The Effect of Perceived Healthy and Unhealthy Commercials on Intake of Perceived Healthy and Unhealthy Snack foods in Normal Weight, College-Aged, Dietary Restrained Women

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I am submitting herewith a thesis written by Seletha Ann Periman entitled "The Effect of Perceived Healthy and Unhealthy Commercials on Intake of Perceived Healthy and Unhealthy Snack foods in Normal Weight, College-Aged, Dietary Restrained Women." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Hollie A. Raynor, Major Professor

We have read this thesis and recommend its acceptance:

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(Original signatures are on file with official student records.)
The Effect of Perceived Healthy and Unhealthy Food Commercials on Intake of Perceived Healthy and Unhealthy Snack Foods in Normal Weight, College-Aged, Dietary Restrained Women

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ABSTRACT

Background: Exposure to various types of food cues via television commercials may enhance consumption of different foods, particularly in females who engage in cognitive efforts to control food intake (i.e., restrained eaters). However, it is unknown if food-related commercials differing in health perceptions impact on intake of foods with differing health perceptions. This study investigated the effect of viewing “healthy” or “unhealthy” food commercials on intake of “healthy” and “unhealthy” snack foods in healthy weight, dietary-restrained, college-aged women.

Methods: Using a 3 x 2 between-subjects design (factors of commercial type [“healthy” foods, “unhealthy” foods, and non-food-related] and snack food type [“healthy” and “unhealthy”]), 36 women (21.9 ± 1.5 kg/m² [kilograms per meters squared], 20.2 ± 2.3 years) were randomized to one of six conditions. Participants watched a 35-minute television program, containing a 30-minute comedy sketch (Saturday Night Live) containing no food cues and five minutes of commercials. Conditions differed by type of commercials shown, “healthy” foods, “unhealthy” foods, and non-food related, and the type of food provided to consume (200 g each of “healthy” snack foods, carrots [0.41 kcal/g] and grapes [0.75 kcal/g], providing 232 kcals; or “unhealthy” snack foods, potato chips [5.1 kcals/g] and chocolate chip cookies [5.0 kcal/g], providing 2020 kcals). Dependent variables were grams and energy of snack food consumed.

Results: Factorial analyses of variance revealed a significant main effect of snack food type on energy and grams consumed. Participants consumed more grams when provided a “healthy” snack as compared to an “unhealthy” snack (173.5 g ± 70.3 vs. 87.8 ± 43.1 g, p < 0.001) and more energy when provided an “unhealthy” snack as compared to a “healthy” snack (425 ± 230 kcal vs. 105 ± 46 kcal, p < 0.001).
Conclusion: Exposure to food-related commercials while watching television did not increase intake as compared to watching television without food-related commercials in healthy weight female, restrained eaters. As greater energy intake occurred when only foods higher in energy density were provided, if one eats while watching television, only having foods lower in energy density available to eat may assist with reducing energy consumed.
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CHAPTER I: LITERATURE REVIEW
BACKGROUND AND SIGNIFICANCE

Adult Obesity in the United States

Obesity is a growing, multifaceted health issue in the United States. Both overweight and obesity are categories that represent unhealthy weight statuses. In adults, overweight is defined as having a body mass index (BMI) of 25.0 kg/m$^2$ to 29.9 kg/m$^2$, with obesity being defined as having a BMI of 30 kg/m$^2$ or greater. Individuals in these categories are at an increased risk of morbidity, stroke, coronary heart disease, type 2 diabetes, respiratory and fertility problems, and mortality.

Causes of Obesity

While obesity is a complex health issue, the reason behind weight gain remains relatively simple. Individuals gain excessive weight when in the state of positive energy balance, meaning when the amount of energy consumed through food is greater than energy expended. For weight loss, negative energy balance must occur, which can be achieved through consuming less energy and/or by expending additional energy, which is usually achieved by increasing physical activity.

Due to the rapid rise in the prevalence of obesity, it is commonly believed that environmental factors have been responsible for increased energy intake and/or decreased physical activity. Some of the environmental factors believed to promote excessive intake include increased portion sizes of food and increased consumption of foods high in energy density. One factor believed to have reduced energy expenditure includes increased engagement in entertainment and leisure-time activities that are sedentary, such as computer usage and watching television. These sedentary behaviors cause very little additional energy expenditure above the resting metabolic rate. Sedentary behaviors may also compete with time to be physically active, which can reduce overall energy expenditure. Television watching may
be especially problematic for energy balance, as greater time spent watching television may not only reduce overall energy expenditure, but it is believed that it may also increase energy intake.

**Behavioral Theory**

Behavioral theory suggests mechanisms by which factors in the environment may influence energy balance. Behavioral theory is based upon a framework of antecedents, behaviors, and consequences. Antecedents are “cues” in the environment that can prompt or not prompt a behavior to occur. Behaviors are also followed by consequences, which act to either encourage or discourage a behavior to occur again.

Behavioral theory also suggests that environmental cues that do not naturally prompt eating or inactivity can prompt these behaviors through a process called classical conditioning. Classical conditioning involves four components: unconditioned stimulus, unconditioned response, conditioned stimulus, and conditioned response. The unconditioned stimulus naturally evokes the unconditioned response. When a neutral stimulus is placed alongside the unconditioned stimulus, with enough repetitions, the neutral stimulus will yield the same response as the unconditioned stimulus. When this occurs, the neutral stimulus has become the conditioned stimulus and the response it now yields is the conditioned response. An example of classical conditioning is Pavlov’s experiment in which food was paired with the ticking of a metronome, with the measured outcome being the salivation response in dogs. In this experiment, Pavlov used food as the unconditioned stimulus and salivation as the unconditioned response. The sound of a ticking metronome was used as the neutral stimulus. First, the dogs were exposed to the ticking metronome and then they were presented with food. After several exposures, the dogs salivated (conditioned response) when they heard the sound of the ticking metronome (conditioned stimulus).
Within the Behavioral Theory framework, the relationship between eating behaviors and television can be explained in several ways. The first is through classical conditioning, in which hunger is the unconditioned stimulus, eating is the unconditioned response, and watching television is the neutral stimulus. In this situation, an individual becomes hungry and consumes food in response. If hunger is paired with television watching and eating occurs, after several conditioning trials, food consumption (conditioned response) can occur when television is watched (conditioned stimulus), without the occurrence of hunger. Thus, overtime, simply turning on the television may prompt eating.

From a behavioral perspective there are two other mechanisms by which television viewing may enhance consumption. Once eating occurs, television may act as a distractor, thus making individuals less aware of the amount of food being consumed and increasing the likelihood of overconsumption. In this situation awareness of the behavior is diminished. Finally, another mechanism through which television may influence energy intake is by serving as a cue for eating by showing visuals of food or factors related to food. This cue is different than that formed from classical condition as the cue is the visual of food itself and does not require conditioning to elicit a consumption response.

**Television and Obesity**

Television watching is a common leisure-time activity in both children and adults. According to the 2014 Neilsen report on television viewing, American adults aged 18 years and older spend an average of 4.5 hours per day watching television. When including television watching on devices other than traditional cable/satellite devices are included (i.e. smartphone, tablet, or laptop), this number increases to approximately 8 hours per day, signifying that adults spend a large proportion of the day engaging in leisurely screen-time behaviors. In 1985,
Dietz and Gortmaker were the first to report a relationship between television viewing and obesity in children.\textsuperscript{12} In this study, data from cycles II and III of the National Health Examination Survey (NHES) were used to determine if obesity was associated with increased television viewing in children aged 6 to 11 years and adolescents aged 12 to 17 years in the U.S. Degree of obesity was divided into two main categories, with obesity being defined as having a triceps skinfold measurement $\geq 85^{th}$ percentile and superobesity defined as having a triceps skinfold measurement $\geq 95^{th}$ percentile.\textsuperscript{12} Results found that in 6- to 11-year-olds, increased television viewing was associated with a greater prevalence of obesity and superobesity. For 12- to 17-year olds a similar relationship was found. Furthermore, regression analyses in both age groups demonstrated a dose-response relationship between obesity, superobesity, and time spent watching television.\textsuperscript{12}

As cycle III of NHES included adolescents who had previously been studied in cycle II, longitudinal samples were included in analyses to determine if the association between television viewing and obesity remained consistent overtime. Potential bias was controlled for in the longitudinal analyses by controlling for past history of obesity and socioeconomic status of the family. After controlling for these variables, results remained consistent that there was a positive relationship between television viewing and obesity, such that higher levels of television viewing at the age of 6 to 11 years was predictive of being obese at the age of 12 to 17 years.\textsuperscript{12}

Since 1985, many investigations have been conducted examining the relationship between television viewing and weight status in both children and adults, with investigations consistently showing a positive relationship between these variables. For example, Peart and colleagues analyzed data from U.S. adolescents aged 12-19 years obtained from The National Health and Nutrition Examination Survey (NHANES) from 2003-2006 and found that increased
television viewing time was positively associated with overweight and obesity. Furthermore, Inoue and colleagues investigated the association between television viewing time and overweight and obesity in older adults (65 to 74 years) and found that spending less time watching television was associated with a significantly lower risk of being overweight or obese, independent of physical activity. Additionally, a review of 35 studies investigating the relationship between television watching and health outcomes in adults by Williams, Raynor, and Ciccolo found a consistent positive association between television viewing and weight status in adults.

*Television Watching and Dietary Intake*

**Observational Studies**

Four observational studies have investigated the association between television watching and dietary intake. In the first investigation, Bowman analyzed data from the U.S. Department of Agriculture’s Continuing Survey of Food Intakes by Individuals 1994-1996 (CSFII 1994-1996), and included data on adults aged 20 years and older. Dietary data was self-reported and collected on two nonconsecutive days, with the names of each eating occasion self-reported from participants. Furthermore, participants were also asked to report the number of hours spent watching television per day, and were able to respond with: no television watched, one hour or less, integers from 2 to 24 hours, and don’t know; with those responding 0 to 24 hours included in analyses. Television viewing was divided into three categories: watched <1 hour television per day, watched 1-2 hours television per day, and watched >2 hours television per day. Individuals who reported watching more than two hours of television per day consumed significantly more calories per day than those who reported watching less than an hour of
television per day. Furthermore, individuals who reported watching more than two hours of television per day consumed more energy-dense snack foods and soft drinks.\textsuperscript{18}

A cross-sectional study by Stroebele and de Castro reported similar findings in college-aged students.\textsuperscript{19} Dietary and television diaries were collected from 78 undergraduate students. Seven-day food diaries collected information regarding the time food was consumed, location where the food was consumed, amount of food consumed, how food was prepared, and hunger ratings. Participants were also asked to report if the food was eaten while watching television. Days where no meals were consumed while watching television were identified as “control days” and days where participants ate while watching television was compared to control days.\textsuperscript{19}

On days where at least one meal was consumed while the television was on, significantly more meals were consumed as compared to days where meals were not consumed with the television on. There was also an overall higher caloric intake on days where at least one meal was consumed with the television on. These effects were independent of the time of day and day during the week in which at least one meal was consumed while watching television.\textsuperscript{19}

Gore and colleagues collected the Block Food Frequency Questionnaire and a questionnaire on television habits from 74 obese women seeking treatment for weight loss and found significant positive associations between television viewing and calories from snack food intake.\textsuperscript{20} This study included women with a BMI between 27 and 50 kg/m\textsuperscript{2}, with type 2 diabetes treated with oral medication, and who reported being able to walk for exercise. Participants were asked to report the number of hours spent watching television and videos on weekdays and weekend days, the number of days per week a meal was consumed in a room with the television on, the number of times per week they snacked while watching television, and the number of times per week they snacked on low-fat or low-calorie foods while watching television.\textsuperscript{20}
Participants in this study spent an average of 3 hours per day watching television.\textsuperscript{20} A significant positive association was found between snacking while watching television and total caloric intake, however significant associations were not found between consuming a meal while watching television and total caloric intake. Furthermore, those who reported a high frequency of snacking while watching television were less likely to consume low-calorie, low-fat foods.\textsuperscript{20}

Finally, a cross-sectional study conducted by Cleland and colleagues looked to identify a potential mechanism for obesity and television watching by investigating if the association between time spent watching television and obesity in young adults was mediated by energy consumption during television viewing or by a reduction in overall energy expenditure.\textsuperscript{21} This study included data from 2001 Australian adults between the ages of 26 and 36 years. Waist circumference measures were taken and abdominal obesity was defined as having a waist circumference between 94 and 101.9 cm for men and between 80 and 87.9 cm for women, with severe abdominal obesity being defined as having a waist circumference $\geq$102 cm in men and $\geq$88 cm in women.\textsuperscript{21} Participants self-reported the amount of time spent watching television on weekdays and weekends and also reported how often they consumed food (meal, snack, soft drink, or alcohol) while watching television. Time spent in leisure time physical activity (LTPA) was assessed using the International Physical Activity Questionnaire and was split into quartiles. After adjusting for demographics and time spent watching television, increased consumption of food and beverages while watching television was significantly associated with an increase in abdominal obesity in both men and women. However, significant correlations were not found between television viewing and LTPA in either men or women, suggesting that food and beverage consumption while watching television was the mechanism through which television viewing increased the chance of becoming overweight or obese.\textsuperscript{21}
Experimental Studies

While non-experimental studies have shown a positive association between television viewing and increased food intake, experimental studies have also examined if television watching influences intake and the potential mechanisms by which these variables are related.\textsuperscript{5, 17, 22, 23} For example, two studies examined if television viewing increases consumption through distraction, so that increased consumption occurs because individuals become less aware of the amount consumed.\textsuperscript{17, 23} Hetherington and colleagues used a within-subject design and had 37 males and females undergo four different experimental conditions.\textsuperscript{22} The first condition was a baseline condition where participants consumed lunch alone. The second condition was a television condition, where participants ate lunch while watching non-food-related television programming. The third and fourth conditions involved eating with others, where participants ate lunch with strangers in the third condition and ate lunch with friends in the fourth condition. Participants were also videotaped while eating and the videotape was coded for six behaviors: eating and looking at the meal; eating and looking away; drinking and looking at the meal; drinking and looking away; talking and looking at food; talking and looking away; resting and looking at food; and resting and looking away. These behaviors were used to assess if the participant was actively engaged in eating or distracted.\textsuperscript{22} Results from this study showed that participants consumed significantly more calories in the television and friend conditions than in the condition in which they were alone. Participants eating alone spent significantly more time engaged in eating than being distracted (such as engaging in conversation) as compared to all other conditions.\textsuperscript{22} Moreover, participants in the television condition consumed more food while looking away from the meal than in other conditions, suggesting that the participants were more engaged in watching television than eating. These results suggest that television acts as a
distracter, causing individuals to consume more food simply because they are less aware of what they are consuming.\textsuperscript{22}

Bellisle and colleagues further investigated the effect of television viewing on meal intake by having participants consume a meal while watching television or while listening to an audio story.\textsuperscript{23} The study included 48 women aged 18 to 50 years with a BMI between 18.5 and 24.9 kg/m\textsuperscript{2}. Participants were given four meals, with the first meal serving as baseline intake, the second and third being consumed while watching a television show without food cues or while listening to an audio story, and the last meal being used to control for any changes in intake that occurred due to meal becoming less palatable over time. Results showed that individuals consumed more food while watching television and while listening to the audio story as compared to baseline intake. In this study, participants did not consume more food while watching television as compared to the audio story condition.\textsuperscript{23}

Blass and colleagues conducted a similar study in 20 undergraduate participants.\textsuperscript{5} This study was also within-subject design, where participants were subjected to both an experimental condition where two lunches or dinners were consumed while watching television, or while listening to Rachmaninoff’s Second Symphony (control). Participants were given a choice of macaroni and cheese or pizza as their meal, and those who chose macaroni and cheese as a meal were provided cola to drink, while those that chose pizza were provided water to drink with their meal. During the study, participants were given a choice of 6 television shows to watch. The television shows included the original commercials, however it was not reported if these commercials included food cues. Results from this study showed a significantly increased caloric intake while watching television as compared to listening to music, regardless of the meal chosen.\textsuperscript{5}
Another way to investigate if watching television influences eating through distraction is to look at compensation that may occur later in the day to consumption occurring earlier in the day while watching television. Higgs and Woodward tested this by having participants consume a lunch while watching or not watching television and then measured snack food intake later in the day. This study included 16 women aged 18-20 years in a within-subject design, where all women were exposed to a television condition, in which a 10-minute video without food cues was played while eating lunch, and a control condition where lunch was consumed in silence. Measures on appetite, mood, and lunch recall were also taken. All participants consumed the same lunch and were scheduled to return to the lab for an afternoon snack about 2.5 hours after the lunch. For the snack, participants were given three plates of broken cookies and were given ten minutes to eat as much or as little of the cookies as wanted. Results showed a significant effect of television on cookie intake, where participants who watched television while eating lunch consumed more cookies than those who ate lunch without television. While there was not an effect of television on mood or appetite, participants in the television condition were not able to recall their meal with as much detail as those who did not watch television while eating lunch, suggesting that television served as a distracter while lunch was consumed, making participants less aware of food consumed at lunch thereby increasing consumption later in the day.

