

THE EXAMINATION OF MINDFULNESS, STRESS, AND EATING BEHAVIORS
IN MOTHERS OF YOUNG CHILDREN

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ABSTRACT

With the alarming prevalence of overweight and obesity, it is important to explore new approaches and strategies to improve dietary quality and weight status. Recently, a neuropsychological model of obesity was proposed. This new model illustrates an evidence-based relationship between a chronically activated hypothalamic-pituitary-adrenal (HPA) axis, due to chronic psychological stress and mood disturbance, and the food reward-related mechanisms within the brain. Intensive mindfulness-based training programs, such as Jon Kabat-Zinn's Mindfulness-Based Stress Reduction have demonstrated impressive results with a variety of populations. Given the relationship of stress to eating behavior and the capacity of mindfulness in managing stress, a relationship between mindfulness and eating is expected. The goal of this dissertation research was to help understand the concept of mindful eating and the relationship between stress and eating behavior for mothers of young children in order to inform the development of a mindfulness-based stress management and dietary intervention. The research consisted of three components: 1) an informative photo-elicitation study with working mothers of young children aiming to understand how mothers define, perceive, and experience mindful eating; 2) a cross-sectional study investigating the relationship between mindful eating, dietary quality, and stress; and 3) the development and mixed-methods pilot intervention of the Slow Down Program, a mindfulness-based stress management and nutrition program for mothers of young children. Results from these studies give further evidence on how mindfulness can be utilized in nutrition research and they further confirm the success of mindfulness-based

training on health and dietary outcomes. This research can inform public health programs and practice to encourage mindfulness, as it relates to dietary behavior, for families and other audiences, as well as future research studies that explore the interaction between mindfulness and eating behaviors.

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GENERAL ABSTRACT

With the alarming rise of obesity seen in the United States over the last few decades, it is important to explore new approaches and strategies to improve dietary quality and weight status. Traditional approaches to weight loss or weight management involve eating less food and exercising more. Unfortunately, this approach is often ineffective for long-term weight maintenance. A new approach to treating and preventing overweight and obesity was recently suggested and it credits the rise in obesity in part to chronic stress. Mindfulness is a strategy often used for successfully managing stress. Given the relationship of stress to eating behavior and the usefulness of mindfulness in managing stress, a relationship between mindfulness and eating is expected. The goal of this dissertation research was to help understand the concept of mindful eating and the relationship between stress and eating behavior for mothers, in order to develop a mindfulness-based stress management and dietary intervention. The research consisted of three different studies that ended with the development and testing of the Slow Down Program, a mindfulness-based stress management and nutrition program for mothers of young children. Results from these studies give further proof of how mindfulness can be used in nutrition research and they further confirm the success of mindfulness-based training on health and diet. This research can inform public health programs and practice to encourage mindfulness, as it relates to dietary behavior, for families and other audiences, as well as future research studies that explore the interaction between mindfulness and eating behaviors.

Dedication

This dissertation is dedicated to all the women and girls around the world who are denied an education on the basis of their gender. I do not take my access to education for granted and I hope that in some way, I can use it to help other women.

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Attribution

A brief description of the contributions made by colleagues that assisted with the preparation of my dissertation chapters is outlined below. Contributions rose to the level of coauthor for manuscript publication for three of my chapters.

Chapter 3: Maternal understanding of mindful eating: An exploratory photo elicitation study

Elena Serrano (Department of Human Nutrition, Foods & Exercise, Virginia Tech) provided assistance with study design, data collection planning, data interpretation, and edits of the manuscript.

Chapter 4: The Mindful Eating Scale is not predictive of maternal eating behavior

Lin Zhang (Department of Statistics, Virginia Tech) provided statistical analysis assistance. Elena Serrano (Department of Human Nutrition, Foods & Exercise, Virginia Tech) provided assistance with study design, data collection planning, data interpretation, and edits of the manuscript.

Chapter 5: The Slow Down Program: A mindfulness-based stress management and nutrition program for mothers of young children

Kathy Hosig (Department of Population Health Sciences, Virginia Tech), Kiyah Duffey (Department of Human Nutrition, Foods & Exercise, Virginia Tech), and Young Ju (Department of Human Nutrition, Foods & Exercise, Virginia Tech) provided assistance with data collection planning, study design and edits of the manuscript. Elena Serrano (Department of Human Nutrition, Foods & Exercise, Virginia Tech) provided assistance with study design, data collection planning, data interpretation, and edits of the manuscript.

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Chapter 1 Introduction

Traditional weight loss interventions, along with most public health recommendations, focus primarily on the simple energy balance model of obesity.¹ This model suggests that if calories consumed through food and beverage are lower than calories expended through physical activity, weight loss will undoubtedly occur. This model is founded on the flawed premise that modifying either caloric intake or physical activity level will not produce any compensatory changes in the other component.² However, the components of energy balance are regulated at several levels and they are interdependent. For example, when caloric intake is slashed, hunger is stimulated and basal metabolic rate is reduced, leaving the dieting person hungry and burning fewer calories at rest. The failure of this model to provide long-term results for weight loss or weight maintenance is further proof, beyond basic physiology, that the energy balance model is not the most suitable model for promoting weight loss in overweight and obese populations.³⁻⁶

In order to combat the alarming prevalence of obesity, the exploration of alternative obesity models is essential.^{7,8} Recently, a neuropsychological model of obesity was proposed.¹ The authors of this model suggest obesity is a neurobiological disease citing evidence that neurocircuits involved in appetite regulation are etiologically integrated into the pathomechanism. This is in contrast to models that position personal responsibility for poor eating habits as the main etiological contributor to obesity, like the energy balance model. The foundation of this new model is the evidence showing a relationship between a chronically activated

hypothalamic-pituitary-adrenal (HPA) axis due to chronic psychological stress and mood disturbance and the food reward-related mechanisms within the brain.

Mindfulness has a long tradition, founded in the Buddhist religion.⁹ The definition of mindfulness often varies across fields of study, but is generally described as an attentive awareness to the present moment.¹⁰ Although relatively new in the psychological literature, mindfulness training programs have shown potential for alleviation or improvement in conditions like depression, anxiety, and stress management.¹¹ Related to stress, Jon Kabat-Zinn first published work on mindfulness training in the literature thirty years ago with the development of Mindfulness-Based Stress Reduction (MBSR), an intensive mindfulness meditation stress management program used originally with patients suffering from chronic pain.¹² Researchers have also been trying to determine the effects of MBSR on a variety of other states or conditions. For example, some studies have used MBSR with breast cancer oncology patients to improve psychological health outcomes¹³ or other studies have tested its applicability as an employee worksite wellness program.¹⁴ MBSR has shown consistent efficacy for improving a variety of health outcomes and reducing stress, both in clinical and nonclinical populations.^{15,16}

The relationship between psychological stress and eating behavior is well documented, in adults, adolescents, and children.¹⁷⁻²¹ An increase in psychological stress often results in an increase in hedonic eating and an increased preference for energy-dense foods, specifically those that are high in fat and sugar.¹⁸ Stress also produces increased amounts of cortisol and catecholamines that may contribute to fat storage and ultimately, weight gain.¹⁸ Given the relationship of stress to eating

behavior and the capacity of mindfulness in managing stress, a relationship between mindfulness and eating is expected.

Mindful eating (ME) has become an increasingly popular mainstream concept. ME refers to a state of being nonjudgmentally aware of any physical or emotional sensations while eating or in a food-related environment such as the grocery store or restaurant.²² Framson's development of the Mindful Eating Questionnaire revealed 5 constructs or domains of ME: Distraction, Disinhibition, Awareness, External Cues, and Emotional Response.²² ME has shown considerable success as a supplement or stand-alone treatment for clinical eating disorders, most notably with binge eating disorder (BED).²³⁻²⁵ There is less known about the impact of ME interventions on non-clinical populations with regard to diet, weight, or eating behavior.

The goal of this dissertation research was to help elucidate the concept of mindful eating and the relationship between stress and eating behavior for mothers of young children in order to inform the development of a mindfulness-based stress management and nutrition intervention. There are four distinct parts to this dissertation that all contribute to addressing this overarching goal:

Part 1: Literature Review

Objectives:

1. To summarize current evidence for use of ME in nutritional interventions
2. To inform best practices for a future intervention

Part 2: Maternal Understanding and Experience of Mindful Eating: An Exploratory Photo-Elicitation Study

Objectives:

1. To elucidate the perception of ME with working mothers of young children
2. To operationalize the concept of M

Part 3: The relationship of maternal stress and eating behavior using factor analysis of the Mindful Eating Scale

Objectives:

1. To investigate the relationship between maternal stress and diet
2. To investigate the relationship between perceived stress and cortisol levels
3. To conduct a confirmatory factor analysis of the Mindful Eating Scale

Part 4: The Slow Down Program: A mindfulness-based stress management and nutrition program for mothers of young children

Objectives:

1. To design and implement a mindfulness-based stress management and nutrition program for mothers of young children
2. To evaluate a mixed methods pilot study of the Slow Down Program
3. To understand the effects the Slow Down Program has on mindfulness self-efficacy, mindfulness practice, dietary behavior, child feeding, cortisol, and perceived stress

The research contributes to theory by further establishing the importance of mindfulness-based approaches in creating dietary behavior changes, in contrast to

traditional approaches. It furthers research by expanding the evidence base to include women who have young children and mothers who work outside the home, capitalizing on a critical time period for learning and change, both with mothers and children. This research contributes to practice by teaching mothers a skill, as opposed to simple knowledge and facts, that can be used to nudge behavior change.

