The Effect of Television Watching and Portion Size on Intake During a Meal

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ABSTRACT

Background: Several investigations have examined the influence of television and portion size on intake. Results have found that watching television while eating or being provided larger portions increases intake. However, no investigation has examined the combined effect of these variables on food intake, when these factors are combined they may enhance consumption.

Methods: To test the influence of television and portion size on intake during a meal in healthy weight adults, a 4X2X2 mixed factorial design was used, with a between-subject factor of order of conditions and within-subject factors of television (TV vs. NO TV) and portion size (SMALL vs. LARGE). Seventeen women and three men (21.6 $\pm$ 2.3 kg/m^2, 22.3 $\pm$ 3.7 years), who were predominately white (80%), and non-Hispanic (95%), were randomized to one of four orders of conditions. For TV conditions, participants viewed a 30-minute show (no commercials or food cues), for NO TV conditions participants sat for 30 minutes. Participants received 500g macaroni and cheese (998 kcal) and 150g salad with dressing (85 kcal), providing a total of 1083 kcal in SMALL conditions; while LARGE conditions were provided with portions 200% of SMALL conditions. Dependent variables were grams and energy consumed during the meal.

Results: Factorial ANOVA revealed a significant main effect of portion size on grams and energy consumed of the total meal. Participants consumed more grams (577.9 $\pm$ 150.5g vs. 453.1 $\pm$ 96.6g; $p<0.046$) and more energy (903.9 $\pm$ 270.4 kcal vs. 734.6 $\pm$ 187.1 kcal; $p<0.049$) when provided a larger portion size. Factorial ANOVA revealed a significant main effect of food type for grams and energy consumed. Participants consumed more grams (368.9 $\pm$ 114.1g vs. 146.7 $\pm$ 44.7g; $p<0.006$) and more energy (736.2 $\pm$ 227.8 kcal vs. 83.0 $\pm$ 25.3 kcal; $p<0.000$) of macaroni and cheese as compared to salad with dressing. A significant main effect of television viewing or interaction of television viewing x portion size was not found.

Conclusion: Watching television did not increase intake during a meal. Greater gram and energy intake occurred when larger portion sizes were provided. To assist with reducing intake, smaller portion sizes should be implemented.

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CHAPTER I: LITERATURE REVIEW

BACKGROUND AND SIGNIFICANCE

OBESTIY

Obesity, a complex health condition, currently affects one-third of adults in the United States (US).[1] In 2013, no state in the US had a prevalence of obesity less than 20%, and the Southeastern section of the US had the highest prevalence of obesity at 30.2%.[1] In adults, overweight is defined as a body mass index (BMI) of 25.0-29.9 kg/m^2 and obesity is defined as a BMI of 30 kg/m^2 and higher.[1] Obesity can lead to various diseases, such as coronary heart disease, type 2 diabetes, certain cancers, hypertension, stroke, liver disease, gall bladder disease, sleep apnea, respiratory problems, osteoarthritis, and gynecological problems.[1] With the increase in the prevalence of obesity and its associated diseases, there have been direct and indirect increases in medical costs in the US, which in 2008 were estimated to be $147 billion nationally.[2] Direct costs include those related to prevention and treatment, while indirect costs are related to morbidity and mortality.[2] In 2008, individuals who were obese had annual medical bills that were $1,429 higher than individuals of a healthy weight.[1]

CAUSES OF OBESITY

Factors that influence an individuals' weight status include genetics, various diseases, certain drugs, rate of metabolism, behaviors, culture, education level, environmental factors and socioeconomic status.[2] Obesity is the consequence of excessive weight gain, which is explained by an energy imbalance resulting from consuming too much energy as compared to energy expended.[2] A decrease in physical activity and increase in sedentary leisure-time activities has contributed to the obesity epidemic.[3]

TELEVISION AND OBESITY

Sedentary behavior is defined as a sitting activity that does not increase energy expenditure beyond that which is achieved at rest, which is defined as an energy expenditure of 1.0 to 1.5 metabolic equivalent units (METs).[4] Television viewing is the most common sedentary leisure-time activity.[5] About 99% of households in the US have at least one television, but on average, most households have three televisions.[6] Having greater number of televisions in a home is correlated with greater television viewing hours.[6] From 1950 to 2000, the average time adults spent watching television increased from 4.5 hours per day to about 8 hours per day.[5]

A consistent relationship has been found between television viewing and negative health outcomes. For example, Williams, Raynor, and Ciccolo reviewed 35 studies to investigate the relationship between television viewing and anthropometrics in adults.[7] After controlling for demographics and physical activity, significant relationships were found between television viewing and anthropometrics in almost all of the studies, with higher amounts of television viewing associated with greater BMI, body fat, waist-to-hip ratio, and waist circumference.[7] Sedentary behavior has also been found to have a strong relationship with other health problems, such as cardiovascular disease, metabolic syndrome, and other physiological problems.[5]

Boulos and colleagues propose three mechanisms to explain the relationship between television viewing and obesity.[6] The first mechanism is that television viewing, an activity that is low in energy expenditure, displaces physical activity, an activity that is higher in energy expenditure, as a leisure activity.[6] The second mechanism is that viewing unhealthy food advertisements shown while one is watching television stimulates unhealthy food intake.[6] The third mechanism is increased occurrence of mindless eating.[6] Mindless eating is defined as when an environmental distraction occurs while eating, reducing attention to the food being

consumed.[8] It is believed that if mindless eating becomes a habit for individuals, they will reduce responsiveness to internal cues of hunger and sataition.[9] Television may lead to mindless eating as watching television may serve as environmental distraction when one is eating.[6,10]

TELEVISION WATCHING AND DIETARY INTAKE

Many observational and experimental studies have been conducted with adults to examine the relationship between dietary intake and television watching. The studies analyze time spent viewing television and its relationship to snack, meal, and overall energy intake. The studies reviewed are organized first by experimental design (observational then experimental). Within observational studies, they are reviewed by studies that provide data suggesting that television watching influences intake via food cues first, followed by data that suggests the relationship is driven by mindless eating. Within experimental studies, they are organized by studies in which data are not provided that can address which mechanism may influence consumption, followed by studies that report on data that suggest the relationship between television viewing and eating is cued by what is shown on television, and then by studies that provide data that suggests that mindless eating occurs when individuals eat while watching television.

OBSERVATIONAL STUDIES

Gore and colleagues analyzed baseline questionnaires that assessed dietary habits and television viewing behaviors in overweight and obese women undergoing treatment to lose weight.[11] The 74 participants completed a self-reported television viewing questionnaire and a food frequency questionnaire to assess dietary habits.[11] Individuals were asked to record number

of days per week they ate breakfast, lunch, dinner and/or snacks in a room with the television on.[11] Individuals in this sample reported watching television for an average of 3.1 hours per day.[11] Snacking in front of the television was positively correlated with an increase in total calories and fat intake.[11] Frequency of snacking in front of the television was negatively correlated with choosing a low-calorie and low-fat snack.[11] The participants in this sample reported eating an average of 46% of their meals in front of the television per week.[11] Since the study found specific differences in types of snacks consumed while watching television, this suggests that watching television may be cueing certain types of food to consume.[11]

Thomson and colleagues investigated the relationship between snack consumption and television viewing via an internet-based survey.[12] The participants consisted of 613 undergraduate students who reported number of average hours spent on weekdays and weekend watching television.[12] The diet was assessed via modified food frequency questionnaires to assess snack behaviors.[12] About 30% of the participants reported consuming a soda and snack bars more than one time per week.[12] There was a positive correlation shown between snacking frequency, television viewing, and energy-dense snack consumption.[12] High viewers of television (greater than 4 hours per day) reported more consumption of energy-dense snacks than low viewers (less than 1 hour per day).[12] Since more energy-dense snacks were consumed in those watching more television, this suggests that food cues shown on television may be playing a role in dietary intake.[12]

Stroebele and de Castro examined the relationship between television viewing and meal frequency in undergraduate students.[13] The participants consisted of 78 undergraduate students who reported television behavior and diet via a 7-day diet diary.[13] The participants averaged about one meal per day in front of the television.[13] On the days the participants recorded

watching significantly more television they reported eating more calories per meal (up to twice as much as meals without television).[13] In addition, on the days participants reported watching more television, they ate more meals (3.53 meals versus 2.76 meals).[13] A significant increase in meal frequency and decrease in time between meals was found on higher television viewing days.[13] The increased intake of calories per meal with more television viewing may be a consequence of seeing food cues on television or mindless eating.

Bowman and colleagues used data from the 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII) to investigate the relationship between dietary intake and television viewing time in adults 20 years and older.[14] The 9,157 participants completed a self-reported television viewing record and interviewer administered 24-hour dietary recall of two nonconsecutive days.[14] A significant positive relationship was found between television watching time and total energy consumed per day.[14] Individuals that viewed more than two hours of television per day consumed the highest total amount of calories per day, more calories from snacks and dinner, and the highest percentage of added sugars, compared to participants who watched one hour or less of television per day.[14] Mechanistically this study suggests that foods shown on television may be cuing the action of eating and increasing consumption due to the higher percentage of added sugars consumed, but mindless eating may also play a role since it is also increase calories in general.[14]

There is a clear relationship in adults between television viewing and greater dietary intake seen via observational, cross-sectional studies. The studies rely on self-reported data, which can add bias to the results. Overall, since these studies were not designed to investigate the mechanism by which television viewing increases dietary intake it is hard to draw a concrete conclusion about how television viewing influences intake.

EXPERIMENTAL STUDIES

Blass and colleagues investigated the relationship between television viewing and dietary intake.[15] The participants in the study consisted of 20 undergraduate students (age was not reported), who received extra credit for an introductory level psychology course.[15] The participants were told the investigators were looking at whether television affected memory for everyday events.[15] Participants were given no instructions regarding their intake or physical activity prior to coming to either session.[15] Participants came to two sessions, both sessions were held at either lunch or dinner, whichever was convenient for the participant.[15] Sessions occurred once a week, and the start of each session was scheduled $\pm$1 hour within each other.[15] The order of the two conditions was counterbalanced.[15] Participants were given either macaroni and cheese (family size) and cola or pizza (12 inch) and water during their meals in the laboratory.[15] The rationale for who was provided which meals was not given.[15] The mean BMI of the participants in the macaroni and cheese group was 22.71$\pm$ 4.02 kg/m^2 and for the pizza group was 26.35$\pm$ 6.66 kg/m^2.[15] During one session the participants watched a television show of their choice from six given options, which were 30 minute pre-recorded popular shows that included original commercials.[15] It was not reported if the show contained any food cues or if the commercials were for food products.[15] During another session the participant listened to a symphony, Rachmaninoff's Second Symphony.[15] This song was chosen, as the sequence of the song resembles a television show, by starting out slowly and building up across time.[15] No specific instructions were reported in the methodology about instructions for eating during the sessions.[15] In the session in which television was watched, participants ate 36% more calories from pizza (on average one slice) and 71% more calories from macaroni and cheese and showed a constant increase of 288 kcal per meal.[15] As the authors did not report if food cues were shown in the

television condition, the potential mechanism by which the television condition increased consumption cannot be determined.[15]

Hetherington and colleagues investigated the situational effects that influence eating meals in 37 healthy volunteers that responded to an electronic bulletin board for staff and students from the University of Liverpool.[16] The participants were aged 28.3±1.7 years with a mean BMI of 23.87±0.8 kg/m^2.[16] The participants were told the study was on food, mood, and appetite, and with completion of the study participants received course credit or small monetary award.[16] Participants completed four laboratory visits that were scheduled to occur at least three days apart, with visits scheduled between 12:00 pm and 1:30 pm.[16] There was no standard amount of time for each visit, and visits ranged from 20 to 40 minutes in length.[16] Prior to the visit participants were instructed to eat a normal breakfast and only consume water until the laboratory session at lunch.[16] Participants were given no directions about physical activity prior to the session.[16] In one visit participants watched a clip of a game show alone for an unreported amount of time.[16] It was not reported if the clip contained any food cues.[16] In the other visits, participants ate alone (baseline), with two friends, or two strangers.[16] The conditions were presented to the participant in a counterbalanced order.[16] Participants were provided a meal containing bread with cheese, potato chips, salad, coleslaw, cakes, water, tea or coffee, which provided 3283 kJ.[16] The meal was presented on a tray and participants were told to eat until they felt full and were welcome to ask for more of any item.[16] The participants ate significantly more when eating lunch in front of the television (4350±252 kJ) versus eating alone in a quiet room (3861±200 kJ), but intake was not significantly different when comparing to eating with two friends (4565±272 kJ).[16] Since the investigators did not report if the game show contained food

cues, the potential mechanism that the television condition increased consumption cannot be determined.[16]