Food Cues on Television and Dietary Intake

Television viewing may also prompt consumption by showing foods cues, which could encourage consumption. A cross-sectional, internet-based surveillance study conducted by Thomson and colleagues suggests that food commercials play a part in the relationship between television and dietary intake. The survey targeted 613 students aged 18 to 25 years from the University of Alberta, Canada and included self-reported measures on television viewing, snack
food intake, advertising recall, snacking frequency, body weight status, and demographics. To assess television viewing, participants were to estimate the number of hours spent watching television on an average weekday and an average weekend day. A classification system was then used to categorize viewers as high viewers (≥4 hours of television per day) or low viewers (<1 hour of television per day). Snack food intake was assessed using the Block Food Frequency Questionnaire. From this questionnaire, 12 snack food categories were created and subdivided into energy-dense snack foods (7 categories) or healthy snack food choices (5 categories). Advertising recall was measured by having participants complete 10 fill in the blank questions referring to energy-dense snack foods and the advertisement slogans associated with those foods (20). Snacking frequency was assessed by asking “How often do you snack while watching television?” and having participants answer using a five-point Likert scale. Results from this study found that high television viewers were able to recall more snack food slogans than low television viewers and consumed a higher amount of energy-dense snacks, suggesting that television commercials may play a role in influencing the amount and types of foods that are consumed while watching television.24

Koordeman and colleagues further investigated the link between television commercials and dietary intake by investigating the effect of commercials on sugar-sweetened soda intake.25 In this experiment, 51 female college students aged 18-29 years watched a 35-minute movie that was interrupted by seven commercials. The participants were either randomized to a soda condition, where five of the commercials were neutral and two commercials focused on soda; or a water condition where five of the commercials were neutral or two focused on water consumption. During the movie, participants were allowed to get unlimited drinks of Pepsi, Sprite, Orangiana, or Evian Water. Participants were observed through a camera while watching
the movie to determine drinking behavior and also to determine the number of glasses of soda and water that was consumed before the first commercial. Results from this study found that participants exposed to the sugar-sweetened soda commercials consumed more soda than those in the water condition. However, the amount of water consumed in the water condition as compared to those in the soda condition was not significantly different. These results suggest that the sugar-sweetened soda commercials prompt sugar-sweetened soda consumption and water commercials did not prompt water consumption. The lack of effect with water commercials may be due to water not being regarded as a highly palatable or highly desired item. \(^{25}\)

Anschutz and colleagues also investigated the effect of food commercial exposure on snack food intake. \(^{26}\) The study included 82 college students with a BMI in the normal weight range. In the study, participants were exposed to a 30-minute movie that was interrupted by 2 commercial breaks that included eight commercials. Participants were randomized to either a food commercial condition or a neutral condition. In the food commercial condition, three of the commercials focused on energy-dense foods, with the remaining five neutral and not containing any food cues; while in the neutral condition, all eight commercials were neutral and did not contain food cues. In both conditions, students were presented with chips, M&M’s, and water and were told they could eat or drink as much as they wanted while watching television. Participants were asked to rate satiation, attitudes towards the movie, commercial liking, and to write down as many of the commercials as they could remember. Results from this study showed that while there was not a significant relationship between condition and food intake, significant differences were found between sexes. Women consumed significantly more food when exposed to food commercials than when exposed to neutral commercials, while the opposite was found in
men. These findings suggest women may be more susceptible to marketing and food cues that are viewed on television.\textsuperscript{26}

Shimizu and Wansink investigated the link between television content and food intake and examined if the relationship was moderated by an individual’s level of dietary restraint.\textsuperscript{27} This study included 180 male and female undergraduate students. Individuals participating in the study were randomized to one of two conditions where they were given a bowl with two types of candy and a bottle of water and watched an episode of SpongeBob SquarePants in which the show contained food-related content or non-food-related content. These sessions took place in a lecture hall and participants were instructed not to sit next to other participants. After the television show, participants rated their liking of the candies and completed the 10-item Restraint Eating Scale. While there was no overall difference in food intake between the two conditions, there was a significant interaction of restraint status where restrained eaters consumed more candy while watching the food-related television show as compared to restrained eaters in the other condition. However, significant effects were not seen in unrestrained eaters. These results suggest that restrained eaters may have more difficulty controlling food intake when exposed to highly palatable foods, and thus are more vulnerable to the effects of food-related television than unrestrained eaters.\textsuperscript{27}

Bodenlos and Warmuth also investigated the link between television content and food intake.\textsuperscript{28} In this study, 80 male and female college students were randomized to one of two conditions in which they were exposed to a television show and then provided with 800 kilocalories of snack foods (chocolate covered cherries, cheese curls, and carrots) and given 10 minutes to eat as much or as little of the foods as they wanted. One television show was 10-minute cooking segment from Food Network, while the other television show was a 10-minute
nature segment from Planet Earth. Participants were also asked to complete the Three Factor Eating Questionnaire to assess cognitive restraint, disinhibition, and hunger. Furthermore, hunger levels and desirability of foods provided were assessed before and after the experimental session using a visual analog scale. Results from this investigation did not find a significant difference in energy intake between the two conditions. However, an interaction of snack food and condition occurred, in which participants randomized to the food-related television condition consumed significantly more energy from chocolate covered cherries than individuals randomized to the non-food-related condition. These results suggest that exposure to food-related television may impact on energy intake from specific foods provided.28

Martin and colleagues investigated the effect of television on distraction and food intake as well as the influence of television advertisements on memory and food intake.29 This study included both males and females 18-54 with a BMI between 20 and 35 kg/m². A within-subject design was used where participants consumed a meal in four different conditions in random order. These conditions consisted of a meal consumed while watching television without advertisements, participants consuming a meal while watching television with both food and nonfood advertisements, a reading condition where participants were asked to read while eating, and a control condition where participants were only provided a meal to eat. To ensure the manipulation of the study went into effect, participants were told that they would be asked questions about the television or reading material. These meals were completed on two days where participants consumed a standardized breakfast and the first meal was given at lunch and the second meal at dinner. The second testing day was scheduled about seven days after the first and followed the same procedures with a standardized breakfast served with the third meal served at lunch and the fourth meal served at dinner. To test for memory of television
advertisements, participants were given a list with a description of advertisements with 50% of the advertisements used in the program and the other 50% consisting of advertisements that were not used in the program. For this information, a proportion of remembered advertisements was calculated and used in analyses.29

Results from this study found that while energy intake did not vary by condition, significant associations were found in memory for advertisements and distractibility with energy intake and body weight.29 Distractibility was found to be significantly associated with body weight in women, but not in men. Furthermore, memory for advertisements was significantly associated with body weight and energy intake in conditions where participants watched television. These results suggest that cues prompting eating may differ between sexes. Women may be more likely to be distracted when watching television, thus leading to increased food intake; whereas men may be more likely to remember commercials that they are exposed to while watching television, thus serving as a cue to prompt eating in men.29

Harris and colleagues investigated naturally occurring food advertisements on snack food consumption.30 This study included 98 university students aged 18 to 24 years and included both restrained and unrestrained eaters. Participants were randomized to one of three conditions, with each condition including a 16-minute comedy program and eleven commercials with seven of those commercials being the same non-food commercials. One condition included four commercials with food and beverage commercials encouraging consumption of snack foods along with the seven non-food commercials, another included four advertisements that emphasized nutritional foods along with the seven non-food commercials, and the last condition served as a control condition with all eleven commercials being non-food-related. After watching the television shows, the participants were moved to another room and presented with five
different snack foods with varying health perceptions and were asked to try each food item, but they could also eat as much as they wanted of each food. Carrots and celery with dip were included as healthy food items; chocolate chip cookies and cheese snack mix as unhealthy snack foods; and banana chips and multi-grain tortilla chips as moderately healthy items.

Results from this study found a significant main effect of advertising with participants in the condition with snack food advertisements consuming more food and eating for a longer period of time than participants in the nutrition commercial conditions, with differences in food intake between snack food ads and control conditions approaching significance. Furthermore, restrained eaters consumed significantly more food after exposure to snack food advertisements as compared to both the nutrition and control commercial conditions, with restrained eaters consuming the least amount of food in the nutrition commercial condition. Results from this experiment show that the effects of television food advertisements go beyond distraction and effect food intake when television is not being watched. Moreover, these results suggest that restrained eaters may not view all food commercials as equal and that some commercials may allow restrained eaters to maintain their restraint, where as other food commercials may disinhibit restrained eaters and prompt eating.

As a whole, these investigations indicate that television is related to increased food and beverage consumption and appears to prompt eating. Interestingly, these studies also appear to suggest that individual characteristics may influence the relationship between television food commercials and consumption, with women potentially more responsive then men, and restrained eaters more responsive than unrestrained eaters.

While these investigations have shown that television increases consumption, no studies have investigated if the type of food commercial viewed on television influences energy intake
from the snack and if the type of food available to eat is a factor in the relationship between food commercials and consumption. Therefore, the objective of this investigation was to investigate the effect of watching a television show with commercials perceived as advertising healthy foods and commercials perceived as advertising unhealthy foods on the intake of either perceived healthy snack foods or perceived unhealthy snack foods in normal weight, dietary restrained females. To test this, females who were restrained eaters were randomly assigned to one of six conditions. For the conditions, one factor that was examined was type of commercial (perceived as healthy food-related, perceived as unhealthy food-related, or non-food-related) and the other factor that was examined was type of snack food available to consume (perceived as healthy or unhealthy). Individuals participating in the study were provided with a snack (perceived healthy or unhealthy) to consume while watching a television show (Saturday Night Live skit) with the commercials embedded within the show. The primary aim of this investigation was to determine if exposure to food-related commercials increases food consumption as compared to exposure to non-food-related commercials. The two secondary aims of this investigation were 1) to determine if more food is consumed when exposed to “unhealthy” food commercials as compared to “healthy” food commercials and 2) to determine if individuals consume the most food when exposed to “unhealthy” food commercials and have “unhealthy” snack foods available. We hypothesized a priori that individuals exposed to food-related commercials will consume more energy than individuals exposed to non-food-related commercials. Furthermore, we hypothesized those individuals in an “unhealthy” matched condition (i.e. exposed to an “unhealthy” food commercial and being provided an “unhealthy” snack food) will consume more energy than individuals not in a matched condition, while individuals in a “healthy” matched condition were hypothesized to consume the least amount of energy.
CHAPTER II: MANUSCRIPT
INTRODUCTION

Television watching is a common leisure-time activity in both children and adults. According to the 2014 Neilsen report on television viewing, American adults aged 18 years and older spend an average of 4.5 hours per day watching television.\textsuperscript{10} When including television watching on devices other than traditional cable/satellite devices (i.e. smartphone, tablet, or laptop), this number increases to approximately 8 hours per day, signifying that adults spend a large proportion of the day engaging in leisurely screen-time behaviors.\textsuperscript{10,11} A review of 35 studies investigating the relationship between television watching and health outcomes in adults by Williams, Raynor, and Ciccolo found a consistent positive association between television viewing and weight status in adults.\textsuperscript{14}

Television watching may impact weight status by influencing both energy expenditure and intake. Television viewing is a sedentary behavior, which expends low levels of energy, and may compete with time spent in both light and moderate- to vigorous-intensity physical activity, which expend greater amounts of activity. High amounts of television viewing may reduce time spent in these other activities, thereby decreasing overall energy expenditure.\textsuperscript{6,7,31-33} Television viewing may also increase energy intake through classical conditioning, by distraction, or by serving as a cue to prompt eating.\textsuperscript{9} Classical conditioning involves four components: unconditioned stimulus, unconditioned response, conditioned stimulus, and conditioned response. One example of classical conditioning is Pavlov’s experiment with dogs and salivation. In this experiment, Pavlov used food as the unconditioned stimulus and salivation as the unconditioned response.\textsuperscript{9} The sound of a ticking metronome was used as the neutral stimulus. First, the dogs were exposed to the ticking metronome and then they were presented with food. After several exposures, the dogs salivated (conditioned response) when they heard the sound of
the ticking metronome (conditioned stimulus). Within this framework, the relationship between eating behaviors and television can be explained using hunger as the unconditioned stimulus, food consumption as the unconditioned response, and television as the neutral stimulus. In this situation, an individual becomes hungry and consumes food in response. If hunger is paired with television watching and eating occurs, after several conditioning trials, food consumption (conditioned response) can occur when television is watched (conditioned stimulus), without the occurrence of hunger. Thus, overtime, simply turning on the television may prompt eating.\textsuperscript{9}

Additionally, once eating occurs, television may act as a distractor, thus making individuals less aware of the amount of food being consumed and increasing the likelihood of overconsumption. Another mechanism through which television may influence energy intake is by serving as a cue for eating by showing visuals of food or factors related to food.\textsuperscript{5, 23, 29} This cue is different than that formed from classical condition as the cue is the visual of food itself.

When watching television, an individual may be exposed to food cues either through the television program itself (i.e. a cooking program or characters consuming food) or through commercials shown (i.e. commercials for candy bars or restaurants). While the exact content of commercials (food-related versus non-food-related) is not reported, the Video Consumer Mapping study found that American adults are exposed to approximately 73 minutes of commercials each day, and that most (85\%) watch these advertisements rather than changing the television channel or leaving to go to another room.\textsuperscript{34} Thus, individuals watching television have the opportunity to be exposed to food cues through two mechanisms.

Two laboratory-based experiments investigated the effect of watching food-related television on energy intake. The first study, conducted by Shimizu and Wansink, investigated how watching food-related television influences energy consumed while watching the television
program. Shimizu and Wansink randomized participants to a condition in which participants either watched a 30-minute SpongeBob SquarePants episode that included food cues or an episode that did not include food cues and provided candy to consume during the program. Results from this study revealed that while overall energy intake did not differ between conditions, there was an interaction of dietary restraint and condition in which dietary restrained individuals increased energy intake when exposed to a food-related television program. Thus, dietary restrained individuals may be more susceptible to food cues viewed on television, and thus may be more likely to increase energy intake when exposed to food-related television programs.

The second experiment, conducted by Bodenlos and Warmuth, investigated how watching food-related television influences energy consumption after exposure to the television program. Bodenlos and Warmuth randomized participants to a condition in which participants watched a 10-minute cooking program or a nature program. After exposure to the programs, participants engaged in a taste test of chocolates, mini chocolate chip cookies, and cheese curls and were given 10 minutes to consume as much or as little of the foods as they wanted. Results from this study revealed that while overall energy intake did not differ between the two conditions, an interaction of condition and energy consumed from specific foods occurred, in which participants consumed significantly more energy from chocolate after exposure to the cooking program than when exposed to the nature program. Thus, these findings suggest that food-related television may not impact on overall energy intake, but may impact on energy intake from specific foods that are provided.

