PROP Status and Weight Loss:

Does Taster-Type Predict Weight Loss Success?

by

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ABSTRACT

Given the continued increase in obesity rates in the United States, there has been growing research regarding factors related to obesity. Researchers have examined biological factors, such as set point theory, as well as various psychological factors such as motivation, self-efficacy, and eating styles. Taster-type, defined as how an individual experiences the perception of taste (particularly bitterness), is a recent area of research that has explored the potential relationship between this phenomenon and obesity. The current study examined whether taster-type impacted weight loss, along with secondary measures of BMI, waist circumference, and food neophobia, as well as taster-type's impact on these measures over time. This study also examined the potential role of taster-type as a predictor of weight loss, independent of the psychological variables of motivation, self-efficacy, and eating styles. Ninety adult participants, consisting of 64 females and 19 males were recruited for this study. They were asked to diet for four weeks; 60 finished the full four weeks and completed psychosocial measures over two time periods. They were asked to record their food using an online food journal, attend weekly meetings for weigh-ins, and were given psychoeducational materials regarding factors affecting weight loss. The results indicated that taster-type was not a significant factor in BMI or waist circumference, but taster-type did interact with time to reveal that supertasters consistently lost weight across the four week dieting period while nontasters leveled off after Week 2. Additionally, both groups increased in food neophobia from the start of the dieting period to the end of Week 4. Consistent with previous research, motivation and self-efficacy predicted weight loss; however, taster-type did not increase

the prediction of weight loss across the dieting period. This effect only occurred at Week 2. By Week 4, no psychosocial variables were significant predictors of weight loss.

This dissertation is dedicated to my family, specifically my mother, Virginia, and my brother and sister, Michael and Caitlynn, for their endless support, and encouragement throughout this process.

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CHAPTER 1

THE PROBLEM IN PERSPECTIVE

According to the most recent data compiled by the Centers for Disease Control and Prevention (Ogden, Carroll, Kit, & Flegal, 2012), 35.7% of adults in the United States are categorized as obese (having a Body Mass Index [BMI] of 30 or higher – calculated as weight in kg/height in meters^2), with some estimates placing the overall percentage of overweight adults somewhere near 50%. Additionally, researchers have noted an increase in the prevalence of obesity since 1999 (Flegal, Carroll, Ogden, & Johnson, 2002; Flegal, Carroll, Ogden, & Curtin, 2010; Ogden, Flegal, Carroll, & Johnson, 2002). As the rates of obesity climbed, researchers began to examine the appropriateness and utility of including obesity as a behavioral disorder in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-V*; Devlin, 2007). While the Eating Disorders Work Group of the DSM-V Task Force noted several biological and psychological factors that warranted consideration of obesity as a mental disorder, they ultimately did not recommend inclusion due to "insufficient evidence" (Marcus & Wilders, 2012).

As the prevalence of obesity continues to increase, research has focused on attempts to explain eating behavior and the propensity toward overconsumption. Better understanding of these behaviors could result in interventions to help those who are obese and overweight to lose excess weight and maintain healthy BMIs. Unfortunately, research findings as to the cause of this increased prevalence of obesity have been ambiguous. As a result, there is no current unifying theory in the fields of psychology, medicine/biology, or sociology that completely and fully explains why we eat, why

individuals overeat, why they diet, and why they have success and difficulties in losing weight. In many ways, discovering the "answer" to obesity has become a holy grail-type pursuit with many researchers and drug companies vying to be the first to offer a safe and effective means of weight loss (Mark, 2009). The lack of a unifying theory is due to the multiple factors related to eating behaviors, including biological, psychological, and social components, each of which contributes to consumption habits in unique ways. As such, a biopsychosocial framework is the only comprehensive framework for researching and understanding this important issue. A biopsychosocial theoretical orientation allows for research that is responsive to changes in the obesity problem from the various fields (biological, psychological) that are attempting to examine and understand this phenomenon.

From a biological perspective, numerous causes and correlates of obesity have been researched and supported. One of the more prevalent biological theories is the concept of "set point", which posits that an individual's body is hardwired to maintain a particular body weight, in both normal weight and overweight/obese populations. This theory recently gained additional attention when Fothergill et al. (2016) published results that showed over the course of six years, "Biggest Loser" contestants (a reality television show that pushes extreme and rapid weight loss by contestants who qualify as obese or morbidly obese) regained all or nearly all of the weight they had lost while on the show. The Fothergill et al. study followed up with the contestants 6 years after their weight loss on the show and noted that "metabolic adaptation" defined as weight loss "accompanied by a slowing of resting metabolic rate (RMR) that is often greater than would be expected based on the measured changes in body composition" (p. 1) was a significant reason why

the contestants regained the weight and was one of the processes by which the human body attempts to maintain a particular weight.

A more recent biological theory regarding causes of obesity has come from the area of taste perception. The idea of taster-type – defined as how one experiences the perception of taste – has been introduced as a potential biological factor related to level of consumption and to food choice (Goldstein, Daun, & Tepper, 2005). Taster-type is measured via a test of sensitivity to a chemical called propylthiouracil (PROP), which tastes bitter to certain individuals as the result of a genetic variation. People who are sensitive to PROP also tend to experience tastes more intensely than those who are not sensitive to PROP. While most studies (Bajec & Pickering, 2010; Drewnowski, Henderson, Hann, Barratt-Fornell, & Ruffin, 1999; Grimm & Steinle, 2011; Yackinous & Guinard, 2002) examining taster-type and food consumption look for links to BMI, taste preferences, and food choices, very little research has focused on dieting and outcomes of dieting based on taster-type. Additionally, this new area of taster-type research is still in the process of trying to illuminate the effects of taster-type, particularly as it interacts with various psychological and social variables in influencing diet success.

In contrast to biological explanations, psychological theories attempt to explain obesity as a function of various mental processes and phenomena. These include levels of self-efficacy, motivation, and even opinions/fears about novel foods. One of the more researched psychological theories relates to eating styles, or, how we make choices about and consume food. While research on eating styles has existed for a number of years, only recently have researchers looked at potential relationships between these eating styles and biological factors such as taster-type.

The purpose of the current study was to examine the effect an individual's taster-type has on weight loss, and relatedly BMI, waist circumference, and food neophobia during a four week dieting period. A second aim of the current study was to determine whether or not an individual's taster-type is a more powerful predictor of weight-loss than psychosocial factors such as motivation, self-efficacy, and dietary restraint and disinhibition. This study, which examined PROP taster-type and weight loss and their relationship to psychosocial factors, operated from a biopsychosocial framework, taking into consideration the biological and the psychological aspects of dieting. However, what was more critical was the potential to identify which factors (biological or psychological) are more important or have a larger influence on attempts to lose weight and maintain that weight loss. This study was based on the assumption that, in regards to weight loss and weight loss maintenance, biological factors (specifically taster-type) have a significant influence in this model.

CHAPTER 2

BIOPSYCHOSOCIAL CONSIDERATIONS OF OBESITY

The purpose of this study was to examine the potential effect of taster-type on weight, BMI, waist circumference, and food neophobia, with a secondary examination of whether taster-type was a more powerful predictor of weight loss when compared to known relevant psychosocial factors such as motivation, self-efficacy, and eating styles (restrained/unrestrained and levels of inhibition). Coming from a biopsychosocial theoretical orientation, it is critical to examine the influence of each of these areas – particularly the biological and psychological– in understanding the various "causes" for why individuals gain weight and have difficulty losing weight.

Genetics and Obesity

It is well accepted that in mammals a significant portion of eating behavior is related to functioning in the hypothalamus (Shin, Zheng, & Berthoud, 2009). Researchers have found that the energy consumption of lab rats can be significantly affected by creating lesions in particular areas of the hypothalamus. As a result of these lesions, lab rats will engage in hypophagia (a significant decrease in food intake) and lose significant amounts of weight (Keesey & Hirvonen, 1997). However, the ability to manipulate the hypothalamus to promote healthy weight loss in humans is not currently feasible. As such, biological research on eating and weight loss/gain has moved toward a focus on individual genetic factors. These include the influence of the appetite-stimulating hormone ghrelin and the appetite-suppressing hormone leptin (Egecioglu et al., 2011; Friedman, 2002; Grimm & Steinle, 2011; Shin et al., 2009; Speakman et al., 2011), and even reward models that posit that the taste of certain foods enhances one's sense of

pleasure and motivation via reward centers in the brain, which trigger dopamine responses and encourage continued eating (Egecioglu et al., 2011).

One of the leading genetic theories, set-point theory, argues that humans are hard-wired to maintain a certain balance of energy intake and expenditure and that internal systems will fight to maintain this balance, including balances that result in long-term obesity (Levin, 2005; Speakman et al., 2011; Tremblay, 2004; Weinsier et al., 2000; Weinsier, 2001). This process, termed "metabolic efficiency", has a strong genetic component. Crerand et al. (2006) found that individuals who are classified with Class III obesity (BMI > 40) showed evidence of a "genetic predisposition" towards obesity. Chung and Leibel (2008) examined twin studies and found that BMI heritability among the twins was correlated at .50 to .70. Additionally, their research noted that the twins in their study had a total body fat correlation of .75 to .80, a cognitive restraint eating style that correlated at .59, an emotional eating style correlation of .60, and a correlation of .45 for an uncontrolled eating style. Hainer et al. (2001) also found a strong relationship between genetics and set-point in their twin study with an interclass correlation of .77 ($p < .001$). While the genetic contribution to metabolic efficiency is significant, Keesey and Hirvonen (1997) argued that nutrition factors (i.e., food choice) also contribute to weight regulation. Although genetics is an undeniable component of the obesity problem, what one eats is a factor that cannot be ignored. This idea led to research on taster-type and on the links between taster-type and BMI, taste preferences, and food choice.

PROP, Food Preferences, and BMI

Taken from Goldstein et al. (2005), PROP status is defined as "taste responsiveness to the bitterness of 6-n-propyltiouracil (PROP) and phenylthiocarbamide

(PTC)" (p.1017). This is a genetically determined trait that can be traced to a bitter receptor gene on chromosome 7, called *TAS2R38*. Previous research has found that that approximately 70% of Whites respond to the taste of the chemical PROP, with roughly 25% describing the taste as extremely bitter (Bartoshuk, Duffy, & Miller, 1994; Tepper, 1998). These individuals were classified as "supertasters". The remaining 30% Whites do not detect the bitterness of PROP. This results in three taster-types: nontasters, medium-tasters, and supertasters (Bartoshuk et al, 1994). While roughly 70% of Whites taste PROP to some degree, there is significant variation in taster-type among various ethnic groups. Drewnowski, Kristal, and Cohen (2001) found higher rates of tasters (those who can taste the presence of PROP) among Asians and Africans as compared to Whites. Additionally, data compiled by the Epidemiology and Biostatistics Program of the National Institute of Deafness and Other Communication Disorders (2010) based on work by Guo and Reed (2001) revealed that rates of nontasters by population ranged from as low as 9.9% in Central American or Caribbean groups all the way to 49.7% of Australian Aborigines.

In addition to racial/ethnic differences, taster-type also varies by age and gender. In general, taster-type thresholds increase with age, meaning that an individual's ability to taste PROP decreases as the individual gets older (Guo & Reed, 2001; Schiffman et al., 1994; Tepper, 1998; Whissell-Buechy, 1990). This effect holds true regardless of gender (Drewnowski et al., 2001). Gender differences for taster-type are also fairly robust. Women are more likely to be tasters as comparted to men and are able to taste PROP at lower thresholds (Drewnowski et al., 2001; Guo & Reed, 2001; Tepper, 1998).

The three taster-type classifications (nontaster, medium-taster, and supertaster)

show differing perceptions of food-related tastes including spiciness, alcohol, and sweetness, as well as bitterness. There is also evidence that taster-type affects the perception of fats in various foods with supertasters being more sensitive to fat, although many of these findings have been restricted primarily to children (Duffy & Bartoshuk, 2000; Keller, Steinmann, Nurse, & Tepper, 2002; Keller & Tepper, 2004). Furthermore, the data regarding food choice and taster-type are mixed. Some researchers have found PROP tasters (i.e. medium-tasters and supertasters) tend to avoid Brussels sprouts, cabbage, spinach, and other bitter fruits/vegetables and beverages (Drewnowski et al., 1999; Grimm & Steinle, 2011), while others have found that PROP tasters eat more dietary fat and less green salad but do not differ from nontasters in the intake of bitter fruits and vegetables (Yackinous & Guinard, 2002). There is also some evidence that supertasters are more likely to dislike sweet foods (Yeomans, Tepper, Rietzschel, & Prescott, 2007). Even in the midst of these mixed results, differences in taster-type appear to have some impact on how individuals experience food and make food choices. For example, Tepper, Neilland, Ullrich, Koelliker, and Belzer (2011) found that nontasters ate more during an *ad libitum* buffet than did supertasters, although these groups did not differ in the amount of fat consumed.

Researchers argue that the differences in consumption should also mean a difference in certain biological variables related to eating, in particular BMI. Research regarding taster-type and BMI is mixed, however (Donaldson, Bennett, Baic, & Melichar, 2009). Some studies show no relationship between taster-type and BMI (Bajec & Pickering, 2010; Dotson, Shaw, Mitchell, Munger, & Steinle, 2010; Grimm & Steinle, 2011), while other studies have linked higher BMI levels to both nontasters (Goldstein et

al., 2005) and supertasters (Lumeng, Cardinal, Sitto, & Kannan, 2008). Further, there is some argument that the relationship between taster-type and BMI can be mitigated by psychological variables, specifically restraint and disinhibition (Tepper & Ullrich, 2002). Regardless, researchers still appear to believe that taster-type is an important component in understanding "dietary behaviors that associate with higher risk of increased weight gain, obesity, and certain chronic disease states" (Tepper & Ullrich, 2002, p. 310).

In examining the research on the effect of taster-type on BMI and food choice, it is important to consider the samples and methodology used in these studies. Given that taster-type rates vary based on race/ethnicity as well as age, sampling issues can easily lead to the aforementioned "mixed" results. For example, much of the research on taster-type and food choice, including fat preferences, has been conducted on children or adolescents (Donaldson, Bennett, Baic, & Melichar, 2009; Grimm & Steinle, 2011; Keller et al., 2002; Keller & Tepper, 2004). Additionally, some of the research was conducted only on women or had samples made up primarily of women (Drewnowski et al., 1999; Grimm & Steinle, 2011; Yeomans, Tepper, Rietzschel, & Prescott, 2007). Methodological differences are also apparent in nearly all studies. To classify individuals as tasters or nontasters, researchers have used a variety of approaches, including liquid solution-based tests, paper strip tests, genetic testing, and/or counting of fungiform papillae. Each of these methods has benefits and weaknesses, but the lack of consistency in measurement makes research results difficult to compare and leads to inconclusive findings overall.

Psychosocial Issues and Measurements

Another key factor in the discussion of energy consumption and taster-type is the

relevance of psychosocial factors, including restraint/disinhibition, food neophobia, and self-efficacy/motivation. Each of these has an effect on food choice and interacts with taster-type in unique ways. One of the most researched factors is the relationship of restraint and disinhibition to eating and taster-type. "Disinhibition is the tendency to overeat in response to different stimuli, and can occur in a variety of circumstances such as when an individual is presented with an array of palatable food choices or is under emotional distress. Restraint is the conscious restriction of food intake to prevent weight gain or promote weight loss" (Hays & Roberts, 2008, p. 52).

The most commonly used assessment of disinhibition and restraint is the Three-Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985), which also measures a third variable – hunger. The TFEQ was created in response to an eating phenomenon observed in the lab called "counter-regulation", where individuals who were given a "preload" (typically in the form of a milkshake) subsequently consumed more food than did those who did not receive the preload. Stunkard and Messick (1985) argued that this occurrence was a result of an interaction between restraint, which was stressed by the preload, and disinhibition, which kicks in as a result of that stress and undermines an individual's cognitive control of eating. This effect, originally observed and explored by Herman and Mack (1975), is fairly robust and can be brought about by preloading, changes in mood, or the consumption of alcohol (Mills & Palandra, 2008; Ouwnes, van Strien, & van der Staak, 2003).

Using the TFEQ allows for an examination of the interplay of restraint, disinhibition, and hunger with taster-type and food choices. For example, using the TFEQ on a sample of 40 normal-weight women, Yeomans, Tovey, Tinley, and Haynes

(2004) discovered that individuals scoring high on disinhibition (overeating due to various stimuli such as palatable food or various emotional states) and low on restraint (restricting one's food intake) were more responsive (had greater levels of food intake) to palatable food choices such as pasta with seasoned tomato sauce. Chamber and Yeomans (2011) expanded on the Yeomans et al. (2004) study and found that in a sample of 64 healthy weight women, the increase in intake for a high-disinhibition group occurred only following a high carbohydrate breakfast but not following a high fat breakfast. They also found support for the TFEQ disinhibition scale as a good measure of tendency to overeat. Westenhoefer, Broeckmann, Münch, and Pudel (1994) found that, in general, high disinhibitors ate more than low disinhibitors. Additionally, several researchers have linked higher disinhibition with higher BMI levels (Bellisle et al., 2004; Goldstein et al., 2005; Hays & Roberts, 2008).

The addition of taster-type in relation to restraint and disinhibition results in more complicated findings. For example, in their sample of 381 Amish women, Dotson et al. (2010) found that women categorized as PROP tasters showed significantly decreased disinhibition but there was no link to BMI levels, despite the fact that there was a strong correlation between disinhibition and BMI for these Amish women. Tepper and Ullrich (2002), however, found that disinhibition and restraint mitigated the relationship between taster-type and BMI for their sample of 86 women recruited from a local university and surrounding community. They noted that BMI levels differed significantly by taster-type in the low-restraint condition. In their study of 40 women who were mothers of 7- to 11-year-old children, Goldstein et al. (2005) found that restraint had a greater influence than did taster-type on eating and body weight, while disinhibition had a greater influence on

BMI than did taster-type. These studies serve to illustrate the complex nature in which psychological variables like disinhibition and restraint interact with biological variables such as taster type and BMI. Despite the complicated relationships among restraint, disinhibition, and taster-type, most researchers agree with the conclusions of Lindroos et al. (1997) that the disinhibition scale is a strong independent measure that allows for differentiation of obese and nonobese individuals and is a valid measure for studying and predicting eating behaviors.

While previous research has looked at disinhibition and restraint via self-reported eating behaviors or has examined eating behaviors manipulated in the lab, the current study examined food choices and eating behaviors as they related to weight loss and potentially to weight maintenance. This is an important distinction in that general eating behaviors and food choice are different from eating behaviors and food choice when dieting. For example, Butryn, Thomas, and Lowe (2009) examined two factors within the disinhibition scale: Internal disinhibition, "eating in response to cognitive and emotional cues" (p. 1101); and external disinhibition, "eating in response to environmental cues" (p. 1101), and how these relate to weight loss and weight loss maintenance. Butryn et al. found that changes in internal disinhibition over a three-month period during the weight loss phase was a significant predictor of weight loss and weight maintenance while external disinhibition was not a significant factor in maintenance. Levine et al. (2007) had similar results and noted that weight maintenance improved with increasing dietary restraint and decreasing dietary disinhibition. They argued that the TFEQ was a useful tool in distinguishing those who were successful at weight maintenance from those who were not. In short, these studies illustrate that using

the TFEQ and examining an individual's eating style (via levels of disinhibition and restraint) can be helpful in understanding some of the psychological variables affecting both general eating and weight loss.

Although the previous studies looked at both disinhibition and restraint, Carmody, Brunner, and St. Jeor (1995) took a slightly different route, examining disinhibition combined with dietary helplessness (which included dietary self-efficacy and mood) in examining weight-cyclers, defined as individuals who "yo-yo diet" (p. 248). They found significant differences between obese and nonobese individuals in regards to dietary helplessness and disinhibition, with greater disinhibition and dietary helplessness associated with obesity. This study by Carmody et al. is unique in that it also examined other psychological variables such as self-efficacy in relation to restraint and disinhibition and how these variables might affect weight loss. For example, an individual's motivation and sense of self-efficacy while dieting can be important factors in their level of success (Georgiadis, Biddle, & Starvou, 2006). However, variables such as motivation and self-efficacy can also overwhelm the effects of taster-type when examining weight loss and result in nonsignificant findings. As such, measuring the self-efficacy and motivation of the participants and controlling for these was necessary for the current study.

Other psychological variables related to taster-type, especially food neophobia (the reluctance to eat and/or avoidance of novel foods) and sensation-seeking (including impulsivity), are also relevant when discussing food choice, in that each of these variables affects eating choices and can potentially affect the influence of taster-type on food consumption and weight loss. Examining how arousal level affected novel food

choice among college students, Pliner and Melo (1997) found that lower arousal led to an increased likelihood of choosing novel foods. Yeomans, Leitch, and Mobini (2008) found a significant link between disinhibition, as measured by the TFEQ, and impulsivity and suggested that the "tendency to over-eat may be related to impulsive personality type" (p. 474). Jansen, Klaver, Merckelbach, and van den Hout (1989) discovered a link between sensation-seeking and "restrained" eating, measured by the Restraint Scale of the TFEQ, with a tendency for these restrained eaters to habituate quickly when exposed to neural stimuli. Each of these studies supports the idea that eating can be affected by individual arousal levels and the need to meet that optimal level of arousal by choosing new (more exciting) foods.

The individual need for arousal is complicated by the fact that PROP tasters tend to avoid new foods and theoretically should show higher levels of food neophobia and lower scores on measures of sensation-seeking. Monneuse et al. (2008) looked at taster-type and food neophobia among obese adolescents following a weight reduction session. Being a PROP taster made it more difficult to overcome food neophobia, with nontasters more likely to accept healthy foods as a part of their diet. Monneuse et al. (2008) argued that taster-type may be a predictor of behavior changes regarding food choice when individuals are attempting to lose weight. Examining food adventurousness and taster-type among a sample of adults from the local university and community, Ullrich, Touger-Decker, O'Sullivan-Maillet, and Tepper (2004) found that although supertasters could be food adventurous and tried a larger variety of strong-tasting foods as compared to their non-adventurous supertaster counterparts, supertasters were not as adventurous as nontasters. While it seems logical to assume that tasters in general have higher levels of

food neophobia, Bajec and Pickering (2010) found no relationship between taster-type and food neophobia. Similar to the research between disinhibition, restraint, taster-type and weight loss, the research on food neophobia and taster-type is also mixed. Without a clear understanding of how these various psychological variables interplay with taster-type and weight loss, it was important to examine all of them in the current study.