CHAPTER 2

LITERATURE REVIEW

INTRODUCTION

Prevalence of obesity has risen alarmingly over the last three decades, both for children and adults.^{8,26-28} More than one-third of adults in the United States are obese and current data show that 17% of youth are obese.⁸ Consequences of obesity include increased risk of cardiovascular disease, hypertension, and type 2 diabetes, among others.²⁹⁻³¹ Of particular concern for overweight and obese children and adolescents are the psychosocial consequences of being heavier than their peers.³²

The two major contributors to this rise in obesity are typically considered to be easy access to large portions of low quality, energy-dense foods and a shift to more sedentary lifestyles.^{29,33} The resulting energy imbalance, with too few calories being expended and too many calories being consumed, causes weight gain. This energy balance model of obesity is a relatively simplistic way of explaining the etiology of the obesity epidemic seen in the United States.

In order to prevent obesity, public health officials have called for changes in the environment, especially among factors that promote unhealthy eating behaviors and incentivize a sedentary lifestyle.³³⁻³⁵ Some changes that have been suggested are consumer education on portion sizes, increasing availability of foods low in energy density, and increased collaboration between the food industry, government, researchers, and educators.³³ In spite of the pursuit of these types of changes, there are still barriers to prevention and treatment of obesity. Current dietary guidelines for the general population focus on providing advice on what to eat (e.g. more fruits, vegetables, leafy greens, whole grains) and what not to eat (e.g. less sugar, salt, and

solid fats).³⁶ In general, the recommendations are nutrient- and food group-focused, but they do not provide individuals with ‘skills’ to eat better and they do not consider personal and psychological needs, instead emphasizing self-discipline and individual responsibility for estimation of energy balance. It has been fairly well established that most individuals are poor estimators of energy intake and have little knowledge of their energy expenditure.^{37,38}

One solution for this gap in public dietary guidance is mindful eating (ME), a concept that is relatively new to nutrition, but has roots in mindfulness, an ancient Buddhist tradition.³⁹ Mindfulness can be defined as a nonjudgmental awareness of the present moment and thus, ME would be the application of that awareness to food-related experiences like eating a meal, snacking, or even grocery shopping.^{22,40} There are several well-validated and widely used measures of general mindfulness.^{10,41-43} General mindfulness is typically measured through constructs like awareness, acceptance (non-judgment), attention, observation, and non-reactivity, although there is immense variation in labeling mindfulness domains from measure to measure.

There is only one study, to the best of our knowledge, that has investigated the underlying constructs specific to ME and attempted to explain how to measure ME through those constructs.²² The development of the Mindful Eating Questionnaire (MEQ) resulted in five domains of ME. Disinhibition describes continuation of eating despite physical cues indicating fullness. Environmental cues refer to triggers within the immediate environment that encourage eating, such as seeing a particularly desired brand of food. Distraction refers to more mindless eating or eating while doing another non-eating related activity like watching television or surfing the

Internet. Emotional response describes eating for emotional reasons, perhaps stress, sadness, or sometimes even happiness. Finally, sensory awareness describes an awareness of food's aromas, textures, colors or other attributes that can be detected through the senses.

Presently, there are only two ME-specific measures: the Mindful Eating Questionnaire described above and the more recent, Mindful Eating Scale.⁴⁴ These measures have not been widely validated in diverse populations and perhaps more importantly, the five original constructs found through development of the MEQ have not been reproduced or expanded on in any subsequent studies. This creates enormous barriers to measuring ME and consequently being able to report on the effects ME training may have on dietary behaviors.

Nevertheless, some of the existing ME constructs do intersect with current dietary guidance and the energy balance model of obesity. Chiefly, disinhibition and distraction, the constructs that encourage portion control or portion awareness, align well with guidance found in the Dietary Guidelines for Americans to control total calorie intake.³⁶ The three other constructs of ME do not correspond well into current dietary recommendations, as the guidelines do not provide recommendations on emotional responses to food, sensory awareness of food, or how to manage environmental cues towards food. Thus, at present, current recommendations will not likely affect the obesity epidemic in a recognizable way. In order to effectively combat obesity, public health recommendations are needed that will supply guidance on how to eat healthfully and how to develop or adapt healthier eating behaviors that include the three other ME constructs.

With the growing popularity of mindfulness in American culture and the success of mindfulness in other fields of study, nutrition researchers and practitioners have begun incorporating mindfulness into eating behavior models and testing its relationship to eating behavior and weight status. Several cross-sectional studies have demonstrated relationships between eating behaviors, including disordered eating behaviors in clinical and nonclinical samples, and weight status with mindfulness.⁴⁵⁻⁵⁰ For example, Camilleri et al surveyed more than fifty French men and women using the Five-Factor Mindfulness Questionnaire and self-reported weight and height. Their results showed that women with higher mindfulness scores were less likely to be overweight or obese, although this effect was only seen for obesity in men, and not also overweight. Additionally, several of the Five Facet Mindfulness Questionnaire (FFMQ) subscales were inversely associated with overweight and obesity in both men and women.⁵⁰

Accordingly, ME has been proposed as an intervention to tackle obesity and dysfunctional eating behaviors that contribute to weight gain. Assisting individuals with the practice of ME may provide them with the skills needed to improve the quality of their diets, enjoy food and eating occasions more, and reconnect with physical sensations of hunger and satiety and better overall energy intake.⁵¹

The goal of this literature review was to examine the effects of mindfulness-based training on dietary, weight, and health outcomes to inform future research.

METHODS

PubMed, Web of Science, PSYCInfo, and EBSCO ALT-Healthwatch were searched in December 2015 using the following terms: “mindful eating” AND diet,

“mindful eating” AND nutrition, and “mindful eating” AND eating. Reference lists of key reviews and other articles were searched for additional articles. Based on this review of literature, only nineteen articles were found that examined the effects of mindfulness-based training on dietary, weight, and health outcomes.

Of the nineteen included studies, two studies investigated the relationship between ME and food satisfaction^{52,53}, three focused on decision-making with food⁵⁴⁻⁵⁶, six used ME as a weight loss or weight management tool⁵⁷⁻⁶², and seven of them focused on dietary behavior and ME.⁶³⁻⁶⁹ The following sections summarize the results of ME’s effects on weight management, food liking and satisfaction, dietary behavior, and food decisions.

RESULTS

Dietary behavior

Of the studies that reported on the relationship between ME and diet, four of them were randomized controlled trials (RCT)^{63-65,69} and three were uncontrolled intervention trials (UCI).⁶⁶⁻⁶⁸

One RCT recruited 50 women in Quebec City, Canada, who were on average, middle-aged (mean age=47.5), overweight (mean BMI=27.7), and had obtained a university degree (56.0%).⁶⁵ The goal of this study was to investigate the effects of a sensory-based intervention for women on mindful and intuitive eating and eating-related attitudes and behaviors. For the intervention, women participated in six free weekly 90-minute workshops on themes such as individual relationship with food, hunger and satiety cues, sense and food tasting, and pleasures associated with eating. No information was provided on the control group. Data were collected at

baseline (T=1), at the end of the program (T=2), and again at 12 weeks post intervention (T=3). There were significant decreases in both types of disinhibition as measured by the TFEQ and the MEQ in the intervention group. They also found significant increases in the IES Scale-Unconditional Permission to Eat, a scale that represents permission to eat when one is hungry.

The authors of another RCT examined trait mindfulness and uncontrolled eating in university students and the general population, first using two non-intervention studies.⁶⁹ In their third experiment, however, they extended their findings into the design of an RCT and they recruited a sample of which 60 undergraduate students, of which 30 were females, 81.7% were Caucasian, and the mean age was 19.82 years. The goal of this study was to examine the relationship between trait mindfulness and consumption behavior and determine if a mindfulness induction activity would causally affect eating behavior and calorie consumption. For the intervention group, participants followed a 15-minute audio relaxation task that used a mindfulness body scan, progressive muscle relaxation, and focus on breathing. Control participants heard an audio recording on relaxation without mindfulness. After the audio exercise, participants tasted and rated foods, as a disguise for the true purpose of the task, which was to measure caloric consumption by weighing food before and after the exercise. Compared to the control group, participants in the mindful condition ate 24% fewer calories, suggesting a causal relationship between state mindfulness and caloric consumption. In a fourth study, the authors took the results of their third study even further with an altered design. They recruited 100 Canadian undergraduate students, of which 72 were female, 53% were European, 24% were Asian/Pacific Islander, and the mean age was 18.84

years. Participants completed measures on mindfulness, attitudes towards fruits/sweets, and trait self-control. The authors then had intervention participants complete an ego-depletion manipulation task that diminishes self-control and control participants completed a similar task that was easier and did not deplete self-control. At the conclusion, participants were offered a piece of fruit or a candy bar. The results of this study showed that individuals reporting higher mindfulness were more likely to choose fruit than sweets, compared to less mindful people. The intervention did not demonstrate that more mindful individuals' snack choices were related to self-control.

Two studies showed significant changes in the consumption of unhealthy foods or sweets following mindfulness-based training.^{63,64} The first study recruited 110 university students in the Netherlands.⁶³ The goal of this study was to find out if a mindfulness exercise combined with either a small or large portion of cookies influenced caloric consumption. The intervention consisted of a 14-minute body scan exercise that preceded an 'afternoon snack' of either a small portion of cookies or a large portion of cookies. The control group listened instead to the first 14 minutes of an unrelated audiobook before receiving their cookies. The authors used a 2X2 between-subjects design using small vs. large portion sizes and intervention control vs. intervention body scan as variables. Self-reported hunger was also a continuous variable. Food and beverage intake was assessed using a digital scale and converted to calories. The authors found that more cookies were consumed when participants were served the large portions of cookies, regardless of intervention, control, or hunger. However, participants who did the body scan ate less of the cookies when they were not hungry, compared to the control.