Bellisle, Dalix, and Slama studied women of a healthy weight in regards to meal intake within three different environmental conditions, one of which included television watching.[17] The participants were 48 women, aged 18 to 50 years, with a BMI of 18.5 to 24.9 kg/m^2, who were paid to participate in the study.[17] The participants were told the investigators were studying effects of meal conditions and appreciation of the given foods.[17] The three conditions were: 1) eating in a quiet room; 2) eating while watching television; and 3) eating while listening to a recorded story.[17] The quiet room condition was considered the control, since it did not include an environmental stimulus.[17] The television shows were pre-recorded videotapes with no reference to food or eating and the audio was a pre-recorded detective story.[17] There were no instructions given to participants for eating or physical activity before the session.[17] Meals provided in each condition were identical, consisting of a frozen entree of shepherd's pie (1 kg), fruit sherbet (150 g), and water.[17] The participants were told to eat as much or as little as they wanted and were required to stay for 30 minutes, but could stay longer and potentially ask for more food.[17] Participants came in for lunch once a week for four weeks, with the first and last week being control meals and the two environmental stimuli conditions were presented randomly to participants.[17] Both the television watching (2023$\pm$84 kJ) and listening to the recorded story (2044$\pm$84 kJ) significantly increased food consumption in comparison to the first (1751$\pm$84 kJ) and second (1868$\pm$92 kJ) control condition.[17] As food cues were not presented in the television viewing condition, this suggests that mindless eating may be increasing intake in comparison to the control condition.[17] Additionally, as intake was increased in the audio-tape condition also,

this suggests that engaging in eating while performing any activity, which may distract one from focusing on consumption, may produce mindless eating.[17]

Higgs and Woodward examined how watching television during lunch can increase snacks later that day in 16 women.[18] The participants were undergraduate students with a BMI of 18.5 to 24.9 kg/m^2 and a mean age of 19±1 years who received course credit.[18] The study was advertised as being for an investigation of mood on taste preference of food.[18] Each participant completed two sessions, with a minimum of two days in between, and ate lunch with and without a 10 minute comedy clip playing on television.[18] The clip contained no references to food.[18] The lunch occurred between 12:00 pm and 1:30 pm and the snack occurred between 2:30 pm and 5:00 pm the same day, both in the laboratory.[18] Before the lunch no special dietary instructions were provided, but before the snack participants were told to only consume water.[18] The same lunch was served at each session and consisted of approximately 400 kcal, and included a ham sandwich, salted crisps, and water. During the lunch participants were asked to eat as much as they could.[18] The snack that was provided was 120 g of three types of cookies, broken up into bite size pieces so the participants were less likely to count their intake.[18] When television was on during lunch, the participants ate more cookies later that day during the snack due to lack of memory of intake from lunch.[18] Memory of intake was tested through a questionnaire that rated vividness of memories and the mean for the television condition was 66.2, while the control condition was 77.4 out of 100, but no standard deviation was reported.[18] Since there is a lack of memory, as seen through the questionnaires, it could be hypothesized that mindless eating is the mechanism that produced this outcome [18]

Braude and Stevenson looked at sensory specific satiety, introception (hunger and fullness), and mood in females while they ate a snack while watching television.[19] Sixty-two

female, undergraduate students, aged 18 to 29 years, completed the study and received course credit or small cash payment.[19] The study was explained to participants as looking at how environmental factors influence eating.[19] The study design contained one within-subject factor (television versus no television) and one between-subject factor (single food versus multiple foods).[19] Participants were randomly assigned into the two experimental groups in the between-subject factor condition.[19] The experiment included two 30-minute sessions separated by a week and held in the mid-morning or mid-afternoon.[19] The participants were instructed not to eat two hours before the session.[19] The television show that was shown was a 20-minute episode of Friends, which took out commercials and had no reference to food.[19] The snacks that participants were presented with were chocolates, skittles, almonds, and potato chips, for the single food condition the most preferred snack was given.[19] A significant finding was that participants consumed more when watching television as compared to not watching television in both the single food and multiple food type conditions, with a mean increase of 210 kJ.[19] This suggests that television may impact an individual by causing them to eat more due to mindless eating.[19]

As a whole these studies suggest that television may influence consumption via mindless eating. However, in the above reviewed articles there were three main weaknesses seen: 1) lack of reporting if foods cues were in the television shows;[15,16] 2) no instructions reported for intake and physical activity before the session;[15,17,18] and 3) variation for the amount of time the individuals could eat during the sessions within each study.[16,17] Given these three weaknesses, it is hard to draw strong conclusions regarding the mechanism by which watching television may influence consumption.

PORTION SIZE

While research suggests that watching television may increase consumption due to mindless eating, another environmental factor that may increase consumption outside of awareness is portion size of food. Numerous observational and experimental studies have been conducted in adults to investigate the relationship between portion size and energy intake, with results consistently showing that larger portion sizes enhance consumption. The following reviewed articles are organized by study design, with observational studies described first followed by experimental studies. The experimental studies are organized by research examining portion size in snacks, then in meals, then in meals in which the focus is on amorphous foods, which will be the foods chosen for the present study.

OBSERVATIONAL STUDIES

Few observational studies have examined the increase of portion size over time and how this may affect energy intake in adults.[20] Duffey and Popkin used cross-sectional data to investigate the relationship of energy density, portion size, and eating occasions on energy intake in adults ≥19 years.[20] The investigators used representative data for the US including, Nationwide Food Consumption Survey (NFCS) (1977-1978), CSFII (1989-1991), and National Health and Nutrition Examination Surveys (NHANES) (1994-1998 and 2003-2006).[20] For the surveys the dietary data were collected through 24-hour recalls administered through an interviewer and 2-day food records (non-consecutive days).[20] The investigators used a decomposition algorithm to find the change of total energy in regards to portion size, energy density, and eating occasion.[20] The average portion size per eating occasion has increased +49g from 1977-1978 to 1989-1991 and +18 g from 1989-1991 to 1994-1998, but then decreased -2g

in 2003-2006, from 1994-1998.[20] In 1977-1978 the average daily intake was 1,803 kcal and in 2003-2006 the average intake was 2,374.[20] Thus, from 1977-1978 to 2003-2006 portion size per eating occasion increased by +65 g and energy intake increased by +570 kcal/day.[20]

EXPERIMENTAL STUDIES

Rolls and colleagues investigated the effect of increased portion size of packaged potato chips on energy intake.[21] The participants were given 28 g, 42 g, 85 g, 128 g, and 170 g portion of chips.[21] The caloric increase for females was 184 kcal and for males was 311 kcal from the smallest portion to the largest.[21] Rolls and colleagues also investigated the effect of increased portion size of a sandwich on energy intake.[22] The participants were given a 6-inch, 8-inch, 10-inch, and 12-inch sandwich, in which the proportions of the ingredients was kept consistent.[22] When the sandwich was increased by 100 g, females consumed 21±7 g more sandwich and males consumed 55±6 g more sandwich.[22] Comparing the 6-inch sandwich to the 12-inch sandwich, females increased intake by 159 kcal and males by 355 kcal.[22] These studies show a significant relationship between increased portion size and increased energy intake.[21,22]

Rolls and colleagues investigated the relationship of increased portion sizes and increased intake over a period of time.[23] The eligibility criteria for the participants included a BMI between 18 and 30 kg/m^2, aged 20 to 40 years, and in good health.[23] There were 23 participants in the study and they were financially compensated for completing the experiment.[23] The participants were told the study was to study the interactions of food over 11 days.[23] Participants were provided with all meals and snacks for two separate periods of 11 days, which were eaten in the laboratory.[23] One period of 11 days was the baseline portion sizes and the other period of 11 days the portion sizes were increased by 50%.[23] Participants were only allowed to eat the meals and

snacks given to them from the lab for the 11 days, but were allowed to drink water when they wanted and non-caloric beverages at night.[23] Participants were told to exclude water an hour before their laboratory meals.[23] Participants were told to keep physical activity level consistent throughout the 11 days and a 24-hour recall was conducted at breakfast for physical acticity.[23] A variety of foods were offered over the 11 days in ranging from muffins, sandwiches, pizza, and macaroni and cheese.[23] The average daily increase when served the 50% larger portions was 423±27 kcal, with no difference found by sex.[23] Nine out of the 23 participants (39%) correctly identified the purpose of the study was to investigate the effect of portion size on dietary intake.[23] Rolls and colleagues concluded that when presented with larger portions over a period of 11 days, the participants consumed significantly more energy.[23] There was no compensation throughout the 11 days seen by the fact that there was no significant change in consumption over the 11 days in the baseline and large portion size, which indicates increased intake from the larger portion size was outside awareness.[23]

AMORPHOUS FOOD

Diliberti and colleagues studied the effect of increased portion sizes on energy intake in a restaurant meal.[24] The restaurant was a public cafeteria on a university campus.[24] Over 10 days 180 adults (≥18 years) were chosen to partake in the study if they bought the appropriate entrée dish for lunch.[24] The BMIs of the participants ranged from underweight to obese, but mean BMI was not reported.[24] Participants were approached after they finished their meal to fill out the survey and investigators could then weigh the tray after the meal.[24] While data were collected over 10 days, on five of the days participants were given the normal size portion of the pasta casserole entrée of 248 g (100% and the control) and the other five days participants were given a portion of 377 g (150%) of the pasta casserole entree.[24] The price of the entrée stayed constant

throughout all days.[24] The length of time the participants ate was not reported.[24] When participants were given the larger portion size, 43% more was consumed from the entrée.[24] While participants may have selected varying sides and drinks along with the entree, only the entrée was weighed before and after consumption.[24] The customers may have noticed the increase in portion size because when asked about the value of their meals, on a scale of 1-7, the participants who received the baseline portion rated it 5.1 ± 0.2 and the participants who received 150% increased portion size rated it 5.6 ± 0.1, which was a significant difference.[24] Though the participants rated the increased portion as a better value, there was not a significant difference in the amount participants perceived consuming.[24] Hunger and fullness ratings were similar for both conditions, though specific numbers were not reported.[24] Since hunger and fullness ratings were similar, but the participants consumed more, this indicates- that the increased consumption with larger portion size was outside awareness.[24]

Rolls, Morris, and Roe investigated how portion size affects energy intake in adults with a BMI of 20 to 28 kg/m^2.[25] The participants were recruited via local and university newspapers and posters.[25] The sample included 51 adults, aged 21-30 years, who were compensated for their participation and not told the actual purpose of the study.[25] The lunchtime meal was served in the laboratory and consisted of macaroni and cheese (varying portions), carrots (30 g), chocolate (17 g), and water (1 L).[25] The participants were instructed to consume as much macaroni and cheese and water as they desired, but were required to finish the carrots and chocolate.[25] The participants came to the lab on four separate days (separated by at least a week) and served different portions of macaroni and cheese: 500, 625, 750, and 1000 g.[25] The order in which the participants received the different portions was randomized.[25] The instructions that were given to all participants was to keep their dinner and physical activity the night before the experiment as

close to usual as possible and avoid alcohol consumption; in addition, only consume water three hours before the experiment and no water one hour before their lunch.[25] The participants spent about 10-15 minutes eating the food, with time varying depending on gender and portion size, but no specific length of time was reported for a minimum or maxium.[25] The participants consumed 99 g (676 kJ) more of macaroni and cheese when provided the largest portion as compared to the smallest portion.[25] Hunger and satiety ratings did not significantly change before or after either of the conditions, which shows that it was outside the participants awareness.[25] Only 45% of participants could identify the portions sizes were different, but 94% did not correctly identify the objective of the investigations.[25]

In sum, these studies provide evidence for the relationship that increased portion size leads to increased dietary intake in adults outside of awareness, suggesting mindless eating. A weakness of the experimental studies was the length of time spent eating varied or was unreported.[21,22,24,25] A strength that was seen throughout the studies was participants were unaware of what the study was actually testing, which reduces bias in the study.[21,22,24,25]

Observational and experimental studies have investigated the relationship between consuming a meal while watching television. These studies generally find an increase in consumption of calories with television watching via the mechanisms of either mindless eating or food cues through television commercials. Numerous experimental studies have demonstrated that when presented with a larger portion of food, more energy is consumed, which is outside awareness of the individuals. Though there have been a number of studies investigating the relationship of television watching and portion size, separately, to our knowledge, no study has looked at consumption with both factors combined. If both factors influence consumption

outside awareness and contribute to mindless eating, when these factors are combined they may exacerbate mindless eating, producing greater intake.

Therefore the purpose of the study was to investigate the independent and interactive effects of television viewing and portion size on consumption during a meal. Furthermore, as previous research has not been consistent with controlling factors that may influence consumption, to increase the internal validity of the current investigation, factors such as dietary intake and physical activity occurring before experimental sessions and the length of time of the experimental sessions were held constant across the conditions. The specific aims of this investigation were: 1) to determine if more calories are consumed during a meal when watching television versus when not watching television; 2) to determine if more calories are consumed when larger versus smaller portions are presented in the meal; and 3) to determine if an interaction occurs when a meal is provided in larger portions and is consumed while watching television thereby increasing meal intake as compared to when a meal is provided in smaller portions and is consumed while not watching television.