Three investigations have specifically examined how food-related television commercials impact on eating behaviors. Koordeman and colleagues investigated the link between
television commercials and dietary intake by investigating the effect of commercials on sugar-sweetened soda intake. In this experiment, participants were exposed to a 35-minute movie that was interrupted by seven commercials. The participants were either randomized to a soda condition, where five of the commercials were neutral and two commercials focused on soda; or a water condition where five of the commercials were neutral or two focused on water consumption. During the movie, participants were allowed to get unlimited drinks of Pepsi, Sprite, Orangiana, or Evian Water. Results from this study found an interaction of commercial type and beverage consumed, in which participants exposed to the sugar-sweetened soda commercials consumed more ounces of soda than those in the water condition, suggesting that the sugar-sweetened soda commercials prompt sugar-sweetened soda consumption and water commercials did not prompt water consumption. While results from this investigation revealed that food-related television commercials influenced consumption of beverages, it is important to note that as water was included as a beverage, the primary dependent variable in this investigation was ounces of beverage consumed, rather than energy from beverage consumed. Thus, it is impossible to ascertain how exposure to food-related television commercials influences energy intake.

Anschutz and colleagues also investigated the effect of food commercial exposure on snack food intake. In this investigation, participants were exposed to a 30-minute movie that was interrupted by two commercial breaks that included eight commercials. Participants were randomized to either a food commercial condition or a neutral condition. In the food commercial condition, three of the commercials focused on energy-dense (ED) foods, with five of the commercials neutral, and in the neutral condition, all eight commercials were neutral and did not contain food cues. In both conditions, students were presented with chips, M&M’s, and water
and were told they could eat or drink as much as they wanted while watching television. Results from this found showed that while there was not a significant relationship between condition and energy intake, a significant interaction of sex and condition occurred. Women consumed significantly more energy when exposed to food commercials than when exposed to neutral commercials, while the opposite was found in men. These findings suggest women may be more susceptible to marketing and food cues that are viewed on television. While this investigation revealed that exposure to food-related commercials increases in energy intake in women, this investigation included commercials advertising energy-dense foods and provided energy-dense foods to participants. Thus, it cannot be ascertained if advertising varying types of foods (i.e. fruits, vegetables, or whole grains) also influences consumption or if varying the type of food provided (i.e. low-ED versus high-ED) impacts on overall consumption.

Finally, Harris and colleagues investigated naturally occurring food advertisements on snack food consumption. This investigation included 98 university students aged 18 to 24 years and included both restrained and unrestrained eaters. Participants were randomized to one of three conditions, with each condition including a 16-minute comedy program and eleven commercials with seven of those commercials being the same non-food commercials. One condition included four commercials with food and beverage commercials encouraging consumption of snack foods (i.e. advertising individuals consuming snack foods while engaging in fun and exciting behaviors) along with the seven non-food commercials, another included four advertisements that emphasized consuming of nutritious foods (i.e. advertising granola bars, orange juice, or oatmeal and emphasizing health benefits of these foods) along with the seven non-food commercials, and the last condition served as a control condition with all eleven commercials being non-food-related. After watching the television shows, the participants were
moved to another room and presented with five different snack foods varying in health perceptions (very healthy = carrots and celery with dip; very unhealthy = mini chocolate chip cookies and cheesy snack mix; and moderately healthy = trail mix and multigrain tortilla chips) and were asked to try each food item, but they could also eat as much as they wanted of each food. 

Results from this study found a significant main effect of advertising with participants in the condition with snack food advertisements consuming more grams of food and eating for a longer period of time than participants in the nutrition commercial conditions. Furthermore, restrained eaters consumed significantly more grams of food after exposure to snack food advertisements as compared to both the nutrition and control commercial conditions, with restrained eaters consuming the least amount of food in the nutrition commercial condition. These results suggest that restrained eaters may not view all food commercials as equal and that some commercials may allow restrained eaters to maintain their restraint, where as other food commercials may disinhibit restrained eaters and prompt eating. While results from this investigation revealed that exposure to snack food-related commercials influences grams of food consumed in restrained eaters, energy intake was not measured in this investigation. Thus, it is not possible to ascertain how commercials varying in food-related messages impact on energy intake from snack foods, which is important from a weight management perspective.

As a whole, these investigations indicate that television is related to increased food and beverage consumption and appears to prompt eating. Interestingly, these studies also appear to suggest that individual characteristics may influence the relationship between television food commercials and consumption, with women potentially more responsive then men, and restrained eaters more responsive than unrestrained eaters.
While these investigations have shown that television increases consumption, no studies have investigated if the type of food commercial viewed on television influences energy intake from the snack and if the type of food available to eat is a factor in the relationship between food commercials and consumption. Therefore, the objective of this investigation was to investigate the effect of watching a television show with commercials perceived as advertising healthy foods and commercials perceived as advertising unhealthy foods on the intake of either perceived healthy snack foods or perceived unhealthy snack foods in normal weight, dietary restrained females. To test this, females who were restrained eaters were randomly assigned to one of six conditions. For the conditions, one factor that was examined was type of commercial (perceived as healthy food-related, perceived as unhealthy food-related, or non-food-related) and the other factor that was examined was type of snack food available to consume (perceived as healthy or unhealthy). Individuals participating in the study were provided with a snack (perceived healthy or unhealthy) to consume while watching a television show (Saturday Night Live skit) with the commercials embedded within the show. The primary aim of this investigation was to determine if exposure to food-related commercials increases food consumption as compared to exposure to non-food-related commercials. The two secondary aims of this investigation were 1) to determine if more food is consumed when exposed to “unhealthy” food commercials as compared to “healthy” food commercials and 2) to determine if individuals consume the most food when exposed to “unhealthy” food commercials and have “unhealthy” snack foods available. We hypothesized a priori that individuals exposed to food-related commercials would consume more energy than individuals exposed to non-food-related commercials. Furthermore, we hypothesized those individuals in an “unhealthy” matched condition (i.e. exposed to an “unhealthy” food commercial and being provided an “unhealthy” snack food) would consume
more energy than individuals not in a matched condition, while individuals in a “healthy”
matched condition were hypothesized to consume the least amount of energy.

**STUDY DESIGN AND METHODOLOGY**

*Study Design*

To test the effect of commercials as advertising perceived healthy foods or unhealthy
foods on the intake (in grams and kilocalories) of either perceived healthy or unhealthy snack
foods in healthy weight, dietary restrained females, a 3 x 2 between-subjects design was used.
One factor was type of commercial (perceived as healthy food-related, perceived as unhealthy
food-related, or non-food-related) and the other factor was type of snack food available to
consume (perceived as healthy or unhealthy) (Appendix A, Table 1). Females participating in the
study were randomized to one of six conditions where they were exposed to a television show
with five minutes of embedded commercials and were provided with two snack foods to
consume while watching the television show. In each condition, participants were given two
different pre-measured, condition-specific snack foods to consume while watching the television
show (Saturday Night Live (SNL) Skit). This study was approved by the Institutional Review
Board at the University of Tennessee- Knoxville and was registered at ClinicalTrials.gov
(NCT01694043).

*Participants*

Participants were recruited for a research study to “investigate the effects of watching a
television show on the liking of snack foods.” To recruit participants, flyers were placed around
the University of Tennessee- Knoxville campus and e-mails were sent out to campus electronic
mailing lists (Appendix C). Additionally, participants enrolled in Psychology 100 at the
University of Tennessee- Knoxville were recruited to participate in exchange for class credit.
Interested individuals were asked to contact the Healthy Eating and Activity Laboratory (HEAL) for an initial phone screen. A rolling recruitment strategy was used.

The sample size for this study was calculated based on the effect size found in a study conducted by Harris and colleagues. Based on an effect size of 4.6 with 80% power and alpha set at 0.05, two participants per condition were needed. However, as it was likely that such a large effect size would not be found in this study, a goal of recruiting eight participants per conditions, or 48 participants overall, was set in order to increase the likelihood of significance being found.

**Eligibility Criteria**

Eligibility for this investigation was based upon the following criteria:

1. Female
2. Aged 18 – 30 years
3. Body mass index (BMI) between 18.5 – 24.9 kg/m²
4. Do not have an unfavorable preference for snack foods used in investigation (grapes, baby carrots, chocolate chip cookies, and potato chips). Liking of snack foods was assessed via phone screening where participants were asked to rate, using a scale of 1 to 5, their liking of the snack foods used, with 1 meaning the participant highly disliked the snack food and 5 meaning that the participants highly liked the snack food. Participants were required to rate each food as a 3 or higher to be eligible to participate
5. Be a restrained eater as determined by scoring ≥ 10 on the Three Factor Eating Questionnaire Restraint Scale (TFEQ-R)
6. Desired health perception of foods and commercials used in the investigation as assessed via the phone screen. This was measured on a scale of 1 to 5 with 1 indicating that the
food or advertisement was perceived as extremely unhealthy and 5 indicating the food or advertisement was perceived as extremely healthy, with 3 indicating neutrality. In order to be deemed eligible participants were required to perceive each food or advertisement as the following:

a. Perceive grapes and baby carrots as healthy foods as determined by ranking the foods as a 4 or a 5 on the scale

b. Perceive chocolate chip cookies and potato chips as unhealthy foods as determined by ranking the foods as a 1 or 2 on the scale

c. Perceive commercials advertising Fiber One bars, Honey Bunches of Oats cereal, Musselman’s applesauce, Nature’s Path granola, and Nestle fruit yogurt as healthy commercials as determined by ranking the commercials as a 4 or 5 on the scale

d. Perceive commercials advertising M&M’s candies, Oreo cookies, Cheez-it crackers, 3 Musketeers chocolate bars, and Doritos chips as unhealthy commercials as determined by ranking the commercials as a 1 or 2 on the scale

e. Scores of 3 indicated that the potential participant had a neutral health perception of the food or commercial. Thus, if a potential participant rated any of the foods or commercials used in the study as a 3, the individual was deemed ineligible to participate in the investigation

7. No reported food allergies to foods used in the investigation

8. Report being a non-smoker

9. Did not have a medical condition affecting eating or following a therapeutic diet

10. Was not taking any medications that affect appetite or food intake at time of investigation
Exclusion from this investigation was based upon the following criteria:

1. Dieting for weight loss

A total of 192 individuals called with interest in participating in the investigation. Of these initially interested individuals, 20 were no longer interesting in participating after being provided additional details regarding the study. Additionally, 1 individual was ineligible due to living outside the Knoxville area. Of the remaining individuals screened for eligibility, 11 were male, 21 had a BMI outside eligibility range, 22 reported disliking snack foods being used in the study, 3 reported not perceiving foods used in the study as desired, 35 reported not perceiving commercials used in the study as desired, 1 reported smoking, 1 reported allergies to foods used in the study, 4 reported having health conditions (i.e. celiac disease) that influenced eating, 5 reported currently dieting for weight loss, 29 were not classified as restrained eaters, and 1 had schedule conflicts that interfered with participating. Thus, a total of 38 women were screened eligible, signed an informed consent statement (approved by UTK IRB), and participated in this study. Two participants were deemed ineligible after fully participating in the study due to having a BMI outside eligible range. These two participants still received compensation for participating. Thus, 36 women were included in analyses (Appendix A, Figure 1).

Consent

Interested participants were told that the purpose of this study was to investigate the effects of watching a television show on the liking of snack foods. Interested potential participants contacted the HEAL lab, completed a phone screen to determine eligibility, and potentially eligible participants were scheduled for an experimental session with a trained researcher. At the start of the session, participants signed a consent form that was approved by the Institutional Review Board at the University of Tennessee- Knoxville (Appendix E).
Procedures

Following completion of the phone screen, eligible participants were scheduled for a 60-minute individual session on Monday through Friday between 12 and 5 pm at the HEAL Lab. Participants were asked to eat within two to four hours of their scheduled appointment. Furthermore, participants were asked to refrain from engaging in structured physical activity prior to their scheduled appointment. After this phone screen, participants were randomly assigned to one of the six study conditions described in Appendix A, Table 1 using a random number table. During this session, participants were asked to complete a brief dietary recall where they were asked to record all foods and beverages consumed after waking on the day of their scheduled appointment. This procedure was done to ensure that participants consumed food within two to four hours of their appointment. Participants not following this protocol were rescheduled for another appointment. Physical activity was then assessed via self-report with the investigator asking the participant if she had engaged in any structured physical activity prior to the appointment. Participants were also provided with a hunger scale to measure hunger levels prior to consuming the snack. To the investigator’s knowledge, all participants in this investigation followed the above protocol regarding food consumption and physical activity prior to the experimental session correctly.

Next, participants were provided with two snack foods based upon their assigned condition and a 12 oz. glass of water. Participants were informed that they would be watching a television show participating in a taste-test and would be asked to at least try the two snack foods, but could eat as much or as little as they liked while watching the television show. Following the television show, the investigator promptly removed the foods from the room and provided the participants with liking of snack food measures, demographic measures, hunger
measures, and a memory questionnaire on commercials viewed. Last the investigator took the participant’s height and weight measurements. These measures were taken at the end of the experimental session to ensure that these measures would not impact on food intake. Participants with BMI measures outside of this study still received compensation for participating, but their data was excluded from analyses. After the experimental session, participants were asked what they thought the true purpose of the study was, debriefed, compensated with a $15 gift card, and thanked. Participants enrolled in Psychology 100 received class points for participation rather than a $15 gift card.

**Pilot Data- Selecting Commercials Used in the Investigation**

Pilot data were collected to assist the investigator with determining appropriate commercials to use in the study. To do this, the investigator used YouTube to search for potentially appropriate commercials. Any commercials that advertised any of the foods that potentially were going to be used in the study were omitted. For the perceived healthy food-related commercials, those that promoted weight loss, other positive health outcomes were omitted. Additionally, to assist with controlling for prior exposure to commercials, the investigator chose commercials with an original airdate between January 2008 and December 2009, which was approximately 2 to 3 years prior to initiation of the investigation.

To help ensure that snack foods and commercials used in the study would be appropriately perceived, a survey was developed and distributed to a sample of students who were not nutrition majors. These surveys were conveniently distributed in a summer-term Child and Family Studies class. To assess the health perception of potential commercials to be used in the study, students were asked, “If you were watching TV and saw a commercial advertising the following foods, would you perceive them as healthy or unhealthy?” and were given a list of
commercials including: Fiber One bars, Nature’s Path granola, Honey Bunches of Oats, Nestle fruit yogurt, M&M’s candies, Oreo cookies, Twix chocolate bars, 3 Musketeers chocolate bars, Cheez-it crackers, and Doritos chips. Sixteen students completed the survey and results are presented in Appendix A, Table 2.

After the results from this survey were collected, the data were then entered into an Excel spreadsheet and number of individuals ranking the commercials and snack foods as being “healthy” or “unhealthy” was calculated. The majority of the students surveyed marked their perceptions of the food commercials as anticipated. However, in the final selection of commercials, the investigator only chose five “healthy” food commercials and five “unhealthy” food commercials. This was done so that participants would be exposed to the same variety of commercials in each condition. From the “unhealthy” food commercials, the commercial advertising Twix chocolate bars was omitted as only one commercial was available to be downloaded online.

**Commercial Used in the Investigation**

The “healthy” food commercials used in this investigation included commercials advertising Fiber One bars, Honey Bunches of Oats cereal, Musselman’s applesauce, Nature’s Path granola, and Nestle Fruit yogurt. In order to equalize variety and amount of time allotted to food commercials between conditions, five healthy and five unhealthy food commercials were chosen. Thus, while it was not pilot-tested, Musselman’s applesauce was added as a healthy food commercial. There were two commercials advertising each food, with each commercial approximately 30 seconds in length, which gave a total of five minutes of “healthy” food commercials. All of these commercials emphasized the food as being healthy in various ways (such as being high in fiber or containing healthy grains), but still tasting good. While these
commercials emphasized the foods as being healthy, the commercials did not mention weight loss or any other specific health outcomes. For example, the Fiber One bars commercials contained the catch phrase “half a days-worth of fiber;” however, the commercial did not include information on why fiber is healthy or why an individual should increase their fiber intake.

The “unhealthy” food commercials used in the investigation included commercials advertising M&M’s candies, Oreo cookies, Cheez-it crackers, 3 Musketeers chocolate bars, and Doritos chips. There were two commercials advertising each food, with each commercial approximately 30 seconds in length, which gave a total of five minutes of “unhealthy” food commercials.