The second study measuring sweets consumption recruited 194 obese women from the San Francisco Bay Area into a 5.5 month diet and exercise weight-loss program that either contained mindfulness-based eating and stress management components or one that did not.⁶⁴ The goal of this study was to understand how the addition of mindfulness components to a diet and exercise weight-loss program affected sweets consumption and fasting blood glucose levels and whether changes in mindfulness mediated those effects. For all participants, the program consisted of 12 weekly sessions, 3 biweekly sessions, one session 4 weeks later, plus an all-day weekend session. For the mindfulness arm of the intervention, participants were trained using the MB-EAT model.⁵¹ Topics included attending to physical hunger, stomach fullness, and taste satisfaction (sensory-specific satiety), increasing awareness of these practices prior to meals, and identifying food craving, and emotional and other triggers to eat. In addition to ME training, the MB-EAT model also uses activities from MBSR like chair yoga, loving kindness meditation, body scans, and seated mindfulness meditation. The control group was given equivalency content that covered a variety of topics on physical activity, nutrition, and stress management using cognitive behavioral tools. The authors found that although both groups showed a reduction in sweets consumption from baseline to 6 and 12 months, the control groups showed a significant increase in sweets consumption from 6 to 12 months, whereas the intervention groups did not. Additionally, fasting glucose significantly increased for control participants between baseline and 12 months, but did not for the mindfulness group participants. Importantly, the authors found that mindful eating training partially mediated the effect of a reduced fasting glucose from baseline to 12 months. This suggests that ME should be included in

existing diet and exercise weight loss programs, as a strategy to encourage more persistent stabilization of fasting blood glucose levels in obese adults.

Intervention participants in two RCT's showed significant increases in mindful eating at follow-up.^{64,66} One of these studies recruited 124 women into a skill-based worksite wellness program, *Eat for Life*, with an average age of 45 years, of which 87% were white and college educated.⁶⁶ Most participants were overweight or obese. The goal of the study was to test a mindfulness and intuitive eating workplace-based intervention on eating behavior, body appreciation, and mindfulness. Like a previously described study⁶⁴, the authors also wanted to know if mindfulness was a mediator for change in the other outcome variables. The *Eat for Life* program is a 10-week worksite wellness program that provides formal mindfulness practices like body scans and yoga, group discussions about weekly homework, and lectures about the principles of intuitive eating, such as savoring food and listening to hunger cues. Results of this study demonstrated that *Eat for Life* produced higher levels of body appreciation and intuitive eating than those in the waitlist control group. Meaningfully, this study also found that mindfulness was a mediator for the changes in outcomes produced by *Eat for Life*.

For a UCI that sampled predominantly males (87.5%), investigators recruited 48 veterans with chronic health conditions who were mostly white, and overweight or obese.⁶⁷ The goal of this study was to test the effects of MBSR on emotional and uncontrolled eating, food intake, and mindfulness. The intervention was a standard MBSR program: 8-weekly 2.5 hour sessions, one 7-hour session in between weeks 6 and 7. Techniques taught include body scan, chair yoga, walking meditation, and loving-kindness meditations. This intervention found no decreases in emotional and

uncontrolled eating after MBSR training. Likewise, there were no significant changes in food intake, including total energy intake, fat, sugar, or fruit and vegetable consumption.

One UCI measured effects of a single session of mindful eating training, compared to typical training programs that often last around eight weeks.⁶⁸ The authors recruited 26 undergraduate students who were primarily female (77%) and Caucasian (73%). The goal of the study was to examine the effects of participation in a single session of mindfulness training on appropriate hunger-related food consumption and mindfulness. Participants were asked to fast for four hours and attend a 1-hour mindfulness training session between the third and fourth hours. The session consisted of three experiential exercises, including mindful breathing, sitting meditation, and mindful eating. After the fast and mindfulness training, participants were instructed to apply what they had learned while eating a provided lunch. Results of this study showed that 86% of participants demonstrated an appropriate level of food consumption based on their self-reported hunger after eating the provided meal. Increases were seen in state mindfulness, but not for present-moment awareness or mealtime awareness.

Weight management

Four RCT's^{57,60-62} and two UCI's^{58,59} reported on using mindfulness or mindful eating as a treatment for weight loss or weight management. Participants in four of the six studies lost weight^{57,59,60} and another maintained weight in the intervention group.⁶²

In one of the studies showing weight loss, the authors recruited 63 military employees living on a military base in Greece, with 22 females and 41 males enrolled.⁶⁰ The goal of this study was to test whether mindfulness meditation assisted weight loss efforts, whether mindfulness combined with self-compassion aided weight loss even further, and whether participants were able to maintain weight loss and continue practicing mindfulness meditation at follow-up periods. The intervention lasted five weeks, with introductory session on two days for the entire group and an additional third day for the group receiving mindfulness and self-compassion. After the introductory days, participants were asked to practice three times each day with a meditation teacher for 20-30 minutes sessions, using only sitting meditations focused on the breath for the mindfulness-only group. The mindfulness and self-compassion group also did sitting meditations, but one session out of three each day was devoted to loving-kindness meditations. The control group received written psychoeducational materials on diet and exercise. After 5 weeks, participants were instructed to continue using the meditation practice. While both experimental groups lost weight at 5 weeks, the intervention group receiving mindfulness training and additional self-compassion training lost more weight than either the control group or the group receiving mindfulness training alone at one year follow-up, despite some weight regain.

Authors from another study that resulted in weight loss recruited 10 obese adults through a YMCA in New Mexico, of which 7 were women, 6 were Caucasian, and 9 had completed at least some college.⁵⁹ The goal of this study was to pilot test the Mindful Eating and Living (MEAL) program's effects on weight status, BMI, eating behavior, and psychological distress. The authors also collected data on physiological

markers of cardiovascular risk like C-reactive protein (hsCRP), adiponectin, low-density lipoprotein (LDL), and plasminogen activator inhibitor-1 (PAI-1). The intervention consisted of six weekly 2-hour classes designed for overweight and obese individuals that covered mindfulness meditation, and mindful eating, using group discussion. It was based on other similar ME programs like MB-EAT.⁵¹ All participants in this pilot lost weight and reduced their hsCRP levels. For all eating behavior and psychological measures, moderate to large effect sizes were present.

Restaurant settings and the accompanying portion sizes have been suggested as an environmental contributor to obesity.^{70,71} As such, the authors of another study that resulted in weight loss, investigated the effects of a mindful restaurant eating intervention.⁵⁷ They recruited 35 perimenopausal women from central Texas who reported eating outside the home at least 3 times each week and had, on average, an obese BMI. The mean age of the study population was 49.6 and the sample was considered tri-ethnic with 54% of the sample being white, 29% Hispanic/Latino, and 17% African American. The goal of this study was to test the effects of a mindfulness-based restaurant eating intervention on weight status, caloric and fat intake, and diet-related self-efficacy. The intervention consisted of 6 weekly 2-hour sessions with topics covering energy needs, goal setting skills, improving satiety, and strategies to prevent weight gain in a variety of restaurant settings such as fast food, Italian, Chinese, dessert, and salad skills. Mindfulness meditation practices included mindful eating, hunger and fullness meditations, a meditation for eating at buffet-style restaurants, and a meditation for eating triggers. The results of this study showed that intervention participants lost significantly more weight and had lower average

daily caloric and fat intakes compared to control participants. They also reported higher levels of diet-related self-efficacy and fewer barriers to weight management

Another study reported on the outcomes of 2 separate trials that tested a novel approach to mindfulness meditation with the use of food diaries.⁶¹ The authors hypothesized that use of concrete construals, mindsets that focus our attention on how we carry out behavior as opposed to why, could simulate mindfulness meditation. They performed two experiments. The first study recruited 72 university students in Greece, of which 30 were females and 42 were males with an average age of 21.11 and average BMI of 25.55. The goal of this study was to explore whether mindful concrete construals were as effective in weight loss as abstract construals. For the intervention, participants were given a pocket-diary to use for five weeks that prompted them with questions to consider prior to and during each meal. Questions either corresponded to concrete construals (e.g. how does it smell?) or abstract construals (e.g. why is it important to eat less?). The results of this study indicated that those with the concrete construal diaries reported higher levels of mindfulness and self-compassion and decreased levels of avoidance and negative thoughts compared with those using the abstract construal diaries. In their next study, the authors tested the concrete construal theory, but added in self-compassion training, and tested it against traditional mindfulness meditation practices. They again recruited 98 university students in Greece, with 41 females and 57 males, an average age of 23.3, and average BMI of 25.79. For the concrete construal group, participants used a pocket-diary like the one described earlier that had been infused with self-compassion messages (e.g. how kind are you to yourself now that you eat this meal?). For the meditation group, participants were asked to

attend a three-day introduction to mindfulness and loving-kindness meditation and then practice three times each day with a counselor according to a schedule.

Although there was no difference in weight loss at the end of the intervention, those using the concrete construal diaries performed better at weight maintenance at three-month follow-up than those in the meditation group.

Three of the weight management studies used overweight and/or obese participants.^{58,59,62} In one of these studies, the authors recruited 12 obese women living in an inner city housing community, of which 58.3% were African American, 41.7% were unemployed, and the mean age was 51.8 years.⁵⁸ The goal of this mixed-methods study was to quantitatively examine the effects of a mindful eating intervention on self-efficacy for weight loss, depression, mindful eating and biomarkers of weight in an urban and underserved population of obese women. Qualitatively, the authors wanted to identify the common themes of the lived experience of mindful eating for the participants. The intervention consisted of 8 weekly group sessions lasting 60 to 90 minutes each with practices and skills based on the workbook “Eat, Drink, and Be Mindful”.⁷² Content included mindful eating principles, developing mindful awareness and being in the moment, non-judgment and letting go, shifting out of autopilot and mindless routines, and practicing acceptance of self, hunger, and body. For the quantitative results, the authors found that the only outcome was increased self-efficacy for weight loss. The qualitative arm’s results notably showed that additional changes, especially in regards to mindful eating, had taken place but had not been measured adequately using the quantitative measures, as mothers indicated during the focus group that they had over-estimated their practice of ME behaviors while providing baseline data.