CHAPTER II: MANUSCRIPT

INTRODUCTION

Obesity, a complex health condition, currently affects one-third of adults in the United States.[1] The prevalence of obesity has increased over the past 40 years, and it has been proposed that changes in the environment have increased energy intake and decreased energy expenditure, contributing to the change in obesity prevalence.[1,2,7] Two environmental changes that have been hypothesized to increase energy intake are greater television viewing and larger portion sizes.[2,7] Both environmental variables are believed to influence consumption outside of awareness, producing "mindless eating." "Mindless eating" is eating that is paired with an environmental distraction.[8] This type of eating is not in response to internal cues of hunger or satiation, and consequentially is believed to produce an amount of eating that could contribute to excessive energy intake.[8]

Five laboratory-based experiments have investigated the effect of watching television on energy intake.[15-19] These studies found a consistent relationship of increased energy consumption when participants watched television versus other conditions, for example, listening to a recording[15,17] or eating alone in a quiet room.[16,18,19] Many laboratory-based experiments have investigated the effect of portion size on consumption.[21,22,24,25] The studies have shown that when provided a greater portion size, participants eat more food.[21,22,24,25] The portion size effect has been found during meals and snacks, and with non-amorphous and amorphous foods.[21,22,24,25]

Though there have been a number of studies investigating the relationship of television watching and portion size separately, to our knowledge, no study has looked at consumption with both factors combined. If both factors influence consumption, when these factors are combined they may exacerbate mindless eating, producing even greater intake. As watching television[5,6] while eating large portion sizes[20] may be a common occurrence for many people, understanding

how these environmental factors influence consumption when combined is important. Furthermore, as previous research has not been consistent with controlling factors that may influence consumption, to increase the internal validity of the current investigation, factors such as dietary intake and physical activity occurring before experimental sessions and the length of time of the experimental sessions were held constant across the conditions.

Therefore the purpose of the study was to investigate the independent and interactive effects of television viewing and portion size on consumption during a meal. The specific aims of this investigation were: 1) to determine if more calories are consumed during a meal when watching television versus when not watching television; 2) to determine if more calories are consumed when larger versus smaller portions are presented in the meal; and 3) to determine if an interaction occurs when a meal is provided in larger portions and is consumed while watching television thereby increasing meal intake as compared to when a meal is provided in smaller portions and is consumed while not watching television.

STUDY DESIGN AND METHODOLOGY

STUDY DESIGN

To test the influence of watching television and portion size on meal consumption in healthy weight adults, a 4X2X2 mixed factorial design was used, with a between-subject factor of order of the conditions and within-subject factors of television viewing (TV versus NO TV) and portion size (SMALL VS LARGE) (see Appendix A, Table 1). Individuals who participated in the study were randomized to one of four orders of conditions. In each condition, participants were given a meal of macaroni and cheese and salad. The dependent variables were gram and calorie amounts consumed during the meal. This study was approved by the Institutional Review

Board at the University of Tennessee- Knoxville and was registered at ClinicalTrials.gov (NCT02505490).

PARTICIPANTS

Twenty men and women participated in the study. The study was advertised as an investigation of the effect of television watching and liking of food. Flyers were posted around the University of Tennessee, Knoxville (UTK) campus and e-mails were sent out to electronic mailing lists (Appendix C). Individuals who were interested in participating in the research study were asked to call the Healthy Eating and Activity Laboratory (HEAL) for more information and were screened over the phone. Participants were enrolled until 20 had been recruited and completed the study.

The sample size for this study was calculated based on the effect size found in three different studies,[16,17,25] using 80% power and two-tail alpha level set at 0.05. The first study used to calculate the sample size examined the influence of various portion sizes of food on intake in normal-weight and overweight men and women and had an effect size of d = 4.4.[25] In a within-subject design, this would require a sample size of three participants.[25] The Bellisle and colleagues study, which investigated how television viewing versus listening to a recorded story influenced intake, had an effect size of d = 3.2.[17] In a within-subjects design, this would require a sample size of 4 participants.[17] The Hetherington and colleagues study, which tested the effect of eating alone while watching television and eating alone without television watching, had an effect size of d = 2.1, thus five participants were needed as a sample size in a within-subjects design.[16] However, since such a large effect size is unlikely, to be conservative twenty participants were used.

ELIGIBILITY CRITERIA

Eligibility for this investigation was based upon the following criteria:

1. Between the ages of 18 and 35 years
2. Body mass index (BMI) between 18.5 kg/m^2 and 24.9 kg/m^2
3. Unrestrained eater (≤ 12 on the Three Factor Eating Questionnaire [TFEQ-R])[26]
4. Reported a favorable preference for the foods served in the meal including: macaroni and cheese and salad (dressing was chosen by the participant via initial phone screen), participants rated each food item ≥ 3 during phone screen and ≥ 50 on a visual analogue scale (VAS) during the initial screening session[27]
5. Ate before 10:00 am on most days of the week
6. Were able to complete all sessions within eight weeks of the screening session
7. Reported being a non-smoker
8. Were not taking medications that affect appetite or food intake
9. Were not pregnant or breastfeeding
10. Were not on a dietary plan or had dietary restrictions that prevent consumption of certain types and/or amounts of food

Participants were excluded based on affirmative responses to the following:

1. Binge eating[28]
2. Athletes in training

A total of 68 individuals called with interest in participating in the investigation. Of these initially interested individuals, 6 were no longer interesting in participating after being provided

additional details regarding the study. Of the remaining individuals screened for eligibility, 16 had a BMI outside eligibility range, 4 reported disliking foods being used in the study, 1 reported currently dieting for weight loss, 4 were classified as restrained eaters, 3 reported instances of binge eating, 2 reported not consistently eating a breakfast meal, and 1 reported currently breast feeding. After being phone screened eligible 11 potential participants dropped out from the study by not showing up to the initial screening session before signing informed consent. Thus, a total of 20 were screened eligible, signed an informed consent statement (approved by UTK IRB), and participated in this study (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 foods. Participants who were phone-screened as eligible were scheduled for a screening 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

At the initial screening session, after informed consent was obtained, height and weight measurements were taken and the investigator calculated BMI. Next, participants confirmed liking of foods that were served in the study by taste testing the macaroni and cheese and salad with their preferred dressing and rated them on a visual analog scale (VAS).[27] At the end of the screening session, participants were randomized to one of four orders, described in Appendix A, Table 1 using a random numbers table, and scheduled for four lunch appointments with

approximately one week between appointments. Appointments were scheduled between 11:00 am and 3:00 pm, Monday-Friday, 68% of appointments were scheduled between 12:00 pm and 1:00 pm. Participants were asked to eat their usual breakfast the morning of the study, but asked to stop eating a minimum of three hours before the scheduled lunch appointment and only consume water during that time. In addition, participants were asked to not complete any physical activity for 24 hours prior to their scheduled lunch appointment. At the start of each lunch appointment, participants completed a dietary recall of all foods and beverages consumed 24 hours prior to the appointment and were asked about physical activity that had been completed in the previous 7 days. During the dietary recall and physical activity questioning, if participants did not consume a morning meal, consumed anything other than water within three hours of the appointment, or completed any physical activity within 24 hours, the appointment was rescheduled for a later date. After recalls had been completed, the participant was asked to rate their current levels of hunger, fullness, and liking of the presented foods using a VAS,[27] and then were served a meal of macaroni and cheese, salad with dressing, and water. Participants were given 30 minutes and instructed to eat as much or as little as they wanted and ate at a table. During the TV conditions, the television was directly in front of participants while they ate at the table. Following the 30 minutes, the meal was removed, and participants rated their levels of hunger, fullness, liking of the presented food, and liking of the television show (in TV conditions only). Participants that were in TV conditions were also asked if they had previously seen the specific episode shown in the condition. After all sessions and questionnaires were completed, the participant was thanked for their participation and given a $25 gift card to compensate for their time in the study.

MEAL DESCRIPTION

The meal that was served for this experiment was Stouffers© macaroni and cheese and salad with dressing, which varied in portion size (Appendix A, Table 2), depending on condition. Participants were given 20 oz of water in each condition. For the TV condition, the television show that was shown was ***Scandal*** (season 1 episode 2 *Dirty Little Secrets* and season 2 episode 5 *All Roads Lead to Fitz*) and was shown for 30 minutes in a counterbalanced order. The episodes did not include food cues and the shows were shown without commercials. In addition, the episodes did not include physical activity and a majority of the characters were of a healthy weight. In the NO TV condition, participants sat quietly and engaged in no other activities while their meal was served. For the LARGE condition participants received 1000 g macaroni and cheese and 300 g salad with dressing, and water. For the SMALL condition participants received 500 g macaroni and cheese and 150 g salad with dressing, and water. The salad dressing choices were light ranch and light Caesar (Ken's Brand©) with the same nutrient content. These foods and portion sizes were based upon previous research examining the effect of portions size on intake.[25,29]

MEASURES

Anthropometrics

During the initial screening session, height and weight were assessed using a stadiometer and an electronic scale, respectively, using standard procedures, with participants wearing light clothing, but participants were asked to remove their shoes, jackets, and any heavy items in their pockets, such as, wallets, keys, etc. BMI (kg/m^2) was calculated from the individual's height and weight measurements.

Demographics

During the initial screening session, basic demographic information, such as, gender, age, race, ethnicity, and education level were collected via a questionnaire.

Dietary Restraint

Dietary restraint was determined during the phone screen using the Three Factor Eating Questionnaire-Restraint Scale (TFEQ-R), which was developed by Stunkard and Messick in 1985.[26] The TFEQ-R is part of the Three Factor Eating Questionnaire (TFEQ), which is a reliable and valid assessment tool.[26] The 21-item TFEQ-R measures dietary restraint rates questions using a point scale by asking either true or false questions or using a likert scale (1-5).[26] A score ≤ 12 categorizes the participant as an unrestrained eater, while a score > 12 categorizes the participant as a restrained eater.[26]

Liking of Foods

During the initial screening session, liking of foods was confirmed using a 100 mm VAS; a rating of ≥ 50 mm was required in order for participants to be eligible for the study.[27] The 100 mm scale is a continuous 100 mm line that has two endpoints to rate how likable the participants find the foods.[27] When assessing liking of foods, an anchor of 0 mm indicates the participant does not like the food at all, while an anchor of 100 mm indicates the participant likes the food very much.[27] In addition, to follow the rationale provided to participants about the purpose of the study, the same measure was repeated at the beginning and end of each session.

Dietary and Physical Activity Recall

A dietary recall was conducted at the beginning of each of the four experimental sessions, and participants were asked what time of day foods and beverages were consumed and asked to report estimated portion sizes. The Nutrition Data System for Research (NDSR) dietary software,

developed by the Nutrition Coordinating Center, University of Minnesota, Minneapolis, Minnesota, and was used to calculate energy and percent energy consumed from macronutrients consumed prior to the experimental session.[30] The participants were also asked to report physical activity completed in the past seven days using the Seven-Day Physical Activity Recall (PAR).[31]

Hunger and Fullness

At the beginning and end of each experimental session, participants were asked to rate their levels of hunger and fullness again using a 100 mm VAS.[27] When assessing hunger, an anchor of 0 mm indicates the participant is not hungry, while an anchor of 100 mm indicates the participant is extremely hungry.[27] When assessing fullness, an anchor of 0 mm indicates not full, while an anchor of 100 mm indicates the participant is extremely full.[27]

Consumption

Before and after each lunch session, the macaroni and cheese and salad with dressing was weighed to the nearest tenth using an electronic food scale (Denver Instrument Co., Arvada, Colorado). The salad was tossed evenly with the appropriate amount of dressing depending on the session and weighed together before and after the meal. The total grams of food consumed during the meal session were measured by finding the difference of the weight of food from the pre-meal weight from the post-meal weight measurement. Energy intake from the meal was calculated using information from food labels and total grams consumed of each food.

Previous Viewing and Liking of Television Show

At the end of the television condition sessions, participants were asked if they had ever watched the series *Scandal* and the specific episodes that were shown. In addition, liking of the show was rated using a 100 mm VAS.[27] The 100 mm scale is a continuous 100 mm line that has two endpoints to rate how likable the participants found the television show.[27] When assessing

liking of television show, an anchor of 0 mm indicated the participant did not like the show at all, while an anchor of 100 mm indicated the participant likes the show very much.[27]

STATISTICAL ANALYSES

Statistical analyses were conducted with SPSS 21.0, with the significance level (alpha) set at 0.05.[32] One-way analyses of variance (ANOVA), with order as the between-subject factor, were conducted to examine differences among the different orders on baseline characteristics for interval/ratio data, and chi-square tests, with order as the between-subject factor, were conducted to examine differences among the different orders on baseline characteristics for nominal data. Then to determine any significant differences between the four conditions in participants' dietary recall data for 24-hours prior to each session, number of hours since last meal or snack, physical activity prior to each session, initial ratings of liking of the food, and ratings of hunger and fullness before the meal, 4X2X2 mixed factorial ANOVAs, with order as between-subject factor and television viewing and portion size as the within-subjects factors, were conducted. Changes in hunger and fullness were examined using 2X2X2 factorial ANOVAs, with television viewing, portion size, and pre and post meal measures as the within-subject factors. For the gram and energy consumed for each of the foods, a 2X2X2 factorial ANOVA was conducted, with television viewing, portion size, and food as the within-subjects factors. For total gram and energy intake for the meal, 2X2 factorial ANOVAs were conducted, with television viewing and portion size as the within-subjects factors. Then to determine any significant differences between the four conditions in participants' liking of television show, a 4X2 mixed factorial ANOVA, with order as between-subject factor and portion size as the within-subjects factors, in which only television conditions were included, was conducted. Two chi-square tests were used to

analyze the relationship of participants previously watching the presented episodes to see if there were differences in portion size condition. For significant outcomes ($p<0.05$), post hoc pairwise comparisons using Bonferroni corrections were made to determine which groups differed in total grams and energy consumed. The Greenhouse-Geisser corrections were used when appropriate for repeated measures to adjust for sphericity.

