997; Gendall et al., 1998; Gendall & Joyce, 2000; Kemps, Tiggemann, & Hart, 2005; Macdiarmid & Hetherington, 1995; Nederkoorn & Jansen, 2002; Nederkoorn, Smulders, & Jansen, 2000; Polivy, Coleman, & Herman, 2005). This focus is not applicable to the growing diversity of people, eating habits, and food preferences prevalent today. In order to better serve and apply the research on food cravings to the population in which we live, a more multicultural, multigender, and socioeconomically diverse approach needs to be taken.

Several instruments have been developed to study food cravings (Cepeda-Benito, Gleaves, Williams, & Erath, 2000; Gendall, Joyce, Sullivan, et al., 1998; Herman & Polivy, 1980; Hill, Weaver, & Blundell, 1991; Lafay et al., 2001; Stunkard & Messick, 1985; Weingarten & Elston, 1991; White, Whisenhunt, Williamson, Greenway, & Netemeyer, 2002); however, they are rarely utilized and validated by other groups of researchers. Also, these instruments are often designed to look at specific disorders and to support a theory of food cravings rather than providing a broader understanding of food cravings (Cepeda-Benito, Gleaves, et al.; Herman & Polivy; Hill et al.; Stunkard & Messick). Three main theories as to the origin of food cravings have been proposed: physiological, learning, and psychological (White et al.); however, no single theory is currently capable of explaining why food cravings occur. It is important to get a better understanding of food cravings in the general population (which includes a broader socioeconomic, gender, and ethnic pool) in order to direct research in appropriate directions.

Most of the research to date has been too narrow to be applicable in the diverse society in which we live, and a broader look at food cravings should be taken in order to better direct future studies. The purpose of this study is to further uncover the prevalence and types of food cravings experienced in a multicultural, urban university community and to investigate whether relationships exist between food cravings and socioeconomic status, ethnicity, gender, BMI (body mass index), diet history, and mood state. Also of interest is whether the perception of specific food cravings is more prevalent within these subgroups.

Method

Participants The participants were undergraduate and graduate students enrolled in general education courses taught in the Department of Nutrition and Food Science for both majors and nonmajors during the Fall 2005 semester at San Jose State University (SJSU). SJSU is located in a culturally diverse large metropolitan city with a student enrollment of over 28,000 that is more than 70% non-white. A convenient sample of students in classes that met throughout the day (morning, afternoon and evening) were asked to fill out the questionnaire. Exclusion criteria included individuals under 18 years of age and women currently pregnant.

Questionnaire The questionnaire consisted of three sections. The first part was developed by the authors and assessed clinical and demographic information (such as income, ethnicity, and academic level) and typical food consumption, exercise, and dieting habits. The second section was a modified version of the questionnaire developed by Lafay et al. (2001). It was designed to determine whether or not food cravings are

experienced, the prevalence of food cravings, and mood states during these experiences. Two questions were added in order to assess triggers to food cravings and to determine whether specific food cravings could be replaced by another substance. A question assessing the type of food cravings was eliminated due to its similarity to the food craving frequency section. The last section of the questionnaire was based on the Food Craving Inventory (FCI) developed by White et al. (2002) to assess prevalence of specific food cravings. Modifications made included: alphabetization of foods to increase readability, addition of five foods based on research (milk, cheese, soda, beer, and coffee), and addition of three “other” options that could be filled in by the participant.

Procedure A pilot study was conducted on 39 volunteer graduate students in the Department of Nutrition and Food Science to ensure readability, fine tune the food craving frequency section, and estimate the amount of time required for completion. The questionnaire was revised along with recommendations to improve readability and make the foods more culturally diverse and relevant to students in the region. The study was approved by the Institutional Review Panel for Human Studies at San Jose State University; informed consent was assumed by completion and return of the questionnaire.

Statistics The data from the questionnaire was evaluated using SPSS. Means and standard deviations were calculated for age, height, weight, BMI, and dieting history. BMI was calculated as weight (kg) divided by height (m) squared. Frequencies were calculated for all of the questions. Cravers were compared to noncravers using t-test and chi-square tests. The same tests were used to compare gender, ethnicities, academic rank, and socioeconomic levels.

Results

Of the 304 questionnaires returned, four individuals were excluded from the analysis due to pregnancy ($n = 3$) or age ($n = 1$). Subjects that reported having food cravings at least once a week during the last six months were classified as cravers. Clinical, demographic, academic, and ethnic characteristics of cravers (71%) and noncravers (29%) are presented in Table 1. It is important to note here that 92% of the subjects reported food cravings at least once a month over the past six months. Age, BMI, and history of dieting to achieve weight loss were not significantly different between cravers and noncravers. There was, however, a statistically significant difference in number of times cravers reported consuming the craved food compared to the noncravers (57% versus 45%, respectively); while 57% of all subjects reported consuming the craved food at least 50% of the time. Most of the subjects (83%) were upper classmen (junior or senior), which was similar to the undergraduate enrollment at SJSU (73%) for the same year; likewise, the ethnic distribution of subjects was representative of the enrollment at the university. Thus, the study sample was representative of the students enrolled in the university for that academic year. The majority of subjects (53%) exercised for a minimum of 30 minutes three times a week. Reported estimated annual income ranged from less than \$20,000 to over \$100,000 and was relatively evenly distributed throughout the range.