Decision-making

Three RCT's investigated effects of mindfulness on decision-making processes related to food.⁵⁶ In the first study, the authors recruited 196 participants, of which 175 were female and the mean age was 19.93. The goal of this study was to compare the efficacy of two-week mindfulness-based interventions, targeting different combinations of specific mindfulness skills (e.g. awareness, acceptance, dis-identification), at reducing trait and state chocolate cravings. The intervention consisted of three different components and four experimental conditions. The study began with a pre-training laboratory session, a two-week training period at home, and a post-training laboratory session. Participants assigned to the Aw condition were instructed to increase awareness of the craving for chocolate. Those assigned to the Aw + Acc condition were instructed to become more aware of their cravings and to stay open to uncomfortable experiences and refrain from judging. During the pre-training lab session, participants assigned to the Aw + Dis condition were instructed to become aware of their cravings and to attempt to dis-identify from them by labeling them as "just thoughts". Participants assigned to the Aw + Acc + Dis condition were instructed to become aware of their cravings, to remain open to uncomfortable experiences without judging them, to label them as "just thoughts", as well as dis-identifying from them. The control group practiced distraction and was instructed to recite the alphabet and other non-mindfulness tasks when faced with a craving. During the training period at home, participants were instructed to apply their instructions to all chocolate cravings, to log all cravings, and to rate the extent to which they applied their instructions to the craving. In the post-training lab session, participants were taken through a craving induction exercise where they were given a

wrapped chocolate that they were allowed to unwrap and touch, but instructed not to eat. After a few minutes, the chocolate was put out of sight and participants were asked to rate their state cravings. The authors found that each condition significantly increased the mindfulness skills that were targeted by that intervention, but that additional mindfulness skills not specific to that condition were also increased. Disidentification and awareness (Aw + Dis) resulted in greater reductions of trait chocolate-cravings and smaller increases in state cravings, compared to the control group practicing distraction. Mediation analyses discovered that these reductions were due to the participants being more able to dis-identify with the cravings and consequently, the chocolate they craved was perceived as less attractive.

Another study examining decision-making around food was a worksite intervention called The “What to Eat for Lunch” study.⁵⁵ The authors recruited 28 hospital employees with a mean age of 44.9, a mean BMI of 33.4, 69.2% African American, and 88.5% female. The goal of this study was to evaluate a mindful eating and online pre-ordering meal system intervention’s effects on healthier lunch purchases at work. Participants were provided a single 90-minute training on mindful eating, tips on being more mindful, and education on different types of hunger. After this training, researchers recorded the lunches they purchased from the worksite cafeteria for 4 weeks and analyzed them for fat and calories. Intervention participants purchased meals with 144.6 less kcals than control participants and 8.9 grams less of fat. Further longitudinal analyses confirmed this effect. The authors also found moderate increases in participants’ mindful eating skills.

The authors of the final study on decision-making recruited 102 university students in Idaho, of which 73 were female, the average age was 25.46, and 80.4%

were European-American.⁵⁴ The goal of this study was to test the effects of an eating-behavior and mindfulness-based workshop on discounting patterns like impulsive decision making around food. The intervention provided a 50-minute workshop that included a modified version of Kabat-Zinn's Raisin Exercise and a series of food samples with instructions and guidance on how to eat the samples mindfully. The control group viewed a DVD with instructions on healthy eating and they also sampled food, but no instructions were given on how to eat them mindfully. All participants were then given a series of delay discounting (DD) and probability discounting (PD) tasks related to both money and food. The DD money task asks participants to choose between \$10 after a series of time delays (1, 2, 30, 180, 365 days) or a lesser amount of money they could have immediately. The DD food task is identical, but asks participants to imagine bites of their favorite food. The PD tasks measure the degree to which the value of the reward decreases as the odds against obtaining it increases, so it is very similar to the DD tasks, but asks participants to choose between a probability of receiving a larger amount of money (or bites of a favorite food), or a smaller amount of food to be received for certain. Results for those in the intervention group showed lower impulsivity for food-related outcomes compared to control participants. This effect was not seen in the monetary-related outcomes, indicating there is specificity for mindful eating training and food-related outcomes. Importantly, those in the control group did not exhibit changes in discounting for money or food when compared to their baseline scores, showing that simply providing instructions on what to eat does not have the same effect on decision-making as ME training.

Food liking

The authors of two studies examined the effects of mindfulness interventions on food satisfaction or food liking.^{52,53} The interventions in both studies were very similar in design, both using Kabat-Zinn's Raisin Exercise, but the goals of each study were slightly different. In the first study, the authors recruited 21 university students from the Midwest, of which 71.42% were female, 85.71% were Caucasian, and the mean age was 18.95.⁵³ The goal of this study was to study the use of ME to affect the expected liking of a raisin and also the sampling of foods that are often disliked and avoided (e.g. tofu, anchovies, prunes) compared to non-mindful eating. The authors conducted two separate interventions. Experiment 1 randomized participants into either the mindful condition, where they listened to the Kabat-Zinn Raisin Exercise, or the non-mindful condition where participants ate a raisin while listening to audio without any mindful instruction. The only outcome that the authors looked at for this experiment was a rating of food liking for a list of foods typically disliked. The participants in the mindful condition reported higher levels of expected food liking for 24 of the 33 food items, compared to the non-mindful group. In the 2nd experiment, 165 midwestern university students were enrolled, of which 66.06% were female, 87.88% were Caucasian, and the mean age was 18.92. The goal of Experiment 2 was to replicate and clarify the results from the first intervention by recruiting a larger sample size, decreasing participant suspicion of the study hypothesis, incorporation of a no-task control condition, and testing the mindful eating condition's effects on ratings of liking non-food stimuli (e.g. pets, hobbies). Aside from these changes, the intervention design, including the materials, methods, and randomization procedures was the same as Experiment 1. The results of Experiment 2 showed consistent

results with Experiment 1, confirming that those in the mindful eating condition reported higher expected levels of liking different foods than those in the other two conditions. This effect was even more significant for foods that are typically initially disliked.

In the other study by the same authors, the sample was expanded from the previous study to include 411 university students from the Midwest, of which 61.6% were female, 85.6% were Caucasian, and the mean age was 18.92.⁵² The goal of this study was to test the ability of ME training to increase enjoyment of a liked food and to see if it would increase willingness to sample novel foods that are typically avoided (e.g. anchovies). The participants were randomized into one of three conditions: a mindful condition that received a version of the Raisin Exercise described above, a non-mindful condition that ate a raisin without mindful instruction, and a baseline control with no task. Results showed a significant effect for those who sampled the avoided food, reporting higher levels of enjoyment of the food in the mindful group compared with the other two control groups. Scores on mood and mindfulness measures were not significantly different among groups.

DISCUSSION

This review highlights the substantial amount of work done to investigate ME in the last ten years and the vast potential for the use of ME in dietary behavior, food choice, or weight management interventions. Being a relatively new concept in the field of nutrition, these results point to ME as a way to improve current dietary behavior change strategies and increase efficacy of nutrition and weight loss interventions. The ME and weight management studies reviewed here demonstrate

that ME should be added to weight loss interventions to increase weight maintenance^{61,64} and increase overall weight loss and self-efficacy for weight loss.⁵⁷⁻
⁵⁹ The studies on decision-making reveal that ME is effective at managing cravings⁶⁸, making better food choices at work⁵⁵, and making better eating-related decisions⁵⁴. Based on the results of the two studies showing a relationship between ME and food liking, ME has strong implications for developing taste preferences and avoiding picky eating behaviors that need further investigation.

There is more research needed to understand the mechanism of ME, the dose-response relationship for ME in diverse populations, and effective delivery formats for mindfulness concepts that are abstract and unfamiliar to many individuals. Mantzios et al's concrete construal studies are excellent examples of interventions that acknowledge the difficulties of teaching and practicing mindfulness meditation in the general public and likewise, test ways to simulate mindfulness meditation as an alternative to the challenge for many individuals of creating a formal mindfulness meditation practice.⁶¹ Likewise, there is a gap between research and practice seen in many of the programs reviewed here. Some involve laboratory research or rigorously controlled conditions that may not translate well to community settings.⁷³ Programs designed by scientists tend to be more intense, complex, and do not align well with standard community practices for program implementation.⁷⁴ There are unique program fidelity and implementation challenges faced in community settings that need to be reflected in future ME program designs.

Despite the potential benefits of ME this review suggests, the range of ME conditions used in interventions indicates that substantial work is warranted to come

to a consensus on definitions, constructs, and strategies for implementation of ME to operationalize the practice and build upon existing research of applying ME to the individual relationship to food and rediscovery of satiety feelings and hunger cues with more diverse populations. Relatively little is known about the effects of ME with non-white, non-clinical populations.

In particular, mothers of young children may be an important population to target for several reasons. Mothers are often found to be the ‘nutritional gatekeepers’ of the home and make the majority of food-related decisions pertaining to selection, preparation, and child feeding.⁷⁵ Moreover, early childhood is a critical time for development of eating habits and food preferences, so a maternal intervention during this time period could facilitate development of healthy child eating behaviors and child feeding practices.⁷⁶ Future interventions should evaluate the effects of ME on maternal dietary behavior and child feeding practices, particularly for mothers of young children. Most MBSR-based programs are long and require a strong commitment to attending multiple sessions and regularly practicing meditation skills, which are potential barriers to mothers who have young children. Interventions should investigate the dose-response relationship of ME for mothers in order to develop shorter, less burdensome programs that will fit more seamlessly into their busy lives. Additionally, interventions should consider adapting mindfulness in a way that is more accessible and cultivates awareness without emphasizing the complex practice of meditation that is a deterrent to participation and limits the extent of possible behavior change.

CHAPTER 3

Maternal Understanding and Experience of Mindful Eating: An Exploratory Photo-Elicitation Study

ABSTRACT

Background: Mindful eating (ME) is gaining popularity as a concept by nutrition researchers and practitioners for obesity treatment modalities. Framson et. al (2009) developed five constructs of ME: disinhibition, awareness, environmental cues, emotional response, and distraction. Through this study, we sought to provide insight into real world perspectives and experiences of the term, in order to understand how mothers perceive the concept and inform future interventions.