RESULTS

Participant Characteristics

Participant characteristics by group are presented in Appendix A, Table 3. Participants were aged 22.3 $\pm$ 3.7 years with a BMI of 21.6 $\pm$ 2.3 kg/m^2 and classified as unrestrained eaters (6.6 $\pm$ 3.3). Participants were predominately female (85%), white (80%), non-Hispanic (95%), unmarried (85%), and with 100% with having some college education or higher. No statistically significant differences were found between the orders in participant characteristics.

Initial Liking of Foods

Liking of foods used in the study are presented in Appendix A, Table 3. Mean liking ratings across all conditions for foods were as follows: 77.5 $\pm$ 14.0 mm for macaroni and cheese and 78.6 $\pm$ 13.6 mm for salad with preferred dressing. No statistically significant main effects or interactions were found for liking of foods.

Energy Consumed Prior to Experimental Session

Energy and percent energy from macronutrients consumed, and time since last eaten prior to the experimental sessions are presented in Appendix A, Table 4. Across all conditions, participants consumed a mean energy intake of 1830.8 $\pm$ 469.4 kcal 24 hours prior to each session. Furthermore, across all conditions mean percent energy consumed from macronutrients

prior to each session was 36.0 ± 9.1% energy from fat, 43.5 ± 11.0% energy from carbohydrates, and 19.0 ± 6.6% energy from protein. No significant main effects or interactions were found for energy or macronutrients consumed. A significant main effect of order ($F(3,16) = 3.9$ $p < 0.029$) occurred, with participants in order 1 reporting fewer hours since their last eating occasion prior to the experimental sessions than participants in order 4. Therefore, order was used as a covariate for additional analyses. No sessions were rescheduled due to not following consumption instructions prior to sessions.

Physical Activity Prior to Experimental Session

Seven-day physical activity recall total is presented in Appendix A, Table 4. Across all conditions, participants reported engaging in 1.5 ± 1.7 hours of physical activity across the seven days prior to the experimental session. No statistically significant main effects or interactions were found for physical activity. No sessions were rescheduled due to not following physical activity instructions prior to sessions.

Hunger and Fullness During the Experimental Sessions

Hunger and fullness ratings before and after the snack are presented in Appendix A, Table 5. For changes in hunger ratings, a main effect of time was found ($F(3,16) = 24.6$, $p < 0.000$), with hunger ratings significantly lower after the meal than before the meal. Overall across all conditions, mean hunger ratings before the meal were 69.0 ± 17.1 mm and after the meal ratings were 10.4 ± 9.7 mm. No other statistically significant main effects or interactions were found for changes in hunger levels.

For changes in fullness ratings, a main effect of time was found ($F(3,16) = 23.3$, $p < 0.000$), with fullness ratings significantly higher after the meal than before the meal. Overall, mean fullness ratings across all conditions before the meal were 22.9 ± 15.7 mm and after the

meal ratings were 82 ± 14.9 mm. No other statistically significant main effects or interactions were found for changes in fullness levels.

Grams and Energy of Meal Consumed

Grams and energy consumed in all conditions are presented in Appendix A, Figure 2 and 3, respectively. For grams, a significant main effect portion size was found ($F(1,18) = 4.6$ $p < 0.046$), with greater consumption occurring when participants received a larger portion size as compared to a smaller portion, 577.9 ± 150.5 g vs. 453.1 ± 96.6 g, respectively. For grams, a significant main effect of food type was found ($F(1,18) = 9.5$ $p < 0.006$), with greater consumption occurring for macaroni and cheese as compared to salad with dressing, 368.9 ± 114.1 g vs. 146.7 ± 44.7 g, respectively. No other statistically significant main effects or interactions were found for grams of food consumed.

For energy, a significant main effect portion size was found ($F(1,18) = 3.1$ $p < 0.049$), with greater consumption occurring when participants received a larger portion size as compared to a smaller portion, 903.9 ± 270.4 kcal vs. 734.6 ± 187.1 kcal, respectively. For energy, a significant main effect of food type was found ($F(1,18) = 27.0$ $p < 0.000$), with greater consumption of macaroni and cheese as compared to salad with dressing, 736.2 ± 227.8 kcal vs. 83.0 ± 25.3 kcal, respectively. No other statistically significant main effects or interactions were found for energy of food consumed.

Liking of Television Show

Overall, mean liking for the episodes across the sessions with television was 72.3 ± 19.6 mm. For episode 1, mean liking was 70.0 ± 20.1 mm, and for episode 2, mean liking was 74.7 ± 19.1 mm. For previously viewing the episodes, 40% had seen episode 1 and 45% had seen episode 2 before. No statistically significant differences were found.

DISCUSSION

The purpose of the study was to investigate the independent and interactive effects of two environmental factors that have been shown to influence eating, television viewing and portion size, on consumption during a meal. It was hypothesized that participants would consume greater intake when watching television versus not watching television. It was also hypothesized that participants would consume greater intake when given a larger portion versus smaller portion. Finally, it was hypothesized that the greatest intake would occur when the participant watches television and is served the larger portion as compared to all other condition. Contrary to what was hypothesized, this study did not find any significant main effect of television viewing or interaction of television viewing and portion size on consumption during a meal. However, results revealed a main effect of portion size on grams and energy of food consumed, in which participants consumed a greater amount of grams and energy when served a larger portion size. These findings suggest exposure to television did not impact on energy intake in healthy weight, dietary-unrestrained participants, but portion size did influence consumption.

The finding that television viewing did not influence consumption is inconsistent with the studies that have found increased consumption with watching television.[15,16,17,18,19] There are a number of factors that may contribute to differences in findings in the present investigation and previous investigations. First, in previous studies[16,17] there was not a standard amount of time participants were required to sit for the study, while the present study required the participants to sit for 30 minutes even if they had completed their meal. Thus, potentially participants stayed longer when in conditions when they were watching television, providing more opportunity to eat. In addition, in the present study television shows contained no food cues while two previous studies[15,16] did not report whether food cues were present in the shows. Thus, the mechanism in

which increased consumptin occurs when television is watched may be due to exposure to foods cues, which was absent from the current investigation. In addition, the present study was conducted using a meal of macaroni and cheese and salad with dressing, while previous studies were conducted using snack foods.[15,16,17,18,19] Thus, an effect may not have been found due to the type of eating occasion in the present study or the types of foods used in the investigation may not be common foods for individuals to consume while watching television. In this investigation the effect size of television viewing was only d = 0.3, suggesting that exposure to television during a meal had a small impact on consumption.

Furthermore, if "mindless eating" from decreased awareness is the mechanism by which watching television influences eating, a recent study has found that familiarity with what is watched on television may be an important factor in the occurrence of mindless eating when watching television. Stevenson and Mathur conducted a study which investigated how consumption differed when the same episode from a television show was watched twice in the same session (same), or when two different episodes from a television show were watched in the same session (different).[33] In this investigation, none of the episodes contained food cues.[33] The investigation found that more food was consumed while watching television only when the same episodes were shown, possibly because participants could focus more on eating.[33] Potentially being too distracted from eating and having to cognitively focus on another activity actually reduces eating, rather than increases eating. This has relevance for the current study as the majority of participants had not previously seen the episodes shown in the investigation. Thus, for most participants, watching the shows was not a "repeat watching," making the session more similar to the "different" condition in the Stevenson and Mathur study.[33] As the two episodes were new to most participants, potentially they were more cognitively focused on watching

television than eating, due to the novelty of the shows.[33] Thus, a lower level of distraction may be enough to produce mindless eating, while a higher level of distraction may actually reduce eating due to overall cognitive distraction.

Again, the current findings are consistent with previous research regarding the relationship between portion size and intake, with larger portions enhancing intake.[21,22,24,25] The present study further strengthens the evidence that increased portion size increases consumption in all situations outside of awareness via mindless eating. Since hunger and fullness ratings were similar across conditions, but participants consumed more in the conditions with larger portions, this suggests that the increased consumption with larger portion sizes did not produce different internal sensations of hunger of fullness, a potential sign of "mindless eating." This study lends support that the effect of portion size is a ubiquitous phenomenon that is seen in all situations, such as snacks, meals, non-amorphous, and amorphous foods.[21,22,24,25] This indicates that to assist with reducing intake, smaller portion sizes should be implemented in all types of eating situations and food.

This study has a number of limitations and strengths. The first limitation is since 24-hour recalls were taken prior to experimental sessions this may have led to an increased awareness of consumption, thus possibly influencing consumption during experimental sessions. In addition, since there was no question in the screening process about how often participants usually eat while watching television, potentially television watching only influences consumption in those individuals with this history due to conditioning. Eating may be a conditioned response for some individuals, stimulated by the television watching, while others may not have the same response. Lastly, this study included a homogenous sample of healthy weight and unrestrained eaters, which limits the generalizability of the findings. Thus, it is possible that other characteristics,

such as weight or dietary restraint status, which are factors that have been previously shown to influence intake at meals, would cause an individual to respond differently to television watching and portion size during a meal.

Strengths of this study include objectively measured food intake. Another strength of the present study is total exposure time to food was identical in all conditions (30 minutes), and previous dietary intake and physical activity were controlled. In addition, amorphous foods were provided to decrease the chance of participants quantifying how much they consumed during sessions. Finally, this study was novel in that it was the first study to manipulate television watching and portion size during a meal and impact on consumption of food. The factors were combined because they are two environmental changes that have been proposed to influence energy intake, outside awareness, producing "mindless eating."[2,7]

To better enhance understanding of the relationship between television viewing and consumption, future research should focus investigations on how distraction impacts intake while watching television. The present study may not have found an effect of television because the majority of the participants had not previously seen the episodes shown in the television conditions. Therefore, future studies should ensure that presented episodes are all novel (or not) to the participants. In addition, future studies should investigate if the time of day impacts consumption while watching television, as potentially watching television at night may be more readily associated with eating than during earlier times in the day.

Overall, watching television did not increase intake during a meal. The finding that participants consumed more grams and energy of food when larger portion sizes were provided has important clinical implications. For weight management, to assist with reducing intake, smaller portion sizes should be implemented in all types of eating situations.

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APPENDICES

APPENDIX A: TABLES AND FIGURES

Table 1. Depiction of Study Design- 4X2X2 Mixed Factorial Design

Order	Meal Session 1	Meal Session 2	Meal Session 3	Meal Session 4
1 (N=5)	NO TV/SMALL PS	TV/ LARGE PS	TV/SMALL PS	NO TV/LARGE PS
2 (N=5)	TV/LARGE PS	TV/SMALL PS	NO TV/LARGE PS	NO TV/SMALL PS
3 (N=5)	TV/SMALL PS	NO TV/LARGE PS	NO TV/SMALL PS	TV/LARGE PS
4 (N-5)	NO TV/LARGE PS	NO TV/SMALL PS	TV/LARGE PS	TV/SMALL PS

Note: PS = Portion Size

Table 2. Description of Foods per Condition

Food	**Small PS**		**Large PS**	
	Grams	Kcal	Grams	Kcal
Macaroni and Cheese	500	998	1000	1996
Salad	130	25	260	50
Salad Dressing	20	60	40	120
Total:	650	1083	1300	2166

Note: PS = Portion Size

Table 3. Participant Characteristics

	Order 1 (N=5)[a]	Order 2 (N=5)[a]	Order 3 (N=5)[a]	Order 4 (N=5)[a]
Age (yrs)	21.0 ± 1.5	21.0 ± 1.9	24.0 ± 1.6	23.0 ± 6.8
BMI (kg/m^2)	19.8 ± 1.4	22.0 ± 1.5	23.1 ± 2.0	21.7 ± 3.0
Race (% white)	100.0	60.0	80.0	80.0
Non-Hispanic/Latino (%)	80.0	100.0	100.0	100.0
Never Married (%)	80.0	100.0	80.0	80.0
Education (%)				
Some college	40.0	80.0	20.0	80.0
College/University Degree	40.0	20.0	60.0	0.0
Graduate/Professional Education	20.0	0.0	20.0	20.0
Dietary Restraint[b]	8.6 ± 2.1	6.0 ± 3.9	6.8 ± 4.3	4.8 ± 1.6
Initial Liking of Foods[c] (mm)				
Macaroni and Cheese	78.6 ± 10.9	73.0 ± 15.8	75.2 ± 16.5	83.0 ± 14.7
Salad with Dressing	73.6 ± 16.9	84.0 ± 8.1	78.6 ± 19.0	78.2 ± 10.1

Note: Data presented in M ± standard deviation.

[a]See Table 1 for order of conditions.

[b]Dietary Restraint measured on a scale of 1-21.

[c]Liking ratings measured on a scale using a 100 mm VAS scale.

Table 4. Dietary Intake and Physical Activity Prior to Sessions

	NO TV/ SMALL PS (N=20)	NO TV/ LARGE PS (N=20)	TV/ SMALL PS (N=20)	TV/ LARGE PS (N=20)
Energy (kcal)	1866.2 ± 513.2	1867.3 ± 427.6	1684.3 ± 371.8	1905.2 ± 564.9
Carbohydrate (% energy)	44.3 ± 9.1	43.1 ± 12.7	46.0 ± 10.5	40.1 ± 11.5
Protein (% energy)	19.5 ± 6.7	18.4 ± 6.1	18.9 ± 6.9	19.0 ± 6.8
Fat (% energy)	35.6 ± 8.2	36.1 ± 10.1	33.4 ± 8.0	39.1 ± 9.9
Hours since last meal	3.9 ± 0.7	4.1 ± 0.5	4.1 ± 0.5	3.9 ± 0.6
Weekly physical activity (hours)	1.8 ± 2.2	1.1 ± 1.2	1.5 ± 1.5	1.7 ± 2.0

Note: PS = Portion Size.