Diet Types

While the impact of genetics and psychosocial variables has been examined in relation to weight loss, the discussion would not be complete without mention of current dieting methods. Abete, Parra, Zulet, and Martínez (2006) conducted a critical review of the most common diets (based on macronutrients). These included: a) balanced low-energy diets (diets consisting of 10-20% of calories from protein, 50-65% of calories from carbohydrates, and 25-35% of calories from fat with a total caloric range of 800-1500 kcals per day); b) very low-calorie diets (diets consisting of no more than 800 kcals per day); c) high-fat/low-carbohydrate diets (diets consisting of 45-65% of calories from fat and less than 30% of calories from carbohydrates); d) high-carbohydrate/low-fat diets (60% of calories from carbohydrate, 25% of calories from fat, and 15% of calories from protein).; and e) high-protein/low-carbohydrate diets (25-30% of calories from protein and less than 30% of calories from carbohydrates). Nearly all of the diets resulted in moderate weight loss when energy restriction was the focus, but when dieters were allowed to eat freely and to engage in low-fat or high-fat/low-carbohydrate diets, the average weight loss decreased. Given that diets are most successful when following an energy restriction focus, individuals attempting to lose weight should be able to utilize an eating plan that focuses on a particular macronutrient such as fat or carbs, as long as

energy restriction is the primary goal.

Another key component to successful dieting is a structured program (including energy restriction, food logs, frequent weigh-ins, and exercise promotion). Indeed, McGuire, Wing, Klem, Seagle, and Hill (1998) found that the methods chosen by an individual to lose weight were less important than the behavioral strategies that the individual used. The current study asked all participants to engage in a structured program of food/activity logging. Also, critical to the current study was the inclusion of participants who were not in a dieting "program" such as Jenny Craig or Weight Watchers. Having participants diet in vivo allowed for the examination of taster-type effect without the influence of a lab environment on possible results. For example, Tomiyama, Moskovich, Haltom, Ju, and Mann (2009) illustrated the differences in eating behaviors in and out of the lab when looking at diet violation. They found that although previous research illustrated the presence of an overconsumption effect in the lab, dieters did not overconsume when an overconsumption opportunity was presented outside of a laboratory setting. As such, it appears that studying participants' eating behaviors in the "real world" may be imperative to understanding the potential effects of taster-type on food choice and dieting.

Purpose of the Study and Hypotheses

With various biological and psychological factors potentially contributing to the complex issue of weight loss, the intent of this study was to examine whether taster-type was a significant factor and, if so, to what level when examining the role of taster-type in relation to other psychosocial variables such as motivation and self-efficacy on weight loss. Based on previous research (Drewnowski et al., 1999; Grimm & Steinle, 2011;

Ullrich et al., 2004), it was expected that in the general population, supertasters would restrict their food choices (particularly fruits and vegetables) and exhibit higher levels of food neophobia. Given this, the question becomes how do these differences in taste perception impact dieting attempts by individuals? Additionally, how might possible differences in dieting also be impacted by various psychological factors including eating styles (restraint/disinhibition), self-efficacy, and motivation? The current study sought to examine these questions.

Hypotheses

Three specific hypotheses were tested in this study.

Based on the findings of Lumeng et al. (2008) and Tepper and Ullrich (2002) that taster-type is correlated with BMI, the first hypothesis contained two propositions. The first proposition was that: Supertasters would be different from nontasters on weight across time and that both groups would have decreased weight across time (H1a). The second proposition was that: Supertasters would be different from nontasters on BMI and waist circumference over time and that both groups would have lower BMIs and waist circumference measurements over time (H1b).

Based on the findings of Monneuse et al. (2008) and Ullrich et al. (2004) that food neophobia is related to taster-type, the second hypothesis proposed that: Supertasters would have higher levels of food neophobia over time compared to nontasters (H2).

Based on findings by Yeomans et al. (2004), Chamber et al. (2011), Dotson et al. (2010), Tepper and Ullrich (2002), Lindroos et al. (2007), Levine et al., (2007) and Carmdoy et al. (1995) that psychological variables such as motivation, self-efficacy, and level of restraint/disinhibition can influence consumption, dependent on taster-type, the

third hypothesis proposed that: Taster-type would add to the prediction of weight loss above and beyond psychosocial factors (including levels of motivation, self-efficacy, and levels of restraint/disinhibition) (H3).

CHAPTER 3

METHOD

Recruitment and Sample

Participants were solicited via listserve emails, fliers, and in-class presentations. Eligible participants had to be 18 years of age or older and were required to have a BMI of 25 or above. Participants were offered an incentive for weekly participation (occasional random drawings for a water bottle or pedometer) as well as a final drawing for an iPod shuffle upon completion of the study. The study recruitment procedures and incentives met IRB requirements for research with human subjects and was approved by the IRB for the university and the community college (see Appendix A). Recruitment took place in multiple rounds over the course of 2 and a half years due to significant attrition rates (greater than 50% at the beginning of the study).

Ninety individuals who were faculty, students, and staff at a southwestern research university and a local community college initially responded to the recruitment efforts and were screened for exclusion criteria. These criteria included: current symptoms of clinical depression based on an administration of the Major Depressive Inventory (MDI); a diagnosis of Bipolar Disorder or Major Depressive Disorder in the past five years; any diagnosis of an eating disorder in the past 10 years; any recent bingeing behavior (the last six months); being pregnant or planning to become pregnant in the next six months, or were lactating; any substance abuse or dependence disorders; use of any medications that impacted energy consumption and expenditure; and being unable to meet the study timeline requirement of four weeks.

Of the 90 participants who attended the first session, six were immediately

declared ineligible due to scores greater than 30 on the MDI, which indicated significant symptoms of depression. One participant changed her mind about being involved in the study, and one participant did not qualify due to having a BMI below the cut-off of 25. As a result, 83 participants completed the entire first session (referred to as the "initial" sample). The mean age for this initial sample was 39.09 (*SD* = 13.98). A majority of the 83 participants (over 60%) identified as Caucasian and more than three-fourths (77%) identified as female. Nearly half of the initial sample (44.6%) identified as students with the remaining identifying as faculty or staff. Similarly, the majority of the initial sample (43.4%) reported their relationship status as "Engaged/Married/Civil Partners", with 20.5% as "Single", and 18.1% as "Committed Relationship". The demographic data for the initial sample is presented in Table 1.

Over the course of the four-week protocol, 34 participants dropped out via communication with the researcher and/or by simply failing to attend, leaving 56 participants who completed the entire four-week study. An additional four participants completed 60% of the required weigh-ins but missed the final weigh-in. An Independent Samples t-test was conducted on all pre-measures to determine whether the missing data from these four participants, as well as the 34 dropped participants, were missing at random. No significant differences were found (see Appendix D). Given the data appeared to be missing at random, multiple imputation was used to estimate the final weigh-ins and post-measures responses for these four participants, which resulted in a total of 60 "complete" cases (referred to as the "final" sample). The addition of the four imputed cases resulted in only minor changes to the final means of the biometric data including a .07 pound increase in average weight loss, .02 increase in average BMI

change, and -.08 inch change in average waist circumference. The demographics for both the initial sample and the final sample were nearly identical for ethnicity, gender, college status, and relationship status (see Table 1). Additionally, the mean age of the final sample (M = 39.70, SD = 13.88) was also nearly identical to the initial sample.

Table 1

Demographics for Initial and Final Sample

	Initial Sample		Final Sample	
	Frequency	Percent	Frequency	Percent
Race/Ethnicity				
Asian/Pacific Islander	7	(8.4)	4	(6.7)
Black/African-American	6	(7.2)	6	(10.0)
Native American/Alaskan Native	2	(2.4)	2	(3.3)
Caucasian	51	(61.4)	37	(61.7)
Hispanic/Latino/Latina	12	(14.5)	8	(13.3)
Bi-racial/Multi-racial	4	(4.8)	3	(5.0)
Other	1	(1.2)	0	(0.0)
Total	83	(100)	60	(100.0)
Gender				
Male	19	(22.9)	13	(21.7)
Female	64	(77.1)	47	(78.3)
Total	83	(100.0)	60	(100.0)
College Status				
Student	37	(44.6)	30	(50.0)
Faculty/Staff	46	(55.4)	30	(50.0)
Total	83	(100.0)	60	(100.0)
Relationship Status				
Single	17	(20.5)	12	(20.0)
Engaged/Married/Civil Partner	36	(43.4)	32	(53.3)
Widowed	1	(1.2)	1	(1.7)
Divorced	13	(15.7)	8	(13.3)
Separated	1	(1.2)	0	(0.0)
Committed Relationship	15	(18.1)	7	(11.7)
Total	83	(100.0)	60	(100.0)

Design

This study used a quasi-experimental design to test H1a, H1b, and H2. For H1a, a 2 (taster-type) by 5 (time) repeated measures design was used to test differences in weight. Participants were classified into levels of taster-type, either supertasters or nontasters. Time had five levels - initial, Week 1, Week 2, Week 3, and Week 4. For H1b, a 2 (taster-type) by 2 (time) repeated measures design was employed with BMI and waist circumference as the dependent variables. Participants were again classified by taster-type (supertasters or nontasters), and completed measures for BMI and waist circumference at two time points (initial and Week 4). The same 2 by 2 repeated measures design was used to test differences in food neophobia for H2. The two taster-type levels were supertaster and nontaster, and time had two levels (initial and Week 4). For H3, which examined the potential of taster-type as a predictor of weight loss after psychosocial variables are taken into account, a hierarchical regression procedure was employed to examine predictors of the various weight-related measures at two points in time—2 weeks and 4 weeks.

Procedures

Participants were asked to engage in a diet for four weeks. They were allowed to choose a preferred diet "type" (i.e. low fat, low carb, high-protein, Paleo, Atkins, Mediterranean, etc.); however, they were required to focus on calorie restriction as the central component of the diet. During these four weeks, participants attended five meetings. The first meeting occurred at the beginning of the four-week period. During that meeting, participants completed a survey packet that included a cover letter briefly describing the study, a consent form, a demographic form (which included questions to

assess for exclusion criteria), and the study assessments. A copy of the survey packet can be found in Appendix B. Also during this first meeting, anthropometric measures were taken, including weight (measured in pounds using an analog digital scale rounded to the nearest tenth of a pound), height (measured in inches using a tape measure rounded to the nearest half-inch), and waist circumference (measured in inches at the height of the participant's belly button). BMI was calculated (kg/m^2) using height and weight data. All measurements were taken over light, loose clothing and without shoes. The average BMI for the initial sample was 32.02 (*SD* = 6.97). The biometric data for the initial sample and final sample by gender are presented in Table 2.

Table 2

Biometric Data by Gender for Initial and Final Sample

	Initial Sample			Final Sample		
	n	Mean	SD	*n*	Mean	SD
Males						
Height (cm)	19	178.74	7.39	13	180.54	8.13
Weight (kg)	19	104.41	22.13	13	106.64	24.40
BMI	19	32.70	6.62	13	32.72	7.07
Females						
Height (cm)	64	164.92	7.16	47	164.13	6.79
Weight (kg)	64	87.02	22.30	47	87.45	23.82
BMI	64	31.82	7.10	47	32.26	7.74

Taster-type testing was done for classification of participants into supertaster and nontaster categories. Also during the first meeting, participants were instructed on how to use MyFitnessPal to track their food consumption and exercise. MyFitnessPal is a free weight loss website that provides access to calorie counters, nutrition databases, and exercise information, all of which can be entered via the website or a downloadable mobile app. Participants were also required to submit food/exercise journals every week.

Meetings two through four occurred at the beginning of weeks two through four and consisted of a weigh-in, collection of food/exercise journals, and psychoeducation regarding successful weight loss strategies (see Appendix C). The psychoeducational materials included handouts on topics such as reading food labels, ways to increase physical activity, motivation issues, and common challenges in weight loss. The psychoeducational materials came from the MOVE! Program, a weight management program developed by the Veterans Administration of the U.S. Department of Veterans Affairs. These materials are in the public domain and have been extensively researched for usability and efficacy. Meeting five occurred at the end of week four. In this final meeting, participants were weighed, waist circumference was re-measured, food/exercise journals were collected, and post measures were completed including repeat measures of food neophobia, self-efficacy, and motivation.

PROP Taster Classification – General Labeled Magnitude Scale (gLMS)

Classification of participants on PROP taster status was conducted using commercially available filter paper strips treated with phenylthiocarbamide (PTC), a reliable and well-researched chemical acceptable for assessing an individual's propensity to tasting PROP. The PTC strips were manufactured by Frey Scientific and purchased online. Participants placed the filter paper strip treated with PTC on the center of the tongue for 15-20 seconds and were then asked to rate the intensity of the taste using a paper-pencil version of the General Labeled Magnitude Scale (gLMS; Bartoshuk et al., 2002; Bartoshuk, et al., 2004; Bartoshuk et al., 2005). The gLMS asks participants to rate the intensity of the taste strip on a scale from 0 ("no sensation") to 100 ("the strongest imaginable sensation of any kind"). General cut-off scores for taster-type are:

PROP ≤ 22 (nontasters), PROP 23-49 (medium-tasters), and PROP ≥ 50 (supertasters) according to thresholds used by Dinehart, Hayes, Bartoshuk, Lanier, and Duffy (2006). Lastly, participants were told to rate the intensity of their taste experience based on a sound scale. The sound scale had 8 options ranging from "Silence" to "Loudest sound imaginable". The use of a sound scale to rate the intensity of the taste experience is due to the fact that "intensity" is subjective, similar to ratings of pain. By asking for a sound rating, Bartoshuk and her colleagues created an objective rating scale for a subjective experience to allow for better comparison of taste intensity among individuals.

Given the limited number of participants in the current sample, participants were divided into 2 taster-types with a cut-off score of PROP≤50 classified as nontaster and PROP>50 classified as supertaster, per an accepted modified taster-type classification (L. Bartoshuk, personal communication, May 28, 2016). Additionally, there were four participants who rated PROP greater than 50 but rated the intensity of the taste as low. Given the low intensity ratings, they were categorized as non-tasters for this study. The taster-type classifications for the initial sample and final sample by gender are given in Table 3.

Table 3

Taster-Type Classification by Gender for Initial and Final Samples

	Initial Sample		Final Sample	
	Frequency	Percent	Frequency	Percent
Males				
Nontaster	8	(9.6)	7	(11.7)
Supertaster	11	(13.3)	6	(10.0)
Females				
Nontaster	22	(26.5)	16	(26.7)
Supertaster	42	(50.6)	31	(51.6)
Total	83	(100.0)	60	(100.0)

Study Measures

Major Depression Inventory (MDI). The MDI (Bech, 1998; Bech, Rasmussen, Olsen, Noerholm, & Abildgaard, 2001), a 10-item questionnaire, was used to assess for the *DSM–IV–TR* (2000; 4th ed., text rev.) symptoms of depression. At the time this study was developed, the *DSM-IV-TR* was the most current version in use; the *DSM-V* had not yet been introduced. The MDI asks participants to rate how often they had felt a particular emotion or engaged in a particular behavior ("Have you felt subdued or slowed down?") over the past two weeks. Participants rated each item on a 6-point Likert-type scale ranging from "All the time" (5) to "At no time" (0). Possible MDI scores range from 0 to 50 with scores of 20-24 indicating mild depression, scores of 25-29 indicating moderate depression, and scores of 30 or higher indicating severe depression. Olsen, Jensen, Noerholm, Martiny, and Bech (2003) reported an internal consistency reliability coefficient of .90 and a correlation of .86 ($p < .01$) with the Hamilton Depression Scale. For the purposes of this study, any participants with a score of 30 or higher were excluded from the study. For the current study, the initial sample had an internal consistency reliability coefficient of .86 and a relatively low average depression score of 10.79 ($SD = 7.61$).

Liking/Disliking Food Questionnaire (LDFQ). The Liking/Disliking Food Questionnaire, developed by Capaldi, Wadhera, and Wilkie (2009), examines the liking/disliking of particular foods. During the development of this scale, the purpose of the measure was to discover "benchmark" foods that help to distinguish taster-type. The LDFQ contains a list of 58 foods, such as canned tuna and soy sauce. Participants were asked to rate their "intensity of liking for that particular food" on a scale from -100

("Strongest Imaginable Disliking of Anything, Not Just Food") to +100 ("Strongest Imaginable Liking of Anything, Not Just Food"). No validity or reliability information for this scale was available.

The Three-Factor Eating Questionnaire-R18 (TFEQ-R18). The original TFEQ is a 51-item questionnaire (Stunkard & Messick, 1985) with three subscales that measure cognitive restraint, disinhibition, and hunger. Reported internal reliability coefficients were .93 for restraint, .91 for inhibition, and .85 for hunger when combining samples of dieters and free-eaters. When using the measure with obese men and women, however, Karlsson, Persson, Sjöström, and Sullivan (2000) found problems with convergent validity with the disinhibition and hunger scales and also found that some of the items in the cognitive restraint scale were unnecessary. Because they were unable to replicate the factor structure of the TFEQ, they developed a shorter, revised version of the TFEQ containing 18 items and 3 subscales: cognitive restraint, uncontrolled eating, and emotional eating. The cognitive restraint subscale was defined as "the conscious effort to restrict food" (p. 1718) and contains 6 items. A sample item is "I consciously hold back at meals in order not to gain weight." The uncontrolled eating subscale was defined as "difficulties in the regulation of eating" (p. 1718) and contains 9 items. A sample item is "Sometimes when I start eating, I just can't seem to stop." The emotional eating subscale was defined as "overeating during dysphoric mood states" (p. 1718) and contains 3 items. A sample item is "When I feel blue, I often overeat." Participants were asked to indicate their level of agreement with each of the statements on a 4-point Likert-type scale ranging from "Definitely True" (4) to "Definitely False" (1). Ratings are summed to form total scores for each subscale, ranging from 6 – 24 for cognitive

restraint, 9 – 36 for uncontrolled eating, and 3 – 12 for the emotional eating subscale. Higher total values on each subscale indicate more of the behavior. Internal reliability coefficients for the new subscales were reported as .77, .83, and .85 for cognitive restraint, uncontrolled eating, and emotional eating, respectively. de Lauzon et al. (2004) and Anglé et al. (2009) also found support for use of the measure with a French sample from the general (non-obese) population. In the current study, the initial sample had internal reliability coefficients of .73 for cognitive restraint, .84 for uncontrolled eating, and .75 for emotional eating.

Weight Efficacy Lifestyle Questionnaire (WELQ). Developed by Clark, Abrams, Niaura, Eaton, and Rossi (1991), the WELQ consists of 20 challenging eating situations (i.e., "I can control my eating on the weekends") that measure five dimensions of eating self-efficacy: availability; negative emotions; physical discomfort; positive activities; and social pressure. The questionnaire is based on Bandura's concept of self-efficacy. Participants were asked to rate their level of confidence in resisting overeating for each of the 20 situations on a 10-point Likert-type scale ranging from "Not confident at all that you can resist the desire to eat" (0) to "Very confident that you can resist the desire to eat" (9). Sample items include, "I can resist eating even when I am at a party" (availability), "I can resist eating when I am anxious" (negative emotions), "I can resist eating when I feel physically run down" (physical discomfort), "I can resist eating when I am happy" (positive activities), and "I can resist eating even when others are pressuring me to eat" (social pressure). Total scores for each dimension range from 0 to 40 with higher scores in a given dimension indicating greater self-efficacy in weight loss and weight management. The authors calculated internal consistency reliability coefficients

for two samples. The first sample consisted of 162 obese individuals enrolled in a 14-session weight loss program, while the second sample consisted of 220 patients treated at a local hospital's outpatient weight-management clinic. For the two samples, respectively, Cronbach's alphas of .76 and .83 were found or the availability scale, .87 and .88 for the negative emotions scale, .82 and .84 for the physical discomfort scale, .70 and .79 for the positive activities scale, and .90 and .89 for the social pressure scale. The current study obtained internal consistency reliability coefficients of .86 for availability, .85 for negative emotions, .68 for physical discomfort, .61 for positive activities, and .87 for social pressure.

Treatment Self-Regulation Questionnaire – Weight Loss (TSRQ). The TSRQ was developed based on self-determination theory, a motivational construct that posits that autonomy, competence, and relatedness are the primary intrinsic motivators for human action. The TSRQ specifically examines the interplay between autonomous regulation (an intrinsic motivator) and controlled regulation (an extrinsic motivator). The TSRQ was first used by Williams, Grow, Freedman, Ryan, and Deci (1996) to examine an individual's motivation for "behaving in a healthy way." It has also been adapted for use in assessing diabetes treatment compliance and other health-related behaviors such as smoking cessation and weight loss. For the TSRQ for weight loss, participants were asked to rate their level of agreement for 18 statements using a 7-point Likert-type scale ranging from "Not at all true" (1) to "Very true" (7). Examples of autonomous statements include "If I remain in treatment it will probably be because I feel like it's the best way to help myself," and "I decided to enter this weight-loss program because it feels important to me personally to feel thinner." Examples of controlled statements include "If I remain

in treatment it will probably be because people will think I'm a weak person if I don't," and "I have agreed to follow the procedures of the program because I want others to see that I am really trying to lose weight." There are six items on the autonomous regulation subscale and 12 items on the controlled regulation subscale. In explaining why there are more controlled items than autonomous items on the measure, the scale developers argued that there are multiple controlled reasons for engaging in a behavior as compared to autonomous ones. As a result, more controlled regulation items are given to obtain adequate reliability for the controlled regulation subscale. Scores for items within each subscale are averaged, with higher scores reflecting higher levels of motivation for the specific subscale. Levesque et al. (2007) validated the theoretical structure of the TSRQ for three health behaviors – smoking, diet, and exercise – with participants across four different sites. Cronbach's alpha internal consistency reliabilities across the data sets ranged from .73 to .93. The current study obtained internal consistency reliabilities of .67 for the autonomous subscale and .87 for the controlled subscale.