Methods: The purpose of this study was to explore working mothers' experience of ME. Three mothers with young children were recruited to participate. Using photo elicitation as a qualitative method, mothers were asked to provide input on their perceptions of ME through group discussions. ME constructs were used to code data from the discussions.

Results: Each of the six ME constructs were mentioned by participants during the focus group discussions. However, organoleptic awareness was rarely mentioned and participants regarded it as unimportant when asked about it by the facilitator.

Implications: Although a small sample, this pilot study data can help inform future research and interventions that promote use of ME by working mothers of young

children. Future research should include larger samples and create a comprehensive definition of ME based on all constructs.

INTRODUCTION

Mindful eating (ME) is a newer concept and although it does have a fairly consistent definition across fields within the scientific literature, the manner in which it is operationalized varies greatly, both in practice within clinical and community settings and in research.^{51,65,72} ME is typically described as a nonjudgmental awareness to physical or emotional sensations in food-related environments.²² ME facilitates an awareness of one's eating behavior and choices.⁵¹ Some interventions teach mindfulness meditation as the foundation of ME⁵¹, while others focus on being in the present moment without using formal meditation practices.⁶⁵ A resolute definition of ME is needed to develop ME educational programs that are accessible and approachable for working mothers who could derive great benefits from mindfulness and meditation, but may be unfamiliar with them. For example, ME is a potential technique parents can use to model and encourage healthy eating behaviors in their children, including slowing down at mealtimes, that could ultimately influence overall caloric intake, and being aware of the sensations of eating, which could improve dietary quality. Yet, to date, the majority of nutrition-related ME studies have focused on clinical and non-clinical eating disordered audiences, as well as older, economically-disadvantaged women.^{24,77-80} Without an operational definition of ME, it is also challenging to design sensitive instruments to measure ME or create construct-specific and relevant interventions that can produce sustainable behavior change.

The purpose of this study is to develop a better understanding of how to operationalize the concept of ME in order to inform a ME intervention for mothers of young children because this developmental stage is a critical time for both mother and child in establishing healthy eating patterns and attitudes toward food.^{76,81,82} The hypothesis of the current study is that existing terms used to describe ME constructs are not recognized by lay audiences and therefore need to be re-framed to be more contextual and relatable.

METHODS

Participants

Mothers were recruited using email list-servs for a working mothers group at a university in southwest Virginia, flyers, and university campus-wide announcements. Mothers were included if they were 18 or older, employed full-time or part-time, with at least one child between the ages of 3-5. Mothers who were pregnant, breastfeeding, or college or high school students were excluded. Mothers were paid up to \$50 for providing data in the form of pictures and their individual perspectives in each of the four weekly sessions.

All mothers were provided with detailed explanations of the study objectives and procedures and gave their written consent to participate. Confidentiality of information was warranted and guaranteed. Participation in the study was voluntary and they could withdraw from participation at any time without penalty. Ethical approval for this study was granted by the Virginia Tech Institutional Review Board.

Study Design

Photo-elicitation was utilized as a qualitative method for exploring working mothers' perception of ME.⁸³⁻⁸⁵ Photo elicitation is a participatory research technique of documenting and analyzing qualitative data on participants' lived experiences.⁸⁴ Photo-elicitation combines the techniques of participant created photographs and participant interpretations as a means of collaborating, documenting and analyzing, and, in its extension to participatory action research (PAR), using this output to produce change within participants and the community.⁸³ The benefit of using this methodology with this complicated topic is that the ownership and tangibility of the photographs give participants a way to articulate themselves through means that are not solely reliant on abstract thinking, specialized knowledge, or formalized written or verbal skills.⁸⁶ The use of a visual narrative helps participants verbalize abstract concepts, such as ME, that otherwise may be difficult to describe. Participants were asked to photograph their lived experiences, often using prompts designed to answer specific research questions. Researchers then facilitated a focus group or groups with participants, using the photographs to elicit comments, ideas, and perceptions related to the research questions. There were four 1-hour sessions. Week One was the study introduction and explanation. Week Two and Three involved the photo-elicitation with new pictures for each of those weeks. Week Four used photos from previous sessions to help participants summarize their perceptions and provide information on how to explain ME to other mothers.

At the first meeting, participants were provided with an explanation of Framson's five ME constructs (Distraction, Awareness, Environmental, Disinhibition, Emotional Response) to give them background information on the research questions.²² An overview of ME constructs was discussed each consecutive week to continue to help

mothers visualize this abstract concept. During the first week, participants were also asked to use their own Smartphone to take at least 10 pictures, which they deposited in a private web-based dropbox before the second meeting. Participants returned that second week having taken pictures of “What is mindful eating?” and “What isn't mindful eating?” For the the third week, the instructions were narrowed to take pictures of “What does mindful eating look like for your family?” and "What doesn't look like mindful eating for your family?".

During the two photo elicitation interviewing sessions, participants entered the room to find their printed photos in a folder. They were asked to reflect on the pictures they took and the main facilitator would begin discussion about how the photos exhibited ME. Probes were used to clarify participant statements and expand insight into their ideas.

At the fourth session, participant photos and statements were summarized and printed on large posters. The main facilitator used those posters to generate a discussion around the participants’ definitions, perceptions, and experiences of ME. The participants and researchers collaborated on generating themes and messages about mindful eating for mothers based on each of the previous meetings. See Appendix for the script used for each week’s focus group.

Data Analysis

A member of the research team recorded key participant statements by hand. Field notes were recorded by both the trained researcher and the main researcher. Data, including participant statements and other field notes, were coded and analyzed by the main researcher using NVivo 9 qualitative data analysis software (QSR

International Pty Ltd. Version 10, 2012).⁸⁷ An inductive coding approach was used to reflect participants' insights. Statements were coded according to Framson's²² five ME constructs (Disinhibition, Environmental Cues, Distraction, Awareness, Disinhibition) and frequency of these themes were calculated. Transcripts and notes from both photo elicitation groups were read several times to identify broad themes and categories to be conceptualized with participants in the final focus group. From there, emerging themes were confirmed and expanded on in the final focus group and relationships between participants' perceptions and identification of additional themes important to participants were documented. It should be noted that photo elicitation interviewing does not involve analysis of photograph content, as the photo is merely a visual representation of the participants' emergent ideas and perceptions.^{88,89} The nature of photo elicitation is a collaborative interaction between researcher and participant that recognizes the role of the participant as a data source and also as a data analysis resource.⁹⁰

RESULTS

One mother dropped out before the first meeting, leaving three mothers to fully participate (n=3). As all mothers were Caucasian, non-Hispanic/Latina and mothers reported similar socio-demographic characteristics. All of the mothers were employees of Virginia Tech.

Although participants received instruction on each of the five ME constructs, participants did not discuss the ME construct of "awareness," specifically organoleptic or sensory awareness. Participants did not explicitly use the term sensory awareness to describe their own or their family's mindful eating behavior,

but occasionally they did use terminology that could be ascribed to sensory awareness. For example, when probed by the main facilitator, one mother described her children's aversion to different textures in unfamiliar foods food and the ensuing discussion she has with the children about the taste of that food.

The majority of participant comments could be divided into the remaining four ME constructs, although they did not necessarily use these words: disinhibition, environmental cues, distraction, and emotional response (Table 3.1). Participants frequently cited emotional responses and environmental cues as the biggest contributing barriers to being able to eat mindfully and healthfully. Participants also frequently cited eating unhealthy foods as evidence that they were not eating mindfully, despite the researchers being careful not to give any instructions that unhealthy foods could not be enjoyed mindfully or that nutrition was an important aspect of operationalizing their definition or perception of ME. For example, when asked to clarify if ME was the ability to make healthy choices, one mother stated,

“When we first started I couldn't get the healthy out of my head, but I do have a huge emotional connection to food and now I think of not so much health, but in the moment or whatever the circumstance is surrounding it.”

When prompted to consider how ME might be used before making an unhealthy choice, one mother stated,

“Maybe the initial choice to eat unhealthy is intriguing, but once you get started you just keep going sometimes, and then it's not about the taste or anything else you're just eating to be eating.”

This statement reflects the need for more emphasis on sensory awareness in the operationalized definition of ME.

TABLE 3.1: Constructs of ME and corresponding key findings

Construct	Key Finding
Disinhibition	<p><i>“My daughter will eat until we tell her to stop.”</i></p> <p><i>“We get the largest fries you can and they fight over them and try to eat them really fast so they can eat the most.”</i></p>
Environmental Cues	<p><i>“I feel weird to order my calzone when all the guys are eating salads.”</i></p> <p><i>“A choice I make this morning is going to affect a choice I make later in the week.”</i></p>
Distraction	<p><i>“But if I’m standing while I’m cooking I think I eat more.”</i></p> <p><i>“It’s an hour to drive and I feel like I’m starving...maybe I’m not hungry but eating snacks passes the time.”</i></p>
Emotional Response	<p><i>“I feel guilty b/c I know the orange is the better choice but also b/c if I don’t eat it it will be wasted.”</i></p> <p><i>“I get an emotional high from it. I’d rather have a gift card.”</i></p>

The most common words that mothers used to describe ME were “planning”, “aware”, and “conscious”. For example, one mother stated,

“When I think of ME, I think of planning, conscious decisions – meal planning and ME are the same things to me.”

All mothers frequently described that “time” was a major factor in their ability to eat mindfully or to have mindful meals with their families. One mother stated,

“For me, mindful goes along with time - how much I have reflects whether I can be mindful or not, how much thought I can put into it. Time has a drastic impact on me at least. If I had all the time in the world, I could be very mindful about what I ate and fed my family.”

The Distraction construct was easily understood by the mothers, but again, often became tied to time with one mother stating,

“If it’s time to eat and we have other things to do then we may just grab what’s easiest, quickest, it may not be balanced, we just grab it so we can fill our bellies, and that’s not mindful.”