Data presented in M ± standard deviation.

Table 5. Hunger and Fullness

	NO TV/ SMALL PS (N=20)	NO TV/ LARGE PS (N=20)	TV/ SMALL PS (N=20)	TV/ LARGE PS (N=20)
Hunger Pre[a] (mm)	67.4 ± 18.0	70.0 ± 16.5	67.1 ± 17.2	71.4 ± 17.7
Hunger Post[a] (mm)	9.3 ± 8.1	10.5 ± 11.3	10.2 ± 8.2	11.8 ± 11.2
Fullness Pre[b] (mm)	25.7 ± 15.8	22.5 ± 17.8	21.8 ± 14.1	21.8 ± 15.9
Fullness Post[b] (mm)	84.0 ± 12.2	84.2 ± 13.2	77.8 ± 18.7	82.1 ± 14.9

Note: PS = Portion Size

Data presented in M ± standard deviation.

[a]Hunger = a main effect of time was found ($p < 0.001$), with participants significantly less hungry at Post as compared to Pre.

[b]Fullness = a main effect of time was found ($p < 0.001$), with participants significantly more full at Post as compared to Pre.

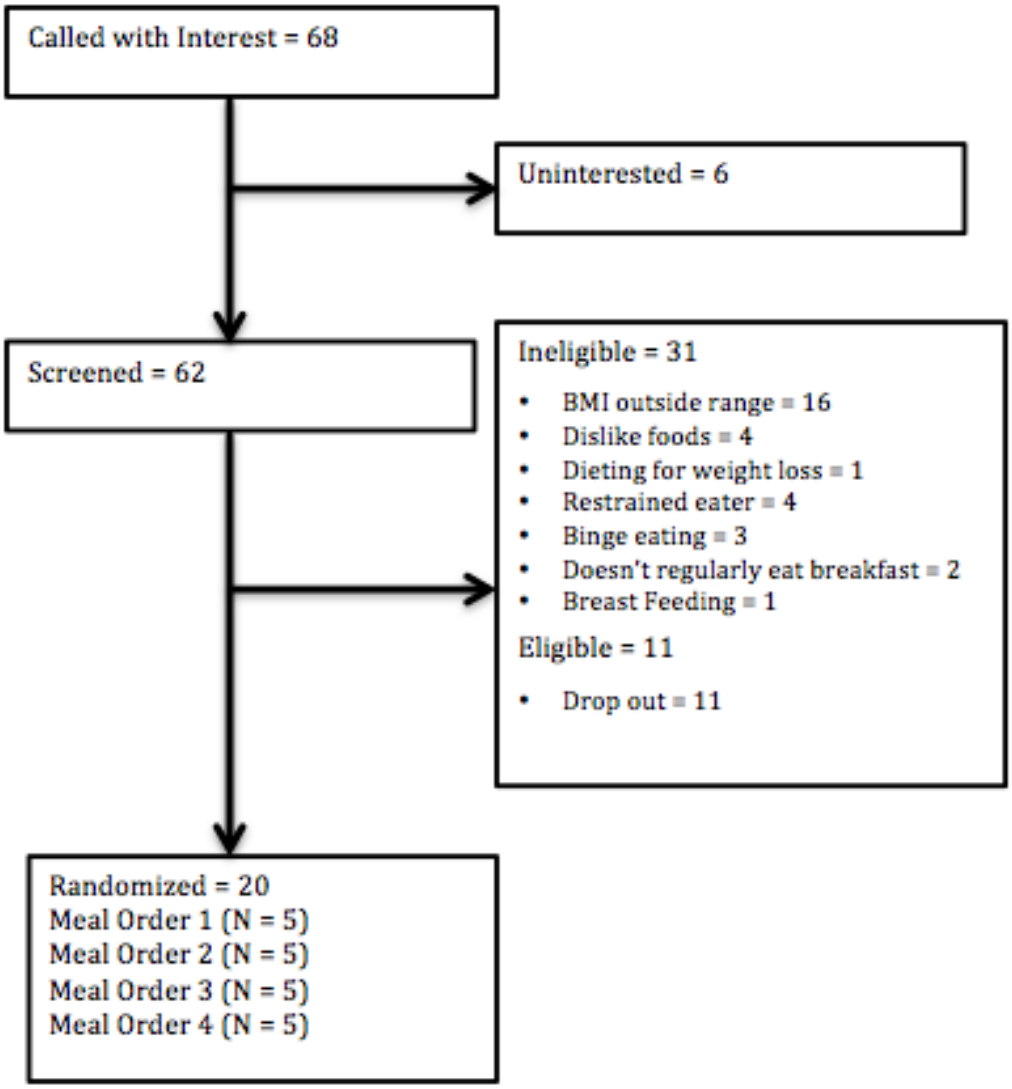

Figure 1. Flow of Study Participants

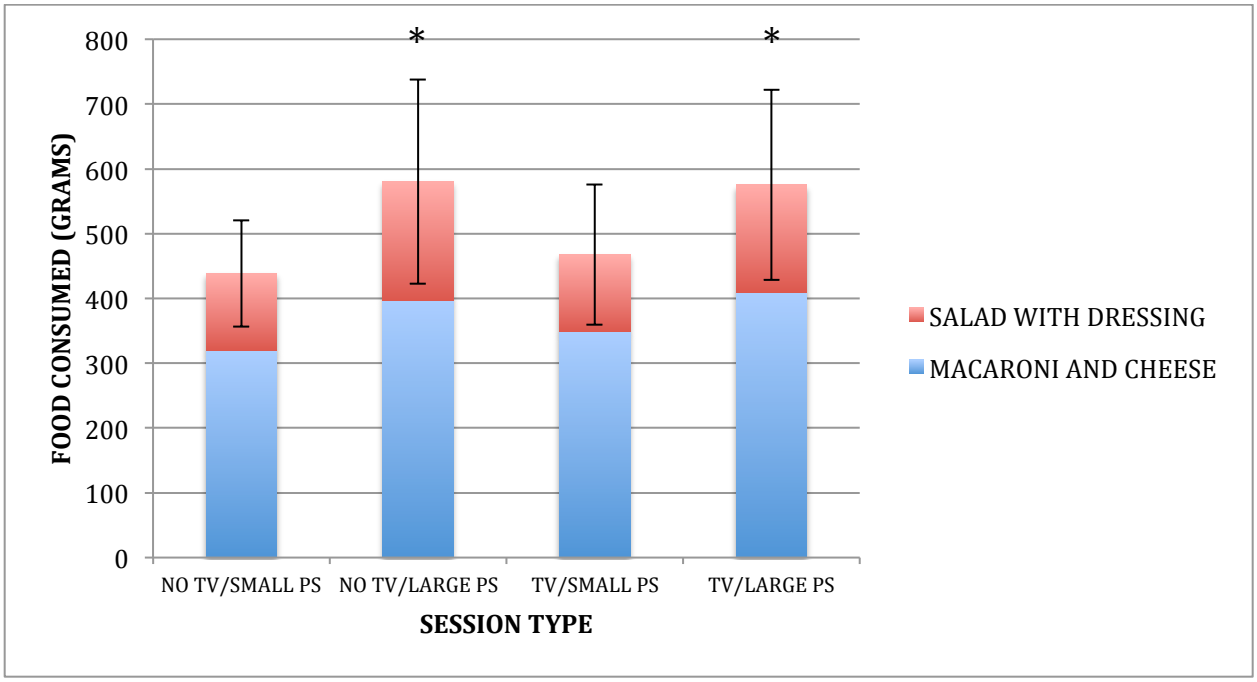

Figure 2. Grams of Food Consumed by Session Type

For grams, a significant main effect of portion size was found ($p < 0.046$), with participants consuming more food when a larger portion was served as compared to a smaller portion. For grams, a significant main effect of food type was found ($p < 0.006$), with participants consuming more macaroni and cheese as compared to salad with dressing. Data are mean $\pm$ standard deviation, with standard deviation representing total meal. PS = portion size.

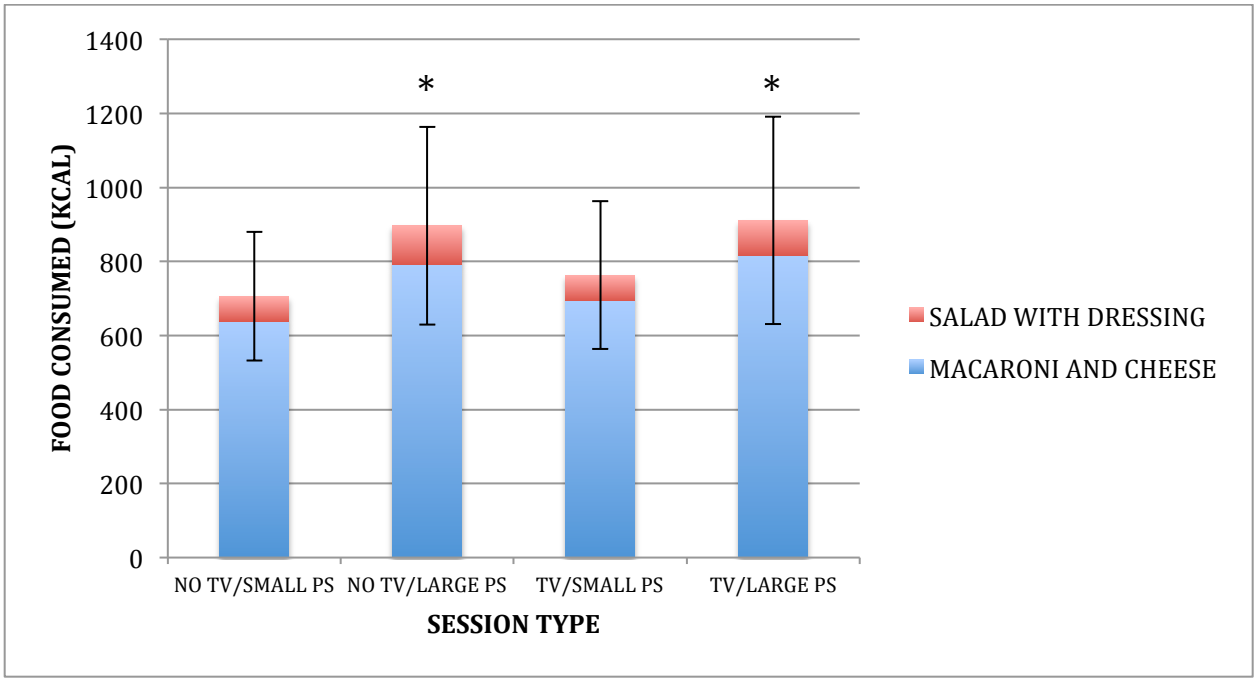

Figure 3. Energy from Food Consumed by Session Type

For energy, a significant main effect of portion size was found ($p < 0.049$), with participants consuming more when a larger portion was served as compared to a smaller portion. For energy, a significant main effect of food type was found ($p < 0.000$), with participants consuming more macaroni and cheese as compared to salad with dressing. Data are mean $\pm$ standard deviation, with standard deviation representing total meal. PS = portion size.

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 Investigator:

Rachel Rosenthal, BS
Jessie Harris Building Room 229
1215 W. Cumberland Avenue
Knoxville, TN 37996-1920
974-0754
rrosent2@vols.utk.edu

Faculty Advisor:
Hollie Raynor, PhD, RD, LDN
Jessie Harris Building Room 229
1215 W. Cumberland Avenue
Knoxville, TN 37996-1920
974-6259
hraynor@utk.edu

Department:
Nutrition

2. Project Classification: Thesis

3. **Title of Project:** The Effect of Television Watching on Liking of Food

4. **Starting Date:** Upon IRB Approval

5. **Estimated Completion Date:** August 2016

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

Grant/Contract Submission Deadline:

Funding Agency:

Sponsor ID Number *(if known)*:

UT Proposal Number *(if known):*

II. PROJECT OBJECTIVES

Approximately one third of adults are currently considered obese, which puts them at greater risk for several comorbidities, including coronary heart disease, type 2 diabetes, and cancer.[1] Though the causes of obesity are multifaceted, ultimately it is a consequence of the disproportionate amount of calories eaten in comparison to calories expended.[2] There are many components that may contribute to the imbalance in calories, including eating while watching television and large portion sizes.

Observational and experimental studies have investigated the relationship between consuming a meal while watching television. These studies generally find an increase in consumption of calories with television watching via the mechanisms of either mindless eating or food cues through television commercials. Numerous experimental studies have demonstrated that when presented with a larger portion of food, more energy is consumed, which is outside awareness of the individuals. Though there have been a number of studies investigating the relationship of television watching and portion size, separately, to our knowledge, no study has looked at consumption with both factors combined. If both factors influence consumption outside awareness and contribute to mindless eating, when these factors are combined they may exacerbate mindless eating, producing greater intake.

Therefore the purpose of the study is to investigate the independent and interactive effects of television viewing and portion size on consumption during a meal. The specific aims of this investigation are: 1) to determine if more calories are consumed during a meal when watching television versus when not watching television; 2) to determine if more calories are consumed when larger versus smaller portions are presented in the meal; and 3) to determine if an interaction occurs when a meal is provided in larger portions and is consumed while watching television thereby increasing meal intake as compared to when a meal is provided in smaller portions and is consumed while not watching television.