Food Neophobia Scale (FNS). The FNS (Pliner & Hobden, 1992) is a 10-item scale developed to measure food neophobia defined as "the reluctance to eat, and/or avoidance of, novel foods" (p. 105). Participants were asked to rate their level of agreement with each statement (such as "I don't trust new foods") on a 7-point Likert-type scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (7). Total scores can range from 10 to 70 with higher scores indicating higher levels of food neophobia. For two samples of undergraduate college students (consisting of 135 and 75 participants respectively) in lower level psychology courses, Pliner and Hobden (1992) reported internal consistency reliabilities of .88. Additionally, 3-week test-retest reliabilities of .91

and .87 and a 15-week test-retest reliability of .82 were also reported. For the current study, an internal consistency reliability of .88 was found.

Food/Exercise Journals. Participants used MyFitnessPal to track all food consumption and exercise. The program is available online and also via a mobile app. MyFitnessPal maintains a database of over 3 million foods and also allows the user to enter custom nutrition information. Additionally, MyFitnessPal allows users to compile and print out their food/exercise journals, which provided convenience and consistency for both the participants and the researcher.

Data Analysis Plan

The first part of hypothesis one (H1a), which predicted that supertasters would be different from nontasters on weight over time and that both groups would have decreased weight across time, was tested using a multivariate analysis of variance (MANOVA) with taster-type as the between-subjects variable, time as the repeated measures variable, and weight as the dependent variable. The second part of hypothesis one (H1b), which predicted that supertasters would be different on BMI and waist circumference over time and that both groups would have decreased BMIs and waist circumference measurements across time, was tested using a MANOVA with taster-type as the between-subjects variable and time as the repeated measures variable. BMI and waist circumference were the dependent variables.

H2, which predicted that supertasters would have higher levels of food neophobia compared to nontasters over time, was tested using a MANOVA with taster-type as the between-subjects variable and time as the repeated measures variable. Food neophobia scores were the dependent variable.

H3 posited that taster-type would add to the prediction of weight loss above and beyond psychosocial factors (including levels of motivation, self-efficacy, and levels of restraint/disinhibition) and was tested using hierarchical multiple regression procedures. Taster-type, restraint/emotional eating/uncontrolled eating, self-efficacy, and motivation scores served as the predictor variables and pounds lost as the criterion variable. Hierarchical multiple regressions were conducted with weight change scores at two weeks and four weeks as the predictor variables.

CHAPTER 4

RESULTS

Preliminary Analyses

Intercorrelations among and descriptive statistics for the study measures were calculated and are presented in Tables 4 and 5, respectively. Correlations for the initial sample are presented above the diagonal, and correlations for the final sample are presented below the diagonal. As can be seen in Table 4, for both the initial and final samples there were significant correlations between the unconditional eating and emotional eating subscales of the TFEQ and the availability, social pressure, physical discomfort, and positive activities subscales of the WELQ. Additionally, the controlled subscale of the TSRQ was significantly correlated with the unconditional subscale of the TFEQ and the negative emotions, availability, physical discomfort, and positive activates subscales of the WELQ for the initial and finals samples. Lastly, the food neophobia measure (FNS) was positively correlated with the availability subscale of the WELQ in both samples (see Table 4).

While a majority of the correlations from both samples were similar, there were a few differences. In the final sample, cognitive restraint (r = .315, p = .015) and uncontrolled eating (r = -.321, p = .013) were significantly correlated with food neophobia, while in the initial sample these correlations were not significant. Additionally, for the final sample there was no correlation between food neophobia and the social pressure subscale of the WELQ; however, for the initial sample there was a significant positive correlation between the two (r = .227, p = .042). Lastly, cognitive

Table 4

Correlations of Pre-Measures for the Initial and Final Samples

		Food Neophobia	Autonomous Motivation	Controlled Motivation	Cognitive Restraint	Uncontrolled Eating	Emotional Eating	Negative Emotions	Availability	Social Pressure	Physical Discomfort	Positive Activities
Food Neophobia	Pearson Corr.	1	.045	.160	.214	-.213	-.063	.123	.293**	.227*	.091	.000
	Sig. (2-tailed)		.691	.151	.054	.054	.569	.271	.008	.042	.427	.998
Autonomous Motivation	Pearson Corr.	.068	1	.243*	.124	.038	.114	-.200	-.094	.127	.023	-.086
	Sig. (2-tailed)	.614		.029	.272	.740	.310	.076	.412	.265	.840	.448
Controlled Motivation	Pearson Corr.	.141	.268*	1	-.201	.337**	.191	-.264*	-.362**	-.161	-.340**	-.314**
	Sig. (2-tailed)	.287	.042		.072	.002	.085	.017	.001	.153	.002	.004
Cognitive Restraint	Pearson Corr.	.315*	.150	-.194	1	-.377**	-.097	.185	.580**	.319**	.279*	.285**
	Sig. (2-tailed)	.015	.264	.144		.000	.386	.098	.000	.004	.013	.010
Uncontrolled Eating	Pearson Corr.	-.321*	.141	.267*	-.492**	1	.452**	-.492**	-.654**	-.542**	-.510**	-.500**
	Sig. (2-tailed)	.013	.295	.043	.000		.000	.000	.000	.000	.000	.000
Emotional Eating	Pearson Corr.	.022	.052	.118	-.160	.448**	1	-.706**	-.330**	-2.93**	-.386**	-.379**
	Sig. (2-tailed)	.868	.696	.375	.227	.000		.000	.003	.008	.000	.000
Negative Emotions	Pearson Corr.	-.006	-.229	-.286*	.274*	-.530**	-.680**	1	.508**	.374**	.565**	.606**
	Sig. (2-tailed)	.961	.084	.028	.036	.000	.000		.000	.001	.000	.000
Availability	Pearson Corr.	.292*	-.078	-.395**	.724**	-.720**	-.293*	.482**	1	.548**	.518**	.546**
	Sig. (2-tailed)	.025	.565	.002	.000	.000	.025	.000		.000	.000	.000
Social Pressure	Pearson Corr.	.196	.094	-.077	.364**	-.508**	-.328*	.316*	.530**	1	.622**	.397**
	Sig. (2-tailed)	.133	.483	.562	.005	.000	.011	.014	.000		.000	.000
Physical Discomfort	Pearson Corr.	.023	.013	-.345**	.371**	-.558**	-.454**	.551**	.537**	.583**	1	.613**
	Sig. (2-tailed)	.867	.922	.009	.005	.000	.000	.000	.000	.000		.000
Positive Activities	Pearson Corr.	-.084	-.146	-.280*	.322*	-.457**	-.408**	.615**	.535**	.261*	.600**	1
	Sig. (2-tailed)	.526	.275	.032	.013	.000	.001	.000	.000	.044	.000	

Initial sample correlations appear above the diagonal and the final sample correlations appear below the diagonal.

restraint was not significantly correlated with the negative emotions subscale of the WELQ in the initial sample; however, the final sample showed a significant positive correlation between cognitive restraint and negative emotions ($r = .274$, $p = .036$).

The taster-type classification for both the initial sample and the final sample were similar, with the average bitterness rating: $M = 67.16$, $SD = 35.09$ for the initial sample and $M = 66.17$, $SD = 34.09$ for the final sample. Additionally, taster-type ratings were compared between the incomplete and complete cases using an Independent Samples *t*-test. There was no significant difference found in bitterness ratings, $t(81) = .413$, $p > .05$, between those who completed the study and those who did not.

Table 5

Means and Standard Deviations for Time and Taster-Type for Weight

	Weight Measurement Periods				
Taster-Type	Initial	Week 1	Week 2	Week 3	Week 4
Supertasters					
M	208.07	206.52	206.20	205.42	203.95
SD	53.24	52.06	52.54	51.75	50.74
Nontasters					
M	192.11	190.79	189.13	189.75	188.95
SD	58.49	56.63	57.24	57.56	57.01
Totals					
M	201.95	200.12	199.64	199.29	198.17
SD	55.21	54.64	53.75	54.07	53.38

Analyses of Hypotheses

Three separate MANOVAs using a Wilks' Lambda test statistic were conducted to test Hypotheses 1a and 1b. H1a predicted that supertasters would be different than nontasters as measured by weight over time and that both groups would have decreased weight across time. Initially, a 2 (taster-type) by 5 (time) repeated measures ANOVA was conducted with weight scores as the dependent variable. The five time periods were

initial, Week 1, Week 2, Week 3, and Week 4. There was no significant main effect for taster-type, $F(1,53) = 1.13$, $p = .292$. There was a significant main effect for time, $F(4, 50) = 12.39$, $p = .000$ (see Table 5 for means and standard deviations). There was also a significant interaction effect, $F(4,50) = 2.59$, $p = .048$. To test the time main effect, pairwise comparisons for the five time periods were conducted using a Bonferroni adjustment. The significance level was set at $p = .005$. This was calculated by dividing .05 by 10. Of the 10 comparisons, 4 were significant. The results of the pairwise comparisons are presented in Table 6. Weight at initial was higher than weight at Weeks 2, 3, and 4. Also weight at Week 1 was higher than at Week 4. A linear trend for time was found, $F(1, 53) = 46.78$, $p = .000$, revealing that weight decreased linearly over time across both taster-type groups.

Table 6

Pairwise Comparisons for Time Main Effect for Weight

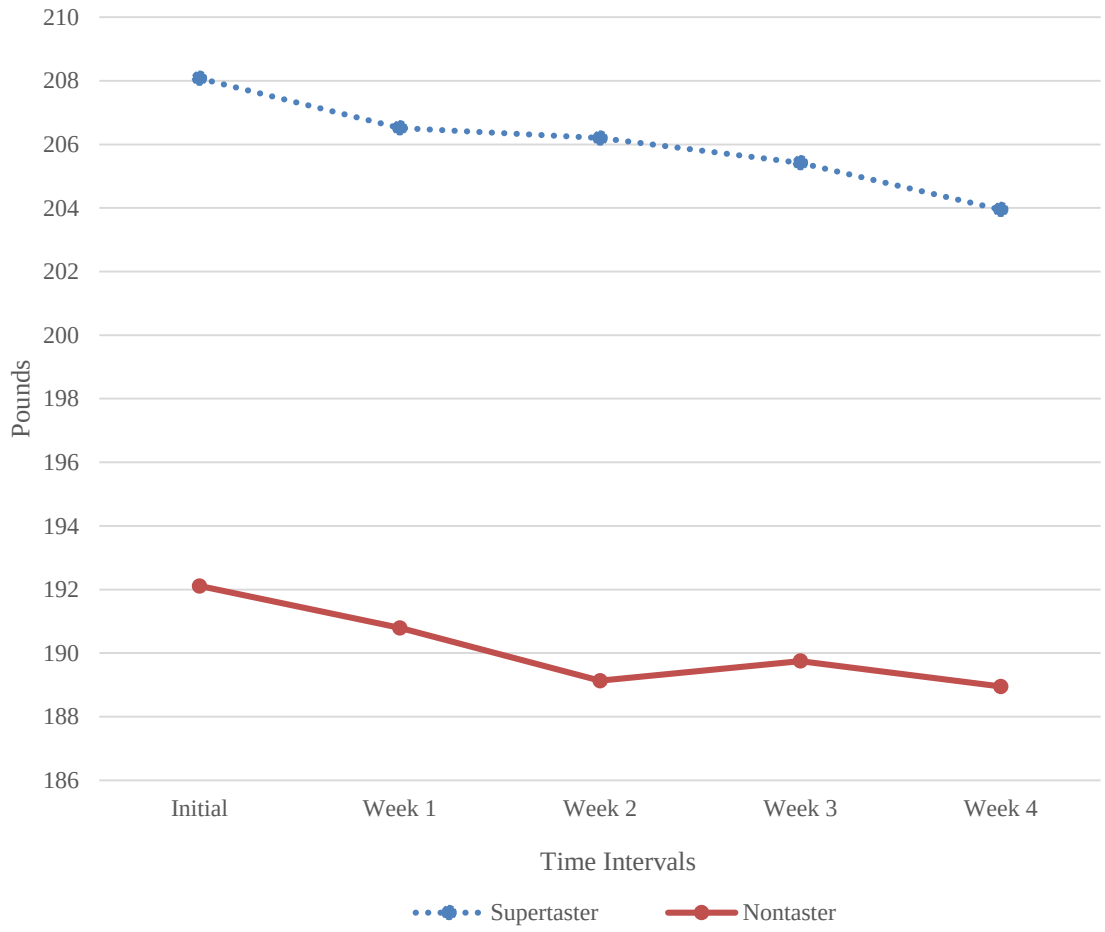
		Mean Difference		95% CI	
(I) Time	(J) Time	(I-J)	Sig.	Lower	Upper
Initial	Week 1	1.437	.040	.036	2.837
	Week 2	2.426*	.000*	1.082	3.769
	Week 3	2.500*	.000*	1.026	3.974
	Week 4	3.639*	.000*	2.028	5.249
Week 1	Initial	-1.437	.040	-2.837	-.036
	Week 2	.989	.039	.029	1.950
	Week 3	1.063	.058	-.020	2.147
	Week 4	2.202*	.000*	.961	3.443
Week 2	Initial	-2.426*	.000*	-3.769	-1.082
	Week 1	-.989	.039	-1.950	-.029
	Week 3	.074	1.000	-.710	.859
	Week 4	1.213	.031	.066	2.360
Week 3	Initial	-2.500*	.000*	-3.974	-1.026
	Week 1	-1.063	.058	-2.147	.020
	Week 2	-.074	1.000	-.859	.710
	Week 4	1.139	.030	.068	2.209

* significance at the $p = .005$ level

To test the significant interaction, taster-type was held constant and weight differences across time were examined by repeated measures ANOVAs. For supertasters, there was a significant main effect for time $F(4,29) = 7.14$, $p = .000$. Pairwise comparisons were run using a Bonferroni adjustment and a significance set at $p = .005$. Of the 10 comparisons, 5 were significant. Supertasters' weight at the initial meeting was higher than their weight at Weeks 2, 3, and 4. Additionally, their weight at Week 1 was higher than at Week 4, and their weight at Week 2 was higher than at Week 4. For nontasters, there was a significant main effect for time $F(4,18) = 7.86$, $p = .001$. Pairwise comparisons using a Bonferroni adjustment and $p = .005$ revealed 5 of 10 significant comparisons. For nontasters, weight at the initial meeting was higher than weight at Weeks 2, 3, and 4. Also, their weight at Week 1 was higher than their weight at Weeks 2 and 4. The pairwise comparisons for the time effect for supertasters and the time effect for nontasters can be found in Table 7.

Figure 1

Weight Loss by Taster-Type Across Time



The second MANOVA tested H1b, which predicted that supertasters would be different on BMI and waist circumference over time and that both groups would have decreased BMIs and waist circumference measurements across time. In this second MANOVA two levels of time (initial and Week 4) were the within-subjects variable and the two taster-type classifications were the between-subjects variable. BMI was the dependent variable. There was a significant main effect for time, $F(1, 58) = 53.28$, $p = .000$. This effect indicated that there was a significant change in BMI from initial ($M = 32.36$, $SD = 7.54$) to Week 4 assessments ($M = 31.75$, $SD = 7.30$). No main effect for

taster-type, $F(1,58) = 2.52$, $p = .118$, was found and no interaction was found, $F(4,50) = 2.59$, $p = .364$. Compared time means and standard deviations on BMI are presented in Table 8.

The third MANOVA also tested H1b. The two levels of time were initial and Week 4, and the two levels of taster-type were taster and nontaster. Waist circumference was the dependent variable. There was a significant main effect for time, $F(1, 58) = 47.79$, $p = .000$, with waist circumference at the initial assessment ($M = 41.21$, $SD = 6.75$) significantly larger than at Week 4 ($M = 39.29$, $SD = 6.50$). There was no significant main effect for taster-type, $F(1,58) = .181$, $p = .672$, and no significant interaction effect, $F(1, 58) = .004$, $p = .949$. Means and standard deviations are presented in Table 8. Overall, hypothesis one (H1) was partially supported.

To analyze H2, which stated that supertasters would have higher levels of food neophobia, a 2 (taster-type) by 2 (time) ANOVA using a Wilks' Lambda test statistic was conducted. Food neophobia was the dependent variable. There was a significant main effect for time, $F(1, 51) = 9.13$, $p = .004$, with initial food neophobia scores ($M = 28.23$, $SD = 12.15$) lower than Week 4 food neophobia scores ($M = 32.87$, $SD = 7.12$). There was no main effect for taster-type, $F(1,51) = 1.41$, $p = .24$, or a significant interaction effect, $F(1, 51) = .067$, $p = .797$. Means and standard deviations are presented in Table 8. Hypothesis two (H2) was not supported.

Table 7

Pairwise Comparisons for Time by Taster-Type Interaction for Weight

	(I) Time	(J) Time	Mean Difference (I-J)	Sig.	95% CI Lower	95% CI Upper
Supertasters	Initial	Week 1	1.552	.010	.390	2.713
		Week 2	1.870*	.004	.652	3.087
		Week 3	2.644*	.000	1.274	4.014
		Week 4	4.118*	.000	2.606	5.630
	Week 1	Initial	-1.552	.010	-2.713	-.390
		Week 2	.318	.461	-.550	1.186
		Week 3	1.093	.036	.078	2.108
		Week 4	2.566*	.000	1.339	3.794
	Week 2	Initial	-1.870	.004	-3.087	-.652
		Week 1	-.318	.461	-1.186	.550
		Week 3	.775	.064	-.047	1.596
		Week 4	2.248*	.000	1.074	3.422
	Week 3	Initial	-2.644	.000	-4.014	-1.274
		Week 1	-1.093	.036	-2.108	-.078
		Week 2	-.775	.064	-1.596	.047
		Week 4	1.474	.007	.439	2.508
	Week 4	Initial	-4.118*	.000	-5.630	-2.606
		Week 1	-2.566*	.000	-3.794	-1.339
		Week 2	-2.248*	.000	-3.422	-1.074
		Week 3	-1.474	.007	-2.508	-.439
Nontasters	Initial	Week 1	1.322	.114	-.343	2.986
		Week 2	2.982*	.000	1.575	4.389
		Week 3	2.356*	.003	.886	3.826
		Week 4	3.159*	.000	1.586	4.732
	Week 1	Initial	-1.322	.114	-2.986	.343
		Week 2	1.660*	.003	.649	2.671
		Week 3	1.034	.056	.029	2.096
		Week 4	1.837*	.002	.784	2.891
	Week 2	Initial	-2.982*	.000	-4.389	-1.575
		Week 1	-1.660*	.003	-2.671	-.649
		Week 3	-.626	.020	-1.145	-.107
		Week 4	.177	.671	-.678	1.033
	Week 3	Initial	-2.356*	.003	-3.826	-.886
		Week 1	-1.034	.056	-2.096	.029
		Week 2	.626	.020	.107	1.145
		Week 4	.804	.101	-.171	1.778
	Week 4	Initial	-3.159*	.000	-4.732	-1.586
		Week 1	-1.837*	.002	-2.891	-.784
		Week 2	-.177	.671	-1.033	.678
		Week 3	-.804	.101	-1.778	.171

* significance at the $p = .005$ level

Table 8

Means and Standard Deviations for Time by Taster-Type on Dependent Variables

	BMI Calculation		Waist Circumference		Food Neophobia	
Taster-Type	Initial	Week 4	Initial	Week 4	Initial	Week 4
Supertasters						
M	33.57	32.90	41.49	39.59	27.91	31.91
SD	7.79	7.50	6.23	6.27	11.84	7.21
Nontasters						
M	30.41	29.89	40.76	38.82	31.21	34.58
SD	6.84	6.72	7.63	6.98	11.81	6.83
Totals						
M	32.36	31.75	41.21	39.29	28.23	32.87
SD	7.54	7.30	6.75	6.50	12.15	7.12

H3 predicted that taster-type would be a predictor of weight-loss success when other psychosocial factors (including levels of motivation, self-efficacy, and restraint/disinhibition) were accounted for. This hypothesis was tested using hierarchical multiple regression procedures. Given the time effects consistently found in the previous analysis, hierarchical regressions were conducted with weight change data at two weeks and at four weeks serving as the dependent variable. In the first regression procedure predicting weight loss at Week 2, psychosocial measures were initially entered in order to determine their separate and combined effects on weight loss. The measures were entered as clusters, with the autonomy and controlled motivation subscales in Step 1. The multiple hierarchical regression revealed that in Step 1 motivation accounted for significant variance, $F(2,47) = 4.36$, $p = .018$, in weight loss over the first two weeks ($R^2 = .156$). The autonomous subscale of the motivation measure was the only significant subscale, $\beta = -.357$, $t = -2.62$, $p = .012$.

The five subscales of the self-efficacy measure (social pressure, positive activities, negative emotions, physical discomfort, and availability) were entered in Step 2. The introduction of the self-efficacy subscales explained an additional 16.7% of the variance, $\Delta F(5, 42) = 2.07$, $p = .089$. In Step 2, the autonomous motivation subscale remained significant, $\beta = -.405$, $t = -3.019$, $p = .004$. The only self-efficacy subscale to be a significant predictor in Step 2 was social pressure, $\beta = .418$, $t = 2.201$, $p = .033$.

In Step 3, the eating styles subscales of uncontrolled eating, emotional eating, and cognitive restraint were entered. They contributed another 3.3% to the accounted for variance in weight loss; however, this was not a significant change, $\Delta F(3,39) = .669$, $p = .576$. In this final step, only the autonomous subscale (motivation) and social pressure subscale (self-efficacy) remained significant; $\beta = -.351$, $t = -2.401$, $p = .021$ and $\beta = .392$, $t = 2.00$, $p = .05$, respectively. The full model with the three psychosocial variables (motivation, self-efficacy, and eating style) accounted for 35.6% of the variance in weight loss during the first two weeks, and was significant, $F(10,39) = 2.16$, $p = .043$. Finally, taster-type was added to the model which accounted for the cluster of all psychological variables. The regression analysis revealed that taster-type added a small, nonsignificant contribution to the variance, $\Delta R^2 = .005$, $\Delta F(1,38) = .317$, $p = .577$. The regression values for this model can be found in Table 9.