The neutral commercials used in the investigation included commercials advertising All-State car insurance, Geico car insurance, and State Farm car insurance. There were three commercials advertising each insurance company, with each commercial lasting approximately 30 seconds. This gave a total of five minutes of neutral commercials. Each set of commercials was downloaded from YouTube, embedded within in the Saturday Night Live clip and downloaded onto three separate DVDs.

**Foods Used in the Investigation**

The snack foods used in this investigation were 200 g each of: baby carrots, red grapes, Chips Ahoy! Chocolate chip cookies (Nabisco, Inc.), and Lay’s Classic potato chips (Frito-Lay, Inc.). The energy density of the baby carrots and red grapes were 0.41 and 0.75 kcals/g, respectively, which provided a total of 232 kcals in the “healthy” snack condition. The energy density of Chips Ahoy! Chocolate chip cookies and Lay’s potato chips were 5.0 and 5.1 kcals/g, respectively, which provided a total of 2020 kcals in the “unhealthy” snack condition.
**Television Show Used in the Investigation**

The television show used in the investigation was a 30-minute Saturday Night Live (SNL) Skit (NBC) (original air date October 2008). This was a comedy sketch that did not include any food cues or commercials. This television show was chosen as it included natural breaks in which commercials could be inserted without appearing odd to participants.

**Measures**

**Demographics**

Participant demographic information (age, education, marital status, race, and ethnicity) was obtained via questionnaire after the experimental session.

**Anthropometrics**

Height and weight was verified at the end of the session using a stadiometer and electric scale, respectively. Standard procedures were used with shoes and jackets/coats removed, and were asked to remove heavy items from their pockets. BMI for participants was calculated using the standard equation of dividing weight in kilograms by height in meters squared. Participant data was excluded if calculated BMI was below 18.5 or above 24.9 kg/m².

**Dietary Restraint**

Level of dietary restraint was determined as part of the initial phone screening process by using the TFEQ-R.35 This measure is a sub-scale of the TFEQ and is a valid and reliable tool to measure three eating behaviors of dietary restraint, disinhibition, and hunger. This is a 21-item tool that measures dietary restraint on a scale of 0 – 21. One point is awarded per item, with participants scoring < 10 being classified as an unrestrained eater and participants scoring ≥ 10 being classified as a restrained eater.
Liking of Snack Foods

Liking of snack foods was also measured as a part of the initial phone screen, where participants were asked to rate on a scale of 1 to 5 their liking of the snack foods used in the study, with 1 being completely dislike the snack food and 5 being extremely like the snack food. To meet the eligibility criteria, participants rated each food as a 3 or higher. To maintain the ruse of the study, liking of snack foods was also assessed during the experimental session. After participants were exposed to each condition, they were asked to rate each food on a 100 mm VAS. This scale was anchored with “extremely dislike” on the left and “extremely like” on the right. Participants were instructed to place an X on the line, which most likely represented how much they liked or disliked the food.

Perception of Snack Foods and Commercials

Perception of snack foods and commercials was also measured as a part of the initial phone screen, where participants were asked to rate on a scale of 1 to 5 their health perception of the snack foods and commercials used in the study. On this scale, a rating of 1 indicated that the participant perceived the snack food or commercial as very unhealthy and a rating of 5 indicating that the participant perceived the snack food or commercial as very healthy, with a rating of 3 indicating neutrality. To meet eligibility criteria, a rating of 4 or 5 was required for the snack foods of grapes and baby carrots and a rating of 1 or 2 was required for the snack foods of chocolate chip cookies and potato chips. A rating of 3 indicated that the participant had a neutral health perception of the food, thus the participant was deemed ineligible for the study.

For commercials, to meet eligibility criteria, a rating of 4 or 5 was required for the commercials advertising Fiber One bars, Honey Bunches of Oats cereal, Musselman’s applesauce, Nature’s Path granola, and Nestle fruit yogurt; and a rating of 1 or 2 was required for
the commercials advertising M&M’s candies, Oreo cookies, Cheez-it crackers, 3 Musketeers chocolate bars, and Doritos chips. Again, a rating of 3 indicated that the participant had a neutral health perception of the commercial, thus the participant was deemed ineligible for the study.

**Dietary Recall**

A brief dietary recall was conducted with each participant during the experimental session. Participants were asked to write down the time of day of food consumption as well as all food and drink consumed during the day prior to their appointment. To aid with the dietary recall, participants were provided two-dimensional handouts depicting various portion sizes. This procedure was done to ensure that all participants followed study protocol of eating within two to four hours of their appointment. This information was entered into Nutrition Data System for Research (NDSR) version 2014 and was used to control for energy and percent energy consumed from macronutrients consumed prior to the experimental session.\(^{36}\)

**Hunger**

Hunger was measured before and after the experimental session using a 100 mm visual analog scale (VAS). This scale was anchored with “not at all hungry” on the left and “extremely hungry” on the right. Participants were instructed to place an X on the line which most closely represented their level of hunger before an after the session.

**Memory of Commercials Viewed During the Study**

A brief questionnaire was developed by the investigator to determine the number of commercials accurately remembered viewing during the experimental sessions. Participants were provided with a list of commercials from all conditions and were instructed to place an X next to each commercial the participant remembered seeing during the experimental session. This questionnaire was hand-coded by the investigator using a coding scheme of 1 to 4. For this
coding scheme, 1 represented a participant reporting seeing a commercial that was actually shown during the session, 2 represented a participant reporting not seeing a commercial that was shown during the session, 3 represented a participant not seeing a commercial that was not shown during the session, and 4 represented a participant reporting seeing a commercial that was not shown during the session. The number of correct responses (1 and 3) and incorrect responses (2 and 4) were totaled and used in analyses. As a total of 18 commercials were listed on the questionnaire, the range of potential responses for correct and incorrect responses was from 0 to 18. For example, if a participant correctly identified all commercials, the participant would score an 18 for correct responses and a zero for incorrect responses.

**Measured Snack Food Consumption**

Snack foods provided to participants in each condition were measured in grams to the tenth decimal point on an electronic food scale (Denver Instrument Co., Arvada, CO) before and after the session. The weight of the container was also measured. Total grams consumed of each snack food during the session were determined by subtracting post-consumption weight from pre-consumption weight. Energy intake was then calculated by multiplying the total grams consumed by the energy per gram of each food.

**Statistical Analyses**

Statistical analyses were conducted using SPSS Statistics 22.0, using a significance level of 0.05.

**Primary Aim**

A 2 x 2 analysis of variance (ANOVA) (food-related x non-food-related commercials) was used to analyze differences between groups in baseline characteristics of continuous dependent variables and chi-square tests were used to analyze associations between nominal
variables. Liking and perception of snack foods used in the investigation were analyzed using a 2 x 2 x 2 x 4 mixed-factors ANOVA with between-subjects factors of group (commercial type and snack food type) and within subjects factors of snack type (healthy or unhealthy) and specific snack food (carrots, grapes, cookies, chips). Perceptions of commercials were analyzed using a 2 x 2 x 2 x 10 mixed-factors ANOVA with between-subjects factors of group (commercial type and snack food type) and within-subjects factors of commercial perception (healthy or unhealthy) and specific food commercial (Fiber One bars, Honey Bunches of Oats cereal, Musselman’s applesauce, Nature’s Path granola, Nestle fruit yogurt, M & M’s candies, Oreo cookies, Cheez-it crackers, 3 Musketeers chocolate bars, and Doritos chips). Total energy and percent energy consumed from each macronutrient prior to the experimental session were analyzed using a 2 x 2 ANOVA (food-related x non-food-related). To analyze differences in hunger before and after the experimental session, a 2 x 2 x 2 mixed-factors ANOVA with a between-subjects factor of commercial type and snack food type and a within-subjects factor of time was conducted. Memory of commercials was analyzed using a 2 x 2 x 2 mixed-factors ANOVA with between-subjects factors of group (commercial type and snack food type) and a within-subjects factor of response (correct and incorrect) to analyze differences between groups for correct and incorrect responses. For the primary aim of the investigation, to determine if exposure to food-related commercials influences intake, a 2 x 2 ANOVA (commercial type x snack food type) was conducted to determine differences in total grams and energy of snack food consumed. Post hoc pairwise comparisons with Bonferroni corrections were conducted on all significant outcomes (p < 0.05). All data are presented in the results are in M ± SD.
Secondary Aims

A 3 x 2 ANOVA (commercial type x snack food type) was performed to analyze differences between groups in baseline characteristics of continuous dependent variables and a chi-square test was conducted to analyze associations between nominal dependent variables. Liking and perceptions of snack foods used in the investigation were analyzed using a 3 x 2 x 2 x 4 mixed-factors ANOVA with between-subjects factors of group (commercial type and snack food type) and within-subjects factors of snack type (healthy or unhealthy) and specific snack food (carrots, grapes, cookies, chips). Perceptions of commercials were analyzed using a 3 x 2 x 2 x 10 mixed-factors ANOVA was used with between-subjects factors of group (commercial type and snack food type) and within-subjects factors of commercial perception (healthy or unhealthy) and specific food commercial (Fiber One bars, Honey Bunches of Oats cereal, Musselman’s applesauce, Nature’s Path granola, Nestle fruit yogurt, M & M’s candies, Oreo cookies, Cheez-it crackers, 3 Musketeers chocolate bars, and Doritos chips). Total energy and percent energy consumed from each macronutrient prior to the experimental session were analyzed using a 3 x 2 ANOVA (commercial type x snack food type). To analyze differences in hunger before and after the experimental session, a 3 x 2 x 2 mixed-factors ANOVA with a between-subjects factor of commercial type and snack food type and a within-subjects factor of time was conducted. Memory of commercials was analyzed using a 3 x 2 x 2 mixed-factors ANOVA with between-subjects factors of group (commercial type and snack food type) and a within-subjects factor of response (correct and incorrect) to determine differences in correct and incorrect responses. For the secondary aims of the investigation, to determine if there is an interaction effect based upon type of commercials exposed to and type of snack food consumed, 3 x 2 ANOVA (commercial type x snack food type) was conducted to determine differences in
total grams and energy of snack food consumed. Post hoc pairwise comparisons with Bonferroni corrections were conducted on all significant outcomes (p < 0.05). All data are presented in the results are in M ± SD.

RESULTS

Participant Characteristics

Participant characteristics by group are presented in Appendix A, Table 3. Participants were aged 20.2 ± 2.3 years with a BMI of 21.9 ± 1.5 kg/m² and classified as restrained eaters (12.7 ± 2.4). All participants were non-Hispanic (100%), predominantly white (82.9%), unmarried (85.7%), and with 100% having some college education or higher.

Primary Aim

No statistically significant main effects or interactions were found between conditions for these characteristics.

Secondary Aims

No statistically significant main effects or interactions were found between conditions for these characteristics.

Liking of Snack Foods

Liking ratings of snack foods used in the study are presented in Appendix A, Table 3. Liking ratings for snack foods were as follows: 4.5 ± 0.6 for grapes, 3.8 ± 0.8 for carrots, 4.6 ± 0.7 for chocolate chip cookies, and 3.9 ± 0.8 for potato chips.

Primary Aim

No statistically significant main effects or interactions were found between conditions for liking of snack foods.
Secondary Aims

No statistically significant main effects or interactions were found between conditions for liking of snack foods.

Perception of Snack Foods and Commercials

Participant perceptions of snack foods and commercials used in the study are presented in Appendix A, Table 3. Mean perception ratings of “healthy” and “unhealthy” snack foods were $4.8 \pm 0.3$ and $1.3 \pm 0.4$, respectively. For perceptions of commercials used in the study, mean ratings for the “healthy” and “unhealthy” commercials were $4.4 \pm 0.2$ and $1.4 \pm 0.2$, respectively.

Primary Aim

No statistically significant main effects or interactions were found between groups for perceptions of snack foods. However, a significant main effect of snack food type ($F(1, 32) = 341.8, p < 0.001$) occurred, with participants rating the “unhealthy” snack significantly less healthy than the “healthy” snacks. No statistically significant main effects or interactions were found between groups for perceptions of commercials. However, a main effect of commercial type was found ($F(1, 32) = 1035.9, p < 0.001$), with participants rating the “unhealthy” commercials significantly less healthy than the “healthy” commercials.

Secondary Aims

No statistically significant main effects or interactions were found between groups for perceptions of snack foods. However, there was a significant main effect of snack food type ($F(1, 30) = 579.8, p < 0.001$), with participants rating the “unhealthy” snack significantly less healthy than the “healthy snacks.” No statistically significant main effects or interactions were found between conditions for perceptions of foods and commercials used in the study. However, there
was a significant main effect of commercial type (F(1, 30) = 1157.5, p < 0.001), with participants rating the “unhealthy” commercials significantly less healthy than the “healthy” commercials.

**Energy Consumed Prior to Experimental Session**

Energy consumed prior to experimental session is presented in Appendix A, Table 3. Participants consumed 656 ± 333 kcals prior to the sessions. Furthermore, participants consumed 33.9 ± 12.8% energy from fat, 52.7 ± 14.2% energy from carbohydrates, and 15.5 ± 5.2% energy from protein.

**Primary Aim**

No statistically significant main effects or interactions were found between conditions for energy consumed or percent energy from each macronutrient consumed prior to experimental session.

**Secondary Aims**

No statistically significant main effects or interactions were found between conditions for energy consumed or percent energy from each macronutrient consumed prior to experimental session.

**Change in Hunger**

Hunger ratings before and after the snack are presented in Appendix A, Table 3.

**Primary Aim**

For changes in hunger ratings, a main effect of time was found (F(2,30) = 14.6, p < 0.001), with hunger ratings significantly lower after the snack than before the snack. No other statistically significant main effects or interactions were found for changes in hunger levels.
Secondary Aims

For changes in hunger ratings, a main effect of time was found \((F(2, 30) = 15.0, p < 0.001)\), with hunger ratings significantly lower after the snack than before the snack. No other statistically significant main effects or interactions were found for changes in hunger levels.

Memory of Commercials Viewed During the Experimental Session

Number of correct and incorrect responses for commercials viewed are presented in Appendix A, Table 3. Participants correctly identified \(15.2 \pm 1.6\) commercials and incorrectly identified \(2.8 \pm 1.6\) commercials.

Primary Aim

A significant main effect of response was found \((F(1, 32) = 430.4, p < 0.001)\), with participants having more correct responses to commercials viewed than incorrect responses. No other main effects or interactions were found between groups for memory of commercials.

Secondary Aims

A significant main effect of response was found \((F(1, 30) = 492.3, p < 0.001)\), with participants having more correct responses to commercials viewed than incorrect responses. No statistically other main effects or interactions were found between groups for memory of commercials.

Grams and Energy of Snack Food Consumed

Primary Aim

Grams and energy of snack food consumed between food-related and non-food-related commercial conditions are presented in Appendix A, Figures 2 and 3, respectively. For grams of food consumed, a main effect of snack food condition was found \((F(1, 32) = 19.25, p < 0.001)\), in which participants consumed more grams of food when provided a healthy snack food to
consume as compared to an unhealthy snack food (173.5 ± 70.3 g. vs. 87.8 ± 43.1 g., respectively). No other statistically significant main effects or interactions were found for grams of snack food consumed.

For energy of food consumed, a main effect of snack food condition was found (F(1, 32) = 28.57, p < 0.001), in which participants consumed more energy when provided unhealthy snack foods to consume as compared to a healthy snack food (107 ± 47 vs. 440 ± 230 kcals, respectively). No other statistically significant main effects or interactions were found for energy from snack food consumed.

**Secondary Aims**

Grams and energy of snack food consumed between all conditions are presented in Appendix A, Figures 4 and 5, respectively. For grams of food consumed, a main effect of snack food condition was found (F(2, 30) = 21.06, p < 0.001), with participants receiving a healthy snack consuming significant more grams of food than those receiving an unhealthy snack (173.5 ± 70.3 g. vs. 87.8 ± 43.1 g., respectively). No other statistically significant main effects or interactions were found for grams of snack food consumed.