They also related Distraction to the size of their food portions, stating,

“Portion control was the first thing I thought of too, which goes back to, distractions around you, don’t eat while doing other things such as watching tv or driving.”

Although Disinhibition was not discussed frequently, mothers interpreted that construct to represent eating food unapologetically in social settings, especially food that may be unhealthy. One mother described Disinhibition as planning to eat a calzone at a special restaurant with her co-workers at the end of the week, the cravings she would face all week, and the excitement she would feel before devouring it in front of all her co-workers.

Emotional response to food was often described through photos of family events, like birthday parties, meal preparation, or favorite foods that were designated as “guilty pleasures”. It was also the most commonly cited construct in reference to their children. One mother described the emotional high she received when using restaurant gift cards because she would spend a lot of time planning what to order with the gift card, increasing the anticipation. Contrastingly, another mother said her emotional response was tied more to her family and her children and as she struggled to find a balance between the family’s food budget and being healthy, she often felt guilty for eating certain items. They also acknowledged that their emotional response to food was heightened when they were stressed or tired, preventing them

from being mindful of the food choices they make for themselves and also their families.

The mothers in this study often discussed the Environmental Cues in the context of their workday. They were very aware of their co-workers' perceptions of their food choices and they often tried to conceal their food choices by eating alone. One mother described how uncomfortable she felt when she ordered a large, unhealthy lunch in front of her male co-workers who were mostly eating salads. One mother had a particularly long commute and she described the restaurants she encountered were often triggers for her to want to eat, despite a lack of hunger.

CONCLUSIONS/IMPLICATIONS

This study aimed to explore working mothers' experience and understanding of ME in order to frame the concept in an intervention. The original hypothesis that mothers (lay audience) would not recognize existing ME terms was confirmed, as they typically used their own words, like "conscious" or "awareness", to describe ME. Although mothers frequently discussed disinhibition, environmental cues, distraction, and emotional response to food, they rarely discussed sensory or organoleptic awareness. The results highlight two important findings. The participants did not see a connection between sensory awareness and eating occasions, but participants do identify with the additional core constructs of ME. These results could be used as an important focus for future research and interventions, such as:

- Developing interventions around the core constructs most widely identified by mothers

- Using identified constructs as a valuable tool for mothers to help their children develop healthy taste preferences and relationship with all foods.
- Using identified constructs as tool to aid mothers in developing healthy ME habits themselves
- Developing curricula with identified ME constructs for potential use by Cooperative Extension

Activating sensory awareness may be an important component of re-establishing the sensations of hunger and satiety necessary for superior food intake regulation.^{65,91} In one study, women who received a sensory-based intervention significantly increased the terminology used to describe hearing, taste, and smell and they displayed significant changes in their reliance on internal hunger and satiety cues.⁹¹ It should also be noted that in the development of the MEQ, Framson found that organoleptic awareness (awareness of the senses) is incredibly similar to affective sensitivity (awareness of internal states), thus creating one category for both, Awareness.²² To our knowledge, other studies have not explored the differences between organoleptic awareness and affective sensitivity in regards to ME. Future research should investigate the importance of the senses in ME practice and how sensory awareness may differ from affective sensitivity. Interventions that focus solely on decreasing mindless eating or distraction and limiting use of food in response to emotions or environmental cues may be missing an important component of ME and should strive to include sensory awareness in their programs.

The small sample size was one considerable limitation in our study and future studies should try to replicate and expand on the results here by conducting similar

studies with a larger and more diverse sample of mothers. The operationalized definition of ME could vary significantly by culture, race, ethnicity, or other socio-demographic variables and so a more diverse sample of mothers could provide better insight on those nuances. Strengths of this study include the unique photo elicitation methodology, which provided participants with a way to make an abstract concept like mindfulness more concrete and tangible through use of photography. It added to the definition of ME and made further progress on operationalizing this concept for feasible, accessible interventions and programs. This study highlighted an important gap in how mothers define or experience mindfulness in their lives without sensory awareness. It also revealed that mothers are frequently thinking about time efficiency in regards to their own eating and also child feeding practices, so future interventions should design programs with that in mind.

Chapter 4

The Mindful Eating Scale is not predictive of maternal dietary quality or psychological stress

ABSTRACT

Mindfulness is a concept growing not only in popularity within the nutrition field, but also in evidence for its relationship to eating behavior and stress. To date, most studies have relied on general mindfulness measures to examine mindful eating behaviors. Two mindful eating-specific measures have been created and validated in specific populations, the Mindful Eating Questionnaire and the newer Mindful Eating Scale (MES). The purposes of this study were: 1) to advance understanding of the relationship between mindful eating, stress, and eating behaviors or diet quality with mothers; and 2) to examine the underlying patterns of mindful eating as measured by the MES using exploratory factor analysis. Mothers in Southwest Virginia completed a 24-hour dietary recall, and self-reported measures of stress and eating behavior, in addition to the MES. Four saliva samples were collected within one 24-hour period and analyzed for cortisol content. The final sample included 64 mothers. Statistical analyses showed a statistically significant negative correlation between the MES and eating behaviors, lending credibility to the MES's alignment with the measurement of dysfunctional eating behaviors. Exploratory factor analysis revealed six latent factors, similar to previous factor analysis of the MES. Although there were few statistically significant associations between the MES, other measures, and socio-demographic variables in this study, future studies should recruit larger and more diverse samples.

INTRODUCTION

Mindfulness has shown increasing importance in health and wellness interventions over the last decade.⁴⁰ Mindful eating (ME) is an intentional non-judgmental awareness of hunger and satiety, taste, food selection and preparation, making it a unique and popular application of mindfulness in nutrition and health research.^{22,51} Recently, mindfulness has been suggested as a strategy for improving weight loss and weight maintenance outcomes^{57,59-61}, chronic disease management⁹², and stress-related eating behaviors.^{62,93}

Although there is substantial evidence for the use of other mindfulness-based programs (e.g. Mindfulness-Based Stress Reduction) for effectively managing stress and some chronic diseases, there is a shortage of quality nutrition studies using ME and outcomes have shown only modest or inconsistent success for the application of mindful eating to weight loss or eating behaviors.^{58,67} Often, general mindfulness measures used to determine dispositional mindfulness or mindfulness skills are used in ME interventions.^{52,56,63,66} Using these measures assumes that participants have translated general mindfulness skills into their everyday life activities and ignores the nuances of mindfulness that apply specifically to eating. As Hulbert-Williams et al points out, these measures are unable to detect whether or not the respondent's mindfulness skills have been generalized across all domains and behaviors of their life, including eating behaviors, or if instead, they are only mindful for the behavior being asked about in each question (e.g. bathing, shopping, caretaking for others).⁴⁴ As a result, high quality self-report ME measures are critical to understand the particular role of ME in diet, health, and weight.

The Mindful Eating Questionnaire (MEQ) was developed using researchers' hypothesized domains of mindful eating.²² The preliminary item pool was then tested with a predominantly white, female, highly educated population (n=303). The final item pool consisted of 28 items based on 5 domains of ME: Disinhibition, Awareness, External Cues, Emotional Response, and Distraction. The MEQ showed a negative association with BMI and a positive association with yoga practice. While this is evidence of its construct validity, it is severely limited by the uniform convenience samples used in testing the MEQ. It is possible that the MEQ is not appropriate for use in general populations or as sensitive with more diverse samples. Critics of the MEQ also cite the absence of non-judgmental or awareness subscales, both constructs that could be especially influential in regard to certain eating behaviors.

As a response to the limitations of the MEQ, the Mindful Eating Scale (MES) was developed using factor structures gleaned from well-researched general mindfulness measures and standard definitions of mindfulness.⁴⁴ An exploratory factor analysis generated six factors compared to the MEQ's four: Acceptance, Awareness, Non-reactivity, Act with Awareness, Routine, and Unstructured Eating. The final pool of items was tested with 127 female university students. Positive correlations were found with the general mindfulness measures and an inverse relationship was seen with eating disorder symptoms. While this measure may possess adequate psychometric properties, it also suffers from a lack of diversity in the sample used for validation. The MES warrants additional studies to confirm its psychometric properties, although promising in the rigor used in its development.

The goals of this study were two-fold: 1) to examine the relationships between mindful eating, perceived stress, cortisol, and maternal dietary behavior and weight

status; and 2) to examine the underlying patterns of mindful eating within a broader population of mothers than has been previously studied in ME research.

METHODS

Study design and sample

This study used data collected in rural and urban areas of southwest Virginia. A concerted effort was made by the researchers to solicit participation from mothers with a broad range of demographics and socioeconomic backgrounds. Therefore, the sample was recruited using a variety of strategies such as emailing to working mother list-servs and other leaders of mother-specific groups local to southwest Virginia, advertisement of open data collection times, and group recruitment presentations. Recruitment included faith-based Mothers of Preschoolers (MOPS) groups, graduate students at a university, members of a health and fitness facility, employees and mothers of participants at a Total Action for Progress-Head Start preschool, and other local area childcare centers.

Participants were included if they were 18 years of age or older and had at least one child of any ages less than 18 living in their home. Participants were excluded if they were pregnant or breastfeeding, had been diagnosed with an eating disorder during the last five years, or were participating in a structured weight loss or diet program.

Generally, data were collected in group community settings where researchers set up computer banks for two or three-hour periods when participants could “drop-in” and complete the survey data. Participants were instructed to return frozen saliva samples within one week during specified drop-off times.