Differences in eating, craving, and dieting behavior are presented in Table 2. The percent of females (65%) was greater than that of males (35%), but only slightly higher than that of the university (54%) in general. There were no significant differences

between cravers and noncravers in eating, craving, weight satisfaction, and weight loss behaviors. However, there were statistically significant differences between females and males in that females reported eating more meals with others, were currently dieting to lose weight, historically used dieting to control weight, and to be dissatisfied with their current weight. There was no significant difference between males and females or cravers and noncravers in how they viewed cravings (a desire rather than a need).

Subjects reported cravings mainly at lunch (50%) or dinner (25%); that the cravings were equally divided between either *easy to ignore* (41%) or *difficult to resist* (44%), and were only capable of satisfying their cravings for specific foods by eating a different food *sometimes* (58%). Most subjects reported consuming the craved food in the presence of others (62%) and felt better afterwards (61%) (data not presented).

Reported triggers to food cravings and feelings after consuming the craved food are presented in Table 3. *Hunger* (60%), *thought of food* (40%), *smell of food* (34%), and *boredom* (26%) were the four most reported triggers to food cravings in subjects as a whole. Although statistical differences were not calculated due the number of comparisons, differences between craver and noncraver responses to the triggers reported for cravings were greatest between *thought of food* (49 vs 20%), *boredom* (33 vs 9%), and *stress* (38 vs 10%), respectively. The four most reported feelings after consuming the craved food in the subjects as a whole were *happiness*, *joy*, *relaxation*, and *guilt*, although the difference between cravers and noncravers were not as great. On a whole, cravers reported a greater percentage of triggers and feelings after consuming the craved food than noncravers.

Results of the frequency of specific foods craved are presented in Table 4.

Results indicate that there were statistically significant differences among the specific foods craved between cravers and noncravers. Specific foods that were significantly different between cravers and noncravers were bacon, candy, chips, chocolate, donuts, pasta, and steak ($p < 0.05$). Foods that approached statistical significance ($p < 0.10$) between groups were bread, cheese, cookies, and pizza. There were also significant differences in the types of foods craved among different ethnicities ($p = 0.02$); specific foods with a significance of $p \leq 0.05$ included: rice, tea, spicy vegetables, tortillas, and popcorn. Upon further evaluation, the frequency of these food cravings by ethnicity were as follows: rice was craved most frequently by Asians, Pacific Islanders, Mexican Americans, and Asian Indians; tea was most frequently craved by Asians, Middle Easterners, Pacific Islanders, and Asian Indians; popcorn was most frequently craved by African Americans; and tortillas were most frequently craved by Mexican Americans.

Discussion

The purpose of the current study was to uncover the prevalence and types of food cravings experienced in a multicultural, urban university community and to investigate whether relationships existed between food cravings and socioeconomic status, ethnicity, gender, BMI, history of dieting, and mood state. The results of the present study showed that food cravings are a common experience among university students. Over 90% of all subjects in the present study experienced a food craving at least once a month within the last six months; with greater than 70% of students experiencing at least one food craving per week during the last 6 months (defined as cravers). Although this is an astonishing

statistic, these data are similar to the findings of Weingarten and Elston (1991) who found that 68% of males and 97% of females experience a food craving at least once a year. When subjects were classified as cravers and noncravers, the percent of food cravers in this study (70%) was substantially higher than the 21% reported by Lafay et al. (2001), despite using the same criterion for the craver. The Lafay et al. study was conducted in France. Craving as a word may be more accepted in the English vernacular compared to French; accordingly more people may be comfortable to report craving behavior in the United States as compared to France. Moreover, there were no significant differences in the present study in the occurrence of food cravings as a function of gender, BMI, ethnicity, or socioeconomic status. Reported age and BMI of cravers and noncravers in the current study were similar to those reported by Lafay et al. This further supports the notion that food cravings are universal experiences.

In the current study, food cravings appear to have defined ethnic influences. There were significant differences between ethnicities in how they responded in the food craving frequency section of the questionnaire and significant differences in specific foods craved (rice, tea, spicy vegetables, tortillas, and popcorn). Several studies have shown that types of foods craved may change depending on ethnicity or geographic region from which a study population is taken (Wansink, Cheney, & Chan, 2003; White & Grilo, 2005, Yeh et al., 1998; Zellner et al., 1999). A move towards a preference for Western tastes can also be seen by all subjects in the present study since the most commonly reported craved foods were pasta, pizza, and ice-cream. Yeh et al. reported that taste ratings of samples for Chinese subjects living in the United States and those

living in the People's Republic of China or Taiwan were significantly different, while Korean and Thai subjects in either their respective countries or the United States were very similar. One explanation given for this difference was that perhaps Chinese acculturate to Western tastes quicker than Koreans and Thais after moving to the United States from their respective countries. Thus, perhaps some of the subjects in the present study may have acculturated to Western tastes, but still have some learned ethnic based cravings.