For energy of snack food consumed, a main effect of snack food condition was found (F(2, 30) = 35.91, p < 0.001), with participants receiving a healthy snack food consuming significantly less energy during the snack than participants receiving an unhealthy snack food (107 ± 47 kcals vs. 440 ± 230 kcals, respectively). No other statistically significant main effects or interactions were found for energy from snack food consumed.

**Participants’ Perception of Purpose of the Study**

No participants correctly guessed the true nature of the study.
DISCUSSION

The purpose of the investigation was to determine if food commercials and type of snack available to eat impact on food intake during a snacking occasion. Contrary to what was hypothesized, the study found that energy consumption did not differ between participants exposed to food-related television commercials and those who were exposed to non-food-related commercials. Additionally, no differences in energy intake were found between “matched” conditions (i.e. receiving healthy snack food and viewing healthy food-related commercials) versus those in an unmatched condition. These findings suggest exposure to food-related commercials did not impact on energy intake in healthy weight, dietary-restrained women. Furthermore, these findings suggest that exposure to differing types of food-related commercials (healthy or unhealthy) does not impact on energy consumption from a particular type of snack food (healthy or unhealthy). However, results revealed a main effect of snack food type on grams and energy of snack food consumed, in which participants consumed a greater amount of grams, and less energy from, healthy snack foods as compared to unhealthy snack foods.

These findings are consistent with the two studies that have examined differences in energy consumed when comparing individuals exposed to food-related television to those watching non-food-related television programs. Thus, as no differences in energy intake were found between the two television exposures, both in the current study and in previous studies, these findings suggest that the mechanism by which watching television may increase intake is by conditioned learning or distraction, and that what is viewed on television does not influence consumption.

In support of this, when Anschutz and colleagues investigated the effect of exposure to food-related commercials versus non-food-related commercials within a television program on
intake, they also found that energy intake did not differ between the two conditions.\textsuperscript{26} However, this investigation found an interaction of gender and condition, which suggested that women were more susceptible to consuming more energy from snacks when exposed to food-related commercials. The current investigation, which only included women, did not find this outcome. Moreover, in this investigation the effect size of exposure to food-related versus non-food-related commercials in the present investigation was very small ($d = 0.16$), indicating that exposure to food-related television commercials had very little impact on energy intake as compared to non-food commercials.

Findings from this investigation regarding the impact of type of food-related television commercials (healthy versus unhealthy) having little impact on food intake are inconsistent with previous investigations. For example, Koordeman found that women consumed significantly more ounces of sugar-sweetened beverages after exposure to commercials advertising sugar-sweetened beverages than water; where as in a condition advertising water, no differences in ounces of water intake were found.\textsuperscript{25} Additionally, Harris and colleagues found that restrained individuals consumed more grams of food after exposure to snack food commercials as compared to nutrition-focused and control conditions. Due to these previous results, it would be expected that female restrained eaters would consume the greatest amount of grams of food when exposed to unhealthy television commercials and presented with unhealthy snack foods to consume than in any other condition. However, the effect size of an interaction between snack food type and commercial condition on gram and energy intake in the present investigation was small ($F = 0.25$ and $F = 0.27$, respectively), suggesting that exposure to differing types of television commercials had very little impact on grams and energy consumed from the snack.
There are a number of factors that may contribute to differences in findings in the present investigation and previous investigations. First, in the present study, perception of commercials was only assessed during the initial phone screen. Participants were not asked if they had viewed these commercials or not, thus participants may have initially believed commercials to be healthy or unhealthy, but their opinion of the commercial may have changed after viewing the commercial.

Secondly, previous studies conducted by Koordeman\textsuperscript{25} and Harris\textsuperscript{30} provided participants with a wider variety of foods/beverages to consume while or after exposure to television commercials. Koordeman and colleagues provided participants with three different types of beverages to consume while watching television (two sugar-sweetened beverages and water);\textsuperscript{25} while Harris and colleagues provided participants with seven different snack foods to consume after being exposed to television commercials (carrots, celery, dip, chocolate chip cookies, cheese crackers, multi-grain chips, and trail mix).\textsuperscript{30} Thus, having a greater variety of foods and beverages to consume may have been the driving force behind increases in consumption, rather than the exposure to television commercials alone.

As previous experimental studies have found a strong link between television watching and increased food consumption, the results of this investigation suggest that these findings are likely not due to increased exposure to food cues, but may be due in part to classical conditioning and television acting as a distractor. As television is a common sedentary activity among adults, it is likely that eating occasions will often occur while watching television. Thus, simply turning on the television may prompt an individual to choose to consume a snack. Furthermore, if food that is chosen is not pre-portioned, watching television may distract the individual from their food consumption, leading the individual to consume more food than was originally planned.
Future studies should focus on investigating habitual television behaviors and the effect of portion sizes of food consumed while watching television to assist in ascertaining the exact mechanism through which television watching increases energy intake.

One finding from this investigation was that participants consumed significantly less energy from the snack and significantly more grams of snack when provided with a healthy snack food as compared to an unhealthy snack food. Energy density (ED) of the foods provided may have contributed to this outcome. ED is the amount of energy per gram of food and is predominantly influenced by the amount of water and fat in food. Fruits and vegetables, such as the ones provided in the study, are naturally low in ED. Research has shown when adults reduce dietary ED, they consume more grams of food and less energy from food, which is consistent with the findings from the current investigation.\textsuperscript{38-40} Importantly, the effect of dietary ED on energy and gram intake occurs outside one’s awareness, and can thus influence food intake in a variety of settings. This premise is supported by hunger data in the current study, where hunger decreased overtime in both snacking conditions, but did not differ based upon snack food type. Thus, this suggests if one is to eat while watching television, ideally the food(s) being consumed is low in ED. Choosing low ED foods in this situation could help with reducing energy consumed while watching television, potentially assisting with reducing the chance of over consuming energy, and reducing the chance that one may feel hungry after eating.

This study has a number of limitations and strengths. As previously noted, perception of commercials was not assessed after participants actually viewed the commercials, thus it is difficult to determine if the manipulation truly went into effect. Furthermore, while the investigator chose foods that are typically consumed as a snack, participants may have been somewhat aware of the amount of food being consumed. Testing amorphous foods varying in
energy density could strengthen the study design by limiting how aware participants are of food being consumed. Additionally, measures of food consumption and physical activity behaviors prior to the experimental session were taken in order to control for any effect of prior eating and physical activity behaviors on food intake. These recalls may have led to increased awareness of these behaviors and thus influenced intake of snack foods during the experimental session. Finally, this study included a homogenous sample, which limits generalizability of the findings. Thus, it is possible that other populations, such as children or overweight/obese adults would respond differently to exposure to food-related television commercials.

Strengths of this study include objectively measured food intake in grams and energy. Furthermore, anthropometric measures were taken at the end of the experimental session, thus awareness surrounding one’s weight likely did not impact food consumption. This study was also tightly controlled as total exposure time to television and commercials and total number of commercials embedded within the television show were identical in all conditions and participants received the same number of snack foods all conditions, thus there was no risk of additional variables confounding the results of the investigation. Additionally, while perception of snack foods and commercials used in the investigation were assessed during the initial phone screen, this did not appear to cue participants into the true purpose of the study as no participants correctly guessed the true purpose of the investigation. Thus, this assessment likely did not influence findings. Finally, this study was novel in that it was the first study to manipulate how type of food provided while being exposed to television commercials may impact on consumption from that food.

To better enhance understanding of the relationship between television viewing and consumption, future research should focus investigations on how television watching prompts
the initiation of an eating occasion and rate of satiation while watching television. Furthermore, investigating how variety, type, and portion size (snack food versus meals) of food provided impacts on intake are of importance to better understand mechanisms through which watching television may influence energy intake.

In conclusion, the finding that participants consumed more grams of food but less energy when provided with a healthy snack food has important clinical implications. As many individuals may eat while watching television and television is a common screen time behavior in both children and adults, these findings suggest that if eating is to occur while watching television, having only low-ED foods available to consume may assist individuals with limiting energy intake during this type of eating occasion.


21. Cleland VJ, Schmidt MD, Dwyer T, Venn AJ. Television viewing and abdominal obesity in young adults: is the association mediated by food and beverage consumption during viewing time or reduced leisure-time physical activity? *Am J Clin Nutr.* 2008;87:1148-1155.


37. IBM. SPSS for Macintosh. 22.0 ed. Chicago, IL; 2014.


APPENDIX A: TABLES AND FIGURES
Table 1. Depiction of Study Design- 3 x 2 Between-Subjects Factorial Design with Independent Variables of Commercial Type and Snack Food Type

<table>
<thead>
<tr>
<th></th>
<th>Perceived Healthy Snack Food</th>
<th>Perceived Unhealthy Snack Food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Healthy Food Commercial</td>
<td>N = 6</td>
<td>N = 7</td>
</tr>
<tr>
<td>Perceived Unhealthy Food Commercial</td>
<td>N = 6</td>
<td>N = 6</td>
</tr>
<tr>
<td>Non-Food-Related Commercial</td>
<td>N = 5</td>
<td>N = 6</td>
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</table>
Table 2. Ranking of Pilot Tested Food Commercials to be used in the Investigation

<table>
<thead>
<tr>
<th>Commercial</th>
<th>Healthy</th>
<th>Unhealthy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber One bars</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Honey Bunches of Oats cereal</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Nature’s Path granola</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Nestle fruit yogurt</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>M&amp;M’s candies</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Oreo cookies</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Twix chocolate bars</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>3 Musketeers chocolate bars</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Cheez-it crackers</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Doritos chips</td>
<td>0</td>
<td>16</td>
</tr>
</tbody>
</table>
Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and After the Snack, and Memory of Commercials Viewed

<table>
<thead>
<tr>
<th></th>
<th>Healthy Snack Food</th>
<th>Unhealthy Snack Food</th>
<th>Non-Food-Related Commercials</th>
<th>Healthy Snack Food</th>
<th>Unhealthy Snack Food</th>
<th>Non-Food-Related Commercials</th>
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<tbody>
<tr>
<td></td>
<td>(N = 6)</td>
<td>(N = 6)</td>
<td>(N = 5)</td>
<td>(N = 7)</td>
<td>(N = 6)</td>
<td>(N = 6)</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>19.3 ± 1.0</td>
<td>21.0 ± 3.6</td>
<td>20.4 ± 3.7</td>
<td>19.2 ± 1.5</td>
<td>21.0 ± 2.1</td>
<td>20.3 ± 1.3</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>22.3 ± 1.6</td>
<td>22.6 ± 1.5</td>
<td>22.5 ± 1.1</td>
<td>21.9 ± 1.3</td>
<td>21.5 ± 1.8</td>
<td>22.1 ± 1.6</td>
</tr>
<tr>
<td>Race (% white)</td>
<td>83.3</td>
<td>100.0</td>
<td>80.0</td>
<td>85.7</td>
<td>60.0</td>
<td>83.3</td>
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<tr>
<td>Non-Hispanic/Latino (%)</td>
<td>100.0</td>
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<td>100.0</td>
<td>100.0</td>
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<td>100.0</td>
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</table>
Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and
After the Snack, and Memory of Commercials Viewed, continued

<table>
<thead>
<tr>
<th></th>
<th>Healthy Snack Food</th>
<th>Unhealthy Snack Food</th>
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<tr>
<td></td>
<td>Healthy Commercials</td>
<td>Unhealthy Commercials</td>
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<td>(N = 6)</td>
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<td></td>
<td>Non-Food-Related</td>
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<tr>
<td></td>
<td>Commercial</td>
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<td></td>
<td>Healthy Commercials</td>
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<td></td>
<td>Unhealthy</td>
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<tr>
<td></td>
<td>Commercial</td>
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<tr>
<td></td>
<td>Non-Food-Related</td>
<td>(N = 6)</td>
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<tr>
<td></td>
<td>Commercial</td>
<td></td>
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<tr>
<td>Education (%)</td>
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<tr>
<td>Some college</td>
<td>66.7</td>
<td>83.3</td>
</tr>
<tr>
<td>College/University Degree</td>
<td>16.7</td>
<td>16.7</td>
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<tr>
<td>Dietary Restraint(^a)</td>
<td>12.3 ± 3.0</td>
<td>13.6 ± 2.9</td>
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<tr>
<td></td>
<td>13.0 ± 2.5</td>
<td>12.0 ± 2.7</td>
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<tr>
<td></td>
<td>12.6 ± 1.7</td>
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</table>
Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and After the Snack, and Memory of Commercials Viewed, continued

<table>
<thead>
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<th>Healthy Snack Food</th>
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<tbody>
<tr>
<td></td>
<td>Healthy</td>
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<tr>
<td>Liking of Snack Foods$^b$</td>
<td></td>
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<tr>
<td>Grapes</td>
<td>4.6 ± 0.5</td>
<td>4.6 ± 0.5</td>
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<tr>
<td>Carrots</td>
<td>3.6 ± 1.1</td>
<td>4.3 ± 0.6</td>
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<td></td>
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<tr>
<td>Chocolate Chip Cookies</td>
<td>4.3 ± 1.1</td>
<td>4.3 ± 0.5</td>
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<tr>
<td>Potato Chips</td>
<td>3.6 ± 1.1</td>
<td>3.3 ± 0.5</td>
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Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and After the Snack, and Memory of Commercials Viewed, continued

<table>
<thead>
<tr>
<th>Perception of Foods</th>
<th>Healthy Snack Food</th>
<th>Unhealthy Snack Food</th>
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<tbody>
<tr>
<td></td>
<td>Healthy Commercials</td>
<td>Unhealthy Commercials</td>
</tr>
<tr>
<td></td>
<td>(N = 6)</td>
<td>(N = 6)</td>
</tr>
<tr>
<td>Grapes</td>
<td>4.6 ± 0.5</td>
<td>4.6 ± 0.5</td>
</tr>
<tr>
<td>Carrots</td>
<td>4.6 ± 0.5</td>
<td>5.0 ± 0.0</td>
</tr>
<tr>
<td>Chocolate Chip</td>
<td>1.3 ± 0.5</td>
<td>1.6 ± 0.5</td>
</tr>
<tr>
<td>Cookies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato Chips</td>
<td>1.6 ± 0.5</td>
<td>1.0 ± 0.5</td>
</tr>
</tbody>
</table>
Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and After the Snack, and Memory of Commercials Viewed, continued

<table>
<thead>
<tr>
<th>Perception of Commercials$^d$</th>
<th>Healthy Snack Food</th>
<th>Unhealthy Snack Food</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Healthy Commercials</td>
<td>Unhealthy Commercials</td>
</tr>
<tr>
<td>Healthy Snack Food</td>
<td>N = 6</td>
<td>N = 6</td>
</tr>
<tr>
<td>Fiber One Bars</td>
<td>4.6 ± 0.5</td>
<td>4.0 ± 0.5</td>
</tr>
<tr>
<td>Honey Bunches of Oats</td>
<td>4.3 ± 0.5</td>
<td>4.0 ± 0.5</td>
</tr>
<tr>
<td>Nature’s Path Granola</td>
<td>5.0 ± 0.0</td>
<td>4.3 ± 0.5</td>
</tr>
<tr>
<td>Nestle Yogurt</td>
<td>4.0 ± 0.5</td>
<td>4.6 ± 0.5</td>
</tr>
</tbody>
</table>
Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and After the Snack, and Memory of Commercials Viewed, continued

<table>
<thead>
<tr>
<th></th>
<th>Healthy Snack Food</th>
<th>Unhealthy Snack Food</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Healthy Commercials</td>
<td>Unhealthy Commercials</td>
</tr>
<tr>
<td></td>
<td>(N = 6)</td>
<td>(N = 6)</td>
</tr>
<tr>
<td>Musselman’s Applesauce</td>
<td>4.6 ± 0.5</td>
<td>4.6 ± 0.5</td>
</tr>
<tr>
<td>M&amp;M’s</td>
<td>1.0 ± 0.5</td>
<td>1.6 ± 0.5</td>
</tr>
<tr>
<td>Oreo Cookies</td>
<td>1.0 ± 0.5</td>
<td>1.3 ± 0.5</td>
</tr>
<tr>
<td>Cheez-it Crackers</td>
<td>2.0 ± 0.5</td>
<td>1.6 ± 0.5</td>
</tr>
<tr>
<td>3 Musketeers Chocolate Bar</td>
<td>1.0 ± 0.5</td>
<td>1.3 ± 0.5</td>
</tr>
<tr>
<td>Dorito’s Chips</td>
<td>1.3 ± 0.5</td>
<td>1.3 ± 0.5</td>
</tr>
</tbody>
</table>
Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and After the Snack, and Memory of Commercials Viewed, continued