Given that only two (autonomous motivation and social pressure self-efficacy) of the 10 psychological variables were significant predictors, the regression was recalculated to be more parsimonious and only these two variables were entered. The autonomous subscale (motivation) and social pressure subscale (self-efficacy) were entered in the first step, and taster-type was entered in Step 2. In Step 1, the autonomous

subscale (motivation) and social pressure subscale (self-efficacy) accounted for 16.9% of the variance in weight loss at two weeks, $F(2,52) = 5.30$, $p = .008$. Examination of the beta weights indicated that the autonomous subscale of the motivation measure was the only significant predictor, $\beta = -.409$, $t = -3.221$, $p = .002$. The addition of taster-type in Step 2 failed to account for additional variance, $\Delta R^2 = .003$, $\Delta F(1,51) = .208$, $p = .65$. The final model accounted for 17.3% of the variance in weight loss at two weeks with only the autonomous motivation subscale as a significant predictor, $\beta = -.396$, $t = -3.008$, $p = .004$.

The second hierarchical regression tested predictors of weight loss at 4 weeks. Psychosocial measures were entered in clusters, with the autonomy and controlled motivation subscales entered in Step 1. The regression analysis revealed the motivation subscales did not contribute significantly to the regression model $F(2,50) = 1.13$, $p = .333$ and accounted for only 4.3% of the variance in total weight loss. The five subscales of the self-efficacy measure (social pressure, positive activities, negative emotions, physical discomfort, and availability), were entered in Step 2. The introduction of the self-efficacy subscales explained an additional 3.3% of the variance and was nonsignificant, $\Delta F(5, 45) = .319$, $p = .899$. Finally, the eating styles subscales of uncontrolled eating, emotional eating, and cognitive restraint were entered. They contributed another 3.5% in variance of total weight loss across the four weeks but failed to reach significance, $\Delta F(3,42) = .553$, $p = .649$. The full model with the three psychosocial variables as predictors accounted for 11.1% of the variance in weight loss at the end of four weeks. Finally, taster-type was added to the model. The regression analysis revealed that taster-type added a 1.9% contribution to the variance and was not significant, $\Delta F(1,41) = .872$,

p = .356. Regression values for this model are presented in Table 10. Hypothesis three was not supported.

Table 9

Hierarchical Regression Analysis for Psychosocial Variables and Taster-Type at Two Weeks

	Two Weeks	
Predictor	ΔR^2	β
Step 1: Motivation	.156*	
Autonomous		-.357*
Controlled		-.119
Step 2: Motivation + Self-Efficacy	.167	
Autonomous		-.405*
Controlled		-.298
Negative emotions		-.217
Availability		-.158
Social pressure		.418*
Physical discomfort		-.259
Positive activities		-.079
Step 3: Motivation + Self-Efficacy + Eating Styles	.033	
Autonomous		-.351*
Controlled		-.252
Negative emotions		-.096
Availability		.038
Social pressure		.392*
Physical discomfort		-.215
Positive activities		-.098
Emotional eating		-.214
Cognitive restraint		.055
Uncontrolled eating		.175
Step 4: Motivation + Self-Efficacy + Eating Styles + Taster-type	.005	
Autonomous		-.332*
Controlled		-.250
Negative emotions		-.123
Availability		.050
Social pressure		.376
Physical discomfort		-.194
Positive activities		-.089
Emotional eating		-.236
Cognitive restraint		.041
Uncontrolled eating		.177
Taster-type		-.080
Total R^2	.361	
n	50	

Table 10

Hierarchical Regression Analysis for Psychosocial Variables and Taster-Type at Four Weeks

Predictor	Four Weeks	
	ΔR^2	β
Step 1: Motivation	.043	
Autonomous		-.175
Controlled		-.076
Step 2: Motivation + Self-Efficacy	.033	
Autonomous		-.190
Controlled		-.167
Negative emotions		-.105
Availability		-.174
Social pressure		.165
Physical discomfort		-.030
Positive activities		-.009
Step 3: Motivation + Self-Efficacy + Eating Styles	.035	
Autonomous		-.174
Controlled		-.144
Negative emotions		-.044
Availability		.103
Social pressure		.154
Physical discomfort		.022
Positive activities		-.052
Emotional eating		-.209
Cognitive restraint		-199
Uncontrolled eating		.032
Step 4: Motivation + Self-Efficacy + Eating Styles + Taster-type	.019	
Autonomous		-.207
Controlled		-.146
Negative emotions		.012
Availability		.079
Social pressure		.184
Physical discomfort		-.018
Positive activities		-.071
Emotional eating		-.169
Cognitive restraint		.221
Uncontrolled eating		.029
Taster-type		.150
Total R^2	.129	
n	53	

CHAPTER 5

DISCUSSION

Effects of Taster-Type

One purpose of this study was to examine the potential role of taster-type on weight loss, weight-related measurements, and food neophobia. Up to this point, there had been research on the relationship between taster-type and BMI (Donaldson et al., 2009; Goldstein et al., 2005; Lumeng et al., 2008), but these study results have been inconclusive. The current study examined a possible connection between taster-type and weight loss, while accounting for other variables that previous research has indicated are important to weight loss success; variables such as motivation (Georgiadis et al., 2006), self-efficacy (Carmody et al., 1995) and even individual eating styles (Dotson et al., 2010; Hays & Roberts, 2008; Yeomans et al., 2004). To that end, three hypotheses were tested.

Although it was expected that supertasters would be different from nontasters on weight, BMI, and waist circumference over time, no group differences were found on the biologic measures. It should be noted, however, that taster-type interacted with time for weight loss. After two weeks, nontasters stopped losing weight while supertasters continued to lose weight. This result is consistent with previous research by Coletta, Bachman, Tepper, and Raynor (2013) who found that super tasters significantly reduced their energy intake as compared to nontasters during a three-month, assigned dietary intervention. Similar to the current study, Coletta et al. noted this reduced energy intake did not translate to a significant change in BMI, although they did not directly report participants' weight or changes in weight in their analysis. A majority of previous

research has examined variables such as BMI and taster-type differences in the perception of different foods but not changes in weight over time while engaging in a participant-selected diet. Research by Bartoshuk et al. (1994) and others (Duffy & Bartoshuk, 2000; Keller et al., 2002; Keller & Tepper, 2004) found that taster-type affected taste perception for various food types such as spicy foods, alcohol, sweetness perception, bitterness perception, and perceptions of fats. These findings indicated that people tend to like and dislike certain foods based on their taste perception. It was thought that these differences in taste perception might result in differences in BMI. However, tests of this proposition have been mixed, with some studies reporting no relationship between taster-type and BMI (Bajec & Pickering, 2010; Dotson, et al. 2010; Grimm & Steinle, 2011) and other studies reporting links between BMI and different taster-types (Goldstein et al., 2005; Lumeng, et al., 2008). Tepper and Ulrich (2002) had maintained that despite previous research, it was still important for researchers to continue to examine how taster-type might affect dietary intake and the potential for obesity.

The current study tested differences in weight, BMI, and waist circumference for both supertasters and nontasters when they were dieting. No effort was made to control food choice. The only restriction placed on participants was related to calories consumed based on their initial weight. The findings for actual weight loss for supertasters are interesting given the time variable. While everyone lost weight, had lower BMIs, and smaller waist circumference measures from the initial meeting to Week 4, the supertasters throughout the study had a gradual and consistent weight loss. Given the results of the

current study in addition to the work by Coletta et al. (2013), research on taster-type and dieting outcomes should continue to be pursued.

When supertasters and nontasters were compared on food neophobia and changes over time examined, all participants had a significant increase in food neophobia scores; however, this was independent of taster-type. Both groups (tasters and nontasters) had increased levels of food neophobia. Ullrich at al. (2004) had found that supertasters were not as food-adventurous as nontasters, and Monneuse et al. (2008) found that being a supertaster made it more difficult to overcome food neophobia as part of a dieting strategy. The current study included a participant-selected diet and food neophobia was measured at two time periods. Previous studies did not include time as a factor. The results for this study might be explained by the fact that participants were dieting and possibly eating foods that were not very palatable. As a result, their food neophobia scores might have increased.

The last hypothesis posited that taster-type would add to the prediction of weight loss when other psychosocial factors (including levels of motivation, self-efficacy, and levels of restraint/disinhibition) were accounted for. Previous research showed complicated relationships between the eating styles of restraint and disinhibition. Researchers have examined the effect of restraint/disinhibition based on palatable food choices (Yeomans, et al., 2004), the consumption of high carbohydrate or low fat breakfasts (Chamber, et al., 2011), and tendencies to overeat (Westenhoefer, et al., 1994). The more critical component for the current study could be found in the examination of the relationships of restraint and disinhibition with taster-type. Taster-type has been linked to increased disinhibition (Dotson, et al., 2010) but other researchers have argued

that the specific type of disinhibition (internal or external) is more predictive of weight loss and weight maintenance (Butryn et al., 2009). In examining restraint and disinhibition with another psychosocial variable (self-efficacy), Carmody et al. (1995) found that greater levels of disinhibition and lower levels of self-efficacy were linked with obesity. The findings of the current study supported previous research on the importance of psychosocial variables, in particular motivation and self-efficacy. Autonomous motivation (which related to intrinsic motivation) and self-efficacy in regards to resisting social pressure were both significant predictors of weight loss at two weeks but not at four weeks. Eating styles and taster-type were not significant predictors at either Weeks 2 or 4.

In examining the results from all three hypotheses, some interesting patterns emerge. First, time was consistently significant, especially as it related to weight, BMI, and waist circumference. Participants lost a significant amount of weight during the four weeks, which supports the conclusion that most of the participants were indeed dieting during the study period. Time was also potentially an important factor in looking at predictors of weight loss. The psychosocial variables of autonomy (motivation) and social pressure (self-efficacy) were only significant predictors at the end of the first two weeks of the dieting period. At the end of four weeks, their effects disappeared. This result is consistent with research in change theory, which proposes that significant change only occurs when individuals are able to maintain a "new" behavior for approximately three weeks. It is likely that after two weeks, participants began to face challenges related to their dieting and waning levels of motivation and self-efficacy.

Another trend of note was taster-type. Taster-type alone was not a significant

factor in weight, BMI, or waist circumference, although there was an interaction between time and taster-type on weight. This contribution related to differences that began during Week 2 where supertasters continued to lose weight from Week 2 to the end of the dieting period while the weight loss for nontasters leveled out between Weeks 2, 3, and 4. Taster-type, however, was not a predictor of weight loss, above and beyond the influence of the psychosocial variables of motivation, self-efficacy, and eating styles. This lack of significance was true for the two week and four week regression models. While taster-type did add a small amount of explained variance, it was simply not enough to matter. The lack of support for taster-type might be explained by some the limitations of the current study.

Limitations and Future Research

There were a number of limitations that likely contributed to the lack of significant findings. The first limitation is sample size. In spite of recruitment efforts over two and a half years, only 90 participants came to the initial meeting and only two-thirds of these individuals completed the full study. This resulted in an attrition rate of nearly 40%. Given this was a diet study, although the attrition rate is large, it is not surprising. The small sample size also contributed to issues related to taster-type categorization. Without an adequate sample size, it was not possible to get equivalent numbers of supertasters, medium tasters, and nontasters. As a result, nontasters and medium tasters had to be combined into a single group for analysis. In addition, imputing of data for 4 cases was necessary to reach an adequate *n* for the "nontaster" group. The combining of the nontasters and the medium tasters into a single group for comparison with the supertasters likely caused error in the results as the medium tasters

may have washed out any differences that might have been found between true nontasters and supertasters. Given these limitations, future studies on this topic would need to obtain a larger sample size. This would allow for attrition and would also allow for better categorization of taster-types. Due to previous research indicating that there are differences between supertasters and medium tasters (in addition to differences between supertasters and nontasters, and medium tasters and nontasters), a larger sample size would allow for a more valid examination of group differences in potential weight loss.

In addition to issues with the sample size, the demographic breakdown of the sample is also a concern. Descriptive analysis revealed 78% of the final sample was female. Bartoshuk, Duffy, and Miller (1994) found that women were more likely to be classified as supertasters as compared to men. The large percentage of females in this study likely led to a higher number of supertasters in the sample, which made supertaster and nontaster comparisons more difficult. It also prohibited any analysis of potential gender effects of taster-type on weight loss. A larger sample with an emphasis on recruiting more males would help to address this limitation. Ethnicity of the sample may have also had an effect on results. Nearly 62% of the sample identified as Caucasian. Most research on taster-type has not looked at the effects or differences related to race/ethnicity so it is difficult to speculate on any potential confounds resulting from the racial/ethnic make-up of study participants. It would behoove researchers to study the differences in race/ethnicity and taster-type in increasing overall understanding of the taster-type phenomenon, particularly given that weight and eating behaviors also have different values, customs, and traditions in various cultures.

There are a few other factors that may have limited the results of this study. Data

for this study was collected over the course of 2 and a half years. It is possible that there were historical effects or some other extraneous variables that may have influenced the study as a result of the extended data collection period. Measurement methods were also a potential issue; participants were not weighed on a medical weight scale, which would likely be more accurate. Additionally, waist measurements were taken over clothing and participants did not wear the same clothes for the initial and Week 4 measurements. This introduced error into the biologic measurements. Lastly, the participants turned in their food journals once a week. There were no controls to monitor daily entry. It is possible that participants did not enter food the day they ate it but may have entered food into the food journal days later from memory. This would affect the accuracy of their food logs. There are a few ways future researchers might be able to address these issues. Researchers could conduct future diet studies in a lab setting to improve accuracy. This would allow for the use of more sensitive weight scales and accurate waist circumference measures. Another method for accurate reporting might be daily self-reporting rather than collecting food data once a week. Researchers could also control the diet type to both increase diet compliance and control for dietary differences in food choice.

Implications for Counseling Psychology

Given the findings of this study, there are a number of conclusions that can be drawn and applied to work with clients. The analysis revealed that, consistent with previous research, motivation and self-efficacy does matter in weight loss. Counseling psychologists should continue to assess and promote various motivational strategies for individuals attempting to lose weight. Additionally, counseling psychologists should work with clients to identify ways to increase self-efficacy, in particular self-efficacy as it

relates to handling social situations in which the client feels pressured to eat or break their diet. Psychologists who are advising clients who are attempting to lose weight also should discuss with clients the potential effect of taster-type, given the research interaction of taster-type and time related to weight loss in the current study. At this time, the mixed findings related to taster-type and weight loss, BMI, and food choice makes it difficult to provide concrete, specific recommendations. However, providing clients with knowledge regarding the taster-type phenomenon and discussing a client's taste preferences and food choices could help clients understand why they may be having difficulty dieting or staying away from particular foods. Developing a food plan that takes into account a client's taster-type and food preferences would likely be helpful as the client navigates the difficult journey of weight loss.

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APPENDIX A

IRB DOCUMENTATION

ASU Knowledge Enterprise Development

Office of Research Integrity and Assurance

To:	Sharon Kurpius EDB
From:	Carol Johnston, Chair Biosci IRB
Date:	01/14/2013
Committee Action:	**Expedited Approval**
Approval Date:	01/14/2013
Review Type:	Expedited F4 F7
IRB Protocol #:	1212008642
Study Title:	PROP Status and Weight-Loss
Expiration Date:	01/13/2014

The above-referenced protocol was approved following expedited review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without approval by the Institutional Review Board.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Biosci IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Biosci IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.

ASU Knowledge Enterprise Development

APPROVAL:CONTINUATION

Sharon Kurpius
SLS - Counseling and Counseling Psychology
480/965-6104
sharon.kurpius@asu.edu

Dear Sharon Kurpius:

On 1/12/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Continuing Review
Title:	PROP Status and Weight-Loss
Investigator:	Sharon Kurpius
IRB ID:	1212008642
Category of review:	(4) Noninvasive procedures, (7)(b) Social science methods, (7)(a) Behavioral research
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Kurpius.pdf, Category: IRB Protocol;

The IRB approved the protocol from 1/12/2014 to 1/12/2015 inclusive. Three weeks before 1/12/2015 you are to submit a completed "FORM: Continuing Review (HRP-212)" and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 1/12/2015 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc:

APPROVAL:CONTINUATION

Sharon Kurpius
CLS - Counseling and Counseling Psychology
480/965-6104
sharon.kurpius@asu.edu

Dear Sharon Kurpius:

On 1/14/2015 the ASU IRB reviewed the following protocol:

Type of Review:	Continuing Review
Title:	PROP Status and Weight-Loss
Investigator:	Sharon Kurpius
IRB ID:	1212008642
Category of review:	(4) Noninvasive procedures, (7)(b) Social science methods, (7)(a) Behavioral research
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• consent, Category: Consent Form;

The IRB approved the protocol from 1/14/2015 to 1/11/2016 inclusive. Three weeks before 1/11/2016 you are to submit a completed "FORM: Continuing Review (HRP-212)" and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 1/11/2016 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

APPROVAL:CONTINUATION

Sharon Kurpius
CLS - Counseling and Counseling Psychology
480/965-6104
sharon.kurpius@asu.edu

Dear Sharon Kurpius:

On 1/27/2016 the ASU IRB reviewed the following protocol:

Type of Review:	Continuing Review
Title:	PROP Status and Weight-Loss
Investigator:	Sharon Kurpius
IRB ID:	1212008642
Category of review:	(4) Noninvasive procedures, (7)(b) Social science methods, (7)(a) Behavioral research
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Kurpius.pdf, Category: IRB Protocol; • Diet Study Flyer.pdf, Category: Recruitment Materials; • 2015 Updated Consent, Category: Consent Form; • 2015 Updated Consent, Category: IRB Protocol;

The IRB approved the protocol from 1/27/2016 to 1/10/2017 inclusive. Three weeks before 1/10/2017 you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 1/10/2017 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

Maricopa County Community College District
2411 West 14th Street
Tempe AZ, 85281
TEL: (480) 731-8701
FAX: (480) 731 8282

DATE:	September 24, 2014	
TO:	Wagner, Melissa, Psychology	
	Kurpius, Sharon, Psychology	
FROM:	MCCCD Institutional Review Board	
PROTOCOL TITLE:	PROP Status and Weight Loss: Does taster-type predict weight loss success?	
FUNDING SOURCE:	NONE	
PROTOCOL NUMBER:	2014-08-369	
APPROVAL PERIOD:	Approval Date: September 24, 2014	Expiration Date: August 31, 2015
FORM TYPE:	NEW	
REVIEW TYPE:	EXPEDITED	

Dear Principal Investigator,

The MCCCD IRB reviewed your protocol and determined the activities outlined do constitute human subjects research according to the Code of Federal Regulations, Title 45, Part 46.

The determination given to your protocol is shown above under Review Type.

You may initiate your project.

If your protocol has been ruled as *exempt*, it is not necessary to return for an annual review. If you decide to make any changes to your project design which might result in the loss of your exempt status, you must seek IRB approval prior to continuing by submitting a modification form.
If your protocol has been determined to be *expedited or full board review*, you must submit a continuing review form prior to the expiration date shown above. If you make any changes to your project design, please submit a modification form prior to continuing.

We appreciate your cooperation in complying with the federal guidelines that protect human research subjects. We wish you success in your project.

Cordially,
MCCCD IRB

Maricopa County Community College District
2411 West 14th Street
Tempe AZ, 85281
TEL: (480) 731-8701
FAX: (480) 731 8282

DATE:	August 20, 2015	
TO:	Wagner, Melissa, Psychology	
	Kurpius, Sharon, Psychology	
FROM:	MCCCD Institutional Review Board	
PROTOCOL TITLE:	PROP Status and Weight Loss: Does taster-type predict weight loss success?	
FUNDING SOURCE:	NONE	
PROTOCOL NUMBER:	2014-08-369	
APPROVAL PERIOD:	Approval Date: August 20, 2015	Expiration Date: July 31, 2016
FORM TYPE:	CONTINUING REVIEW	
REVIEW TYPE:	EXPEDITED	

Dear Principal Investigator,

The MCCCD IRB reviewed your protocol and determined the activities outlined do constitute human subjects research according to the Code of Federal Regulations, Title 45, Part 46.

The determination given to your protocol is shown above under Review Type.

You may initiate your project.

If your protocol has been ruled as *exempt*, it is not necessary to return for an annual review. If you decide to make any changes to your project design which might result in the loss of your exempt status, you must seek IRB approval prior to continuing by submitting a modification form.
If your protocol has been determined to be *expedited or full board review*, you must submit a continuing review form prior to the expiration date shown above. If you make any changes to your project design, please submit a modification form prior to continuing.

We appreciate your cooperation in complying with the federal guidelines that protect human research subjects. We wish you success in your project.

Cordially,
MCCCD IRB

APPENDIX B

SURVEY PACKET ITEMS

PARTICIPANT CONSENT FORM
ASU Diet Study

****

INTRODUCTION
The purposes of this form are to provide you (as a prospective research study participant) information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in the study.

RESEARCHERS
My name is Melissa Wagner, M.C. and I am a graduate student in the Department of Counseling and Counseling Psychology at Arizona State University. I am conducting research under the supervision of Dr. Sharon Robinson Kurpius, Professor of Counseling Psychology in the School of Letters and Sciences at Arizona State University.

STUDY PURPOSE
I am inviting your participation in my research study. The purpose of this research is to examine factors that relate to dieting attempts and weight loss success.

DESCRIPTION OF RESEARCH STUDY
If you decide to participate, then as a study participant you will join a study involving research conducted over a total of four weeks of dieting and will involve the following:

- Providing a small medical history that will be used to screen you for inclusion in the study.
- Your thoughts, opinions, and feelings regarding foods, dieting, and exercise. Your opinions on these topics will be solicited at the beginning and end of the study.
- Biometric data, including your height, weight, waist circumference, and body mass index (BMI).
- The use of an online food and exercise journal.
- Attendance at 5 study meetings (held on campus). At these weekly meetings you will have your measurements taken (privately) and you will turn in your food and exercise journals you completed the previous week. You will also receive information and advice on issues/factors affecting weight loss and have an opportunity to ask questions during each of these weekly meetings.