There were also significant differences in specific foods craved between cravers and noncravers, but the differences observed could not be classified into defined food categories. Chocolate was not the most frequently reported craved foods by the subjects in the present study, contrary to the findings of Christensen and Pettijohn (2001), Weingarten and Elston (1991), and Zellner et al. (1999). However, chocolate was craved significantly more by cravers than noncravers. Other foods that were craved significantly more by cravers than noncravers were pasta, steak, candy, and chips. Fifty percent of both cravers and noncravers reported craving pasta, pizza, ice-cream, rice, and steak. The diversity of each specific food craved make it impossible to fit them into a single category such as carbohydrates, sweet-carbohydrates, or high fats, which have been commonly used within the food craving research (Christensen & Pettijohn; Gendall & Joyce, 2000; Harvey, Wing, & Mullen, 1993; Martin et al, 2006; White et al, 2002). One possible reason that pasta, pizza, rice, and steak were reported by 50% of both cravers and noncravers could be that they were considered more like meal items than snacks and most subjects reported food cravings before meals. Also, *hunger* and *smell of food* were

two of the main triggers to cravings, and over 55% of all subjects reported consuming the craved food 50% of the time. So, these cravings may have been due to a physiological signal to the brain to consume food rather than a true craving. Another explanation could be that cravings before meals may manifest themselves in cravings for comfort foods such as pasta, pizza, ice-cream, rice, and steak. Wansink et al. (2003) found that there were differences in comfort foods between males and females (which were craved) in that males tended to prefer meal-type foods (i.e. pizza, steak, pasta) and females snack-type foods (potato chips, ice cream, cookies). The fact that gender differences were not uncovered in the current study suggests that comfort foods may be craved more often by both genders since the foods craved in the two studies were similar.

If food cravings manifest themselves in the form of comfort foods, both the psychological and learning theories could be used to explain the basis of food cravings. When food preferences of subjects are examined, it is evident that these food preferences parallel several different aspects of food: hedonic, cultural, level of acculturation, and regional (Wansink et al., 2003; White et al., 2002; Yeh et al., 1998; Zellner et al., 1999). Instead of a specific nutrient and or food group, food cravings may be specific to these aspects modified by individual preferences. Research that supports a cognitive or imaginal theory to explain specific food cravings (Kemps et al., 2004; Kemps et al., 2005; Harvey et al., 2005) in which food cravings increase after imagining a desirable food explains why *thought of food* was the second most reported trigger (behind *hunger*) to food cravings. *Thought of food* was also a main reported food craving trigger by Hill and Heaton-Brown, 1994. Thinking of or imaging a specific food suggests that foods

craved may be learned due to the desirability a group (i.e. ethnic or regional) places on specific foods and hedonic values cultures place on specific foods. Since it has been shown that food cues increase cravings (Fedoroff et al., 2003; Nederkoorn et al., 2000; Nederkoorn & Jansen, 2002); these food cues could be learned in the context of specific foods introduced, preferred, or held desirable by a group. Thus, an increase in cravings would only be seen in those specific foods that the individual views as desirable and or pleasing to their palate.

Foods that were not deemed desirable by the subjects were biscuits, gravy, cornbread, sausage, and bacon. Due to the FCI (White et al., 2002) being developed and tested in Louisiana, these foods might be more common “Southern” comfort foods, therefore craved there more often than in the Western United States. White & Grilo (2005) cited this as a possible problem when they tested the FCI on patients with binge eating disorder in the Northeastern United States. Those subjects also did not crave gravy or cornbread. What the results of the White et al. study may reveal is that comfort foods in the Southern United States differ from other regions within the United States, lending more support that food cravings are a learned behavior. Further studies should be done to develop versions of a questionnaire with appropriate regional foods to explore whether regional comfort foods are craved more often than atypical foods for that specific region.

In the present study, females were significantly different from males in that more females were currently dieting to loose weight, historically used dieting to control weight, and were more dissatisfied with their current weight than males, which were independent

from whether they were cravers or noncravers. Rozin et al. (2001) showed that college females had greater body dissatisfaction than males and that this had not changed between the years 1983 and 1998. Akan & Grilo (1994) found that Caucasian college females had more body dissatisfaction and dieting behaviors than either African-Americans or Asian Americans (all three groups were represented equally), which differs from the current study because 74% of the women were dissatisfied with their weight and only 29% were Caucasian. Forman-Hoffman (2004) found that a high percentage of high-school subjects (81%) were dissatisfied with their current weight. This study also reported that 41% of the subjects dieted to control weight, and that the females were more likely to report use of unhealthy weight control practices and eating habits. With abnormal eating habits starting in high-school, it would seem logical that they would continue into college. This raises some alarm as to what this population considers to be “normal” eating behaviors when unhealthful habits such as food restriction become common place and accepted. Although actual nutritional intake was not assessed in this study, the dieting patterns, BMI, and amount of exercise of this population is of concern. More research is necessary to provide an effective way to teach proper weight management and appropriate caloric regulation to this population.