<table>
<thead>
<tr>
<th>Consumption Prior to Session</th>
<th>Healthy Snack Food</th>
<th>Unhealthy Snack Food</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Healthy Commercials</td>
<td>Unhealthy Commercials</td>
</tr>
<tr>
<td></td>
<td>(N = 6)</td>
<td>(N = 6)</td>
</tr>
<tr>
<td>Energy (kcals)</td>
<td>605 ± 235</td>
<td>653 ± 277</td>
</tr>
<tr>
<td>Carbohydrate (% energy)</td>
<td>54.5 ± 11.9</td>
<td>51.5 ± 21.0</td>
</tr>
<tr>
<td>Protein (% energy)</td>
<td>15.8 ± 4.3</td>
<td>15.2 ± 6.3</td>
</tr>
</tbody>
</table>
Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and After the Snack, and Memory of Commercials Viewed, continued

|                          | Healthy Snack Food | | | Unhealthy Snack Food | | | Non-Food-Related Commercials | | | Healthy Commercials | | | Unhealthy Commercials | | | Non-Food-Related Commercials |
|--------------------------|-------------------|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                          | Healthy           | Unhealthy        | Non-Food-Related| Healthy           | Unhealthy        | Non-Food-Related|
|                          | Commercials       | Commercials      | Commercials     | Commercials       | Commercials      | Commercials     |
|                          | (N = 6)           | (N = 6)          | (N = 5)         | (N = 7)           | (N = 6)          | (N = 6)         |
| Fat (% energy)           | 31.0 ± 11.3       | 36.9 ± 19.1      | 37.2 ± 12.8     | 32.1 ± 10.4       | 31.7 ± 13.2      | 34.8 ± 11.2     |
| Hunger Before Snack (mm) | 44.8 ± 22.0       | 48.8 ± 22.2      | 51.4 ± 14.2     | 40.5 ± 17.6       | 38.5 ± 22.5      | 37.5 ± 21.0     |
| Hunger After Snack (mm)  | 29.8 ± 17.7       | 43.0 ± 26.7      | 48.2 ± 21.1     | 20.6 ± 19.8       | 16.0 ± 18.5      | 18.8 ± 13.7     |
Table 3. Participant Characteristics, Liking and Perceptions of Snack Foods, Perception of Commercials, Hunger Prior to and After the Snack, and Memory of Commercials Viewed, continued

<table>
<thead>
<tr>
<th></th>
<th>Healthy Snack Food</th>
<th>Unhealthy Snack Food</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Healthy Commercials (N = 6)</td>
<td>Unhealthy Commercials (N = 6)</td>
</tr>
<tr>
<td>Memory of Commercials (# incorrect responses)(^f)</td>
<td>2.8 ± 1.1</td>
<td>2.1 ± 1.9</td>
</tr>
<tr>
<td>Memory of Commercials (# of correct responses)(^f)</td>
<td>15.1 ± 1.1</td>
<td>15.8 ± 1.9</td>
</tr>
</tbody>
</table>

Note: Data presented in M ± standard deviation.

\(^a\)Dietary Restraint measured on a scale of 1-21.
bLiking ratings measured on a scale of 1-5, with 1 = highly dislike and 5 = highly like.

cPerception of snack foods measured on a scale of 1-5 with 1 = extremely unhealthy, 5 = extremely healthy, and 3 = neutrality; a significant main effect of snack food type was found (p < 0.001), with participants rating “unhealthy” snack foods significantly less healthy than “healthy” snacks.

dPerception of commercials measured on a scale of 1-5 with 1 = extremely unhealthy, 5 = extremely healthy, and 3 = neutrality; a significant main effect of commercial type was found (p < 0.001), with participants rating “unhealthy” commercials significantly less healthy than “healthy” commercials.

eHunger = a main effect of time was found (p < 0.001), with participants significantly less hunger after the snack than before;

fMemory of commercials = significant main effect of response was found (p < 0.001), with participants having significantly more correct responses than incorrect responses.
Figure 1. Flow of Eligibility of Study Participants.
A significant main effect of snack food type was found (p < 0.001), with participants consuming more grams of snack food when a healthy snack food was provided as compared to an unhealthy snack food. The gram amount of snack food consumed when a healthy snack was provided was $173.5 \pm 70.3$ g. and the gram amount of food consumed when an unhealthy snack was provided was $87.8 \pm 43.1$ g.
A significant main effect of snack food type was found ($p < 0.001$), with participants consuming more energy from the snack when provided an unhealthy snack as compared to a healthy snack. The amount of energy consumed when a healthy snack was provided was $107 \pm 47$ kcals and the amount of energy consumed when an unhealthy snack was provided was $440 \pm 230$ kcals.
A statistically significant main effect of snack food type was found (p < 0.001), with participants consuming more grams of snack when provided with a healthy snack food as compared to an unhealthy snack food. The gram amount of food consumed when a healthy snack was provided was $173.5 \pm 70.3$ g. and the gram amount of food consumed when an unhealthy snack was provided was $87.8 \pm 43.1$ g.
Figure 5. Energy from Snack Consumed Between Healthy, Unhealthy, and Non-Food-Related Commercial Conditions and Main Effect of Snack Food Type.

A statistically significant main effect of snack food type was found (p < 0.001), with participants consuming more energy from the snack when provided an unhealthy snack as compared to a healthy snack. The amount of energy consumed when a healthy snack was provided was 107 ± 47 kcals and the amount of energy consumed when an unhealthy snack was provided was 440 ± 230 kcals.
APPENDIX B: IRB Form B
FORM B APPLICATION

All applicants are encouraged to read the Form B guidelines. If you have any questions as you develop your Form B, contact your Departmental Review Committee (DRC) or Research Compliance Services at the Office of Research.

FORM B

IRB # ____________________________

Date Received in OR ______________

THE UNIVERSITY OF TENNESSEE

Application for Review of Research Involving Human Subjects

I. IDENTIFICATION OF PROJECT

Principal Investigators:
Hollie Raynor, PhD, RD, LDN
Jessie Harris Building Room 229
1215 W. Cumberland Avenue
Knoxville, TN 37996-1920
974-6259
hraynor@utk.edu
2. Project Classification: Thesis

3. Title of Project: The Effect of Perceived Healthy and Unhealthy Commercials on Intake of Perceived Healthy and Unhealthy Snack Foods in Normal Weight, College-Aged, Dietary Restrained Women

4. Starting Date: Upon IRB approval

5. Estimated Completion Date: May 2014

6. External Funding (if any): N/A

II. PROJECT OBJECTIVES

Background and Specific Aims

According to the Centers for Disease Control (CDC), approximately one third of the U.S. adult population is obese.\textsuperscript{1} One factor associated with obesity is greater time spent watching television.\textsuperscript{2} One way television is believed to affect energy balance is by increasing energy intake.\textsuperscript{3,4} Television may increase energy intake by acting as a cue to prompt eating due to classical conditioning.\textsuperscript{4,5} Furthermore, food cues shown on television may also cue consumption.\textsuperscript{4,5} Television watching is a common leisure-time activity in both children and adults. According to the 2010-2011 Nielsen report on television viewing, Americans over the age of 18 years spent an average of five hours per day watching television.\textsuperscript{6} As television viewing is such a common leisure-time activity, it is important to investigate the effect of being exposed to food-related television on dietary intake.
Investigations examining the influence of watching food cues on television on food intake have consistently found that individuals consume significantly more food when exposed to television food cues as compared to non-food commercials.\textsuperscript{7-11} Moreover, research has suggested that sex and dietary restraint status may play a role in the effect of television commercials on food intake, with females being more responsive than males to food cues in television commercials and dietary restrained individuals more responsive than unrestrained individuals to food cues in television commercials.\textsuperscript{8,9,11} Restrained eaters, defined as individuals who intentionally restrict the amount of food they consume in a given situation, may be even more responsive to food cues in commercials of foods generally considered to not be healthy. However, no studies have investigated if more food is consumed if the type of food available after exposure to commercials matches the health perception of the foods that were viewed in the commercial. The objective of this investigation is to investigate the effect of television shows with commercials perceived as advertising healthy foods and television shows with commercials perceived as advertising unhealthy foods on the intake of either perceived healthy snack foods or perceived unhealthy snack foods in normal weight, dietary restrained females.

Forty-eight women will participate in this study and will be randomized to one of six conditions where they will be exposed to a 30-minute television show (Saturday Night Live) during which they will be given two different pre-measured snack foods to eat. The television show will have eight commercials imbedded within it. Of the eight commercials, five commercials will represent the study condition (five advertising healthy food, five advertising unhealthy food, or five non-food related commercials). The three additional commercials will advertise neutral products (banks) and will remain the same in each condition. Snack foods being used in this investigation are red grapes and baby carrots for the perceived healthy snack foods; and chocolate chip cookies and potato chips for the perceived unhealthy snack foods. The television commercials representing the unhealthy category include commercials advertising M&M’s candies, Oreo cookies, Cheez-it crackers, 3 Musketeers chocolate bars, and Doritos chips. The television commercials representing the healthy category include commercials advertising Fiber One bars, Honey Bunches of Oats cereal, Nature’s Path granola, Nestle fruit yogurt, and Musselman’s apple sauce. The non-food related television commercials include commercials advertising All-State car insurance, Geico car insurance, State Farm car insurance, Travelers car insurance, and Liberty Mutual car insurance. The three neutral non-food related commercials that will remain the same in each condition are commercials advertising Fifth Third bank, Ally bank, and Capital One bank.

The specific aims and hypotheses are:

1) Women exposed to a television show with commercials imbedded advertising food will consume more food than women exposed to a television show with non-food related commercials.

2) Women will consume more food when exposed to a television show with commercials advertising “unhealthy” food as compared to a television show with commercials advertising “healthy” food.

3) Women will consume the most food when exposed to a television show with “unhealthy” food commercials and have “unhealthy” snack foods available to consume.
III. DESCRIPTION AND SOURCE OF RESEARCH PARTICIPANTS

3.a. Study Design

In order to test the effect of watching a television show with commercials perceived as advertising healthy foods or unhealthy foods on the intake (in grams and kilocalories) of either perceived healthy or unhealthy snack foods in normal weight, dietary restrained females, a 3 x 2 between-subjects design will be used. One factor will be type of commercial (perceived as healthy food related, perceived as unhealthy food related, or non-food related) and the other factor will be type of snack food available to consume (perceived as healthy or unhealthy). Females participating in the study will be randomized to one of six conditions where they will be exposed to a 30-minute television show (Saturday Night Live) with eight commercials imbedded within the show. While watching the show participants will be given two different pre-measured snack foods to eat. Of the eight commercials, five commercials will represent the condition (healthy food, unhealthy food, and non-food) and three will be neutral commercials, which will remain the same in each condition.

3.b. Participants

Forty-eight women meeting the following criteria: 1) age between 18 and 30 years; 2) body mass index between 18.5 and 24.9 kg/m$^2$; 3) be a restrained eater (scoring $\geq 10$ on Three Factor Eating Questionnaire [TFEQ-R]); 4) report being a non-smoker; and 5) perceive foods and commercials used in the study as appropriately classified in the study. To be eligible for this study, commercials advertising Fiber One bars, Honey Bunches of Oats cereal, Nature’s Path granola, Nestle fruit yogurt, and Musselman’s apple sauce must be perceived as advertising healthy foods (rate 4 or 5 on a 5-point likert scale); while commercials advertising M&M’s candies, Oreo’s cookies, Cheez-it crackers, 3 Musketeers chocolate bars, and Doritos chips must be perceived as advertising unhealthy food (rate 1 or 2 on a 5-point likert scale). Furthermore, red grapes and carrots must be perceived as being healthy snack foods (rate 4 or 5 on a 5-point likert scale) while chocolate chip cookies and potato chips must be perceived as being unhealthy snack foods (rate 1 or 2 on a 5-point likert scale). Women will be excluded if they are: 1) currently dieting for weight loss; 2) currently taking any medications that affect appetite or food intake; 3) have a medical condition affecting eating or are currently following a therapeutic diet; 4) report disliking foods used in the investigation (scoring 1 or 2 on a 5-point likert scale); and 5) report having allergies to foods used in the investigation.

3.c. Recruitment

A rolling recruitment strategy will be used with participants being recruited for a research study to “investigate the effects of watching a television show on the liking of snack foods.” To recruit, flyers will be placed around the University of Tennessee campus, e-mails will be sent out to UTK list-servs, and/or participants will be recruited from a Psychology 110 pool at University of Tennessee. Interested individuals will be asked to contact the Healthy Eating and Activity Laboratory for an initial phone screening.

IV. METHODS AND PROCEDURES

4.a. Experimental Session
Following completion of the phone screen, eligible participants will be scheduled for a 60 minute individual session on Monday through Friday between 1 pm and 5 pm at the HEAL Lab. Participants will be asked to eat at least four hours prior to the appointment, but to refrain from eating less than 2 hours before the scheduled appointment. Furthermore, participants will be asked to refrain from engaging in physical activity prior to the appointment. After this phone screen, participants will be randomly assigned to one of six study conditions using a random number table. During this session, informed consent will be obtained. Then, participants will be asked to complete a brief dietary recall where they will be asked to write down all food and drink consumed during the day prior to their appointment. This will be done to ensure that participants eat within four hours of the scheduled appointment, but not less than two hours before the appointment. If the participant does not follow this protocol, the session will be rescheduled. Participant’s hunger will be assessed using a 100 mm Visual Analogue Scale (VAS). Physical activity prior to the scheduled appointment will be assessed via self-report with the investigator simply asking the participant if she has engaged in any physical activity prior to the appointment. Again, if the participant does not follow this protocol, the appointment will be rescheduled.

Next, participants will be given 200 grams of two different snack foods from the condition that they are randomized to (healthy food or unhealthy food). Participants will be told that they will be completing a taste-test after watching the 30-minute television show. Participants will be instructed to at least taste each of the two foods while watching the television show, but they may eat as much or as little of the foods as they would like while watching the television show. The television show will be an episode of Saturday Night Live, which will be the same show for all three conditions. The eight commercials, the three neutral non-food commercials and the five commercials specific for each condition, will be imbedded within the 30 minute show. Following this, the investigator will remove the foods from the room and participants will be asked to complete the taste-test by reporting their liking of the foods on a 100 mm VAS. Participants will then again report on their hunger and demographic measures will be taken. Furthermore, participants will be provided with a questionnaire with descriptions of several commercials and will be asked to indicate which commercials they watched during the television show. Height and weight measures will be taken at the end of the session. This will be done to ensure that these measures do not impact food intake. If the participant’s BMI is outside the specified range, their data will be excluded from analyses, however the participants will still be compensated. After this session, participants will be asked what they think the true purpose of the study is, debriefed, either compensated with a $15 gift card or receive 4 HPR credits if from Psychology 110, and thanked.

4.b. Measures

4.b.i.b Description of Snack Foods Used in Study

The snack foods that will be used in this investigation are red grapes, baby carrots, Chips Ahoy! chocolate chip cookies (Kraft Foods Global Inc., Northfield, IL), and Lays potato chips (Frito-Lay Inc., Plano, TX). Participants will be provided with 200 grams of two different foods, depending on the condition to which they are randomized. The table below shows the energy density of each food as well as the number of kilocalories provided in 200 grams of food.

<table>
<thead>
<tr>
<th>Snack Food</th>
<th>Energy Density</th>
<th>Kilocalories in 200 g</th>
</tr>
</thead>
</table>

82
Red grapes | 0.75 | 150  
Baby carrots | 0.41 | 82   
Chocolate chip cookies | 5.0  | 1000 
Potato chips | 5.1  | 1020 

4.b.ii. Demographics
Participant demographic information (age, sex, education, marital status, race, and ethnicity) will be obtained via questionnaire after experimental session.