Measures

ASA-24

Each participant completed the National Cancer Institute's (Bethesda, Maryland) Automated Self-Administered (ASA-24) web-based 24-hour dietary recall.⁹⁴ All eating occasions and beverages for a period of 24 hours prior to completing the recall were recorded, including detailed information about food preparation, portion sizes, eating with others, and eating while using television or computers. Researchers were present to answer questions and help with technical questions. The ASA-24 uses an automated multi-pass method, modeled on the Automated Multiple Pass Method (AMPM) used in National Health and Nutrition Examination Surveys (NHANES). The ASA-24 has demonstrated similar results to AMPM and is significantly more cost-effective than traditional 24-hour recalls with trained interviewers.⁹⁵

Participant dietary records were converted into Healthy Eating Index-2010 (HEI-2010) scores. The HEI-2010 is a scoring metric used to assess dietary quality and compliance with U.S. Dietary Guidelines for Americans (DGA). The HEI-2010 has been validated and found to be reliable compared to previous versions of HEI, as well.⁹⁶ In order to calculate HEI-2010 scores, participants' dietary recalls are analyzed for 10 components: total fruit (including 100% fruit juice), whole fruit (not juice), total vegetables, dark green/orange vegetables and legumes, total grains, whole grains, milk, meat and beans, oils, saturated fat, sodium, and calories from solid fat/alcohol/added sugars (SoFAAS). Participants are assigned points based on the amount they consumed from each category and there is a total of 100 points possible, indicating a diet that perfectly aligns with the DGA. Lower scores indicate

poorer dietary quality.

Perceived Stress Scale

The PSS was first published in 1982 and is used to measure psychological stress. It has the ability to predict both objective biological markers of stress and increased risk of disease as levels of perceived stress increase. The PSS has been validated in multiple adult populations, mainly college students and adult workers.⁹⁷ The 10-item measure asks the participant general questions about their stress over the last month. Four of the 10 items on the PSS are reverse-scored and then summing across all items provides a total score. Higher scores indicate higher levels of perceived stress

Three-Factor Eating Questionnaire

The Three-Factor Eating Questionnaire-Revised 18 consists of 3 scales corresponding to cognitive restraint, emotional eating, and uncontrolled eating.⁹⁸ It was revised to contain only 21 items from the longer version with 51 and then again to 18 items for the TFEQ-R18. Although the TFEQ-R18 scales were derived in obese subjects, factor analysis of the TFEQ-R21 conducted in an adult sample indicates that the instrument is valid also in nonobese individuals and has been validated in the general population, as well.^{98,99} Each item is summed for subscale scores and then for a total score, as well. Higher scores indicate more dysfunctional eating patterns.

Mindful Eating Scale

The Mindful Eating Scale was initially validated in a sample of 127 university students, predominantly female and white.⁴⁴ It is a relatively new measure of mindful eating and has not been widely validated, but using previous measures of mindfulness and widely evidenced domains of mindfulness in its design is considered to be an improvement on alternative mindfulness measures. This measure consists of 28 items that ask participants about six domains: acceptance, awareness, non-reactivity, unstructured, and distractibility. See Appendix for scoring information and to see how each item is coded according to these six domains. Several of the questions are reverse scored and items are summed to give a total score. Higher scores indicate more mindful eating styles and maximum score is 112.

Cortisol

Participants were asked to collect four 1.8mL samples of saliva using the passive drool technique during a 24-hour period at specified time-points (8AM, 12PM, 4PM, 8PM). Participants were instructed to choose a day that was an ordinary day for them in regards to expected stress levels. They were also instructed to avoid eating, drinking, or exercising vigorously directly before collecting samples. Salimetrics Lab (Carlsbad, California) analyzed each sample individually for its cortisol content twice and then each time-point was averaged. Since the diurnal cycle of salivary cortisol normally decreases steadily after waking, the change in cortisol from 8AM to 8PM was calculated for use in statistical analysis.

Weight/Height

Weight and height were collected from each participant and body mass index (BMI) was calculated and categorized following CDC guidelines.¹⁰⁰ Weight was collected using a digital scale in light street clothing and no shoes. Height was collected without shoes on a standard stadiometer.

Consent & Ethical Approval

All mothers were provided with detailed explanations of the study objectives and procedures and gave their written informed consent to participate. Confidentiality of information was warranted and guaranteed. Participation in the study was voluntary and they could withdraw from participation at any time without penalty. Ethical approval for this study was granted by the Virginia Tech Institutional Review Board.

Data Analysis

Statistical analyses were performed using statistical software R (R Foundation for Statistical Computing, Vienna Austria). Descriptive statistics were computed for socio-demographic factors, HEI score, and all measures, including cortisol. To measure associations between the different measures and socio-demographic characteristics, Pearson correlation coefficients were calculated and corresponding tests were conducted (significance level =0.05) for quantitative variables. Analysis of variance (ANOVA) method was used for investigating the relationship of measures and variables.

Exploratory factor analysis was used to explore the domains of mindful eating relevant to this particular population. This approach allows for exploring the

underlying latent structure of the variables based on subjects' responses, without a priori hypotheses about the data. To find the latent structure, we used the principal component method with promax rotation. In order to determine threshold of loadings, all absolute value of loadings were plotted and examined for a visual cutoff point that would imply there were two groups of loadings (those that loaded vs. those that did not load)¹⁰¹⁻¹⁰³ Based on this plot, a threshold of 0.55 was chosen and applied to determine which items loaded to which factor. The Kaiser-Meyer-Olkin (KMO) measurement of sampling adequacy was used as an indication that a factor analysis was appropriate. A KMO value of more than 0.50 was considered acceptable.¹⁰⁴

RESULTS

Participants

The total sample of participants who participated in survey collection was $n=64$ and mothers who provided full records (both survey measures and returned saliva samples) was $n=53$.

The socio-demographics of the study population are shown in Table 4.1. Although the sample is made up of predominantly White/Caucasian mothers, the sample could be described as broad, with 12 Black/African-American participants and 2 Hispanic/Latina participants. Other demographics also contribute to the presentation of diversity in the sample. For example, 48% of the mothers reported participating in food-assistance programs like the Supplemental Nutrition Assistance Program (formerly food stamps), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) or the National School Lunch Program. There

were also two distinct locations where participants resided, with 22% living in an urban setting and 77% living in a rural setting.

Table 4.1: Socio-demographic characteristics of the sample

Factor		n(Percentage*)
Race	White/Caucasian	40 (76.9)
	Black/African-American	12 (23.07)
Ethnicity	Hispanic/Latino	2 (4.1)
	Non-Hispanic/Non-Latino	47 (95.9)
Educational Attainment	High School	3 (5.55)
	Trade or Vocational School	2 (3.70)
	Some College	19 (35.18)
	Bachelor's Degree	15 (27.77)
	Master's Degree	14 (25.92)
	PhD	1 (1.85)
Income	<\$10,000 - \$20,000	8 (14.8)
	\$20,001 - \$40,000	15 (27.77)
	\$40,001 - \$60,000	12 (22.22)
	\$60,001 - or more	19 (35.18)
Nutrition Assistance Programs	WIC	6 (11.11)
	SNAP	10 (18.50)
	Head Start	7 (12.96)
	FR-School Lunch/Breakfast	8 (14.81)
Number of children	None	33 (61)
	1	10 (18.50)
	2	26 (46.29)
	3	12 (22.22)
	4 or more	6 (11.11)
Location	Urban	12 (22.22)
	Rural	42 (77.77)

*Percentage calculated without non-responses

Relationships between measures and socio-demographics

The median, range, mean, and standard deviations for all measures are presented in Table 4.2. As expected, most participants had cortisol levels considered physiologically normal.^{105,106} No statistically significant associations were seen between age, marital status, educational attainment, income, or geography and the

given measures. See Table 4.3 for the significant correlations that were found for both number of children and race with the given measures.

Table 4.2: Characteristics of participant scores on survey measures

Measure	Median	Range	Mean (S.E.)
PSS	21	8 - 30	19.74 (5.24)
HEI	48.5	18.7 - 84.9	47.82 (14.40)
MES	80	52 - 101	80.62 (10.07)
TFEQ-R18	42.5	23 - 58	41.11 (8.36)
Cortisol	8AM: 0.262 12PM: 0.1185 4PM: 0.109 8PM: 0.0595	8AM: 0.0485 - 0.928 12PM: 0.0165 - 0.8865 4PM: 0.0225 - 0.995 8PM: 0.0205 - 1.089	8AM: 0.311 (0.207) 12PM: 0.148 (0.139) 4PM: 0.133 (0.147) 8PM: 0.110 (0.176)

Mindful eating and eating behavior

The MES and TFEQ-R18 were significantly negatively correlated ($r=-0.689$, p -value <0.000). This correlation was even stronger for the TFEQ-R18 subscale of ‘uncontrolled eating’ ($r=-0.722$, p -value <0.000). There were also significant correlations seen between the MES and the TFEQ-R18’s other subscales, emotional eating ($r=-0.534$, p -value <0.000) and cognitive restraint ($r=-0.344$, p -value $=0.029$). Compared to mothers who had only one child, those who had two children had significantly higher scores on the MES ($p=0.016$) (see Table 4.3). No association was seen for those who had three or more children. In the ‘uncontrolled eating’ subscale of the TFEQ-R18, mothers with two children scored significantly lower than mothers with only one child ($p=0.003$). No association was seen with mothers who had three or more children. Black mothers scored lower on the TFEQ-R18 than White mothers ($+3.429$, $p=0.04$), indicating less self-reported dysfunctional eating behaviors in Black mothers.

PSS

Mothers who reported higher levels of perceived stress on the PSS had fewer children ($p < 0.012$).

Table 4.3: Significant correlations found among measures and socio-demographic variables

Socio-demographics	PSS	MES	TFEQ-R18 (total)	Uncontrolled Eating	HEI	BMI	Cortisol
Number of children	-0.379 (0.012)	+9.365 (0.016)	ns	-6.933 (0.003)	(0.043)	ns	ns
Race	ns	ns	+3.429 (0.004)	ns	ns	ns	ns

Note: R value is listed first and p-value is given in parentheses. Blue text is the mean difference in scores.

ns=not significant at 0.05 level.

Note: Other socio-demographic variables were used in analysis of measures, including marital status, age, geography, poverty level, income, and education level. Additionally, cortisol was analyzed for associations with all measures and socio-demographic variables. No significant effects were seen between any of these variables and measures, and thus were not included in this table.