As with all research, there were limitations to the present study. First, a convenience sample was used. It would seem important to randomly sample subjects within the same metropolis but not exclusive to the university in order to test the validity of the questionnaire. The sample consisted of more females than males; however, it was relatively consistent with the current gender distribution within the University. The

subjects reported being mainly middle to upper-middle class, which may not be representative of the greater population. A more diverse pooling of different socioeconomic levels would be necessary to confirm these results. Finally, several of the questionnaires were not completed. The questionnaire may have been too long for some subjects to complete in the time allotted. Or, subjects were not interested in the topic so did not complete the questionnaire.

The results of this study show that food cravings are a common occurrence among students at a large culturally diverse metropolitan university. The occurrence of food cravings did not differ in respect to gender, BMI, ethnicity, or socioeconomic status. Also, the current study showed that food cravings follow ethnic influences and comfort foods lending support to the psychological or learning theories of food cravings. On the other hand, they could be a manifestation of hunger cues due to the high incidence of reported food cravings before lunch and dinner, but not specific to any one type of nutrient. It is vital for the progression of research on food cravings to construct an operational definition for inclusion and classification of “food cravers” in order to better compare studies. Since food cravers in the current study were more likely to eat the craved food, future studies should focus on the differences between cravers that indulge in food cravings and those that do not because there may be other important issues surrounding this finding. Future studies should also explore how the level of acculturation to a Western diet influences types of foods craved by people of different ethnicities. A shorter and more refined version of the food craving frequency section of the questionnaire should be tested by a population more reflective of California. The

study of food cravings has been shown to be a more diverse and complex issue, just like the people that have them.

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Table 1. Reported demographic, clinical, academic, and ethnic characteristics of student subjects at a culturally diverse metropolitan university categorized as either cravers or noncravers.

	Cravers	Noncravers	Total
Craving Classification n (%)	212 (70.9)	87 (29.1)	299 (100)
Clinical Characteristics (mean $\pm$ SEM)			
Age	23.2 $\pm$ 0.3	24.2 $\pm$ 0.6	23.5 $\pm$ 0.3
BMI (kg/m ²)	23.5 $\pm$ 0.3	24.2 $\pm$ 0.5	23.7 $\pm$ 0.2
Number of weight loss diets over past 5 yrs	2.0 $\pm$ 0.2	1.31 $\pm$ 0.3	1.8 $\pm$ 0.2
% of time craved food was consumed	56.9 $\pm$ 1.7*	44.6 $\pm$ 3.1	53.5 $\pm$ 1.6
Academic Level n (%)	211 (71.0)	86 (29.0)	297 (100.0)
Freshman	12 (5.7)	8 (9.3)	20 (6.7)
Sophomore	15 (7.1)	6 (7.0)	21 (7.1)
Junior	76 (36.0)	19 (22.1)	95 (32.0)
Senior	101 (47.9)	50 (58.1)	151 (50.8)
Graduate	7 (3.3)	3 (3.5)	10 (3.4)
Ethnicity n (%)	212 (70.9)	87 (29.1)	299 (100.0)
Asian	65 (30.7)	27 (31.0)	92 (30.8)
Caucasian	67 (31.6)	20 (23.0)	87 (29.1)
Hispanic/Mexican American	32 (15.1)	23 (26.4)	55 (18.4)
Pacific Islander	17 (8.0)	3 (3.5)	20 (6.7)
African American	7 (3.3)	3 (3.5)	10 (3.3)
Middle Eastern	4 (1.9)	3 (3.5)	7 (2.3)
Asian Indian	2 (0.9)	2 (2.3)	4 (1.3)
American Indian/Alaskan Native	1 (0.5)	0 (0)	1 (0.3)
Other	17 (8.0)	6 (6.9)	23 (7.7)

*Indicates significant differences of *p < 0.05*

Table 2. Reported eating, craving, and dieting behaviors by category (gender or craving classification) of student subjects at a culturally diverse metropolitan university.

Characteristic	Female		Male		Craver		Noncraver	
	n	%	n	%	n	%	n	%
Female	193	64.5	-	-	143	74.1	50	25.9
Male	-	-	106	35.5	68	64.8	37	35.2
Eats meals w/others	128	67.0*	56	53.3	126	60.3	58	66.7
Current dieters	41	21.2*	9	8.5	35	16.5	14	16.1
Controls wt by watching food intake	116	60.4*	49	46.2	118	55.9	46	52.9
Weight satisfaction	69	35.9*	54	51.4	88	41.7	36	41.9
Believe craving is a desire	176	91.2	91	91.0	191	90.9	77	92.8
Crave when alone	100	53.2	55	57.3	116	56.9	39	48.1

Percent is % of total within each category: gender or craving classification

** Indicates significant differences of $p \leq 0.05$*

Table 3. Reported triggers to food cravings and feelings after consuming craved foods for craving and noncraving subjects at a culturally diverse metropolitan university, ordered by the highest total number and percent in each section. Percent exceeds 100 because subjects could check all that applied.