If you say YES, then your participation will last for 4 weeks on the Tempe campus of ASU. Approximately 180 individuals will be participating in this study.

RISKS
There are no foreseeable risks or discomforts as a result of your participation. However, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS
Possible benefits of your participation include learning important information regarding healthy eating, food choice, and the incorporation of exercise into your daily life. The results of this study may also provide information to researchers, psychologists, and the medical community regarding factors that impact an individual's success when attempting to lose weight.

NEW INFORMATION
If the researchers find new information during the study that would reasonably change your decision about participating, then they will provide this information to you.

CONFIDENTIALITY
All information obtained in this study is strictly confidential unless disclosure is required by law. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you. In order to maintain confidentiality of your records, the researchers will use participant ID numbers in place of your name or other identifying information. Your identifying information and consent form will be kept in a locked file cabinet in a locked office on the Tempe campus of ASU. Only the researchers involved with this study will have access to these records.

WITHDRAWAL PRIVILEGE
It is OK for you to say no. Even if you say yes now, you are free to say no later, and withdraw from the study at any time. Your participation is voluntary and if you are a student or employee of ASU, nonparticipation or withdrawal from the study will not affect your grades or employment with ASU.

COSTS AND PAYMENTS
We want your decision about participating in the study to be absolutely voluntary. However, we recognize that your participation may pose some inconvenience or costs associated with attending 5 study meetings. As compensation for your time, participants will be entered into a drawing for a chance to win small items (such as a pedometer or reusable water bottle) for attendance at weekly meetings. Additionally, upon completion of the study you will be entered into a drawing for an iPod Shuffle. An entry form will be made available to you at the conclusion of the study. Your entry in the drawing will not be linked to your responses to ensure confidentiality.

COMPENSATION FOR ILLNESS AND INJURY
If you agree to participate in the study, then your consent does not waive any of your legal rights. However, no funds have been set aside to compensate you in the event of injury.

VOLUNTARY CONSENT
If you have any questions you have concerning the research study or your participation in the study, before or after your consent, please contact me at melissa.c.wagner @asu.edu. You may also contact Dr. Sharon Robinson Kurpius at sharon.kurpius@asu.edu or 480-965-8733.

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk; you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480-965 6788.

This form explains the nature, demands, benefits and any risk of the project. By signing this form you agree knowingly to assume any risks involved. Remember, your participation is voluntary. You may choose not to participate or to withdraw your consent and discontinue participation at any time without penalty or loss of benefit. In signing this consent form, you are not waiving any legal claims, rights, or remedies. A copy of this consent form will be offered to you.

Your signature below indicates that you consent to participate in the above study.

Participant Signature	Printed Name	Date

INVESTIGATOR'S STATEMENT

"I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature. These elements of Informed Consent conform to the Assurance given by Arizona State University to the Office for Human Research Protections to protect the rights of human subjects. I have offered the subject/participant a copy of this signed consent document."

Signature of Investigator_____ Date_____

I greatly appreciate your assistance!

Sincerely,

Melissa Wagner, M.C.
Doctoral Student
Counseling and Counseling Psychology

301 Payne Hall, MC-0611
Arizona State University
Tempe, AZ 85287-0611

DEMO 1.0

Do you smoke? Do you consume more than 3 alcoholic beverages a week? Have you used any illicit substances in the last 6 months? If so, we will not be able to use you in our study at this time. Do not provide a response to each question but if you are ineligible indicate so and do not answer any more questions.

Age: _____

Sex: ( ) Male ( ) Female

What is your ethnic background? Please check one:
( ) Asian/Pacific Islander ( ) Caucasian
( ) Black/African-American ( ) Hispanic/Latino/Latina
( ) Native American/Alaska Native ( ) Bi-racial/Multi-racial

( ) Other: _____

Are you currently an ASU employee? ( ) Yes or ( ) No
If so, what is your work status? Check one:
( ) Full-time Employee ( ) Part-time Employee
( ) Graduate Assistant ( ) Student Employee

Are you currently a student? ( ) Yes or ( ) No
If so, what is your current grade level? Check one:
( ) Freshman ( ) Sophomore ( ) Junior
( ) Senior ( ) Graduate Student

What is your current relationship status? Check one:
( ) Single ( ) Engaged/Married/Registered Civil Partners
( ) Widowed ( ) Divorced
( ) Separated ( ) Cohabitating
( ) In a committed relationship

Have you ever been diagnosed with any of the following? Answer yes or no generally.

Major Depressive Disorder	Bipolar Disorder
Seasonal Affective Disorder	Anorexia Nervosa
Bulimia Nervosa	Binge Eating Disorder
Compulsive Overeating	Purging Disorder

( ) Yes or ( ) No

Have you ever used laxatives or purging behaviors to control your weight?
( ) Yes or ( ) No

If yes, when was the last time you used a laxative or purging behaviors to control your weight?

_____

FOR FEMALE PARTICIPANTS
Is there a possibility that you could be pregnant? ( ) Yes or ( ) No
Are you currently breastfeeding? ( ) Yes or ( ) No

FOR ALL PARTICIPANTS
Please list any medications you are currently taking (including herbal supplements)

_____
_____
_____
_____
_____
_____

Are you currently under a doctor's care for a significant medical issue (i.e. high blood pressure, asthma, diabetes, etc.)? ( ) Yes or ( ) No
If yes, please list the medical conditions

_____
_____
_____

Are you currently engaging in any kind of exercise regimen? ( ) Yes or ( ) No

If yes, please list the frequency and types of exercise

_____
_____
_____

TO BE COMPLETED BY RESEARCH STAFF

Height: _____ Weight: _____

WC: _____ BMI: _____

FNS 1.0 – Pre/Post

NSTRUCTIONS: Please circle a number from 1 to 7 to describe how strongly you agree with the following statements.

1) I am constantly sampling new and different foods.

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

2) I don't trust new foods.

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

3) If I don't know what is in a food, I won't try it.

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

4) I like foods from different countries.

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

5) Ethnic food looks too weird to eat.

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

6) At dinner parties, I will try a new food.

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

7) I am afraid to eat things I have never had before.

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

8) I am very particular about the foods I will eat.

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

9) I will eat almost anything. (R)

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

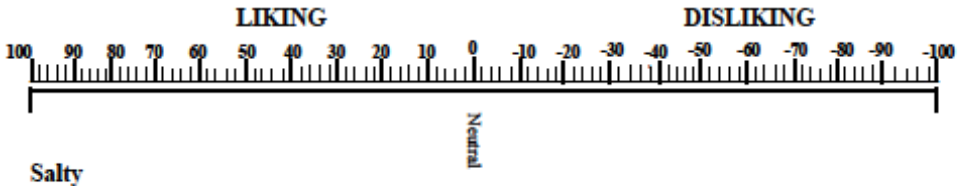
10) I like to try new ethnic restaurants. (R)

1	2	3	4	5	6	7
Disagree Strongly						Agree Strongly

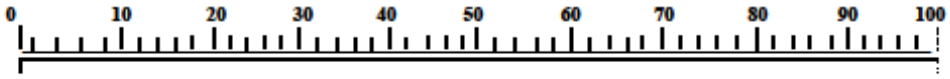
gLMS 1.0

INSTRUCTIONS: You are going to be given a small strip of paper. Place it on your tongue, close your mouth, and leave the strip on your tongue for approximately 30 seconds. After the 30 seconds is up, please rate the taste of the strip utilizing the scales below.

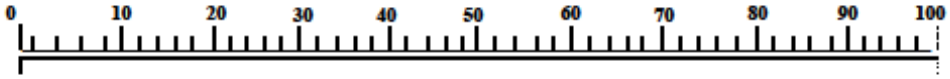
TASTE SCALE



Salty

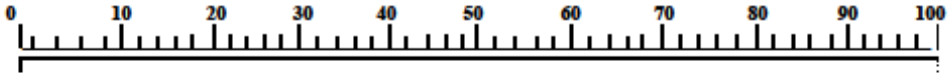


Sweet



Sour

Bitter



Please circle the sound below that corresponds to the intensity of the taste you experienced.

Silence – Whispering – Normal conversation – Playing piano – Train whistle – Rock concert – Jet engine – Loudest sound imaginable

MDI 1.0

INSTRUCTIONS: The following questions ask about how you have been feeling over the last 2 weeks. Please place and X in the box that is closest to how you have been feeling.

	How much of the time	All the time	Most of the time	Slightly more than half the time	Slightly less than half the time	Some of the time	At no time
1	Have you felt low in spirits or sad?						
2	Have you lost interest in your daily activities?						
3	Have you felt lacking in energy and strength?						
4	Have you felt less self-confident?						
5	Have you had a bad conscience or feelings of guilt?						
6	Have you felt that life wasn't worth living?						
7	Have you had difficulty in concentrating (e.g. when reading or watching TV)?						
8a	Have you felt very restless?						
8b	Have you felt subdued or slowed down?						
9	Have you had trouble sleeping at night?						
10a	Have you suffered from reduced appetite?						
10b	Have you suffered from increased appetite?						

TSRQ 1.0 – Pre/Post

There are a variety of reasons why patients decide to enter a weight-loss program such as this one and follow a diet. Please read the statement at the beginning of each group and then consider the reasons that follow in terms of how true each reason is for you.

A. I decided to enter this weight-loss program because:

1) I won't like myself very much until I lose weight.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

2) People will like me better when I'm thin.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

3) It feels important to me personally to be thinner.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

4) I really want to make some changes in my life.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

B. If I remain in the weight-loss program, it will probably be because:

5) I'll feel like a failure if I don't.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

6) People will think I'm a weak person if I don't.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

7) I'll feel very bad about myself if I don't

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

8) Others will be angry at me if I don't.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

9) I feel like it's the best way to help myself.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

C. I plan to lose weight because:

10) I'll be ashamed of myself if I don't.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

11) I'll hate myself if I can't get my weight under control.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

12) My friends/family don't like the way I look.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

13) Being overweight makes it had to do many things.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

D. I have agreed to follow the guidelines of the weight-loss program because:

14) I am worried that I will get in trouble if I don't follow all the guidelines.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

15) I'll feel guilty if I don't comply with all the guidelines.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

16) I want others to see that I am really trying to lose weight.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

17) I believe the weight-loss guidelines will help me solve my problem.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

18) It's important to me that my efforts succeed.

1	2	3	4	5	6	7
Not at all True			Somewhat True			Very True

TFEQ 1.0 – Pre/Post

Below you will find a series of statements. Please read each statement and circle the number that best represents how much you agree with that statement on a scale from 1 to 4. Please provide a response for every statement, even if you are not completely sure of your answer.

1) When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

2) I deliberately take small helpings as a means of controlling my weight.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

3) When I feel anxious, I find myself eating.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

4) Sometimes when I start eating, I just can't seem to stop.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

5) Being with someone who is eating often makes me hungry enough to eat also.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

6) When I feel blue, I often overeat.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

7) When I see a real delicacy, I often get so hungry that I have to eat right away.

1	2	3	4

Definitely False	Mostly False	Mostly True	Definitely True

8) I get so hungry that my stomach often seems like a bottomless pit.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

9) I am always hungry so it is hard for me to stop eating before I finish the food on my plate.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

10) When I feel lonely, I console myself by eating.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

11) I consciously hold back at meals in order not to gain weight.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

12) I do not eat some foods because they make me fat.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

13) I am always hungry enough to eat at any time.

1	2	3	4
Definitely False	Mostly False	Mostly True	Definitely True

14) How often do you feel hungry?

1	2	3	4
Only at meal times	Sometimes between meals	Often between meals	Almost Always

15) How frequently do you avoid “stocking up” on tempting foods?

1	2	3	4
Almost Never	Seldom	Usually	Almost Always

16) How likely are you to consciously eat less than you want?

1	2	3	4
Unlikely	Slightly Unlikely	Moderately Likely	Very Likely

17) Do you go on eating binges though you are not hungry?

1	2	3	4
Never	Rarely	Sometimes	At least once a week

18) On a scale of 1 to 8, where 1 means no restraint in eating (i.e. eating whatever you want whenever you want) and 8 means total restraint (i.e. constantly limiting food intake and never “giving in”), what number would you give yourself?

_____

WELQ 1.0 – Pre/Post

INSTRUCTIONS: Read each situation listed below and decide how confident (or certain) you are that you will be able to resist eating in each of the difficult situations. In other words, pretend that you are in the eating situation right now. On a scale from 0 (not confident) to 9 (very confident), choose ONE number that reflects how confident you feel now about being able to ***successfully resist*** the desire to eat. Write this number down next to each item.

---

0 1 2 3 4 5 6 7 8 9

Not confident at all that you can resist the desire to eat

Very confident that you can resist the desire to eat

EXAMPLES

IAM CONFIDENT THAT: CONFIDENCE NUMBER

1. I can control my eating on weekends. 8
2. I can say "no" to snacks. 6

I AM CONFIDENT THAT:

1. I can resist eating when I am anxious (nervous). _____
2. I can control my eating on the weekends. _____
3. I can resist eating even when I have to say "no" to others. _____
4. I can resist eating when I feel physically run down. _____
5. I can resist eating when I am watching TV. _____
6. I can resist eating when I am depressed (or down). _____
7. I can resist eating when there are many different kinds of food available. _____
8. I can resist eating even when I feel it is impolite to refuse a second helping. _____
9. I can resist eating even when I have a headache. _____
10. I can resist eating when I am reading. _____

0 1 2 3 4 5 6 7 8 9

Not confident at all that you can resist the desire to eat

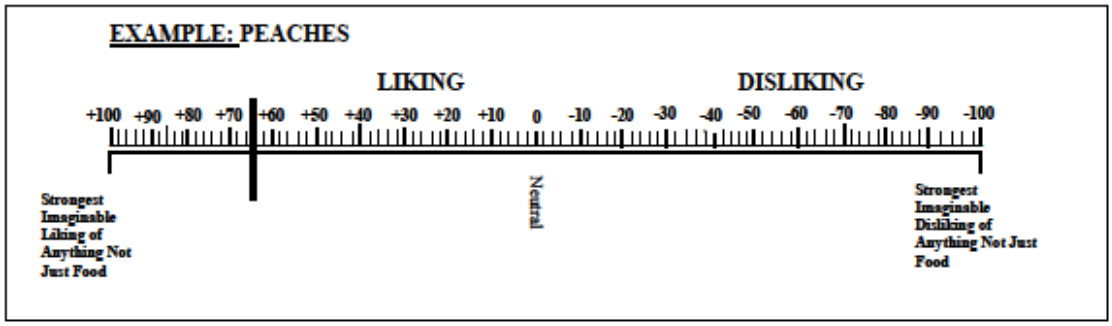
Very confident that you can resist the desire to eat

11. I can resist eating when I am angry (or irritable). _____
12. I can resist eating even when I am at a party. _____
13. I can resist eating even when others are pressuring me to eat. _____
14. I can resist eating when I am in pain. _____
15. I can resist eating just before going to bed. _____
16. I can resist eating when I have experienced failure. _____
17. I can resist eating even when high-calorie foods are available. _____
18. I can resist eating even when I think others will be upset if I don't eat. _____
19. I can resist eating when I feel uncomfortable. _____
20. I can resist eating when I am happy. _____

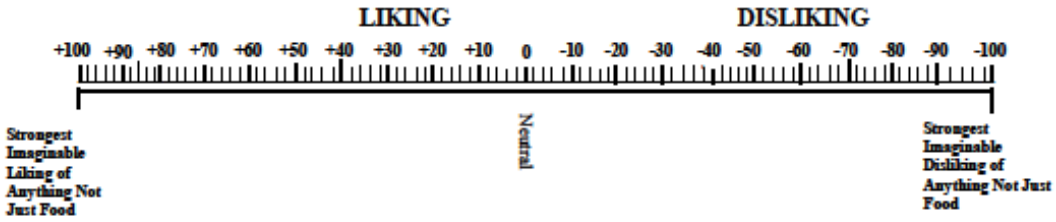
Please rate each food below using the Liking/Disliking scale. For each food that you rate. If you like the food, indicate from 0 to +100 the intensity of liking for that particular food by putting a small vertical line to indicate the intensity of liking for that particular food. If you dislike a food, indicate from 0 to-100 how much you dislike that particular food by putting a small vertical line on the scale to indicate intensity of disliking for that particular food. PLEASE TREAT THE SCALE AS A CONTINUOUS SCALE.

If you have <u>never tried</u> a food from the list below, please put "n/a" next to that food.

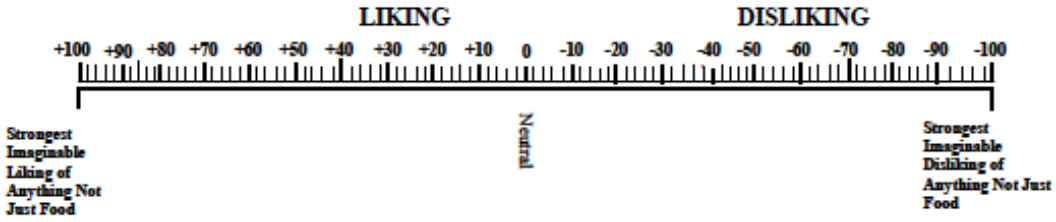
For EXAMPLE, if I LIKE peaches then I would describe the intensity of liking for that food by putting a vertical line on the scale. Something like this:



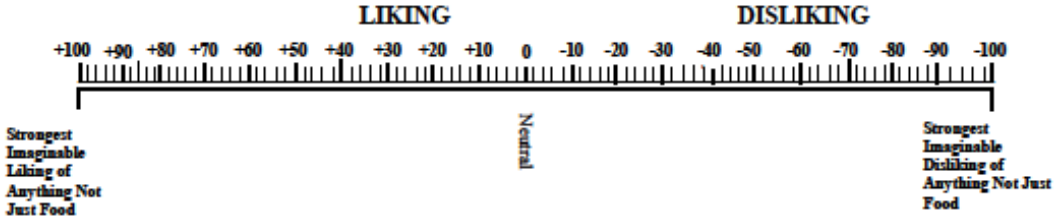
1) SOFT, SALTED PRETZELS



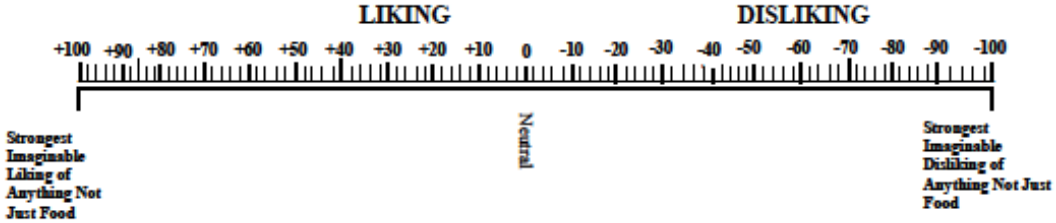
2) LEMONS



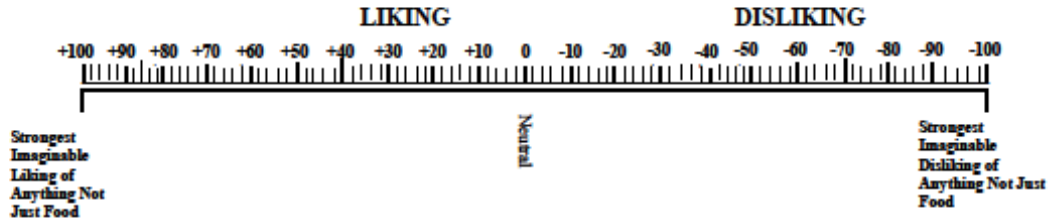
3) RAW BROCCOLI



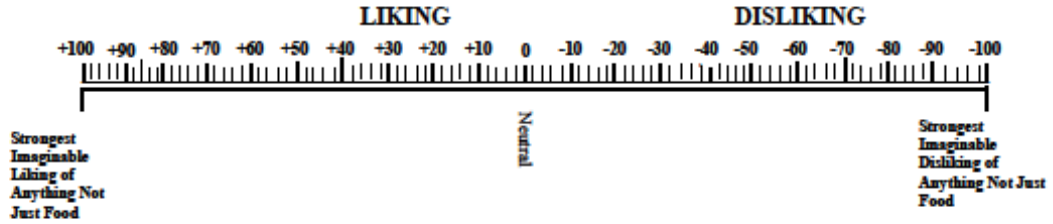
4) CANNED TUNA



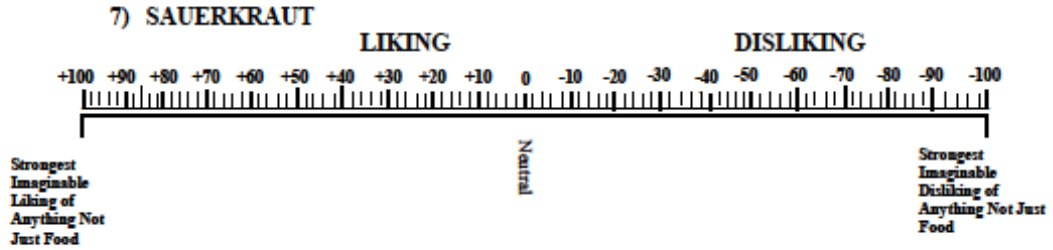
5) RAW PEACHES



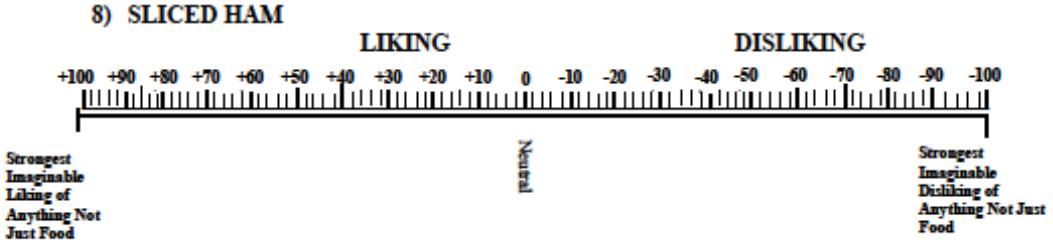
6) OLIVE OIL



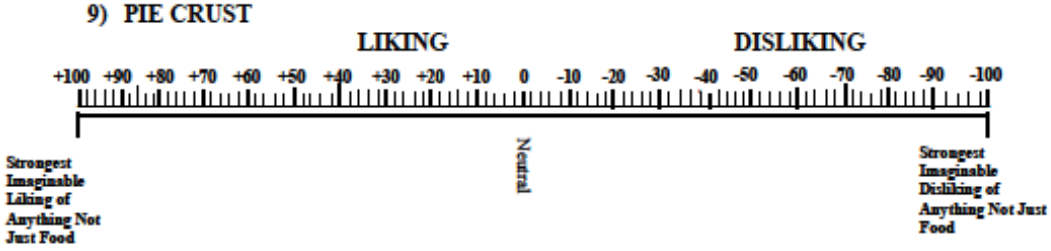
7) SAUERKRAUT



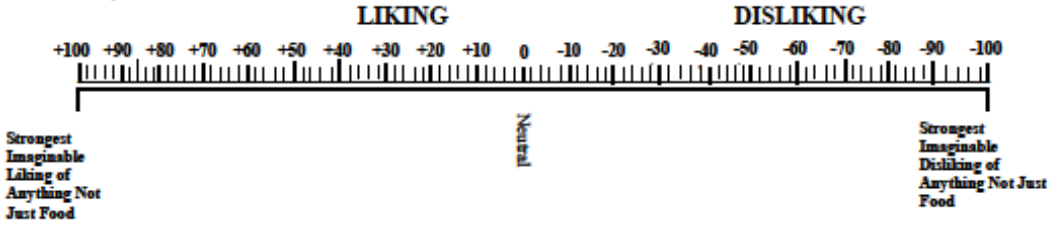
8) SLICED HAM



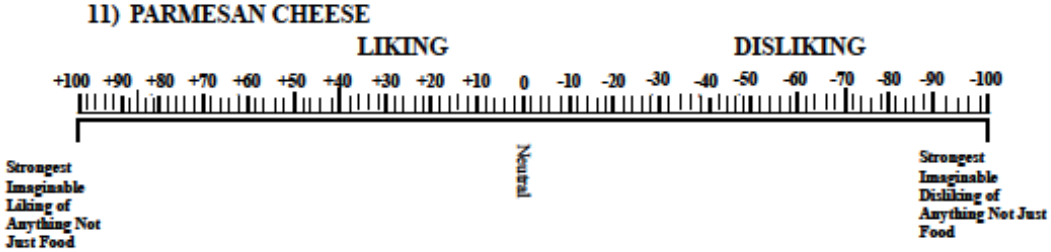
9) PIE CRUST



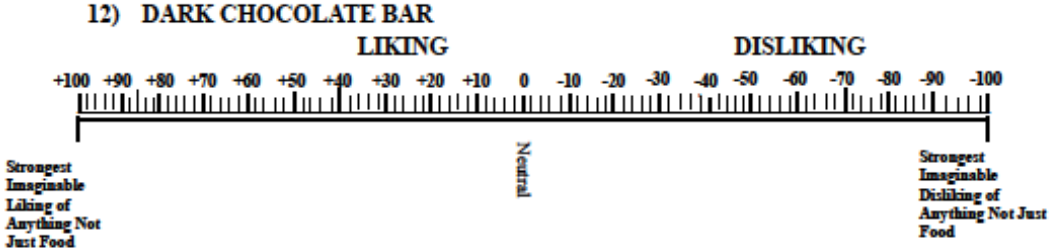
10) KETCHUP



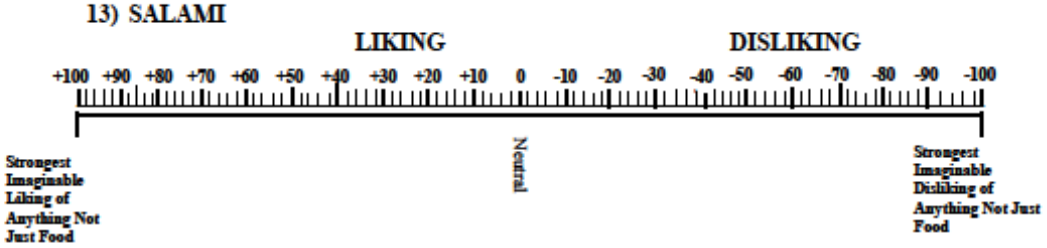
11) PARMESAN CHEESE



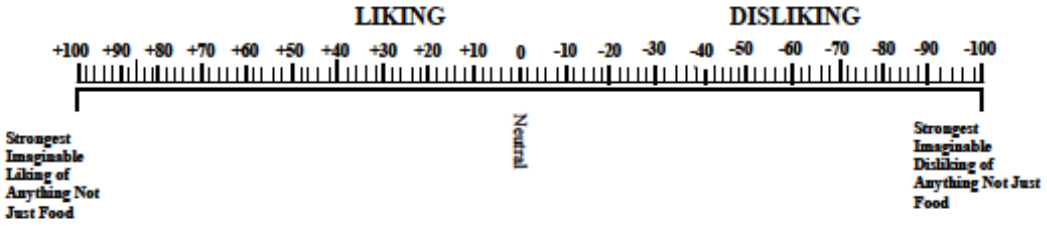
12) DARK CHOCOLATE BAR



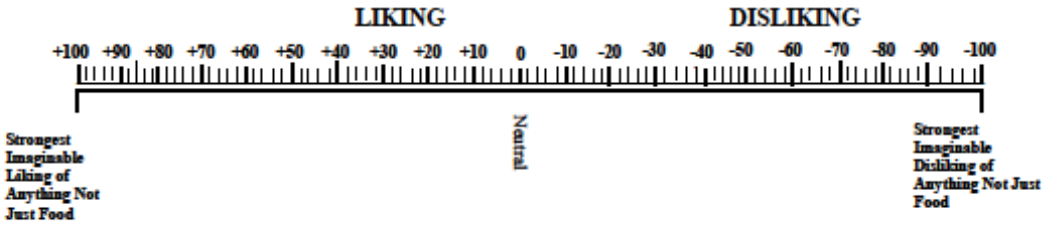
13) SALAMI



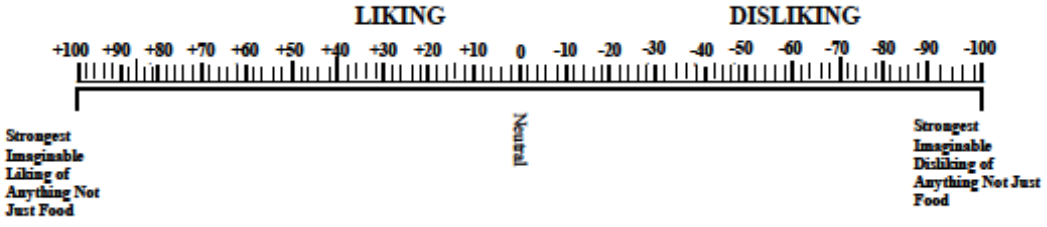
14) BLACK COFFEE



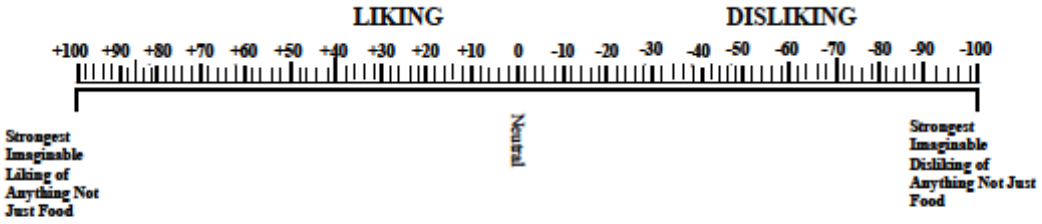
15) TASTE OF BEER



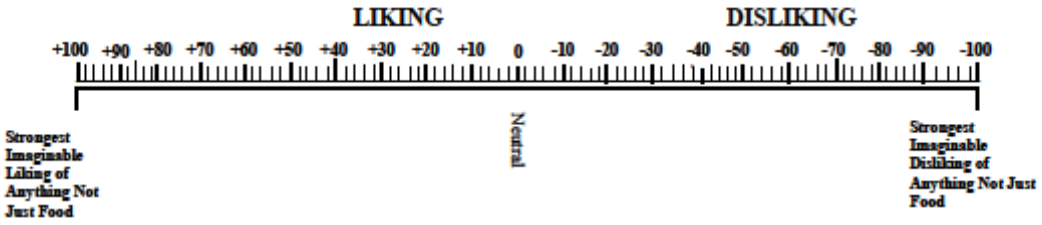
16) RAW GRAPEFRUIT



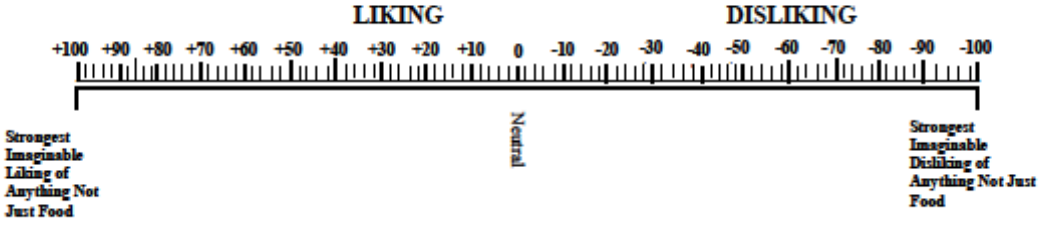
17) VANILLA ICE CREAM



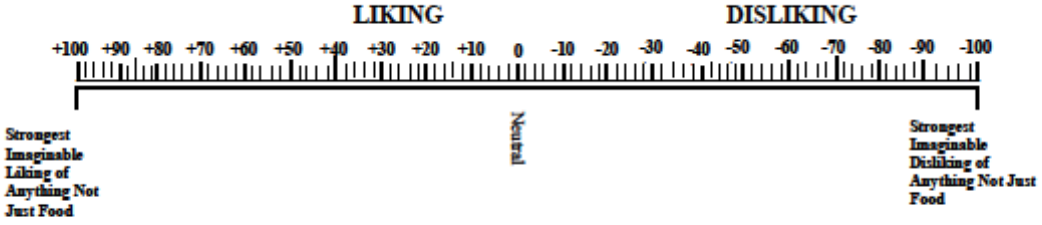
18) PLAIN YOGURT



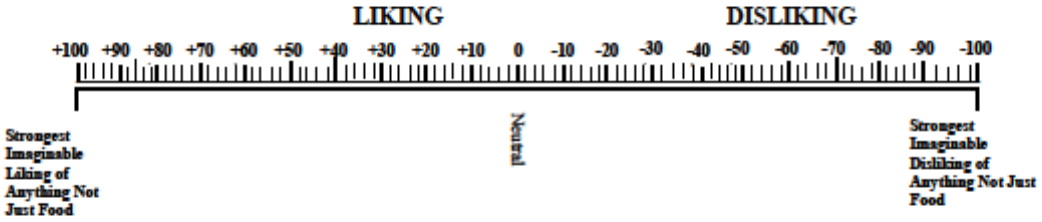
19) MAYONNAISE



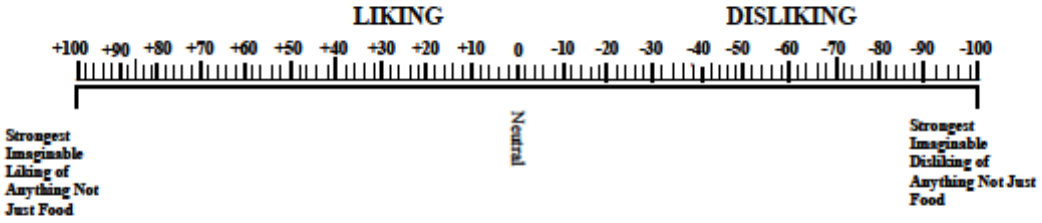
20) MUSTARD



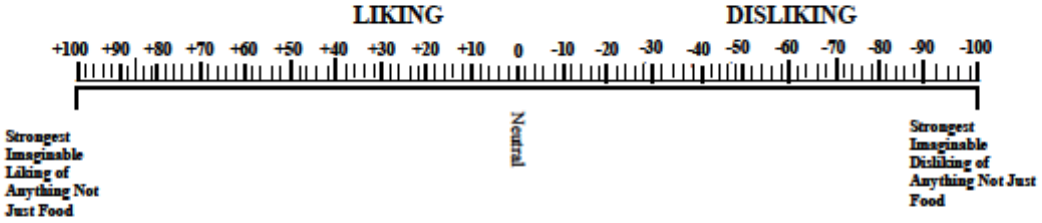
21) RAW KIWI



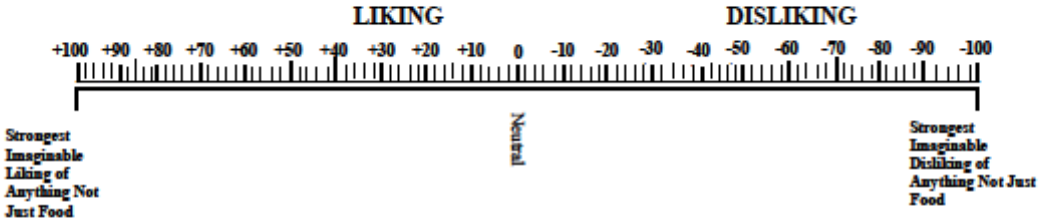
22) SALT



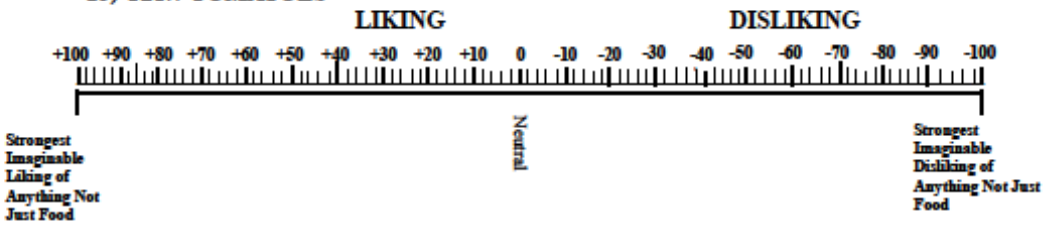
23) DILL PICKLES



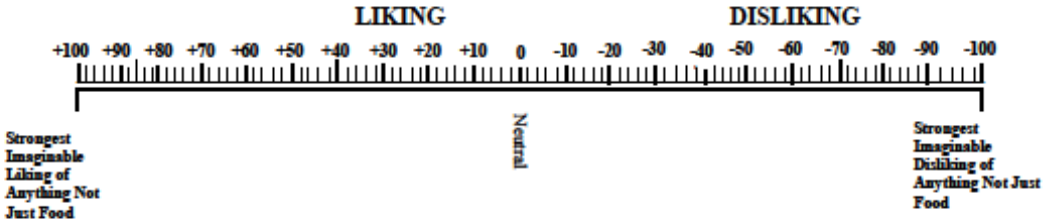
24) COCA-COLA



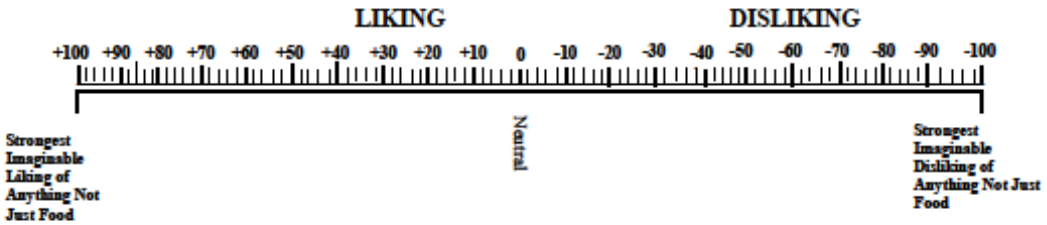
25) RAW TOMATOES



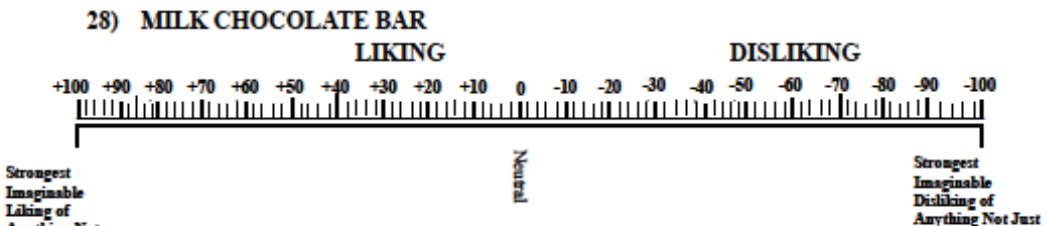
26) GLAZED DOUGHNUTS



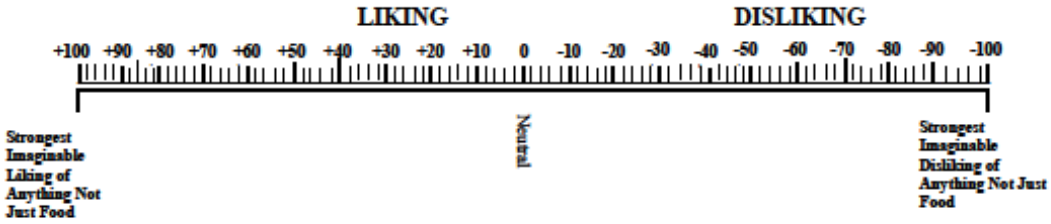
27) GREEN TEA



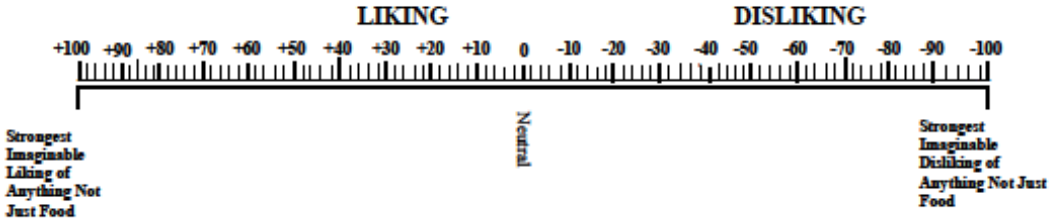
28) MILK CHOCOLATE BAR



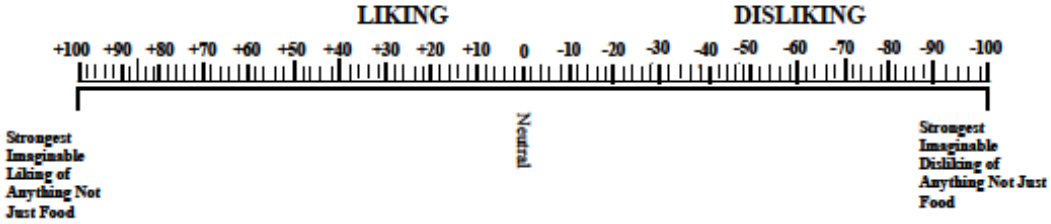
29) UNSALTED BUTTER



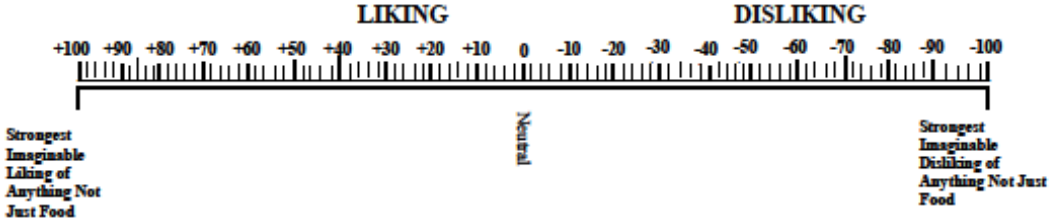
30) CHOCOLATE-CHIP COOKIES



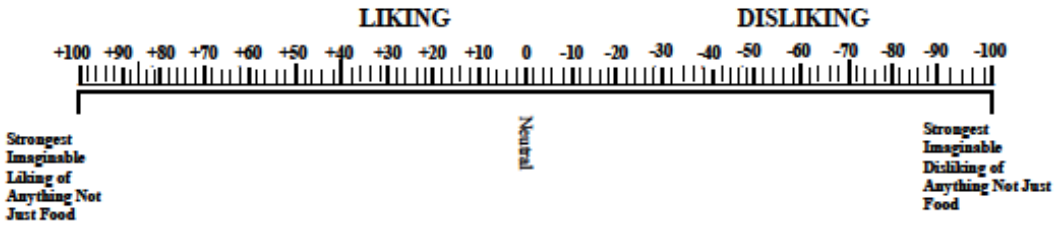
31) RAW CARROTS



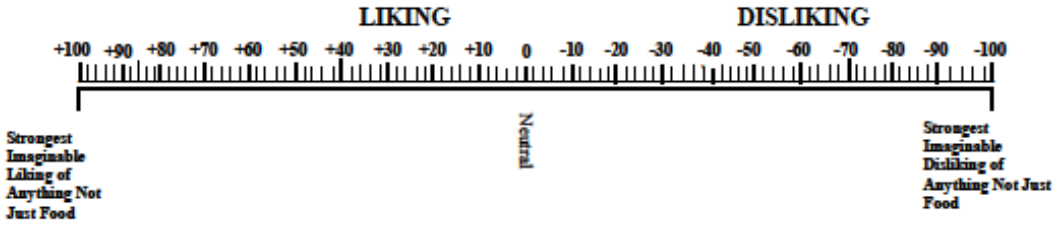
32) SOY SAUCE



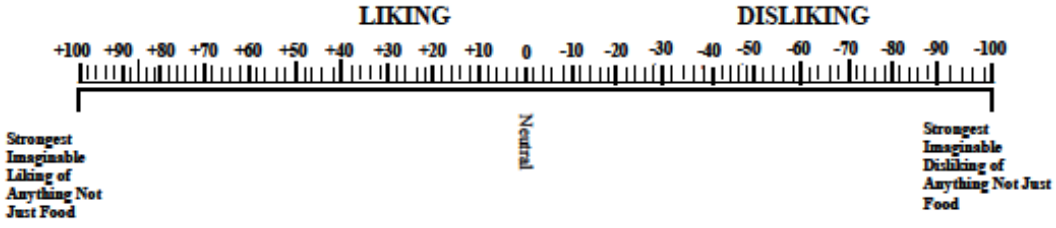
33) RAW PEARS



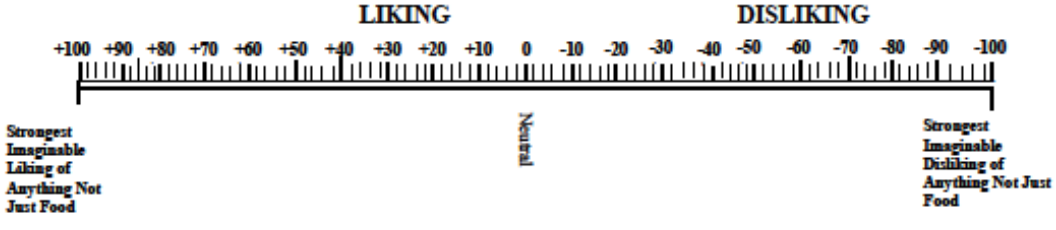
34) SUGAR



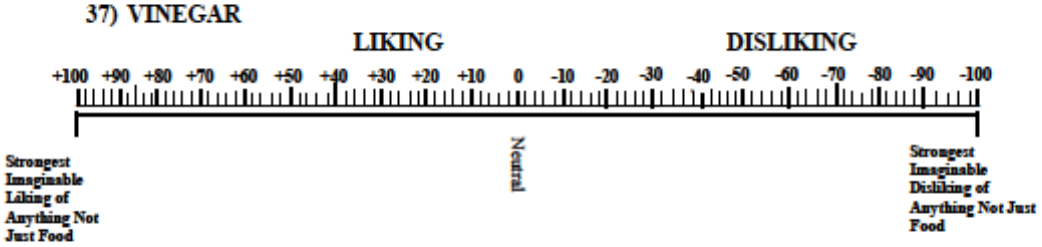
35) TORTILLA CHIPS



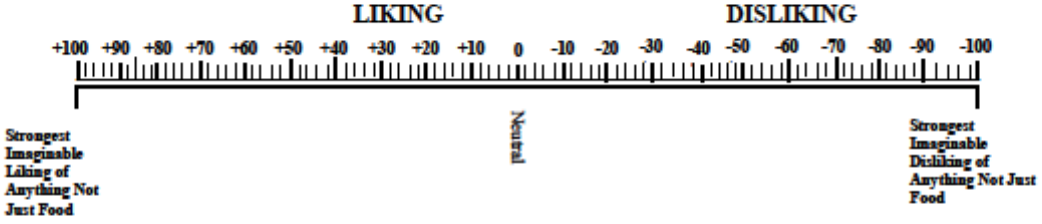
36) SALTED POPCORN



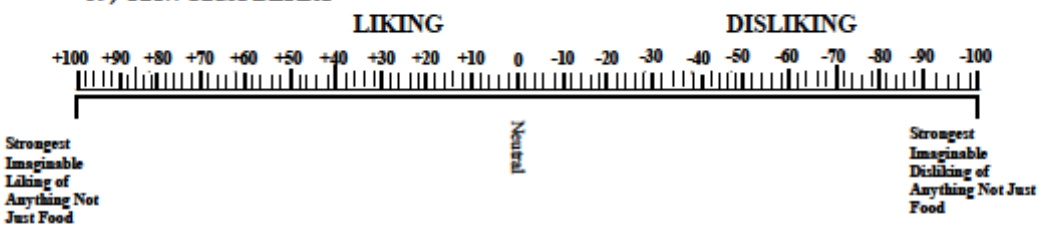
37) VINEGAR



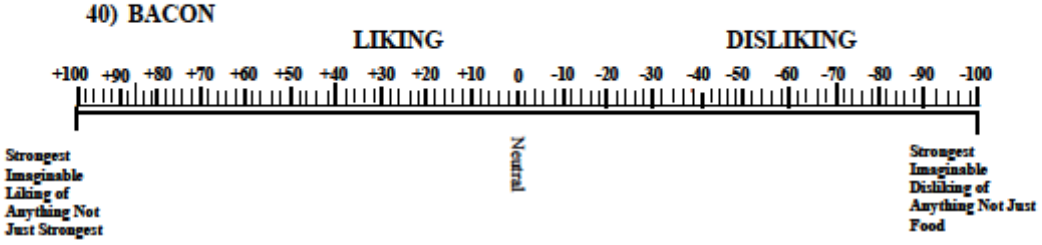
38) MUSHROOMS



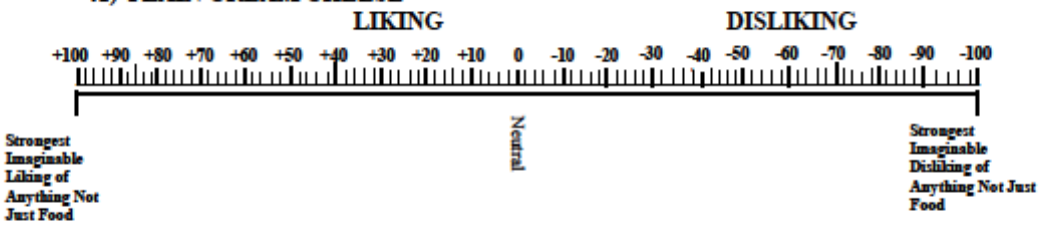
39) RAW RASPBERRY



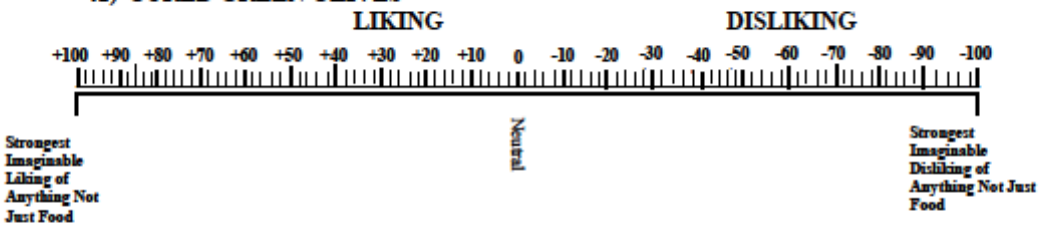
40) BACON



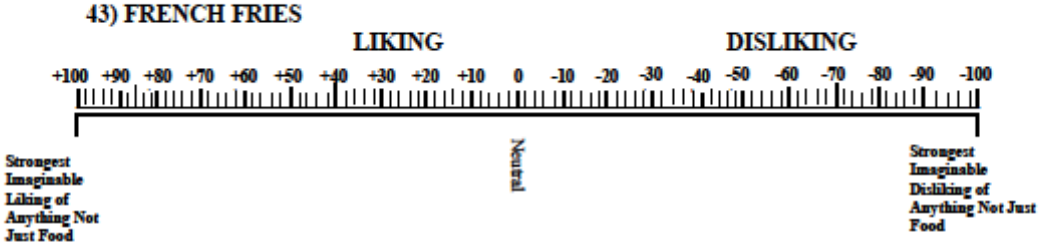
41) PLAIN CREAM CHEESE



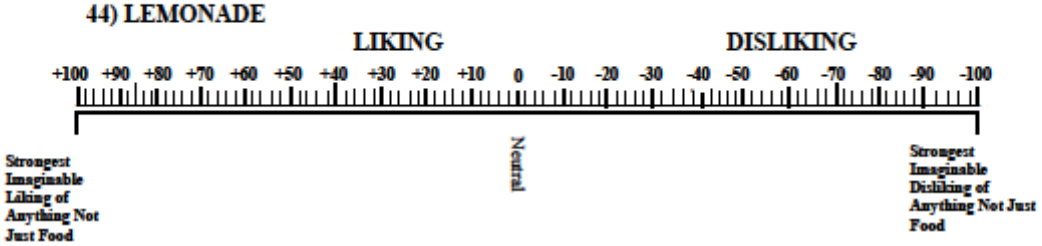
42) CURED GREEN OLIVES



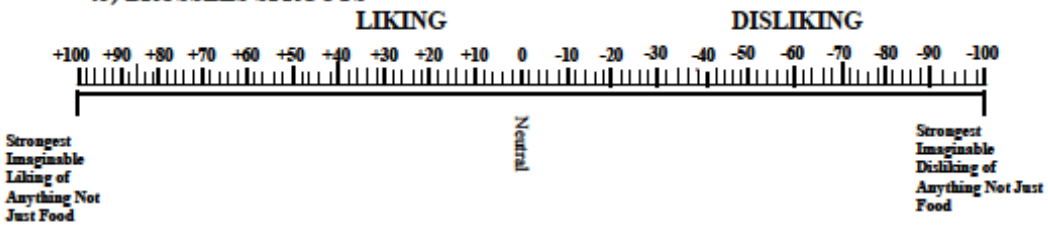
43) FRENCH FRIES



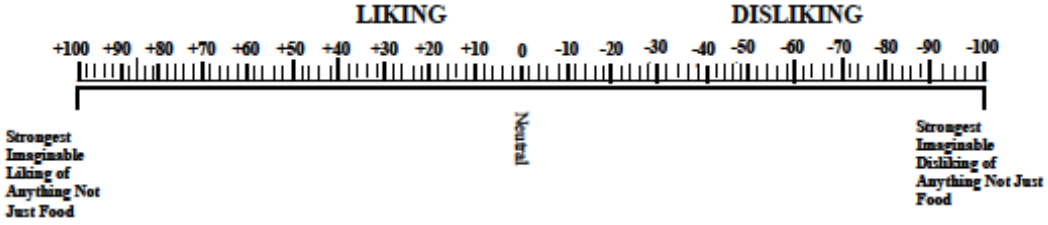
44) LEMONADE



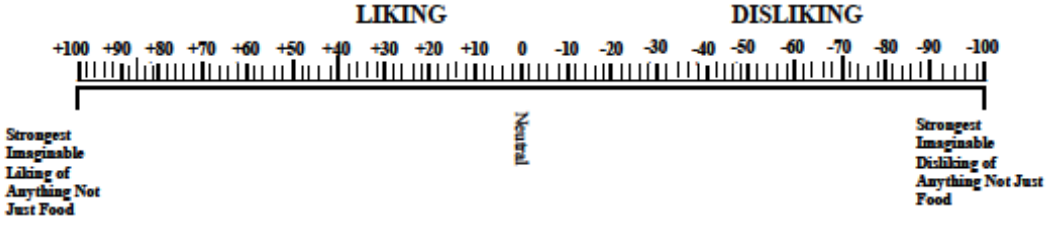
45) BRUSSELS SPROUTS



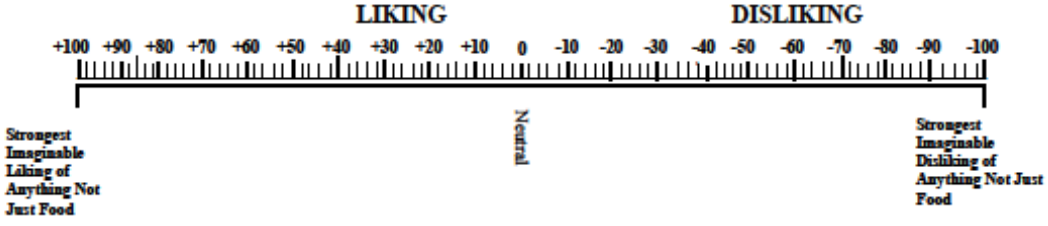
46) WHIPPED CREAM



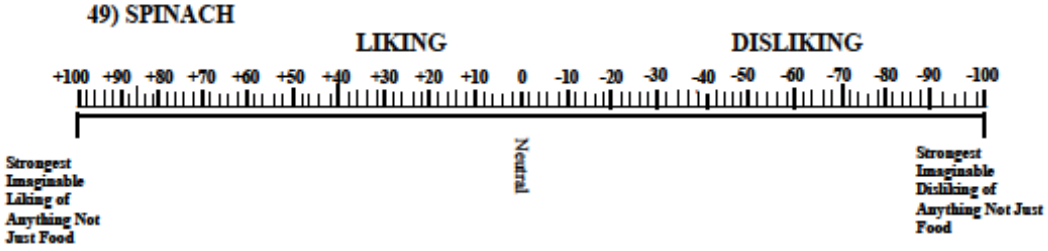
47) GREEN APPLES



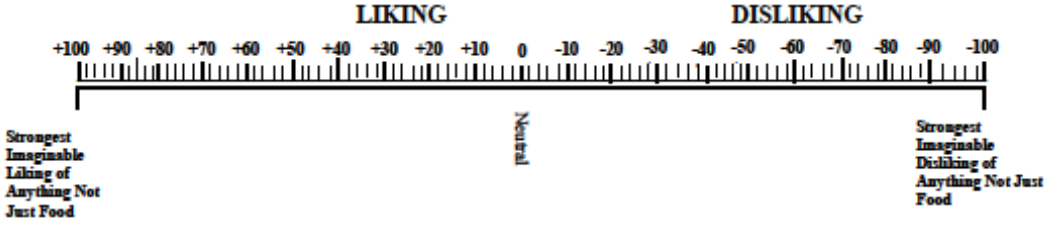
48) CASHEW NUTS