III. DESCRIPTION AND SOURCE OF RESEARCH PARTICIPANTS

Study Design

To test the influence of watching television and portion size on meal consumption in normal weight adults, a 4X2X2 mixed factorial design will be used, with a between-subject factor of order of the conditions and within-subject factors of television status (TV versus NO TV) and portion size (SMALL versus LARGE) (see Table 1). Individuals participating in the study will be randomized to one of four orders of conditions. In each condition, participants will be given a meal of macaroni and cheese and salad. The dependent variables are gram and calorie amounts of the macaroni and cheese and salad consumed during the meal.

Table 1: Depiction of Study Design- A 4X2X2 Mixed Factorial Design

Order	Session 1	Session 2	Session 3	Session 4	Session 5
1	Screening	NO TV/SMALL PS	TV/ LARGE PS	TV/SMALL PS	NO TV/LARGE PS
2	Screening	TV/LARGE PS	TV/SMALL PS	NO TV/LARGE PS	NO TV/SMALL PS
3	Screening	TV/SMALL PS	NO TV/LARGE PS	NO TV/SMALL PS	TV/LARGE PS
4	Screening	NO TV/LARGE PS	NO TV/SMALL PS	TV/LARGE PS	TV/SMALL PS

Participants

Twenty men and women will participate in the present study. The study will be advertised as an investigation of the effect of television watching on liking of food. Flyers will be posted around the University of Tennessee, Knoxville (UTK) campus and e-mails will be sent out to UTK list-servs to recruit participants. Individuals interested in participating in the research study will be asked to call the Healthy Eating and Activity Laboratory (HEAL) for more information and then will be screened over the phone. Participants will be enrolled until 35 have been recruited and completed the study.

Eligibility Criteria

In order to be eligible for the study participants must meet the following criteria:

1. Between the ages of 18 and 35 years
2. Body mass index (BMI) between 18.5 kg/m^2 and 24.9 kg/m^2
3. Unrestrained eater ($\leq$ 12 on the Three Factor Eating Questionnaire [TFEQ-R])
4. Report a favorable preference for foods served in the meal including: macaroni and cheese and salad (dressing will be chosen by the participant via initial phone screen), participants must rate each food item $\geq$ 3 during phone screen and $\geq$ 50 on a visual analogue scale (VAS) during the initial screening session
5. Regularly eat a meal before 10:00 am
6. Are able to complete all sessions within eight weeks of the screening session
7. Report being a non-smoker
8. Are not taking medications that affect appetite or food intake
9. Are not pregnant or breastfeeding
10. Are not on a dietary plan or have dietary restrictions that prevent consumption of certain types and/or amounts of food

Participants will be excluded based on affirmative responses to the following:

1. Binge eating; and/or
2. Athletes in training

IV. METHODS AND PROCEDURES

Procedures

Participants deemed eligible for the study will be invited to schedule an initial screening session at the HEAL laboratory. At the initial screening session informed consent will be requested and eligibility criteria confirmed. Height and weight measurements will be taken and the investigator will calculate BMI. Individuals will confirm liking of foods being served in the study by taste testing the macaroni and cheese and salad with their preferred dressing by rating them on the visual analog scale (VAS). This portion of the screening section will take approximately 30 minutes. At the end of the screening session, eligible participants will be randomized to one of four orders, using a random numbers table, and scheduled for four lunch appointments with approximately one week between appointments. Each lunch appointment will last approximately 45 minutes with appointments occurring between 11:00 am until 3:00 pm, Monday-Friday. Participants will be asked to eat their usual breakfast on the morning of each appointment, but asked to stop eating a minimum of three hours before the scheduled lunch appointment and only consume water during that time. In addition, participants will be asked to not complete any physical activity for 24 hours prior to the scheduled lunch appointment.
At the start of each lunch appointment, participants will complete a dietary recall of all foods and beverages consumed 24 hours prior to the appointment and will be asked about physical activity that has been completed in the previous 7 days. During the dietary recall and physical activity questioning, if participants did not consume a morning meal, consumed anything other than water within three hours of the appointment, or completed any physical activity within 24 hours, the appointment will be rescheduled for a later date. After recalls have been completed, the participant will be asked to rate current levels of hunger, fullness, and liking of the presented foods, and then be served a meal of macaroni and cheese, salad with preferred dressing, and water. Participants will be given 30 minutes and instructed to eat as much or as little as they desire. Following the 30 minutes, the meal will be weighed, and participants will rate their levels of hunger, fullness, and liking of the presented food. When participants are in television viewing conditions they will be asked about their liking of the show and if they have seen the specific episode previously. In addition, in the last session the participant will be asked about their frequency of eating breakfast, lunch, and/or dinner with the television on. The participants will also be debriefed and told the true purpose of the study by being read a script. After all sessions and questionnaires are completed, the participant will be thanked for their participation and be given a $25 gift card to compensate for their time in the study.

Television Show Description

For the TV condition, the television show that will be shown is *Scandal* (season 1 episode 2 *Dirty Little Secrets* and season 2 episode 5 *All Roads Lead to Fitz*) and will be shown for 30 minutes. The episodes do not include food cues and the shows will be shown without commercials. In addition, the episodes do not include physical activity and a majority of the

characters are of a healthy weight. In the NO TV condition, participants will sit quietly and engage in no other activities while their meal is served.

Meal Description

The meal being served for this experiment will be Stouffers© macaroni and cheese and salad with Kraft Brand© dressing, which will vary in portion size (as seen in Table 2), depending on condition. Participants will be given 20 oz of water in each condition.

For the LARGE condition participants will receive 1000 g macaroni and cheese and 300 g salad with dressing, and water. For the SMALL condition participants will receive 500 g macaroni and cheese and 150 g salad with dressing, and water. The salad dressing options will be light ranch and light Caesar (Kraft Brand©) with the same nutrient content and the participant will choose one dressing to use for all conditions. These foods and portion sizes are based upon previous research examining the effect of portions size on intake.[25,29]

Table 2-Description of Foods per Condition

Food	Small PS		Large PS	
	Grams	Kcal	Grams	Kcal
Macaroni and Cheese	500 g	998 kcal	1000 g	1996 kcal
Salad	130 g	25 kcal	260 g	50 kcal
Salad Dressing	20 g	40 kcal	40 g	80 kcal
Total:	650 g	1063 kcal	1300 g	2126 kcal

Measures

Anthropometrics

During the initial screening session, height and weight will be assessed using a stadiometer and an electronic scale, respectively, using standard procedures, with participants wearing light clothing, but participants will be asked to remove their shoes, jackets, and any heavy items in their pockets, such as, wallets, keys, etc. BMI (kg/m^2) will be calculated from the individual's height and weight measurements.

Demographics

During the initial screening session, basic demographic information, such as, gender, age, race, ethnicity, education level will be collected via a questionnaire.

Dietary Restraint

Dietary restraint will be determined during the phone screen using the Three Factor Eating Questionnaire-Restraint Scale (TFEQ-R), which was developed by Stunkard and Messick in 1985.[26] The TFEQ-R is part of the Three Factor Eating Questionnaire (TFEQ), which is a reliable and valid assessment tool.[26] The 21-item TFEQ-R measures dietary restraint rates questions using a point scale but asking either true or false questions or using a likert scale (1-5).[26] A score ≤ 12 categorizes the participant as an unrestrained eater, while a score > 12 categorizes the participant as a restrained eater.[26]

Dietary and Physical Activity Recall

A dietary recall will be conducted at the beginning of each of the four experimental sessions, and participants will be asked what time of day foods and beverages were consumed and asked to report estimate portion sizes. The Nutrition Data System for Research (NDSR) dietary software, developed by the Nutrition Coordinating Center, University of Minnesota, Minneapolis, Minnesota, will be used to review the food recall and to control for food consumption prior to experimental session.[30] Measures of diet in the previous 24 hours will include energy and percent energy from the macronutrients. The participant will also be asked to report physical activity completed in the past seven days using the Seven-Day Physical Activity Recall (PAR).[31]

Liking of Foods

During the initial screening session, liking of foods will be confirmed using a 100 mm VAS; a rating of ≥ 50 mm will be required in order for participants to be eligible for the study.[27] The 100 mm scale is a continuous 100 mm line that has two endpoints to rate how likable the participants find the foods.[27] When assessing liking of foods, an anchor of 0 mm indicates the participant extremely dislikes the food, while an anchor of 100 mm indicates the participant extremely likes the food.[27] In addition, to follow the rationale provided to participants about the purpose of the study, the same measure will be repeated at the beginning and end of each session.

Hunger and Fullness

At the beginning and end of each experimental session, participants will be asked to rate their levels of hunger and fullness again using a 100 mm VAS.[27] When assessing hunger, an anchor of 0 mm indicates the participant is extremely not hungry, while an anchor of 100 mm indicates the participant is extremely hungry.[27] When assessing fullness, an anchor of 0 mm indicates the participant is extremely not full, while an anchor of 100 mm indicates the participant is extremely full.[27]

Consumption

Before and after each lunch session, the macaroni and cheese and salad with dressing will be weighed to the nearest tenth using an electronic food scale (Denver Instrument Co., Arvada, Colorado). The salad will be tossed evenly with the appropriate amount of dressing depending on the session and weighed together before and after the meal. The total grams of food consumed during the meal session will be measured by finding the difference of the weight of food from the pre-meal weight from the post-meal weight measurement. Energy intake from the meal will be calculated using information from food labels and total grams consumed of each food.

Liking of Television Show

At the end of the television condition sessions, participants will be asked if they have ever watched the series *Scandal* and the specific episodes being shown. In addition, liking of the show will rated using a 100 mm VAS.[27] The 100 mm scale is a continuous 100 mm line that has two endpoints to rate how likable the participants finds the television show.[27] When assessing liking of television show, an anchor of 0 mm indicates the participant extremely dislikes the show, while an anchor of 100 mm indicates the participant extremely likes the show.[27]

Statistical Analyses

Statistical analyses will be conducted with SPSS 21.0, with the significance level (alpha) set at 0.05.[32] A one-way analyses of variance (ANOVA), with order as the between-subject factor, will be conducted to examine differences among the different orders on baseline characteristics for interval/ratio data, and chi-square tests, with order as the between-subject factor, will be conducted to examine differences among the different orders on baseline characteristics for nominal data. Then to determine any significant differences between the four conditions in participants' dietary recall data for 24-hours prior to each session, number of hours since last meal or snack, initial ratings of liking of the food, and ratings of hunger and fullness before the meal, a 4X2X2 mixed factorial ANOVA, with order as the between-subjects factor and television status and portion size as the within-subjects factors. Changes in hunger and fullness will be examined using a 4X2X2X2 mixed factor ANOVA, with order as the between-subject factor, and television status, portion size, and pre and post meal measures as the within-subject factors. For the gram and energy consumed for each of the foods, a 4X2X2X2 mixed ANOVA will be conducted, with order as the between-subjects factor and television status and portion size as the within-subjects factors. For total gram and energy intake for the meal, a 4X2X2 mixed ANOVA will be conducted, with order as the between-subjects factor and television status and portion size as the within-subjects factors. For significant outcomes ($p<0.05$), post hoc pairwise comparisons using Bonferroni corrections will be made to determine which groups differed in total grams and energy consumed. The Greenhouse-Geisser corrections will be used when appropriate for repeated measures to adjust for sphericity.

V. SPECIFIC RISKS AND PROTECTION MEASURES

Human Subjects Research and Protection from Risk

Risks to Subjects

Human Subjects Involvement and Characteristics. Participants will be 20 men and women; 18 to 35 years old; healthy BMI; unrestrained eater; favorable preference to macaroni and cheese and salad with dressing (either light ranch or light Caesar); regularly eat a meal before 10:00 am; report being a non-smoker; report not taking medications that may affect appetite; report not being pregnant or breastfeeding; are not on a dietary plan or have dietary restrictions that prevent consumption of certain types and/or amounts of food. Participants will be excluded if they report binge eating behavior or report being an athlete in training. These inclusion and exclusion criteria are included for the safety of participants to reduce bias and reduce the likelihood of dropouts due to concurrent medical problems.

Rationale for Exclusion of Children and Adolescents. Although obesity is a significant concern for children and adolescents, these groups have different eating habits than adults and may respond to the change in portion size differently than adults.

Source of Materials. Participants will provide weight, dietary intake, questionnaire data and consumption data specifically for research purposes. Participants will be given a unique identification number that will be used on all documents and electronic data files with no references to individual names, addresses, or phone numbers. Hard copies of data will be stored in locked file cabinets in locked rooms in which project staff will have access (Jessie Harris Building [JHB], room 102).

Potential Risks. The risks of this investigation are considered minimal. Participants could be allergic to the foods used in the investigation; however, all participants will be screened for food allergies prior to consuming the meal.

Adequacy of Protection Against Risk

Recruitment and Informed Consent. Participants will be recruited from the University of Tennessee, Knoxville campus through posted flyers and emails sent out through list-servs. Participants will contact HEAL and will receive a description of the study over the telephone. Interested participants will be screened over the phone and scheduled for an in-person lab appointment. Interested participants who meet eligibility criteria will sign a consent form approved by the Institutional Review Board of the University of Tennessee during the first appointment.