	Cravers		Noncravers		Total	
Food Craving Triggers	n	%	n	%	n	%
Hunger	134	63.5	45	51.7	179	59.7
Thought of food	103	48.8	17	19.5	120	40.0
Smell of food	78	37.0	25	28.7	103	34.3
Boredom	70	33.2	8	9.2	78	26.0
Stress	65	30.8	9	10.3	74	24.7
Someone else is eating	63	29.9	10	11.5	73	24.3
Sight of food	55	26.1	18	20.7	73	24.3
Premenstrual Syndrome (only women subjects)	44	20.9	13	14.9	57	19.0
Good mood	38	18.0	15	17.2	53	17.7
Depressed mood	38	18.0	6	6.9	44	14.7
Other	12	5.7	7	8.1	19	6.3
Feelings After Consuming Craved Food						
Happiness	130	61.6	44	50.6	174	58.0
Joy	96	45.5	29	33.3	125	41.7
Relaxation	90	42.7	30	34.5	120	40.0
Guilt	61	28.9	15	17.2	76	25.3
Other	36	17.1	22	15.3	58	19.3
Excitation	40	19.0	5	5.7	45	15.0
Tiredness	20	9.5	5	5.7	25	8.3
Irritation	19	9.0	3	3.4	22	7.3
Hunger	12	5.7	8	9.2	20	6.7
Annoyance	15	7.1	1	1.1	16	5.3
Inactivity	10	4.7	3	3.4	13	4.3
Anxiety	8	3.8	5	5.7	13	4.3
Depression	9	4.3	2	2.3	11	3.7
Anger	8	3.8	3	3.4	11	3.7
Boredom	7	3.3	2	2.3	9	3.0
Sadness	8	3.8	-	-	8	2.7
Solitude	6	2.8	2	2.3	8	2.7

Table 4. Reported foods craved by craving and noncraving subjects at a culturally diverse metropolitan university, listed in descending order by most craved foods to least craved foods by total number and percent.

Craved Foods	Cravers		Noncravers		Total	
	n	%	n	%	n	%
Pasta	140	68.0*	44	53.0	184	63.7
Pizza	133	64.6	46	55.4	179	61.9
Ice-cream	127	61.2	42	54.9	172	59.5
Chocolate	132	64.1*	38	46.3	170	59.0
Rice	120	59.1	41	50.0	161	56.5**
Steak	117	57.6*	44	53.7	161	56.5
Bread	117	57.4	39	46.4	156	54.2
Candy	120	58.5*	31	37.3	151	52.4
Hamburger	108	52.2	33	40.2	141	48.8
Cookies	108	52.2	32	39.5	140	48.6
French Fries	105	50.2	36	43.4	141	48.3
Soda	99	48.3	37	45.1	136	47.4
Cheese	103	50.5	26	32.5	129	45.4
Cereal	97	47.5	32	38.6	129	44.9
Chips	102	49.0*	28	33.3	130	44.5
Coffee	96	46.8	31	37.3	127	44.1
Milk	88	42.9	34	41.0	122	42.4
Tea	80	40.0	34	42.0	114	40.6**
Chicken Broth/Soup	77	37.7	28	34.6	105	36.8
Brownie	79	38.6	22	26.5	101	34.8
Spicy Vegetables	72	35.3	27	33.3	99	34.7**
Tortillas	64	32.5	25	31.6	89	32.2**
Hot Dog	66	32.0	22	26.5	88	30.4
Cake	70	34.0	17	20.2	87	30.0
Pancakes/Waffles	56	27.1	23	28.4	79	27.4
Beer	54	26.2	21	25.0	75	25.9
Popcorn	55	27.0	13	16.3	68	23.9**
Fried Fish	48	23.5	17	21.2	65	22.9
Donuts	55	26.7*	7	8.3	62	21.4
Rolls	47	22.9	13	15.9	60	20.9
Baked Potato	47	23.0	13	15.5	60	20.8
Sausage	39	19.2	15	18.3	54	18.9
Bacon	38	18.4*	16	19.3	54	18.6
Cinnamon Roll	42	20.6	9	10.7	51	17.7
Biscuit	35	17.3	7	8.4	42	14.7
Corn Bread	25	12.1	15	17.9	40	13.8

Gravy	25	12.2	7	8.7	32	11.2
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** Indicates significant differences between cravers and noncravers $p \leq 0.05$.*

*** Indicates significant difference between ethnicities $p \leq 0.05$.*

CHAPTER THREE
SUMMARY & RECOMMENDATIONS

Summary

The study of food cravings is a new and growing field of research. Several limitations exist in the field of food cravings including the lack of an operational definition, the subjective nature of food cravings, a narrow population studied, multiple instruments developed with rare usage by other research groups, and no clear theory as to the origin of food cravings. The purpose of the present study was to further uncover the prevalence and types of food cravings experienced in a multicultural, urban university community and to investigate whether relationships existed between food cravings and socioeconomic status, ethnicity, gender, BMI (body mass index), diet history, and mood state. Another goal was to present a broader look at food cravings in order to better direct future studies.