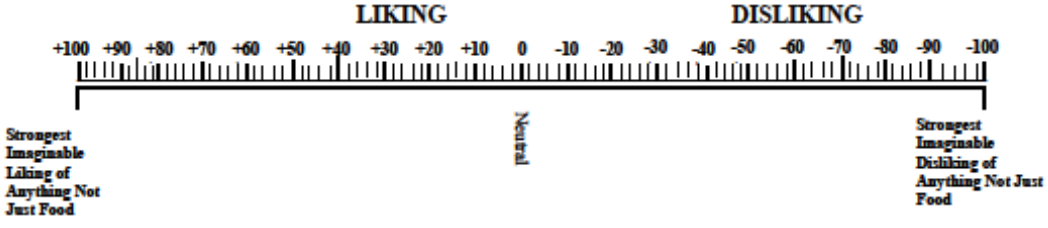
49) SPINACH



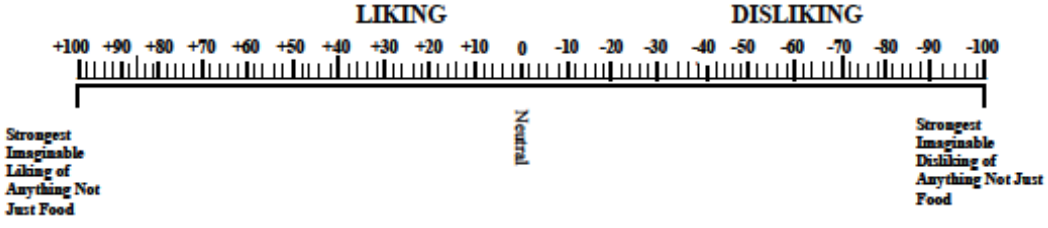
50) CHICKEN BROTH



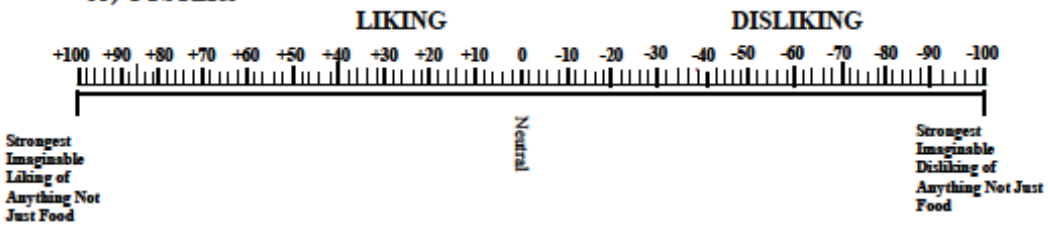
51) SWEET AND SOUR PORK



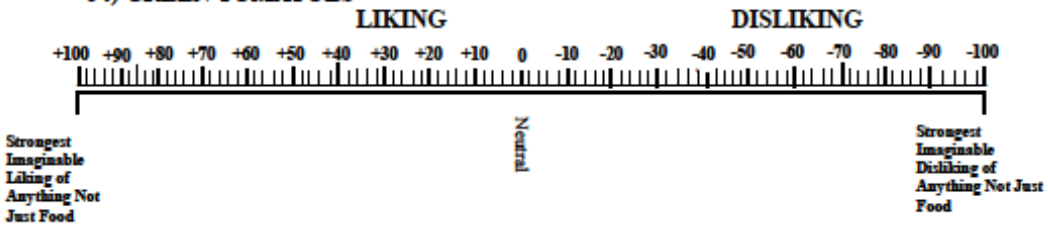
52) RAW AVOCADO



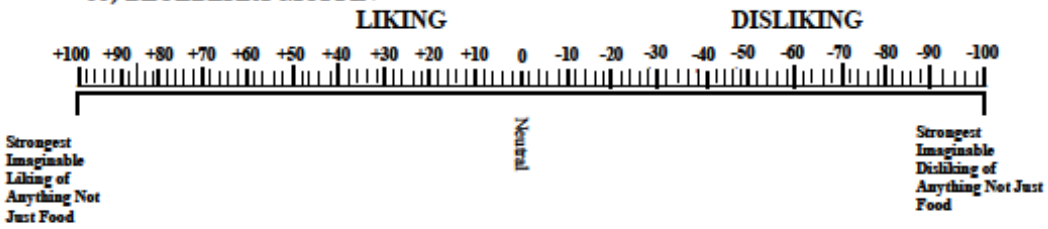
53) OYSTERS



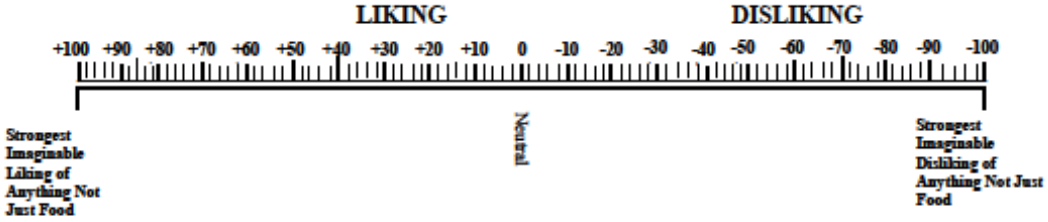
54) GREEN TOMATOES



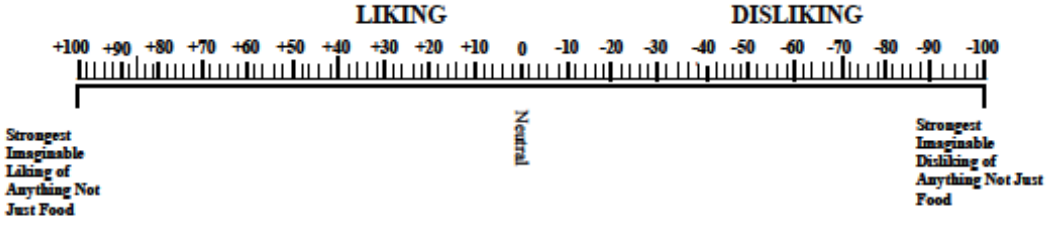
55) BLUEBERRY MUFFIN



56) INSTANT RAMEN NOODLES (CHICKEN FLAVOR)



57) SOUR PATCH KID'S CANDY



APPENDIX C

GROUP PSYCHOEDUCATION MATERIALS

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What Foods Are in the Fruit Group?

Any fruit or 100% fruit juice counts as part of the Fruit Group. Fruits may be fresh, canned, frozen, or dried, and may be whole, cut-up, or pureed.

Key Consumer Message *Make half your plate fruits and vegetables.*

Commonly eaten fruits

- Apples
- Apricots
- Bananas
- Cherries
- Grapefruit
- Grapes
- Kiwi fruit
- Lemons
- Limes
- Mangoes
- Nectarines
- Oranges
- Peaches
- Pears
- Papaya
- Pineapple
- Plums
- Prunes
- Raisins
- Tangerines

Berries

- strawberries
- blueberries
- raspberries

Melons

- cantaloupe
- honeydew
- watermelon

Mixed fruits

- fruit cocktail

100% Fruit juice

- orange
- apple
- grape
- grapefruit

http://www.choosemyplate.gov/food-groups/ fruits.html

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What Foods Are in the Vegetable Group?

Any vegetable or 100% vegetable juice counts as a member of the Vegetable Group. Vegetables may be raw or cooked; fresh, frozen, canned, or dried/dehydrated; and may be whole, cut-up, or mashed.

Vegetables are organized into 5 subgroups, based on their nutrient content.

Key Consumer Message *Make half your plate fruits and vegetables.*

Commonly eaten vegetables in each subgroup

Dark Green Vegetables
- bok choy
- broccoli
- collard greens
- dark green leafy lettuce
- kale
- mesclun
- mustard greens
- romaine lettuce
- spinach
- turnip greens
- watercress

Starchy vegetables
- cassava
- corn
- fresh cowpeas, field peas, or black-eyed peas (not dry)
- green bananas
- green peas
- green lima beans
- plantains
- potatoes
- taro
- water chestnuts

Red & orange vegetables
- acorn squash
- butternut squash
- carrots
- hubbard squash
- pumpkin
- red peppers
- sweet potatoes
- tomatoes
- tomato juice

Beans and peas*
- black beans
- black-eyed peas (mature, dry)
- garbanzo beans (chickpeas)
- kidney beans
- lentils
- navy beans
- pinto beans
- soy beans
- split peas
- white beans

Other vegetables
- artichokes
- asparagus
- avocado
- bean sprouts
- beets
- Brussels sprouts
- cabbage
- cauliflower
- celery
- cucumbers
- eggplant
- green beans
- green peppers
- iceberg (head) lettuce
- mushrooms
- okra
- onions
- turnips
- wax beans
- zucchini

http://www.choosemyplate.gov/food-groups/vegetables.html

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What Foods Are in the Grains Group?