4.b.iii. Anthropometrics
Participant height and weight will be taken through self-report during the phone screening process. This height and weight will also be assessed at the end of the session using a portable stadiometer (Seca Corp., Hanover, MD) and electric scale (Health O Meter Inc., Alsip, IL), respectively. During this procedure, participants will be asked to take off their shoes and jackets/coats and will be asked to take anything heavy (such as wallet, cell phone, change) out of their pockets. BMI for participants will be calculated by using the standard equation of dividing the weight in kilograms by height in meters squared. Participants’ data will be excluded from analyses if calculated BMI is below 18.5 or above 24.9 kg/m², however they will still be compensated for participating in the study.

4.b.iv. Dietary Restraint
As a part of the initial phone screen, the level of dietary restraint will be determined using the TFEQ-R, which is part of the TFEQ and is a valid and reliable tool to measure three eating behaviors: dietary restraint, disinhibition, and hunger. This is a 21-item assessment tool that measures dietary restraint on a scale of 0-21. Items included in this tool are true/false statements and likert scale questions. One point is awarded per item, with a participant scoring <10 being classified as an unrestrained eater and participants scoring ≥10 being classified as a restrained eater.

4.b.v. Health perception of commercials and snack foods
Perception of both commercials and snack foods will be asked as a part of the initial phone screen, where participants will be asked to rate on a scale of 1 to 5 their health perception of commercials and snack foods being used in the study, with 1 meaning that they perceive the commercial or snack foods as being very unhealthy, 5 indicating that a food is very healthy, and 3 indicating that the food is neither healthy or unhealthy. To meet eligibility criteria, participants must rate commercials advertising Fiber One bars, Honey Bunches of Oats cereal, Nature’s Path granola, Nestle fruit yogurt, and Musselman’s apple sauce as a 4 or 5 on the likert scale; and commercials advertising M&M’s candies, Oreo’s cookies, Cheez-it crackers, 3 Musketeers chocolate bars, and Doritos chips as a 1 or 2 on the likert scale. Furthermore, participants must rate grapes and baby carrots as a 4 or 5 on the likert scale and chocolate chip cookies and potato
chips as a 1 or 2 on the likert scale. Scores of 3 will indicate that the participant has a neutral health perception of the food and will not be eligible to participate in the study.

4.b.vi. Hunger

Hunger will be assessed at both the beginning and the end of the session using a 100 mm VAS with an anchor of 0 mm indicating that the participant is not hungry at all and an anchor of 100 mm indicating that the participant is extremely hungry.

4.b.vii. Memory for television show and commercials

Participants’ memory for the television show and commercials will be assessed via questionnaire. This questionnaire will have descriptions of all commercials used in the investigation. Participants will be asked to put a check mark next to each commercial that they remember viewing during their session.

4.b.viii. Liking of snack foods

Liking of snack foods will also be asked as a part of the initial phone screen, where participants will be asked to rate on a scale of 1 to 5 their liking of the snack foods used in the study, with 1 being completely dislike the snack food and 5 being extremely like the snack food. To meet the eligibility criteria, participants must rate each food as a 3 or higher. Liking of snack foods will also be assessed during the experimental session using a 100 mm VAS, anchored on the left with “extremely dislike” and on the right with “extremely like.”

4.b.ix. Dietary recall

A brief dietary recall will be conducted with each participant during the experimental session. Participants will be asked to write down the time of day of food consumption as well as all food and drink consumed during the day prior to their appointment. To aid with the dietary recall, participants will also be given two-dimensional handouts depicting various portion sizes. This procedure will be done to ensure that all participants follow study protocol of eating within four hours of the appointment, but not less than two hours before. If participants do not follow the described protocol, the session will be rescheduled. Furthermore, this information will be entered into Nutrition Data System for Research (NDSR) version 2011 and be used to control for food consumption prior to the experimental session.

4.b.x. Measured snack food consumption

Snack foods provided to participants in each condition will be measured in grams to the tenth decimal point on an electronic food scale (Denver Instrument Co., Arvada, CO) before and after the session. The weight of the container will also be measured. Total grams of snack food consumed during the session will be determined by subtracting pre- and post-consumption weight of snack food. Energy intake will then be calculated using the total grams of food consumed and calories per serving on the food label.

4c. Statistical Analyses

Statistical analyses will be conducted using SPSS Statistics 19.0, using a significance level of 0.05. A 3 x 2 analysis of variance (ANOVA) (perceived healthy food commercials/perceived unhealthy food commercials/non-food-related commercials x perceived healthy/perceived
unhealthy snack foods) and a Chi-square test will be performed to analyze differences between groups in baseline characteristics, such as age, rating of snack foods, and race/ethnicity. In order to analyze differences between groups based on the primary outcome measure of total grams and kilocalories of snack foods consumed, a 3 x 2 ANOVA will also be performed. For significant outcomes (p<0.05), post hoc pairwise comparisons with Bonferroni adjustments will be made to determine exactly which groups differed in total grams and kilocalories of snack foods consumed.

V. SPECIFIC RISKS AND PROTECTION MEASURES

Source of Materials
Participants will provide anthropometrics, dietary intake, and questionnaire data for research purposes. All participants will be assigned a unique code that will be used on all card copy documents and when entering data into computer databases without any references to names or contact information. All hard copies of data and contact information will be locked separately in filing cabinets in Jessie Harris Building room 102. Furthermore, all contact information on computer databases will be password protected.

Potential Risks
The risks for participating in this study are considered to be minimal. Participants in this study will be of a healthy weight (BMI between 18.5 and 24.9 kg/m²). A potential risk is that participants may be allergic to one or more of the foods being used in the study. However, this will be assessed by self-report via phone screening. Furthermore, anyone with a medical condition or following a therapeutic diet will be excluded from this study.

Protection Against Risks
Participants will be recruited by advertising on UTK list-servs as well as through flyers posted on the University of Tennessee campus. The study will be described in detail over the phone and interested participants who meet eligibility criteria will sign a consent form approved by the Institutional Review Board at the University of Tennessee during the experimental session. Assigning participants a unique identification code that will be used on all documents and in computer database with no references to names, addresses, e-mail addresses, or telephone numbers will protect participant confidentiality. All data will be stored in a locked filing cabinet in Jessie Harris Building room 102. Furthermore, all electronic data will be password protected.

VI. BENEFITS
There are no benefits to participating in this study.

VII. METHODS FOR OBTAINING "INFORMED CONSENT" FROM PARTICIPANTS
This study will be briefly explained in over telephone to interested individuals. After meeting initial eligibility, participants will be scheduled for an experimental session during which they will sign a consent form approved by the Institutional Review Board at the University of Tennessee. Participants will receive a copy of the consent form and signed consent forms will be stored in a locked filing cabinet in Jessie Harris Building room 102.

VIII. QUALIFICATIONS OF THE INVESTIGATOR(S) TO CONDUCT RESEARCH
The Principal Investigator has extensive research and experience in designing, implementing and evaluating randomized controlled trials examining eating behaviors, physical activity, and weight loss. Dr. Raynor, who is a clinical psychologist and dietitian, has been funded by the National Institutes of Health (NIH) as a Principal Investigator on an adult weight loss intervention investigating dietary variety and co-investigator on several studies examining behavioral treatment approaches to weight loss and weight loss maintenance.

Ms. Poole has been working under the direction of Dr. Raynor in the HEAL lab for the past three years. During this time period, Ms. Poole has gained experience with managing data, assisting with research assessments, and writing protocols for research projects.

IX. FACILITIES AND EQUIPMENT TO BE USED IN THE RESEARCH

Research space in the Jessie Harris Building will be used for this investigation. The space is in Room 102, is 768 square feet, and includes a group meeting room, two offices, a reception area, a storage closet, and a kitchen. The experimental session will take place in the group room. Materials used in treatment groups will be standardized intervention manuals. Assessments will take place in the Jessie Harris Building using the above-described methods. Data will be stored in locked filing cabinets in password-protected files in the Jessie Harris Building. Data will be analyzed using the dietary software NDS-R and the statistical program SPSS for Windows.

References


**X. RESPONSIBILITY OF THE PRINCIPAL INVESTIGATOR(S)**

By compliance with the policies established by the Institutional Review Board of The University of Tennessee the principal investigator(s) subscribe to the principles stated in "The Belmont Report" and standards of professional ethics in all research, development, and related activities involving human subjects under the auspices of The University of Tennessee. The principal investigator(s) further agree that:

Approval will be obtained from the Institutional Review Board prior to instituting any change in this research project.

Development of any unexpected risks will be immediately reported to Research Compliance Services.

An annual review and progress report (Form R) will be completed and submitted when requested by the Institutional Review Board.

Signed informed consent documents will be kept for the duration of the project and for at least three years thereafter at a location approved by the Institutional Review Board.

**XI. SIGNATURES**

ALL SIGNATURES MUST BE ORIGINAL. The Principal Investigator should keep the original copy of the Form B and submit a copy with original signatures for review. Type the name of each individual above the appropriate signature line. Add signature lines for all Co-Principal Investigators, collaborating and student investigators, faculty advisor(s), department head of the Principal Investigator, and the Chair of the Departmental Review Committee. The following information should be typed verbatim, with added categories where needed:

Principal Investigator: __Hollie Raynor, PhD, RD, LDN____

Signature: _________________________ Date: _________________
XII. DEPARTMENT REVIEW AND APPROVAL

The application described above has been reviewed by the IRB departmental review committee and has been approved. The DRC further recommends that this application be reviewed as:

[ x] Expedited Review -- Category(s): _______ 4 ____________

OR

[ ] Full IRB Review

Chair, DRC: ________________________________________________

Signature: ______________________ Date: ________________

Department Head: __Jay Whelan, PhD___________

Signature: ______________________ Date: ________________

Protocol sent to Research Compliance Services for final approval on (Date) : __________

Approved:
Research Compliance Services
Office of Research
1534 White Avenue
Signature: ____________________________   Date: _________________

For additional information on Form B, contact the Office of Research Compliance Officer or by phone at (865) 974-3466.
APPENDIX C: RECRUITMENT FLYER
Interested in participating in a brief study to investigate the effect of watching TV on the liking of snack foods?

If you are…

- Female
- Between 18-30 years of age
- Of a healthy weight
- A non-smoker
- Free from dietary restrictions

If interested, contact Seletha at the Healthy Eating and Activity Laboratory at 974-0754.

Get a $15 Gift card for Participating!!
TV and Snack Food Study Phone Script

Hello, this is ____________. Thanks for calling about the TV and Snack Food Study. Let me first tell you about the study, so that you can decide if you are interested in participating. The purpose of the study is to investigate the effect of watching a television show on the liking of snack foods. Participants in this study will be scheduled for a 60-minute appointment between the hours of 1 and 5 pm, Monday through Friday in the Healthy Eating and Activity Laboratory (HEAL) on the University of Tennessee campus. Participants will be asked to eat within two to four hours of the scheduled appointment. Participants will also be asked to refrain from engaging in physical activity in the day prior to the appointment. During this session measures on your hunger, physical activity, and food eaten in the day prior to the appointment will be obtained. Participants will then be given two different snack foods, such as grapes and chocolate chip cookies, to eat for a taste-test while watching a 30-minute television show. For the taste-test participants may eat as much or as little of the snack foods as they like while watching the 30-minute television show. After the 30-minute television show, participants will be asked to rate their liking of the snack foods. Participants will again report on their hunger. Height and weight, and demographic measures will be taken. A questionnaire on television commercials will also be completed. Participants will receive a $15 gift card or 4 HPR credits (if from Psychology 110) for participating in the study. If you are interested in participating in this study, I have some questions to ask you to determine your initial eligibility. This will take about 10 minutes.

GO TO SCREENING FORM.
TV and Snack Food Study Screening Form

1) Gender:  □ F  □ M

**If Male:** I am sorry, but we are only recruiting females for this study, so you will not be eligible for this study. Thank you for your time.

2) a) Age:_______________  b) Date of birth: ___/___/___ (must be between 18 and 30)

**If age is not between 18 and 35:** I am sorry, but the age range we’re recruiting for is 18-30. Since you are ____ yrs old, you are not eligible for this study. Thank you for your time.

3) a) Which of the following best describes your racial heritage? (you may choose more than one)

   □ American Indian or Alaskan Native  
   □ Asian  
   □ Black or African American  
   □ Native Hawaiian or other Pacific islander  
   □ White  
   □ Other ______________________________

   b) Which of the following best describes your ethnic heritage?

   □ Hispanic or Latino  
   □ Not Hispanic or Latino

4) a) Current weight:_________pounds  
   b) Height: ____feet _____inches  
   c) Current BMI:_________ (must be between 18.5 and 24.9)  
      BMI= kg/m$^2$ or (lbs/in$^2$) x 703
If BMI is below 18.5 or above 24.9: I’m sorry, but because your height and weight are not within the range for this study, you aren’t eligible. Thank you for your time.

5) Please rate your liking of the following foods using a scale of 1-5, with 1 meaning do not like and 5 meaning extremely like. You can consider 3 to be neutral:

<table>
<thead>
<tr>
<th>Food</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grapes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby carrots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chocolate chip cookies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato chips</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If any of the foods are rated less than 3: I’m sorry, but since you do not like _______, you are ineligible for the study. Thank you for your interest.

6) Please indicate your health perception of the following foods using a scale of 1-5, with 1 meaning you think the food is extremely unhealthy and 5 meaning you think the food is extremely healthy. You can consider 3 to be neither unhealthy nor healthy

<table>
<thead>
<tr>
<th>Food</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Grapes</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>b. Baby carrots</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>c. Chocolate chip cookies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Potato chips</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Q6ab <4: I am sorry, but because you indicated that you do not believe grapes and/or baby carrots to be a healthy food, you are not eligible for this study. Thank you for your time.
Q6cd >2: I am sorry, but because you indicated that you do not believe chocolate chip cookies and potato chips to be an unhealthy food, you are not eligible for this study. Thank you for your time.

7) Please indicate your health perception of the following commercials using a scale of 1-5, with 1 meaning you think the commercial is advertising an extremely unhealthy food and 5 meaning the commercial is advertising an extremely healthy food. You can consider 3 to be neither unhealthy nor healthy.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Fiber One bars</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. M&amp;M’s candies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. Honey Bunches of Oats cereal</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. Oreo cookies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. Nature’s Path granola</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f. Cheez-it crackers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g. Nestle fruit yogurt</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h. 3 Musketeers chocolate bars</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>i. Musselman’s apple sauce</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>j. Doritos chips</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Q7a,c,e,g,l <4: I am sorry, but because you indicated that you do not believe commercials advertising Fiber One bars/Honey Bunches of Oats cereal/Nature’s Path granola/Nestle fruit yogurt/Musseleman’s apple sauce to be advertising healthy foods, you are not eligible for this study. Thank you for your time.

Q7b,d,f,h,j >2: I am sorry, but because you indicated that you do not believe commercials advertising M&M’s candies/oreo cookies/twix chocolate bars/3 Musketeers chocolate bars/Doritos chips to be advertising unhealthy foods, you are not eligible for this study. Thank you for your time.

Now I have some health-related questions.

8) Do you currently smoke?
   □ No    □ Yes (INELIGIBLE)

If YES to Q8: I am sorry, due to the fact that you currently smoke, you are not eligible for this study. Thank you for your time.

9) Do you have any food allergies?
   □ No    □ Yes → Explain (INELIGIBLE if wheat flour, nuts, chocolate)

If YES to Q10: I am sorry, but due to the fact that you are allergic to __________, you are not eligible for this study because the snack food contains __________. Thank you for your time.

10) Do you have a health condition that influences eating or requires a therapeutic diet?
    □ No    □ Yes (INELIGIBLE)

11) Are you currently taking medications that influence eating?
    □ No    □ Yes (INELIGIBLE)
12) Are you currently dieting for weight loss?
   □ No    □ Yes (INELIGIBLE)

If YES to Q10-11: I am sorry, but due to the fact that you have a health condition that influences eating/take medications that influence your eating, you are not eligible for this study. Thank you for your time.