A questionnaire was designed for the purpose of the study and completed by male and female subjects (on an anonymous and volunteer basis) enrolled in general education courses offered by the Department of Nutrition and Food Science at San Jose State University. The first part of the questionnaire included questions assessing basic background information. The second part of the questionnaire was a modified version food craving questionnaire developed by Lafay et al. (2001). Finally, the third part of the questionnaire was modeled after the Food Craving Inventory (FCI) developed by White et al. (2002), which included more culturally diverse foods.

The results of the present study indicate that food cravings are a common occurrence among university students enrolled at a large metropolitan university (over 90% of subjects reported at least one craving once a month during the last six months).

Moreover, there were no significant differences in the occurrence of food cravings between cravers and noncravers as a function of gender, BMI, ethnicity, or socioeconomic status (food cravers were defined as those who experienced cravings at least once a week during the past six months). It is important to note here that since there is no operational definition for food cravers, it was difficult to compare cravers in the current study to past research. On the other hand, there were significant differences for craving classification and ethnic group in specific foods craved. The foods craved most commonly by both cravers and noncravers (i.e. pizza, pasta, ice-cream, steak) could not be classified into defined food categories (i.e. carbohydrates, sweet-carbohydrates, high fats) since they were complex foods. Instead, many of the foods could be considered meal items or comfort foods. Since the food cravings were reported to occur mostly before meals, to be triggered by hunger and smell of food, and consumed over 55% of the time, they could have been a natural response to hunger cues. Further, these cravings may manifest in the form of comfort foods.

The significant differences between the reported foods craved between the ethnic groups and similarities in popular foods craved by all subject's supports the theories that food cravings have a learned or psychological basis. The learning and psychology theories, however, should be used together rather than relying on one theory to explain the origin of food cravings. In the current study, there were significant differences between ethnicities in specific foods craved (specifically rice, tea, spicy vegetables, tortillas, and popcorn); while the most frequently reported craved foods by all subjects are typically considered typical Western foods (pasta, pizza, and ice-cream). Both these

occurrences show that food cravings can be learned and may change over time dependent on different exposures to and or values placed on specific foods. However, a cognitive or imaginal basis to food cravings was also supported by the results since thought of food was the second most reported trigger to food cravings by all subjects.

There were no significant differences between cravers and noncravers in reported weight satisfaction, current dieting behavior, or weight control measures. However, there were significant differences between males and females. Females reported more weight dissatisfaction, current dieting to loose weight, and controlling weight by watching food intake compared to male subjects.

Recommendations

The field of food cravings will continue to be a popular field of study due to its interest by the scientific community and within popular media. It is vital for the scientific community to agree upon an operational definition of food cravings in order to better compare and further the research and theories on food cravings. Clear criteria that distinguish who are food cravers would better define a field of research that is subjective by nature.

The food craving frequency section of the questionnaire (which was a modified version of White et al. (2002) FCI) that included more ethnically diverse foods, proved to be a useful instrument for studying specific food cravings in a culturally diverse university setting. It also revealed that some food cravings follow defined ethnic food preferences. A shorter and more refined version of the food craving frequency section of the questionnaire should be tested at another culturally diverse metropolitan university to

confirm the results of the current study. Also, how the level of acculturation to a Western diet of different ethnic groups influences reported food cravings would be of interest for future studies. Investigation into these influences could lend support that food cravings are a learned behavior and may change over time.

Since the female subjects in the current study reported more dissatisfaction with their current body weight, controlled their weight by restricting food intake, and were currently dieting to loose weight, female university students at a culturally diverse metropolitan university may be a vulnerable population for unhealthy eating patterns and body image. Future studies should take a closer look at actual food intake and weight control measures by the female university students have with these issues. Also, a closer look at current educational and outreach programs should be re-evaluated for their effectiveness on a university population.

Finally, the results of the current study reveal that the study of food cravings is a complex field that shadows ethnic and regional lines. Generalizations about specific foods craved do not easily fit into categories and experts in the field should be cautious when attempting to do so.