Protection Against Risk. The confidentiality of all participants will be protected in the following ways: 1) participants will be given a unique identification number that will be used on all documents with no references to individual names, addresses, or phone numbers; 2) all hard copy data will be stored in locked cabinets in the locked rooms of JHB 102; 3) all electronic data files will be password protected and backed-up; 4) these procedures will be approved by the University of Tennessee's Institutional Review Board to ensure that they meet the standards for the protection of human subjects.

Data and Safety Monitoring Plan

Data Collection, Storage, and Quality Control. All staff involved in data collection will be trained by the PI and must demonstrate competence in administering all questionnaire measures. The research assistant will review all questionnaire data for accuracy and completion. Participants will be re-contacted to provide missing data or to clarify responses. Range checks will be built into the data entry procedure to alert staff to data that should be clarified. Under the supervision of the PI, a complete double-entry verification procedure will be used to ensure that all data entry is correct. Furthermore, Dr. Raynor will conduct error checking and preliminary analyses of all data to ensure accuracy. Hard copies of data will be stored in a locked filing cabinet and electronic data files will be password protected and backed-up. Data will be stored in JHB 102.

Participant Confidentiality. All participant records and assessment data from this study will be treated as confidential, including participants' names and the fact they are participating in the study. The records and questionnaires collected will be safeguarded according to the policy of the University of Tennessee, a policy that is based on Tennessee law and which promotes the protection of confidential health information.

Adverse Event and External Review for Data Safety. Adverse events reported during the course of the study will be documented by research staff and reported to the University of Tennessee's Institution Review Board.

VI. BENEFITS

There are no benefits for participating in this study.

VII. METHODS FOR OBTAINING "INFORMED CONSENT" FROM PARTICIPANTS

The study will be described individually to each interested adult during the initial telephone call and then in more detail during the first in-person appointment at HEAL on the University of Tennessee, Knoxville campus. Interested, eligible participants will sign a consent form approved by the Institutional Review Board at the University of Tennessee during the first appointment. Signed consent forms will be stored in locked file cabinets in JHB 102 with participants receiving a copy.

VIII. QUALIFICATIONS OF THE INVESTIGATOR(S) TO CONDUCT RESEARCH

Rachel Rosenthal, the Principal Investigator, is a graduate student at the University of Tennessee-Knoxville, pursuing a Master of Science degree in public health nutrition. Ms. Rosenthal has worked under the direction of Hollie Raynor, PhD, RD, LDN, as part of HEAL since August 2014. During this time, Ms. Rosenthal has acquired experience in conducting a basic eating study, data management, coding, and evaluation.

The Faculty Advisor, Dr. Raynor, has extensive research and experience in designing, implementing, and evaluating randomized controlled trials examining eating behaviors. 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 investigation on dietary variety and Co-investigator on several studies examining behavioral treatment approaches to weight loss and weight loss maintenance. Dr. Raynor was also the Principal Investigator of two pediatric obesity treatment investigations funded by the American Diabetes Association and NIH.

IX. FACILITIES AND EQUIPMENT TO BE USED IN THE RESEARCH

Research space in JHB will be used for this investigation. The space is in room 102 (Healthy Eating and Activity Laboratory), is 768 square feet, and includes a group meeting room, two offices, a reception area, a storage closet, and a kitchen. Each session will take place in the group room. Food used for the study will be prepared and stored in the kitchen until transported to the group room. Hard copies of data will be stored in a locked filing cabinet and electronic data files will be password protected and backed-up. Data will be analyzed using NDS-R and the statistical program, SPSS for Windows.

X. RESPONSIBILITY OF THE PRINCIPAL/CO-PRINCIPAL INVESTIGATOR(S)

The following information must be entered verbatim into this section:

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:

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

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

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

4. **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: _____

Signature: _____ Date: _____

Co-Principal Investigator: _____

Signature: _____ Date: _____

Student Advisor (if any): _____

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): _____

OR

[] Full IRB Review

Chair, DRC: _____

Signature: _____ **Date:** _____

Department Head: _____

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.

References

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8. Hill A, Magson L, Blundell J. Hunger and palatability: tracking ratings of subjective experience before, during and after the consumption of preferred and less preferred food. Appetite. Dec 1984;5(4):361-371.

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APPENDIX C: RECRUITMENT FLYER

Television and Liking of Food Study

Interested in participating in a study to investigate the effect of watching TV on liking of food?



Get paid $25 to eat 4 lunches!

If you are....

- Between 18-35 years of age
- Of a healthy weight
- Non-smoker
- Free from dietary restrictions
- Normally eat breakfast
- **NOT** an athlete in training

Contact Rachel Rosenthal at the Healthy Eating and Activity Laboratory (865)-974-0754

Healthy Eating and Activity Laboratory (865)-974-0754

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Healthy Eating and Activity Laboratory (865)-974-0754

APPENDIX D: PHONE SCRIPT

The Effect of Television Watching on Liking of Food Study Phone Script

Hello, this is _____. Thanks for calling about the effect of television watching on liking of 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 television on the liking of food. There are five appointments in this study. The first appointment is a screening appointment that will take approximately 30 minutes. There are four lunch sessions that will take approximately 45-minutes and be scheduled between the hours of 11:00 am and 3:00 pm, Monday through Friday in the Healthy Eating and Activity Laboratory (HEAL) on the University of Tennessee campus. The lunch sessions will be scheduled about one week apart from each other. Informed consent, height, weight, demographic measures, and a taste testing of each food items used in the investigation will be taken at the screening session. If still deemed eligible the participants will be scheduled for one of four lunch sessions. Participants will be asked to eat their usual breakfast and not to eat within three hours of the scheduled appointment. Participants will also be asked to refrain from physical activity 24 hours prior to the appointment. During experimental sessions measures of hunger, fullness, liking of foods, 7-day physical activity recall and 24-hour food recall will be obtained. Participants will then be given a lunch of macaroni cheese and salad, served in varying amounts. For the salad you will have a choice of dressing, either light ranch or light Caesar. For lunch the participants will be given 30 minutes to eat as much or as little of the meal as they desire. For two sessions the meal will be consumed while watching a 30-minute television show and for the other two sessions the meal will be consumed while sitting in a room quietly. After the 30-minute lunch session, participants will be asked to report on hunger, fullness, and liking of the foods. When applicable, participants will be asked to report liking of the television show and report if they have ever seen the show

and/or specific episode before. After completing all sessions participants will be asked about television and eating habits and receive a $25 gift card 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.

Television and Liking of Food Study Screening Form

First Name: _____ Last Name: _____

Home Address:

_____

_____

Email Address:

_____

Phone # 1: _____ mobile/home/other

Phone # 2: _____ mobile/home/other

Eligible: ☐ No ☐ Yes

If No, Reason: _____

Appointment Date: ___/___/___ Time: ____

Screened by:

_____

Date:

_____

1) Gender: ☐ F ☐ M

2) A) Age: _____ B) Date of birth: ___/___/___ (must be between 18 and 35)

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

3) 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.

4) 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:

Macaroni and Cheese	1	2	3	4	5
Salad with either light ranch or light Caesar	1	2	3	4	5

If any of the foods are rated <u>less than</u> 3: I'm sorry, but since you do not like _____, you are ineligible for the study. Thank you for your interest.

Now I have some health-related questions.

5) Do you currently smoke?
☐ No ☐ Yes **(INELIGIBLE)**

If YES to Q5: I am sorry, due to the fact that you currently smoke, you are not eligible for this study. Thank you for your time.

6) Do you have any food allergies?
☐ No ☐ Yes → Explain _____ (**INELIGIBLE** if gluten or lactose)

If YES to Q6: I am sorry, but due to the fact that you are allergic to _____, you are not eligible for this study because the foods contain _____. Thank you for your time.

7) Do you have a health condition that influences eating or requires a therapeutic diet?
☐ No ☐ Yes **(INELIGIBLE)**

8) Are you currently taking medications that influence eating?
☐ No ☐ Yes **(INELIGIBLE)**

9) Are you currently dieting for weight loss?

☐ No ☐ Yes **(INELIGIBLE)**

If YES to Q7-8: 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 Q9: 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.

10) Are you currently pregnant or breastfeeding?
☐ No ☐ Yes **(INELIGIBLE)**

If YES to Q10: I am sorry, due to the fact that you currently pregnant or breastfeeding, you are not eligible for this study. Thank you for your time.

11) Are you currently an athlete in training?
☐ No ☐ Yes **(INELIGIBLE)**

If YES to Q11: I am sorry, due to the fact that you currently an athlete in training, you are not eligible for this study. Thank you for your time.

12) Do you regularly eat a breakfast meal before 10 am?
☐ No **(INELIGIBLE)** ☐ Yes

If NO to Q12: I am sorry, but due to the fact that you do not regularly eat a breakfast meal, you are not eligible for this study.

13) Have there been times when you have eaten a large amount of food in a short time and you had a sense of loss of control about your eating?
☐ No ☐ Yes **(INELIGIBLE)**

If YES to Q13: I am sorry, based on information you have provided, you are not eligible for this study. Thank you for your time.

14) Will you be able to complete 4 sessions within 8 weeks of your screening session?
☐ No **(INELIGIBLE)** ☐ Yes

If NO to Q14: I am sorry, but due to the fact that you will not be able to complete all sessions in 8 weeks, you are not eligible for this study.

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

1) When I have eaten my quota of calories, I am usually good about not eating any more.	**T**	F
2) I deliberately take small helpings as a means of controlling my weight.	**T**	F
3) Life is too short to worry about dieting.	T	**F**
4) I have a pretty good idea of the number of calories in common food.	**T**	F

1) How often are you dieting in a conscious effort to control your weight?
Rarely Sometimes **Usually** **Always**

2) Would a weight fluctuation of 5 lbs. affect the way you live your life?
Not at all Slightly **Moderately** **Very Much**

3) Do your feelings of guilt about overeating help you to control your food intake?
Never Rarely **Often** **Always**

4) How conscious are you of what you are eating?
Not at all Slightly **Moderately** **Extremely**

5) How frequently do you avoid "stocking up" on tempting foods?
Almost never Seldom **Usually** **Almost always**

6) How likely are you to shop for low calorie foods?
Unlikely Slightly unlikely **Moderately likely** **Very likely**

7) How likely are you to consciously eat slowly in order to cut down on how much you eat?
Unlikely Slightly likely **Moderately likely** **Very likely**

8) How likely are you to consciously eat less than you want?
Unlikely Slightly likely **Moderately likely** **Very likely**

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

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.	**T**	F
6) I enjoy eating too much to spoil it by counting calories or watching my weight.	T	**F**
7) I often stop eating when I am not really full as a conscious mean of limiting the amount that I eat.	**T**	F
8) I consciously hold back at meals in order not to gain weight	**T**	F
9) I eat anything I want, any time I want.	T	**F**
10) I count calories as a conscious means of controlling my weight.	**T**	F
11) I do not eat some foods because they make me fat.	**T**	F
12) I pay a great deal of attention to changes in my figure.	**T**	F

Total Points

15-B) Please answer the following questions with one of the responses that is appropriate for you.
(Give bolded answer 1 point.)
Points

Total Points (15-A + 15-B): ☐

If Total Points (15-A + 15-B) ≤ 12 INELIGIBLE

If ≤ 12: 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 effect of television watching on liking of food study. I'd like to schedule you for an appointment. The screening session will last about 30 minutes and all other sessions will be about 45 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?

What kind of dressing would you like on your salad: light ranch light Caesar

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 first appointment will take about 30 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) 974-0754. Thanks for participating in our study!

Enter participant information into PTL.

APPENDIX E: CONSENT FORM

Study Volunteer Initials

INFORMED CONSENT STATEMENT

Committee # Name of Study Volunteer

The Effect of Television Watching on Liking of Food

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

Rachel Rosenthal and Dr. Hollie Raynor are doing a study to investigate the effect of television watching on liking of foods. A total of 20 individuals will participate in this study.

You have been asked to participate in the study because you are of a healthy weight according to medical standards, an adult between the ages of 18 and 35 years, and do not have any dietary restrictions.

INFORMATION ABOUT PARTICIPANTS' INVOLVEMENT IN THE STUDY

Explanation of Procedures

You will be asked to come to the Healthy Eating and Activity Laboratory (HEAL) for one, 30-minute initial screening session and four, 45-minute lunch sessions. The lunch sessions will be scheduled between 11:00 am and 3:00 pm, Monday through Friday, and occur in the Healthy Eating and Activity Laboratory (HEAL) on the University of Tennessee campus. The lunch sessions will occur about one week apart from each other. During the initial screening session you will be asked questions about your demographic information (age, race, education, etc.), your height and weight will be measured, and you will taste test the foods used in the study to ensure liking of them, to confirm eligibility.

IRB NUMBER: UTK IRB-15-02352-XP
IRB APPROVAL DATE: 06/25/2015
IRB EXPIRATION DATE: 06/24/2016

Study Volunteer Initials

If deemed eligible, for the remaining sessions, you will be asked to eat a usual breakfast and to refrain from consuming any food or beverage (other than water) within three hours of the appointment, or complete any physical activity within 24 hours of the scheduled appointment.