If YES to Q12: I am sorry, but due to the fact that you are currently dieting for weight loss, you are not eligible for this study. Thank you for your time.

13-A) Please answer true or false to the following statements. (Give bolded answer 1 point.)
Points

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>T</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) When I have eaten my quota of calories, I am usually good about not eating any more.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>2) I deliberately take small helpings as a means of controlling my weight.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>3) Life is too short to worry about dieting.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>4) I have a pretty good idea of the number of calories in common food.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>5) While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>6) I enjoy eating too much to spoil it by counting calories or watching my weight.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>7) I often stop eating when I am not really full as a conscious mean of limiting the amount that I eat.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>8) I consciously hold back at meals in order not to gain weight</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>9) I eat anything I want, any time I want.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>10) I count calories as a conscious means of controlling my weight.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>11) I do not eat some foods because they make me fat.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>12) I pay a great deal of attention to changes in my figure.</td>
<td></td>
<td>T</td>
<td>F</td>
</tr>
</tbody>
</table>

Total Points

98
13-B) Please answer the following questions with one of the responses that is appropriate for you.

(Give bolded answer 1 point.)

Points

<table>
<thead>
<tr>
<th></th>
<th>1) How often are you dieting in a conscious effort to control your weight?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rarely</td>
<td>Sometimes</td>
</tr>
<tr>
<td></td>
<td>2) Would a weight fluctuation of 5 lbs affect the way you live your life?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
<td>Slightly</td>
</tr>
<tr>
<td></td>
<td>3) Do your feelings of guilt about overeating help you to control your food intake?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Never</td>
<td>Rarely</td>
</tr>
<tr>
<td></td>
<td>4) How conscious are you of what you are eating?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
<td>Slightly</td>
</tr>
<tr>
<td></td>
<td>5) How frequently do you avoid “stocking up” on tempting foods?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Almost never</td>
<td>Seldom</td>
</tr>
<tr>
<td></td>
<td>6) How likely are you to shop for low calorie foods?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unlikely</td>
<td>Slightly unlikely</td>
</tr>
<tr>
<td></td>
<td>7) How likely are you to consciously eat slowly in order to cut down on how much you eat?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unlikely</td>
<td>Slightly likely</td>
</tr>
<tr>
<td></td>
<td>8) How likely are you to consciously eat less than you want?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unlikely</td>
<td>Slightly likely</td>
</tr>
</tbody>
</table>
9) On a scale from 0-5, where 0 means no restraint in eating (eating whatever you want, whenever you want) and 5 means total restraint (constantly limiting food intake and never “giving in”), what number would you give yourself?

- 0 – eat whatever you want, whenever you want
- 1 – usually eat whatever you want, whenever you want
- 2 – often eat whatever you want, whenever you want
- 3 – often limit food intake, but often “give in”
- 4 – usually limit food intake, rarely “give in”
- 5 – constantly limiting foods intake, never “giving in”

Total Points

Total Points (13-A + 13-B):

If Total Points (13-A + 13-B) < 10 INELIGIBLE

If < 10: I am sorry, but based on the information you have provided, you are not eligible for this study. Thank you for your time.

IF ELIGIBLE: Congratulations! I am happy to tell you that you meet the initial eligibility criteria for the TV and Snack Food Study. I’d like to schedule you for an appointment. We are scheduling appointments between the hours of 1 and 5 pm on Monday through Friday. These appointments will last about 60 minutes.

Which day and time works best for you for your initial appointment? (Review schedule for available appointments.)

*We have ---- (day), ---- (date) at ---- (time). Does that work for you?*

Appointment date and time:
The HEAL Lab is located in the Jessie Harris Building, Room 102. Do you know where that is?

(If no, provide directions. JHB is located on Cumberland Ave and 12th Ave, next to the 11th Ave parking garage. The UTK website has a building locator and directions can be e-mailed if needed.)

We have you scheduled for your appointment on ----(day), ---- (date) at ----(time). Your appointment will take about 60 minutes. Please arrive on time as we may have another appointment scheduled immediately after yours.

We will send you an email confirming your appointment. If for some reason you cannot keep your appointment, please call our lab at (865) 974-0752. Thanks for participating in our study!
| First Name: ___________________________ | Last Name: __________________________ |
| Home Address: __________________________ |
| Email Address: __________________________ |
| Phone # 1: ___________________________ mobile/home/other |
| Phone # 2: ___________________________ mobile/home/other |

| Eligible: □ No   □ Yes |
| If No, Reason: __________________________ |
| Screened by: __________________________ |
| Date: __________________________ |
| Appointment Date: ___/___/___  Time: ___ |

Enter participant information into PTL.
APPENDIX E: CONSENT FORM
INFORMED CONSENT STATEMENT

Committee #  Name of Study Volunteer

The Effect of Watching a Television Show on the Liking of Snack Foods

You are being asked to take part in a research study. All research studies carried out at the University of Tennessee are covered by rules of the Federal government as well as rules of the State and the University. Under these rules, the researcher will first explain the study, and then he or she will ask you to participate. You will be asked to sign this agreement, which states that the study has been explained, that your questions have been answered, and that you agree to participate.

The researcher will explain the purpose of the study. She/he will explain how the study will be carried out and what you will be expected to do. The researcher will also explain the possible risks and possible benefits of being in the study. You should ask the researcher any questions you have about any of these things before you decide whether you wish to take part in the study. This process is called informed consent.

This form also explains the research study. Please read the form and talk to the researcher about any questions you may have. Then, if you decide to be in the study, please sign and date this form in front of the person who explained the study to you. You will be given a copy of this form to keep.

INTRODUCTION

Nature and Purpose of the Study
Seletha Poole and Dr. Hollie Raynor are doing a study to investigate the effect of television viewing on liking of snack foods. A total of 48 women will participate in this study.

You have been asked to participate in the study because you are normal weight according to medical standards, an adult female between the ages of 18 and 30, and do not have any dietary restrictions.

INFORMATION ABOUT PARTICIPANTS’ INVOLVEMENT IN THE STUDY

Explanation of Procedures
You will be asked to the Healthy Eating and Activity Laboratory for one 60-minute session. You will provide a dietary recall of all foods and beverages consumed since you woke up that morning. You will also be asked to rate your hunger and report on your physical activity from earlier in the day. Then, you will be provided with two different snacks foods to eat for a taste-test while you watch a 30-minute television program and will be instructed that you may eat as much or as little as you desire of the foods. Following the television program you will be asked to rate your liking of the foods and then again rate your hunger and complete a questionnaire on demographics and television commercials. Your height and weight will also be measured at the end of the session.

Please call Seletha Poole at (865) 974-0754 if you have any questions about these procedures for the study.

RISKS

Risks of this investigation are considered minimal. Participants may be allergic to foods, but will be phone screened on this criterion.

BENEFITS

There are no benefits to participating in this study.

CONFIDENTIALITY

All of your records from this study will be kept confidential. Data will be stored securely and will be made available only to persons conducting the study unless participants specifically give permission in writing to do so otherwise. No reference will be made in oral or written reports, which could link participants to the study.

COMPENSATION

Participants who complete the experimental session will receive a $15 gift card or will receive 4 HPR credits if from Psychology 110.

EMERGENCY MEDICAL TREATMENT

The University of Tennessee does not “automatically” reimburse subjects for medical claims or other compensation. If physical injury is suffered in the course of research, or for more information, please notify the investigator in charge, Seletha Poole, at (865) 974-0754.
CONTACT INFORMATION

If you have questions at any time about the study or the procedures, or you experience adverse effects as a result of participating in this study, you may contact the researcher, Seletha Poole at the Healthy Eating and Activity Laboratory in the Department of Nutrition, 229 Jessie Harris Building, The University of Tennessee, Knoxville, TN 37996-1920, (865) 974-0754. If you have questions about your rights as a participant, contact the Office of Research Compliance Officer, Brenda Lawson, at (865) 974-3466.

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at anytime without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed your data will be returned to you or destroyed.

CONSENT

I HAVE READ THE ABOVE INFORMATION. I HAVE RECEIVED A COPY OF THIS FORM. I AGREE TO PARTICIPATE IN THIS STUDY.

__________________________________________  ______________________
Signature of study volunteer                      Date

I ASSURE THAT I HAVE FULLY EXPLAINED TO THE ABOVE STUDY VOLUNTEER/AUTHORIZED REPRESENTATIVE, THE NATURE AND PURPOSE, PROCEDURES AND THE POSSIBLE RISK AND POTENTIAL BENEFITS OF THIS RESEARCH STUDY.

__________________________________________  ______________________
Signature of researcher or designate                  Date

Consent form copy: □ study volunteer □ medical record □ researcher □ other(specify)

*If signed by agent other than study volunteer, please explain below.

UTK EXPEDITED Approval: 7/13

AUG 06 2013 - AUG 06 2014
In the table below, please write down a description of what you ate and drank since waking up this morning. In the description, include the meal names (breakfast, lunch, dinner, snack) and time that you started eating and/or drinking each meal or snack, a description of each item that you ate or drank, and the amount of each item that you consumed.

**Example:**

<table>
<thead>
<tr>
<th>Meal &amp; Time</th>
<th>Description of Food and Drink</th>
<th>Amt. Consumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td>Strawberry Poptarts</td>
<td>1.5 tarts</td>
</tr>
<tr>
<td>9:00am</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
<td>Turkey sandwich</td>
<td></td>
</tr>
<tr>
<td>12:00pm</td>
<td>White bread</td>
<td>2 slices</td>
</tr>
<tr>
<td></td>
<td>Turkey luncheon meat (Oscar Meyer)</td>
<td>2 oz (2 slices)</td>
</tr>
<tr>
<td></td>
<td>American cheese</td>
<td>1 slice</td>
</tr>
<tr>
<td></td>
<td>Mayonnaise - regular</td>
<td>2 Tbsp</td>
</tr>
<tr>
<td></td>
<td>Lettuce - iceberg</td>
<td>1 leaf</td>
</tr>
<tr>
<td></td>
<td>Lay’s regular potato chips</td>
<td>1 oz</td>
</tr>
<tr>
<td></td>
<td>Diet coke</td>
<td>16 oz</td>
</tr>
<tr>
<td></td>
<td>Oreo cookies</td>
<td>3</td>
</tr>
<tr>
<td>Snack</td>
<td>Vegetable soup</td>
<td>1 cup</td>
</tr>
<tr>
<td>3:30pm</td>
<td>Saltine crackers</td>
<td>4 crackers</td>
</tr>
<tr>
<td>Dinner</td>
<td>Double cheeseburger</td>
<td>1 each</td>
</tr>
<tr>
<td>6:45pm</td>
<td>French fries</td>
<td>1 large order</td>
</tr>
<tr>
<td></td>
<td>Sprite</td>
<td>20 oz.</td>
</tr>
</tbody>
</table>
## TV & Snack Food
### Food Record

<table>
<thead>
<tr>
<th>Meal &amp; Time</th>
<th>Description of Food and Drink</th>
<th>Amt. Consumed</th>
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</tr>
</tbody>
</table>

109
Hunger Scale

On the blank line provided, please draw a vertical line or an ‘X’ to rate how hungry you are right now. Please cross out and initial any mistakes.

EXAMPLE:  

Not at all hungry  
Extremely Hungry

How hungry did you feel right now?

Not at all Hungry  
Extremely Hungry

Office Use Only:
Reference #:  
Assessment #:  
Score: _________
Pleasantness Visual Analogue Scales of Foods

On the blank lines provided, please draw a vertical line or an ‘X’ to indicate how much you like the following food items are after you sample them. Also, please cross out and initial any mistakes.

EXAMPLE:

Apples

[Blank lines]

Extremely Dislike  X  Extremely Like

Food 1:

Red grapes

[Blank lines]

Extremely Dislike  [Blank]  Extremely Like

Food 2:

Baby carrots

[Blank lines]

Extremely Dislike  [Blank]  Extremely Like
Pleasantness Visual Analogue Scales of Foods

On the blank lines provided, please draw a vertical line or an ‘X’ to indicate how much you like the following food items are after you sample them. Also, please cross out and initial any mistakes.

EXAMPLE:

Vanilla Ice Cream

Extremely Dislike

| X |

Extremely Like

Food 1:

Potato chips

Extremely Dislike

| |

Extremely Like

Food 2:

Chocolate chip cookies

Extremely Dislike

| |

Extremely Like
Demographic Information

1. AGE □□

2. EDUCATION: Check years of school completed. (CHECK ONLY ONE ANSWER)
   □ (1) Grade School (6 yrs or less)
   □ (2) Junior High School (7-9 yrs)
   □ (3) High School (10-12 yrs)
   □ (4) Vocational Training (beyond High School)
   □ (5) Some College (less than 4 yrs)
   □ (6) College/University degree
   □ (7) Graduate or Professional Education

3. MARITAL STATUS:
   □ (1) Married
   □ (2) Separated
   □ (3) Divorced
   □ (4) Widowed
   □ (5) Never Married
   □ (6) Not Married (living with significant other)
   □ (7) Other (specify): ___________________________

4. Which of the following best describes your racial heritage? (you may choose more than one)
   □ (1) American Indian or Alaskan Native
   □ (2) Asian
   □ (3) Black or African American
   □ (4) Native Hawaiian or other Pacific Islander
   □ (5) White
   □ (6) Other ______________________________

5. Which of the following best describes your ethnic heritage?
   □ (1) Hispanic or Latino
   □ (2) Not Hispanic or Latino

Demographics Page 1 of 1
### Memory Questionnaire

**Directions:** Place a checkmark next to the commercials that you remember seeing during the television show.

<table>
<thead>
<tr>
<th>Viewed</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature’s Path Pumpkin granola</td>
<td></td>
</tr>
<tr>
<td>State Farm car insurance</td>
<td></td>
</tr>
<tr>
<td>M&amp;M’s candies</td>
<td></td>
</tr>
<tr>
<td>Fifth Third bank</td>
<td></td>
</tr>
<tr>
<td>Musselman’s Apple Sauce</td>
<td></td>
</tr>
<tr>
<td>All-state car insurance</td>
<td></td>
</tr>
<tr>
<td>Oreo’s cookies</td>
<td></td>
</tr>
<tr>
<td>Ally Bank</td>
<td></td>
</tr>
<tr>
<td>Honey Bunches of Oats</td>
<td></td>
</tr>
<tr>
<td>Ally car insurance</td>
<td></td>
</tr>
<tr>
<td>Cheez-it crackers</td>
<td></td>
</tr>
<tr>
<td>Capital One bank</td>
<td></td>
</tr>
<tr>
<td>Fiber one bars</td>
<td></td>
</tr>
<tr>
<td>Travelers car insurance</td>
<td></td>
</tr>
<tr>
<td>3 Musketeers chocolate bars</td>
<td></td>
</tr>
<tr>
<td>Geico car insurance</td>
<td></td>
</tr>
<tr>
<td>Doritos chips</td>
<td></td>
</tr>
<tr>
<td>Nestle fruit yogurt</td>
<td></td>
</tr>
</tbody>
</table>
Height/Weight

**Assessment:**
- Height _________ inches
- Weight _________ pounds
- BMI: \(\geq 18.5 \text{ to } \leq 24.9\)
Seletha Ann Poole was born and raised in southern middle Tennessee. She graduated from the University of Tennessee-Knoxville in 2011 with a Bachelor of Science degree in Nutrition. Upon completion, she pursued dual graduate degrees of Master of Science in Public Health Nutrition and Master of Public Health, with a concentration in Community Health Education.

As a graduate student, Seletha worked in the Healthy Eating and Activity Laboratory where, under the direction of Dr. Hollie Raynor, expanded upon skills in research design and methodology. Additionally, she developed skills in client-based nutrition counseling and behavioral weight loss intervention trials. Seletha earned her Master of Public Health in Spring 2014 and completed the Dietetic Internship in Summer 2014, with plans to sit for the Registered Dietitian Examination upon completion of her Master of Science degree in Summer 2015. Her long-term career goals include expanding upon skills in a research or public health setting.