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APPENDIXES

Appendix A

SJSU Institutional Review Board Approval

San José State
UNIVERSITY

Office of the Academic
Vice President
Associate Vice President
Graduate Studies and Research
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San Jose, CA 95192-0025
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e-mail: gstacks@wanoo.sjsu.edu
http://www.sjsu.edu

To: Heidi Kromschroder ✓
1926 6th Avenue
Oakland, CA 94606

From: Pam Stacks, AVP *Pam Stacks*
Graduate Studies & Research

Date: October 5, 2005

The Human Subjects-Institutional Review Board has approved your request for exemption from human subjects review under category "B" in the study entitled:

"Prevalence and types of food cravings in a multicultural urban college community."

This approval is contingent upon the subjects participating in your research project or the subject's data collected for the research project being appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity when they participate in your research project and concerning all data that may be collected from the subjects. The Board's approval includes continued monitoring of your research to assure that the subjects are being adequately and properly protected from such risks. If at any time a subject becomes injured or complains of injury, you must immediately notify Pam Stacks, Ph.D. Injury includes but is not limited to bodily harm, psychological trauma, and release of potentially damaging personal information.

Please also be advised that all subjects need to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate, or withdrawal will not affect any services that the subject is receiving or will receive at the institution in which the research is being conducted. This approval is granted for a one-year period and data collection beyond October 5, 2006 requires an extension request.

If you have any questions, please contact me at (408) 924-2480.

Cc: Clarie Hollenbeck

the California State University:
Bakersfield, Chico, Dominguez Hills,
Fresno, Fullerton, Hayward, Humboldt,
Long Beach, Los Angeles, Maritime Academy,
Merced, Monterey Bay, Northridge, Pomona,
Sacramento, San Bernardino, San Diego,
San Francisco, San Jose, San Luis Obispo,
San Marcos, Sonoma, Stanislaus

Appendix B

AGREEMENT TO PARTICIPATE IN RESEARCH

**College of Applied
Sciences and Arts**
Nutrition & Food Science
Central Classroom Bldg. 200
One Washington Square
San Jose, CA 95193-0058
Voice: 408-924-3100
Fax: 408-924-3114

Prevalence And Types Of Food Cravings In A Multicultural Urban College Community

This questionnaire is specifically designed to assess prevalence and types of food cravings among students at San Jose State University. Please help us by answering all questions honestly and completely. Participation is strictly voluntary and anonymous. No risk or benefit is anticipated as a result of your completing the questionnaire. If you have any questions regarding this study or its procedures, you may contact Heidi Kromschroder or Clarie Hollenbeck, Ph.D., Department of Nutrition and Food Science and San Jose State University at (408) 924-3106 or at clariebh@casa.sjsu.edu, who will be available to answer them. Complaints about the research may be presented to Lucy McProud, PhD, RD, Chair, Department of Nutrition and Food Science at San Jose State University at (408) 924-3100. Additional inquiries regarding subject's rights can be directed to Pam Stacks, PhD., Associate Vice President, Graduate Studies and Research at (408) 924-2480 or pstacks@email.sjsu.edu. By completing this questionnaire, you are demonstrating your willingness and ability to voluntarily participate in this study. Your answers are held in strict confidence. Please do not write your name anywhere on this questionnaire so your identity will remain anonymous.

Thank you.

The California State University:
Chancellor's Office
Bakersfield, Channel Islands, Chico
Claremont, Fresno, Fullerton, Humboldt, Long Beach,
Los Angeles, Maritime Academy,
Monterey, Bay, Northridge, Pomona,
Sacramento, San Bernardino, San Diego,
San Francisco, San Jose, San Luis Obispo,
San Marcos, Sonoma, Stanislaus

Appendix C

Food Craving Questionnaire

1. What are the last four digits of your student I.D. number? _____
2. What is your age? _____
3. What is your gender? (check one) ____ female ____ male
4. Are you currently pregnant? ____ yes ____ no
5. What is your height? _____ Weight? _____
6. What level are you at SJSU? (check one)
____ Freshman ____ Graduate student
____ Sophomore
____ Junior
____ Senior
7. What is your ethnicity? (check one)
____ American Indian/Alaskan Native ____ African American
____ Asian ____ Southeast Asian
____ Pacific Islander ____ Caucasian
____ Hispanic/Mexican American ____ Asian Indian
____ Middle Eastern ____ Other _____
8. What is the estimated annual household income of your family and/or parents?
(check one)
____ less than \$20,000 ____ \$60,000 - \$79,000
____ \$20,000 - \$39,999 ____ \$80,000 - \$99,999
____ \$40,000 - \$59,000 ____ \$100,000 or higher
9. Where do you eat most of your meals?
____ school cafeteria ____ restaurant ____ food brought from home
____ home ____ campus dining ____ other _____
10. Who prepares most of your meals?
____ I do ____ roommate ____ restaurant
____ parents ____ spouse ____ other _____
11. Do you eat the majority of your meals alone or with others?
____ alone ____ with others

12. How many times a week do you exercise for a minimum of 30 minutes?

(check one)