During the lunch sessions you will be asked to recall the foods and beverages you have consumed 24 hours prior to the appointment and report physical activity you have completed in the seven days prior to the appointment. If you have consumed a usual breakfast, any food or beverage (other than water) within three hours of the appointment, or have completed any physical activity within 24 hours of the scheduled appointment, your appointment will be rescheduled. Next, you will be asked to rate your level of hunger, fullness, and liking of the foods in the study. Next, you will be served a meal consisting of macaroni and cheese and salad with your preferred dressing, either light ranch or light Caesar. Each meal you are served will contain differing amounts of macaroni and cheese and salad with your preferred dressing. You will also be served 20 ounces of water with the meal. You will be given 30 minutes to eat as much or as little as you desire of the meal while either watching television (two sessions) or sitting in a room quietly without distraction (two sessions). After eating each meal you will complete questions about your hunger, fullness and liking of the food. In the two sessions that you watch the television show you will be asked to rate your liking of the show and whether you have seen the show and/or specific episode before. After you have completed all four lunch sessions you will be asked about your meal behaviors that occur in front of the television.

Please call Rachel Rosenthal 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 you for 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 all experimental sessions will receive a $25 gift card.

IRB NUMBER: UTK IRB-15-02352-XP
IRB APPROVAL DATE: 06/25/2015
IRB EXPIRATION DATE: 06/24/2016

Study Volunteer Initials

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, Rachel Rosenthal, 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, Rachel Rosenthal 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 at (865) 974-7697.

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 ☐ researcher ☐ other (specify)
*If signed by agent other than study volunteer, please explain below.

IRB NUMBER: UTK IRB-15-02352-XP
IRB APPROVAL DATE: 06/25/2015
IRB EXPIRATION DATE: 06/24/2016

APPENDIX F: STUDY MEASURES

Date: _____ PID #: _____

Anthropometric Measures

Height:_____ inches

Weight: _____ pounds

BMI: _____ kg/m^2

*18.5-24.9

Office Use Only
Reference #:
Assessment #:

DATE: ___ /___ /___

M M D D Y Y

Demographic and Health History Information

1. AGE __

2. SEX: ☐ MALE (1) ☐ FEMALE (2)

3. 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

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

5. 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 _____

6. Which of the following best describes your ethnic heritage?
   - ☐ (1) Hispanic or Latino
   - ☐ (2) Not Hispanic or Latino

Office Use Only
Reference #:
Assessment #:

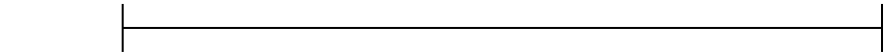
DATE: ___ / ___ / ___
M M D D Y Y

On the blank line provided, please draw an 'X' to indicate your degree of liking each food:

Example: Macaroni and Cheese



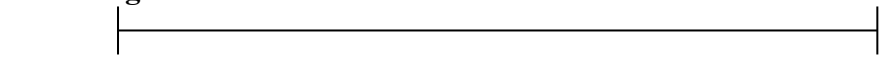
Macaroni and Cheese



Office Use Only:

Score: _____

Salad with Dressing



Office Use Only:

Score: _____

Office Use Only
Reference #:
Assessment #:

DATE: ____ / ____ / ____
M M D D Y Y

In the table below, please write down a description of what you ate and drank in the past 24 hours. In the description, include the 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. Try to be as specific with food names and amounts as possible.

Example: At breakfast (8:00 am), Tom ate an egg sandwich, an apple, and drank a cup of milk.

Meal (B, L, D, S)	Time	Description of Food and Drink	Amount Consumed
L	8:00 am	Egg sandwich	
		Whole Wheat Toast	2 slices
		Eggs	2 whole eggs
		American cheese	1 slice
		Mild Salsa	2 tsp
		Red apple	1 medium
		2 % Milk	8 oz

Enter your food and drink consumption from the past 24 hours below:

Meal	Time	Description of Food and Drink	Amount Consumed
Meal	Time	Description of Food and Drink	Amount Consumed

Meal	Time	Description of Food and Drink	Amount Consumed

Seven-Day Physical Activity Recall

PAR#: 1 2 3 4 5 6 7 Participant_____

Interviewer_____Today is_____ Today's Date_____

1. Were you employed in the last seven days? 0. **No** (Skip to **Q#4**) 1. **Yes**
2. How many days of the last seven did you work? ____ days
3. How many total hours did you work in the last seven days? ____ hours last week
4. What two days do you consider your weekend days? _____ _____
   (mark days below with a squiggle)

WORKSHEET

		DAYS						
	SLEEP	1 __	2 __	3 __	4 __	5 __	6 __	7 __
MORNING	**Moderate**							
	Hard							
	Very Hard							
AFTERNOON	**Moderate**							
	Hard							
	Very Hard							
EVENING	**Moderate**							
	Hard							
	Very Hard							
Total Min Per Day	**Strength:**	____	____	____	____	____	____	____
	Flexibility:							

4a. Compared to your physical activity over the past three months, was last week's physical activity more, less or about the same?
1. More
2. Less
3. About the same

Worksheet Key:

An asterisk (*) denotes a work-related activity.
A squiggly line through a column (day) denotes a weekend day.

Rounding: 10-22 min.=.25 1:08-1:22 hr/min.=1.25
23-37 min.=.50
38-52 min.=.75
53-1:07 hr/min. =1.0

No Caption Available.
From: Med Sci Sports Exerc, Volume 29(6) Supplement..June 1997,89-103

http://ovidsp.tx.ovid.com.revproxy.brown.edu/spb/ovidweb.cgi?View+Image=00005768-1... 6/17/2008

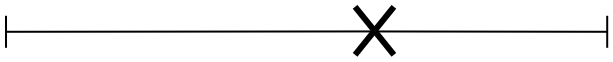
Office Use Only
Reference #:
Assessment #:

DATE: ___ /___ /___
M M D D Y Y

Pre-Meal Hunger Scale

On the blank line provided, please draw a vertical line or an 'X' to rate how hungry you are right now, then answer question 2 on the bottom on the page. Also, please cross out and initial any mistakes.

EXAMPLE:



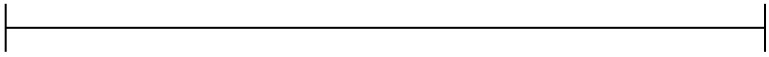
Extremely Not Hungry Extremely Hungry

Office Use Only:

Score:

How hungry did you feel right now?

HUNGER:



Extremely Not Hungry Extremely Hungry

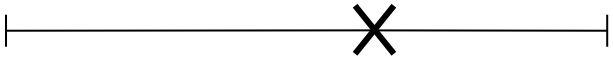
Office Use Only
Reference #:
Assessment #:

DATE: ____ / ____ / ____
M M D D Y Y

Post-Meal Hunger Scale

On the line below, you will see an example for filling out this hunger scale. On the blank line at the bottom of this page, please draw a vertical line or an 'X' to rate how hungry you are right now.

EXAMPLE:



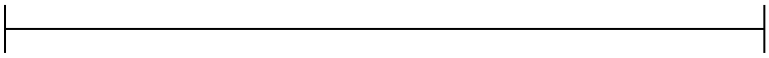
Extremely Not Hungry Extremely Hungry

Office Use Only:

Score: _____

How hungry did you feel right now?

HUNGER:



Extremely Not Hungry Extremely Hungry

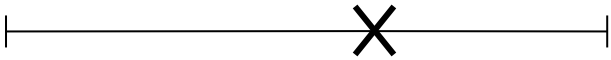
Office Use Only
Reference #:
Assessment #:

DATE: ____ /____ /____
M M D D Y Y

Pre-Meal Scale of Fullness

On the line below, you will see an example for filling out this fullness scale. On the blank line at the bottom of this page, please draw a vertical line or an 'X' to rate how full you are right now.

EXAMPLE:

Extremely  Not Full

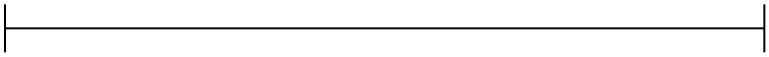
Extremely Full

On the blank line provided, please draw an 'X' to indicate your degree of fullness:

Office Use Only:

Score: _____

FULLNESS:



Extremely Not Full Extremely Full

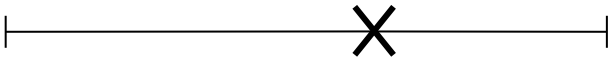
Office Use Only
Reference #:
Assessment #:

DATE: ____ / ____ / ____
M M D D Y Y

Post-Meal Scale of Fullness

On the line below, you will see an example for filling out this fullness scale. On the blank line at the bottom of this page, please draw a vertical line or an 'X' to rate how full you are right now.

EXAMPLE:

Extremely  Not Full

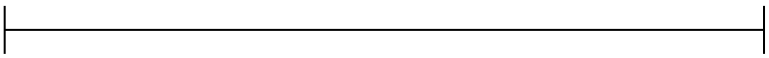
Extremely Full

On the blank line provided, please draw an 'X' to indicate your degree of fullness:

Office Use Only:

Score: _____

FULLNESS:



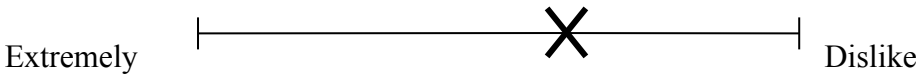
Extremely Not Full Extremely Full

Office Use Only
Reference #:
Assessment #:

DATE: ____ / ____ / ____
M M D D Y Y

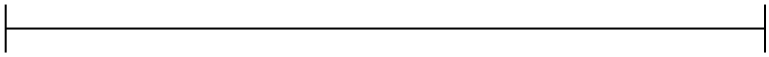
Pre-Meal Scale of Food Liking
On the blank line provided, please draw an 'X' to indicate your degree of liking each food:

Example: Macaroni and Cheese



Extremely Like

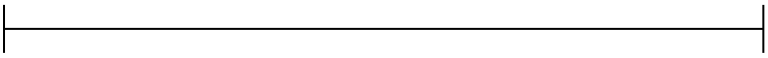
Macaroni and Cheese



Extremely Dislike Extremely Like

Office Use Only:
Score:
_____

Salad with Dressing



Extremely Dislike Extremely Like

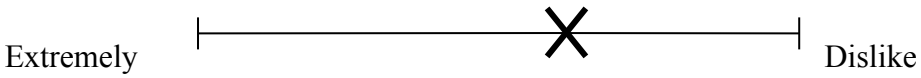
Office Use Only
Score:
_____

Office Use Only
Reference #:
Assessment #:

DATE: ___ / ___ / ___
M M D D Y Y

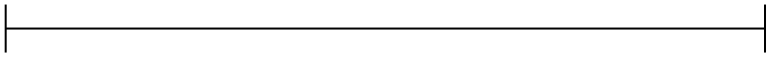
Post-Meal Scale of Food Liking
On the blank line provided, please draw an 'X' to indicate your degree of liking each food:

Example: Macaroni and Cheese



Extremely Like

Macaroni and Cheese

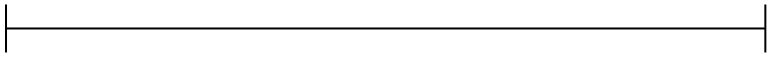


Extremely Dislike Extremely Like

Office Use Only:

Score: _____

Salad with Dressing



Extremely Dislike Extremely Like

Office Use Only:

Score: _____

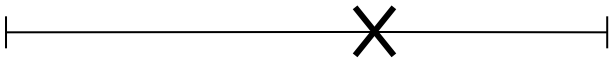
Office Use Only
Reference #:
Assessment #:

DATE: ___ / ___ / ___
M M D D Y Y

Scale of Television Show Liking

On the blank line provided, please draw an 'X' to indicate your degree of liking the TV show:

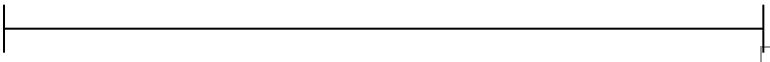
Example: Scandal Episode

Extremely  Dislike

Extremely Like

Scandal Episode

Extremely Dislike Extremely Like



1. Have you ever watched the series *Scandal*?
   ☐ YES ☐ NO

2. Have you seen the presented episode before?
   ☐ YES ☐ NO

Office Use Only:

Score:

_____

Payment Compensation Sheet

Thank you for your participation in the Television and Liking of Food Study. Because you have completed all study requirements you will receive a $25 gift card as compensation for your time and effort. Please complete the information below in order to document the receipt of your gift card:

Signature: _____

Printed Name: _____

Address: _____
_____
_____

Television and Liking of Food Study: Debriefing Script

1. Thank the individual for participating in the study and explain the true purpose of the study.
    a. **"Thank you for completing the Television and Liking of Food study. The true purpose of the study will now be explained to you. The true purpose of the study is to investigate the effects of television viewing and portion size on consumption during a meal. During your four experimental meal sessions the portion sizes of the macaroni and cheese and salad tossed with dressing were prepared in either a small portion size or a large portion size. Overall, you received the small portion size twice and the large portion size twice."**
2. Ask the participant if they have any other questions about the study and thank them for participation.
    a. **"Do you have any other questions about the study? Thank you for participating in the study."**

VITA

Rachel Rosenthal was born and raised in Olney, Maryland. She graduated from The Pennsylvania State University in 2014 with a Bachelor of Science degree in Nutritional Sciences. Upon completion, she pursued graduate degree of Master of Science in Public Health Nutrition at the University of Tennessee, Knoxville (UTK). In January 2016, Rachel started the Dietetic Internship at UTK.

As a graduate student, Rachel 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 behavioral weight management in adults and team collaboration. Rachel will graduate in August 2016 and will seek a job within the public health nutrition field in the Washington, DC area.