Any food made from wheat, rice, oats, cornmeal, barley or another cereal grain is a grain product. Bread, pasta, oatmeal, breakfast cereals, tortillas, and grits are examples of grain products.

Grains are divided into 2 subgroups, **Whole Grains** and **Refined Grains**.

Whole Grains contain the entire grain kernel — the bran, germ, and endosperm.

Examples include:

- whole-wheat flour
- bulgur (cracked wheat)
- oatmeal
- whole cornmeal
- brown rice

Refined Grains have been milled, a process that removes the bran and germ. This is done to give grains a finer texture and improve their shelf life, but it also removes dietary fiber, iron, and many B vitamins.

Some examples of refined grain products are:

- white flour
- de-germed cornmeal
- white bread
- white rice

Most refined grains are *enriched*. This means certain B vitamins (thiamin, riboflavin, niacin, folic acid) and iron are added back after processing. Fiber is not added back to enriched grains. Check the ingredient list on refined grain products to make sure that the word "enriched" is included in the grain name. Some food products are made from mixtures of whole grains and refined grains.

Key Consumer Message ***Make at least half of your grains whole grains.***

http://www.choosemyplate.gov/food-groups/grains.html

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Commonly eaten grain products

Whole Grains

- amaranth
- brown rice
- buckwheat
- bulgur (cracked wheat)
- millet
- oatmeal
- popcorn
- rolled oats
- quinoa
- sorghum
- triticale
- whole grain barley
- whole grain cornmeal
- whole rye
- whole wheat bread
- whole wheat crackers
- whole wheat pasta
- whole wheat sandwich buns and rolls
- whole wheat tortillas
- wild rice

Ready-to-eat breakfast cereals

- whole wheat cereal flakes
- Muesli

Refined Grains

- cornbread*
- corn tortillas*
- couscous*
- crackers*
- flour tortillas*
- grits
- noodles*
- pitas*
- pretzels
- white bread
- white sandwich buns and rolls
- white rice

Pastas

- spaghetti
- macaroni

Ready-to-eat breakfast cereals

- corn flakes

* Most of these products are made from refined grains. Some are made from whole grains. Check the ingredient list for the words "whole grain" or "whole wheat" to decide if they are made from a whole grain. Some foods are made from a mixture of whole and refined grains.

Some grain products contain significant amounts of bran. Bran provides fiber, which is important for health. However, products with added bran or bran alone (e.g., oat bran) are not necessarily whole grain products.

http://www.choosemyplate.gov/food-groups/grains.html

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What Foods Are in the Protein Foods Group?

All foods made from meat, poultry, seafood, beans and peas, eggs, processed soy products, nuts, and seeds are considered part of the Protein Foods Group. Beans and peas are also part of the Vegetable Group.

Select a variety of protein foods to improve nutrient intake and health benefits, including at least 8 ounces of cooked seafood per week. Young children need less, depending on their age and calorie needs. The advice to consume seafood does not apply to vegetarians. Vegetarian options in the Protein Foods Group include beans and peas, processed soy products, and nuts and seeds. Meat and poultry choices should be lean or low-fat.

Commonly eaten protein foods

Meats*

Lean cuts of:
- beef
- ham
- lamb
- pork
- veal

Game Meats
- bison
- rabbit
- venison

Lean Ground Meats
- beef
- pork
- lamb

Lean luncheon or deli meats

Organ Meats
- liver
- giblets

Poultry*
- chicken
- duck
- goose
- turkey
- ground chicken and turkey

Eggs*
- chicken eggs
- duck eggs

Beans and Peas
- bean burgers
- black beans
- black-eyed peas
- chickpeas (garbanzo beans)
- falafel
- kidney beans
- lentils
- lima beans (mature)
- navy beans
- pinto beans
- soy beans
- split peas
- white beans

Processed Soy Products
- tofu (bean curd made from soybeans)
- veggie burgers
- tempeh
- texturized vegetable protein (TVP)

Nuts and Seeds*
- almonds
- cashews
- hazelnuts (filberts)
- mixed nuts
- peanuts
- peanut butter
- pecans
- pistachios
- pumpkin seeds
- sesame seeds
- sunflower seeds
- walnuts

http://www.choosemyplate.gov/food-groups/protein-foods.html

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Seafood*

Finfish such as:

- catfish
- cod
- flounder
- haddock
- halibut
- herring
- mackerel
- pollock
- porgy
- salmon
- sea bass
- snapper
- swordfish
- trout
- tuna

Shellfish such as:

- clams
- crab
- crayfish
- lobster
- mussels
- octopus
- oysters
- scallops
- squid (calamari)
- shrimp

Canned fish such as:

- anchovies
- clams
- tuna
- sardines

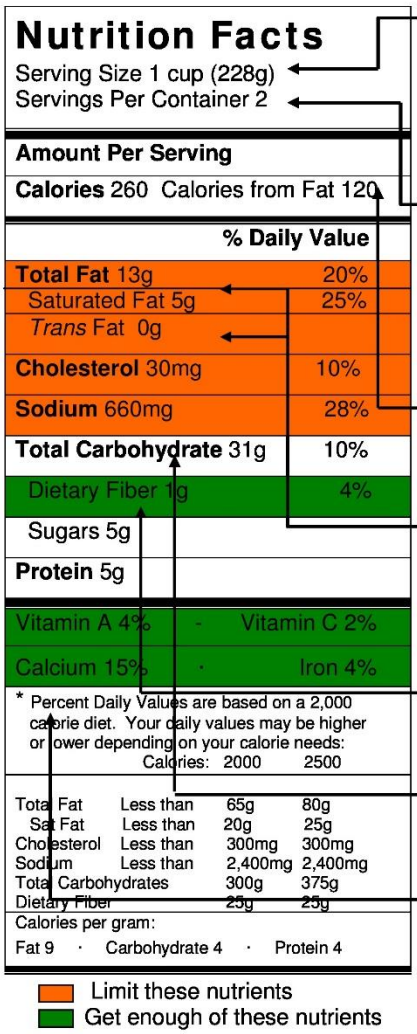
* Selection Tips

- Choose lean or low-fat meat and poultry. If higher fat choices are made, such as regular ground beef (75 to 80% lean) or chicken with skin, the fat counts against your maximum limit for empty calories (calories from solid fats or added sugars).
- If solid fat is added in cooking, such as frying chicken in shortening or frying eggs in butter or stick margarine, this also counts against your maximum limit for empty calories (calories from solid fats and added sugars).
- Select some seafood that is rich in omega-3 fatty acids, such as salmon, trout, sardines, anchovies, herring, Pacific oysters, and Atlantic and Pacific mackerel.
- Processed meats such as ham, sausage, frankfurters, and luncheon or deli meats have added sodium. Check the Nutrition Facts label to help limit sodium intake. Fresh chicken, turkey, and pork that have been enhanced with a salt-containing solution also have added sodium. Check the product label for statements such as "self-basting" or "contains up to __% of __", which mean that a sodium-containing solution has been added to the product.
- Choose unsalted nuts and seeds to keep sodium intake low.

http://www.choosemyplate.gov/food-groups/protein-foods.html

How to Read a Food Label

Reading the label will help you make smart food choices and get the most nutrition out of calories in order to reach your goals!



Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving	
Calories 260 Calories from Fat 120	
	% Daily Value
Total Fat 13g	20%
Saturated Fat 5g	25%
Trans Fat 0g	
Cholesterol 30mg	10%
Sodium 660mg	28%
Total Carbohydrate 31g	10%
Dietary Fiber 1g	4%
Sugars 5g	
Protein 5g	

Vitamin A 4%	Vitamin C 2%
Calcium 15%	Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2000	2500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrates		300g	375g
Dietary Fiber		25g	25g

Calories per gram:
Fat 9 · Carbohydrate 4 · Protein 4

Limit these nutrients
Get enough of these nutrients

Serving Size

We are used to saying "portion" or "helping" when we talk about how much we eat. "Serving size" is a more official or standard amount used for food labels. The nutrition facts given on a food label are based on the serving size.

Servings Per Container

Be sure to look at the number of servings in the package. Small packages may appear to be one serving. Often, they contain more. Snack food items are a good example. If you eat the whole package, then you must multiply the nutrition values by the number of servings in the package.

Nutrition Numbers

Compare the number for Calories from Fat to Total Calories. You want your total fat calories to be no more than 1/3 of your total calories for the day.

If the number of the grams (g) of Saturated Fat is close to the number given for Total Fat, that food or beverage may not be the best choice. Look for choices low in *Trans* Fat.

Look for choices that have at least 1 gram of fiber. Aim for 20-35 grams of fiber per day.

Compare the number of grams (g) of Sugars to the number given for Total Carbohydrate. Unless this food has natural sugar, like that in fruit or milk, these sugars are added sugars. You want to limit added sugars.

Percent Daily Values (DV)

The Percent Daily Value gives a marker for the recommended nutrition needs based on a 2,000 Calorie diet. Your daily values may be higher or lower depending on your calorie/nutrient needs. Tip - 5% DV or less is low, 20% or more is high. You will not find a % DV for *Trans* fat, Sugars, or Protein.

MOVE!

N10 Version 3.0
www.move.va.gov

Serving Sizes

Use familiar objects to judge a single serving size.

½ cup vegetable ½ cup cooked pasta ½ cup of beans 1 small baked potato	Computer mouse 
1 medium piece of fruit	Tennis ball 
1 cup of raw vegetables 1 cup dry cereal 1 cup of lowfat yogurt or milk	Baseball or your fist 
1 small bagel	Hockey puck 
1 small (4-4 ½ inch) pancake	CD 
2 ounces of cheese	2 Pair of dice 
2-3 ounces of meat, poultry or fish	Deck of cards or the palm of your hand 

MOVE!

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Benefits of Regular Physical Activity

- Helps you manage your weight
- Reduces your risk of coronary heart disease
- Reduces your risk of stroke
- Decreases blood pressure
- Reduces your risk of colon cancer
- Helps prevent and control diabetes
- May decrease “bad” (LDL) cholesterol and raise “good” (HDL) cholesterol
- Helps you sleep better
- Strengthens bones and helps prevent injury
- Increases muscular strength and endurance
- Increases flexibility and range of motion
- Improves your mood
- Helps with stress and depression
- Improves self-esteem
- Makes you feel better

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Calories Burned During Physical Activities

The following table gives the number of calories you burn doing 10 minutes of each physical activity listed. The number of calories varies depending on a number of factors including weight, age, and environmental conditions. The figures given are for men ranging in weight from 175-250 lbs and women ranging from 140-200 lbs. If you weigh more than this you will burn more calories per minute.

Physical Activity	Calories Burned in 10 minutes	
	Man	Woman
Light Activities	50	40
Cleaning house		
Office work		
Playing baseball		
Playing golf with a motor-cart		
Moderate Activities	80	60
Walking briskly (3.5 mph)		
Gardening		
Leisurely bicycling (5.5 mph)		
Playing basketball		
Washing windows		
Wheeling self in wheelchair		
Shoveling snow		
Walking stairs		
Water aerobics		
Dancing fast		
Strenuous Activities	120	100
Jogging (9 min/mile)		
Playing football		
Swimming		
Very Strenuous Activities	150	120
Running (7 min/mile)		
Racquetball		
Cross-country skiing		

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S07

FITT — Frequency, Intensity, Time, and Type of Activity

When you put a lot of effort into increasing physical activity, you want results! Whether you are a beginner or have experience, FITT will help you build your physical activity program. By following FITT, you are striving to manage your weight and improve your health.

FREQUENCY

How often are you active?

Everyone:

- Be active 5 or more days of the week.
- Start slowly and gradually increase your physical activity.

Beginners:

- Start with 2-3 days of aerobic activity (activity that increases your heart rate). Gradually increase to at least 5 days/week.

Experienced:

- Continue with aerobic activity 5+ days/week.
- Add in 2 days (Tuesday, Thursday) of strength training.

INTENSITY

How hard are your heart and muscles working?

Everyone (including Beginners):

- Always warm-up, cool-down, and stretch.
- Be active at a moderate intensity (like a brisk walk or gardening).
- Be active at a rate that allows you to talk.
- Slow down if you have trouble breathing or if you can't catch your breath.
- You should stretch after aerobic or strength training. A stretch should never be painful. Some discomfort is normal. You want to feel a slight pull of the muscle.

Experienced:

- Build intensity for aerobic exercise by increasing speed (fast/sprint walk for 30 seconds followed by 1 minute brisk walk) and/or incline/resistance (hills on treadmill, greater workload on bike).
- Increase intensity for strength training by adding weight or only resting 30 seconds between sets.

TIME

How long are you active?

Everyone:

- Try to stay active for at least 10 minutes without stopping. Remember, some activity is better than no activity. It is okay to build up to 10 minutes.
- Aim for a total of at least 30 minutes of activity throughout the day. For weight loss, increase this to 60 minutes per day.
- Set a goal for the week based on total minutes of physical activity.
- Increase the length of time you are active before increasing the intensity of the activity.
- There are no time goals for strength training.
- You should stretch after aerobic or strength activity. For muscles that were used, hold each stretch for 15-30 seconds. Repeating stretches will increase flexibility.

TYPE

What are you doing?

Everyone:

- All types of physical activity are important…so mix it up.
- Aerobic–these make your heart beat faster–bicycling, dancing, swimming, mowing the lawn.
- Strength–carrying wood, lifting dumbbells.
- Flexibility–seated stretches, yoga.

DEFINITIONS

Aerobic activity is when the body's large muscles move together and your heart beats faster than usual. Examples include aerobics, swimming, running, walking, kickboxing, dancing, and cycling. This type of activity burns the most calories and promotes weight loss.

Strengthening activity is when the body's muscles work against a force or weight. Examples include elastic bands, weights, or body weight.

Flexibility lengthens a muscle while increasing range of motion. Examples include self-stretch, yoga, Pilates, and chair stretching routines.

Lifestyle activity occurs during normal, everyday activity such as vacuuming, walking the dog, mowing the lawn, participating in a walking meeting at work, or dancing.

Old Habits Die Hard

You can bury bad habits. Replace old bad habits with new, healthy habits. Here are some tips:

- **Become aware of your actions**. When you realize what you are doing, you can change it.
- **Keep a record** of what you want to change. If you write it down, you are more likely to change it. If your new plan does not work, try something else.
- **Avoid situations that trigger bad habits**, such as eating in front of the TV.
- **Post reminders about healthy habits** where you will notice them…on the refrigerator, on the table, in your car, on the bed, wherever.
- **Practice makes permanent**.

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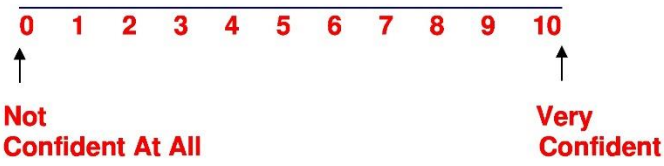
Boost Your Confidence

The more **confidence** you have to make a change, the more successful you will be. Although many people have doubts about their ability to lose weight and keep it off, **it can be done and you can do it!**

How confident are you that you can successfully change your eating and physical activity to control your weight?



Here are some suggestions about ways to strengthen your confidence:

- Ask yourself "What it would take to make that number 2 or 3 points higher?"
- "What would make me more confident?"
- Arrange to make those things happen.

Recall things you did successfully in the past:

- Bring back the good feelings you had at those times.
- Remember how you did those things. What did you do to make those things happen?
- Think about how you can use the successful techniques from the past to accomplish what you want to do now.
- Make a plan about exactly how you are going to accomplish your goal.
- Think positive thoughts. Keep telling yourself you can do it and will do it!

Ask for help. Family members, friends, and your *MOVE!* healthcare team can support and encourage you if you just ask. Spend time with those who offer encouragement. Consider participating in *MOVE!* group sessions for extra support. You will feel more confident when you know you have support behind you!

Get Started! People almost always feel more confident once they get started with something. So, get moving!

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Guiding Thoughts and Images

For behavior change, one or two specific positive thoughts or mental images can help guide you.

- What are your "guiding thoughts" and "guiding images"?
- What personal thoughts and images motivate you to lose weight?

Come up with some particular thoughts and mental images to truly **guide you** through your weight control efforts. Think about them often!

Examples of guiding thoughts:

- "I want to live to see my grandchildren grow up."
- "I will feel much better when I have some of this weight gone."
- "I am worth the effort. I am going to do it!"
- "I CAN do this!"

Examples of guiding images:

- I picture myself as a much healthier and happier person.
- I picture myself surrounded by my children and grandchildren.
- I see myself walking regularly, feeling good, and moving easily.
- I see myself feeling really proud of what I have accomplished.

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Motivate!

Motivation is the force behind doing something. Without it, nothing much happens... Motivation often comes and goes, but here are some tips for how to get it and keep it:

- **Get SERIOUS!** Make your weight control a top priority.
- Have patience. Results take time.
- Have reasonable expectations. Don't expect miracles.
- GOALS! **Set daily and weekly goals that are achievable.** Write the goals down. Don't worry about the long-term stuff right now. It will happen as you achieve daily goals.
- Take 1 day at a time.
- REWARD yourself frequently for following your program (but not with food).
- Do what it takes to get some **RESULTS**! Results motivate!
- Keep a **record** of your weight control activities (food record, exercise record) and your progress.
- Exercise with others.
- Seek support from others.
- **Learn** from your setbacks and mistakes. Forgive yourself….
- Do **LOTS** of positive self-talk!

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Yes! You Can Keep That Weight Off!

You have been managing your weight successfully for a long time. GREAT!!

Here are some tips to help you keep going:

- Now that you know what works for you – keep it up!
- Write down all the reasons you wanted to lose extra weight in the first place. Look at these carefully, and think about how far you have come.
- Take credit for your success and hard work. Continue to reward yourself often!
- Plan for people, places, and events that might trip you up.
- Keep your thinking **POSITIVE**.
- Maintain your network of family and friends to provide encouragement and support. Let them know how much their ongoing support is helping you.
- Plan ways in advance for you to deal with difficult situations.
- Find new ways to cope with stress.
- If you do "slip-up", get right back with your program. Give yourself lots of praise for doing that.

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Involving Others in Your Weight Control Program

One of the most powerful things you can do to help with your weight management efforts is to get support and encouragement from other people. When others give you lots of encouragement, it makes you feel like you can do anything!! It's really motivating!

Here are some tips for making that happen:

- ASK others for encouragement in your weight control efforts. Ask key people who you know will be positive and supportive.
- Share your concerns and struggles with your key supporters.
- Tell your key supporters what they can do to help. Be specific. For example "Ask me how I am doing, and then listen," or "Please don't offer me junk food."

- Let them know that their support is extremely meaningful to you and that you need their encouragement for the long run.
- Even if a support person fails to ask how you are doing, go ahead and tell them! This starts the conversation and provides the opportunity to get some encouragement.
- Give back in return. Reward your support people with your attention and your support for them.

What If My Partner Or Spouse Isn't Helpful?

Weight management requires lots of changes, and sometimes this can cause relationship problems.

Here are some ideas:

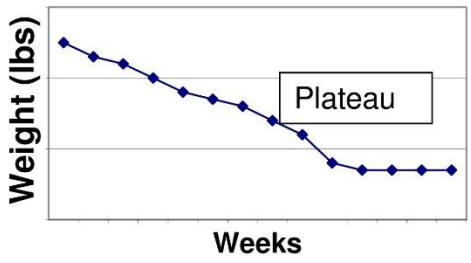
- Try to understand each other. Change can be difficult for both of you.
- Realize that your partner may not know how to support you. In a calm and respectful way, ask the person to help you, and actually tell them what they can do to assist you. Be patient, change takes time.
- Practice being "assertive". This means saying "no" firmly and repeatedly, or whatever else you need to say to maintain your personal program of weight control and physical activity.
- Seek encouragement and support from people other than your spouse or partner. Read the *MOVE!* handout, "Involving Others in Your Weight Control Program."
- Remember that this is about you. Take personal responsibility for what you do, what you eat, your physical activity, and so on.

Handling Weight Plateaus

When losing weight, it is common to have **plateaus** or times when you can't seem to lose any more weight. Research suggests that our bodies will try to maintain a specific weight or "**set-point**". This set-point can make getting over a plateau difficult.

My Weight Log (lbs)

Week 1	285	Week 8	274
Week 2	283	Week 9	272
Week 3	282	Week 10	268
Week 4	280	Week 11	267
Week 5	278	Week 12	267
Week 6	277	Week 13	267
Week 7	276	Week 14	267



Here are tips that can help with managing plateaus and resetting your set-point:

- **Plateaus are often temporary**. Stay with your program and you should start losing again.
- **Try increasing your physical activity**. Adding a few additional minutes or a different kind of physical activity to what you are already doing can get you going again.
- If you haven't been **writing down what you eat** for a while, start again. You may discover that extra calories have crept into your diet plan.
- Plateaus make you feel like giving up. **Remember how hard you have already worked and how far you have come**. Don't lose ground, and push a little harder to keep moving past the plateau.

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APPENDIX D

ADDITIONAL TABLES

Table 11

Comparisons of Incomplete and Complete Cases on Pre-Measures

Pre-Measures	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Food neophobia	-1.213	81	.229	-2.05423	1.69327
Autonomous motivation	.396	79	.693	.51852	1.30871
Controlled motivation	.174	80	.862	.53737	3.08604
Cognitive restraint	-1.270	80	.208	-1.24747	.98263
Uncontrolled eating	-.784	80	.435	-.91616	1.16812
Emotional eating	-.563	81	.575	-.27910	.49565
Negative emotions	-.442	80	.660	-.81181	1.83728
Availability	-.302	79	.764	-.54336	1.80031
Social pressure	.690	79	.492	1.29143	1.87078
Physical discomfort	-.982	77	.329	-1.29100	1.31496
Positive activities	-.811	80	.420	-1.06319	1.31085