☐ 0 times ☐ 2 times ☐ 4 times ☐ 6-7 times
☐ 1 time ☐ 3 times ☐ 5 times

13. Are you currently on a diet to lose weight?

☐ yes ☐ no

14. Over the past five years, how many times have you dieted to lose weight?

times

15. Do you watch what you eat to control your weight?

☐ yes ☐ no

16. Are you satisfied with your current weight?

☐ yes ☐ no

17. During the past six months, how often have you experienced a strong urge to eat specific foods? (check one)

☐ several times a day	☐ twice a month
☐ once a day	☐ once a month
☐ many times a week	☐ less than once a month
☐ once a week	☐ never

18. If you do have a strong urge, at what time does it usually occur during the day?

19. If you have had a strong urge to eat specific foods, what usually triggers it?

(check all that apply)

☐ hunger	☐ someone else is eating	☐ PMS	☐ good mood
☐ smell of food	☐ depressed mood	☐ boredom	☐ other
☐ sight of food	☐ thought of food	☐ stress	<input type="text"/>

20. When you have a strong urge to eat a specific food, how difficult or easy is it to ignore this strong urge to eat a particular food? (check one)

☐ very easy to resist	☐ difficult to resist	☐ impossible to resist
☐ easy to resist	☐ very difficult to resist	

21. When you experience a strong urge (for the single food you crave the most), what percentage of the time do you follow through and eat that food?

percent of the time

22. Can this strong urge for the single food be satisfied by consuming a different food?
☐ yes ☐ no ☐ sometimes
23. Do you believe this strong urge to eat a particular food is related to a “desire” or a “need”?
☐ desire ☐ need
24. When you experience a strong urge to eat a specific food and then eat that food, what is/are your feeling(s)? (check all that apply)
☐ irritation ☐ joy ☐ anxiety ☐ sadness ☐ hunger
☐ anger ☐ boredom ☐ annoyance ☐ relaxation ☐ solitude
☐ happiness ☐ excitement ☐ tiredness ☐ inactivity ☐ depression
☐ guilt ☐ other _____
25. When you experience this strong urge are you generally
☐ alone ☐ not alone
26. When you follow through and eat the food you crave the most, are you by yourself:
 (check one)
☐ always ☐ often ☐ never
☐ very often ☐ sometimes
27. After having eaten following this strong urge to eat, how do you feel? (check one)
☐ better ☐ not different ☐ worse

Food Craving Questionnaire, Continued

For each of the foods listed below, please check the appropriate bubble using the following scale.

A food craving is an intense desire to eat a specific food (or type of food).

Over the past month, how often have you experienced a craving for the food?

		<u>Never</u>	<u>Rarely</u> <u>(once or twice)</u>	<u>Sometimes</u>	<u>Often</u>	<u>Always/Almost</u> <u>every day</u>
1	Bacon	☐	☐	☐	☐	☐
2	Baked Potato	☐	☐	☐	☐	☐
3	Beer	☐	☐	☐	☐	☐
4	Biscuit	☐	☐	☐	☐	☐
5	Bread	☐	☐	☐	☐	☐
6	Brownie	☐	☐	☐	☐	☐
7	Cake	☐	☐	☐	☐	☐
8	candy	☐	☐	☐	☐	☐
9	Cereal	☐	☐	☐	☐	☐
10	Cheese	☐	☐	☐	☐	☐
11	Chicken Broth/Soup	☐	☐	☐	☐	☐
12	Chips	☐	☐	☐	☐	☐
13	Chocolate	☐	☐	☐	☐	☐
14	Cinnamon Roll	☐	☐	☐	☐	☐
15	Coffee	☐	☐	☐	☐	☐
16	Cookies	☐	☐	☐	☐	☐
17	Corn Bread	☐	☐	☐	☐	☐
18	Donuts	☐	☐	☐	☐	☐
19	French Fries	☐	☐	☐	☐	☐
20	Fried Fish	☐	☐	☐	☐	☐
21	Gravy	☐	☐	☐	☐	☐
22	Hamburger	☐	☐	☐	☐	☐
23	Hot Dog	☐	☐	☐	☐	☐
24	Ice Cream	☐	☐	☐	☐	☐
25	Milk	☐	☐	☐	☐	☐
26	Pancakes/Waffles	☐	☐	☐	☐	☐

27	Pasta	☐	☐	☐	☐	☐
28	Pizza	☐	☐	☐	☐	☐
29	Popcorn	☐	☐	☐	☐	☐
30	Rice	☐	☐	☐	☐	☐
31	Rolls	☐	☐	☐	☐	☐
32	Sausage	☐	☐	☐	☐	☐
33	Soda	☐	☐	☐	☐	☐
34	Spicy Vegetables	☐	☐	☐	☐	☐
35	Steak	☐	☐	☐	☐	☐
36	Tea	☐	☐	☐	☐	☐
37	Tortillas	☐	☐	☐	☐	☐
	Other (fill in)					
38		☐	☐	☐	☐	☐
39		☐	☐	☐	☐	☐
40		☐	☐	☐	☐	☐