Exploratory factor analysis

The results of the EFA are compiled in Table 4.4. The KMO factor adequacy was 0.54, exceeding the established threshold. By examining the scree plot, there were six latent factors accounting for 56.6% of the cumulative variance. Factor 1 accounted for 14.1% of the variance, factors 1 and 2 24.6%, Factors 1, 2, and 3 34.5%, Factors 1 through 4 42.4%, Factors 1 through 5 49.8%. The color-coding denotes those variables that were above 0.55 eigenvalue loading values. Some questions did not reach the 0.55 loading threshold and they are coded in orange text.

TABLE 4.4: Factor loadings of participant responses on Mindful Eating Scale items

ITEMS	Acceptance	Routine	Unstructured	Non-	Awareness	Distractibility
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				reactivity		
I eat at my desk or computer	-0.269	0.014	0.551 ²	0.126	-0.047	-0.079
I need to eat like clockwork	-0.202	0.121	-0.232	0.947	0.01	0.015
I eat the same thing for lunch each day	-0.184	0.852	-0.12	-0.08	0.136	0.079
I multitask whilst eating	-0.176	-0.218	0.68	0.15	-0.059	0.223
I eat between meals ¹	-0.13	-0.054	0.253	0.185	0.028	-0.441
I have a routine for what I eat	-0.112	0.848	-0.253	0.23	0.09	0.073
I notice how my food looks	-0.07	0.022	0.196	-0.104	0.476	-0.271
I notice the smells and aromas of food	-0.057	0.156	-0.135	-0.018	0.78	-0.031
I eat the same thing on the same day of each week	0.006	0.583	0.215	-0.059	-0.065	0.12
I stay aware of my food whilst eating it	0.013	-0.3	0.034	0.035	0.453	0.305
I notice flavours and textures when I'm eating my food	0.034	0.085	-0.056	0.036	0.758	0.056
Once I've decided to eat, I have to eat straight away	0.04	0.055	0.184	0.439	-0.053	0.031
I can tolerate being hungry for a while	0.05	0.022	0.12	0.607	0.201	-0.178
I eat something without really being aware of it	0.089	0.274	0.446	-0.209	-0.101	0.592
I have a routine for when I eat	0.121	0.709	-0.295	0.156	-0.007	0.046
I don't pay attention to what I'm eating because I'm daydreaming, worrying, or distracted	0.123	-0.006	0.366	0.142	0.269	0.426
I snack when I'm bored	0.153	-0.296	0.786	-0.194	-0.078	0.015
I become very short-tempered if I need to eat	0.297	0.058	0.092	0.549	-0.195	-0.048
When I get hungry I can't think about anything else	0.327	-0.069	0.073	0.297	-0.17	0.032
I eat automatically without being aware of what I'm eating	0.434	0.078	0.376	-0.033	0.28	0.106
I snack without being aware of what I'm eating	0.473	0.053	0.143	0.028	0.024	0.654
I tend to evaluate whether my eating is right or wrong	0.49	0.433	-0.024	-0.146	0.069	-0.162
I criticise myself for the way I eat	0.573	0.003	0.196	0.05	0.025	0.195
I tell myself I shouldn't be eating what I'm eating	0.59	0.021	0.534	-0.248	-0.046	0.006

I wish I could control my hunger	0.653	0.018	0.051	0.047	-0.177	0.23
It's easy for me to concentrate on what I'm eating	0.687	-0.147	-0.245	0.032	0.334	0.141
I wish I could control my eating more easily	0.69	0.042	-0.028	0.043	-0.028	0.537
I tell myself I shouldn't be hungry	0.877	-0.242	-0.233	-0.054	-0.082	0.013

¹Items that did not reach the 0.55 eigenvalue threshold are indicated in orange text

²Items that reached the 0.55 eigenvalue threshold are coded in a color based on which factor they loaded onto satisfactorily.

DISCUSSION

The present study demonstrates a clear relationship between the MES and the TFEQ-R18 in a broader sample of mothers compared to previous ME studies. This confirms that using the MES in studies measuring eating patterns like those in the TFEQ-R18 is appropriate.

The MES is a relatively new measure that has not been validated across diverse audiences and age groups. The sample in the previous validation study was predominantly female, white, and mature British university students, many of whom had received college degrees and were living with partners, but did not have any children.⁴⁴ Our study was singularly female and predominantly white American women who all had children, varying in age. But, there was greater variation in other socio-demographic characteristics. Namely, our sample had greater variation in age, race, and number of children, but their study had a larger sample size that included men. Similar findings in the factor analysis and patterns were noted across these two samples with the MES, so the study presented here provides additional confirmation of the validity of the MES with adult female Caucasian populations that are primiparous or multiparous. Additional studies are warranted to confirm the validity of the MES with greater racial, ethnic, and gender diverse populations.

In our exploratory factor analysis, some of the questions did not load satisfactorily onto any of the six factors, as with the original MES testing. This could be due to redundancy (see “I eat automatically without being aware of what I’m eating”=no loading value > 0.55; and “I eat something without really being aware of it=0.592). The lack of loadings could also be that some of the questions may be loading to a different factor, beyond the six established by this factor analysis. There did not appear to be any obvious commonalities, however, with the group of items that did not load sufficiently to any of the six factors.

Overall, the factor analysis did show, however, that the questions in this study loaded similarly to the previous factor structure identified by Hulbert-Williams.⁴⁴ All questions that reached the 0.55 threshold were clustered in the same way that their exploratory factor analysis clustered with the six domains of acceptance, routine, unstructured, non-reactivity, awareness, distractibility.

As our samples were different in many ways from the previous validation study, the similar results in our factor analyses suggest the MES may demonstrate good psychometric properties with a wider variety of populations. However, the limited statistically significant findings between the MES with measures beyond the TFEQ-R18 or socio-demographic variables may suggest otherwise. Our hypothesis that the MES would be associated with socio-demographics, anthropometric characteristics, and diet quality was not substantiated here. However, as noted by the authors of the MES,⁴⁴ there is some debate as to the extent to which mindfulness can even be measured.^{107,108} Many individuals are not familiar with the concept of mindfulness and are inexperienced with identifying mindful behaviors or thoughts in daily life. This could lead to personal interpretations of the questions on mindfulness

measures, resulting in unreliable reporting of behavior. It may be uniquely difficult to recognize and reliably report mindfulness in the context of eating, if an individual has never observed their thoughts surrounding food. This could also partially explain why some of the questions did not load onto one of the six factors seen here.

Mean HEI score for mothers in this study (47.82) is slightly lower compared with other studies of U.S. adults that found mean scores of 52.7 and 58.1 for women.^{96,109} In our sample, sixteen mothers received SNAP and/or WIC benefits and evidence shows that low-income families tend to have poorer diet quality, which may partially explain the lower than average mean HEI score.¹¹⁰

Number of children also seemed to be related to self-reported stress. Mothers with less children reported less stress than those with more children. This is expected, given the very likely increase in responsibilities that accompanies having more than one child in a family. The Perceived Stress Scale asks mothers questions about coping with “all the things they have to do” and how often they were on top of things, so an increase in children would logically produce an increase in responsibilities and commitments and in turn, perhaps increase stress. Additionally, mothers who have more children tended to be older in this study and previous studies show that older mothers have more resources (economic and social), thereby possibly contributing to lower levels of stress.¹¹¹

White/Caucasian mothers scored higher on the TFEQ-R18 than Black/African-American women, suggesting a relationship between unhealthy eating behavior and race. Previous studies have confirmed the TFEQ’s validity with both White/Caucasian and Black/African-American populations.^{112,113} The findings here are consistent with

other studies that find African-American women report less eating disorder risk symptoms than White/Caucasian women.¹¹²

Unlike previous studies, the present study did not find correlations between variables like perceived stress and cortisol^{114,115}, or socio-demographic variables and stress¹¹⁶ or cortisol.¹¹⁷ Saliva samples were collected four times within one 24-hour period for this study, attempting to make the study protocol more feasible for this population. Ideally, two or even four 24-hour periods of saliva collection would have allowed for a more robust analysis.^{62,118} The lack of correlation between stress and cortisol could also be attributed to the subjective nature of the perceived stress measure. Finally, it should be noted that there are documented caveats to using salivary cortisol as a measure of HPA-axis activation and the absence of covariance between perceived stress and salivary cortisol can be reasonably expected.¹¹⁹ Future studies should use a larger participant sample size and multiple or real-time perceived stress records to provide a more robust description of participant behavior and perception patterns.

The study also did not find associations between socio-demographic variables and BMI¹²⁰⁻¹²² or BMI and dietary quality,^{123,124} which runs counter to findings from other studies. In regards to diet quality, this could be due to underreporting of high-fat, high-carb foods, resulting in non-representative HEI scores.¹²⁵ Additionally, in the regions where the majority of our sample was recruited, there are very small percentages of racial and ethnic groups beyond Caucasian/Non-Hispanic, so the typical associations seen in larger samples with more profound racial and ethnic divides in other regions may not have been present. While a majority of mothers in our sample were from locations considered rural, many of them resided in a town

less typically rural (e.g. more food purchasing outlets, less food insecurity, more public transportation, less isolation, etc.).¹²⁶ This could contribute to the lack of expected associations among socio-demographic variables, BMI, and dietary quality in this study.

The present study expanded on current ME research by testing associations with a more diverse population than is typically seen in mindfulness-based studies. Most of the existing ME literature has been tested in predominantly white, middle to upper-class, educated women.¹²⁷⁻¹²⁹ Although our sample was predominantly white and female, there was a broader mix of socio-demographics like geography, socioeconomic status, and race than previously studied or reported and the researchers made concerted efforts to recruit a more diverse sample of mothers. Future studies investigating these relationships should continue to recruit racially, ethnically, and socioeconomically diverse populations to increase generalizability.

This study had several limitations. The sample size was relatively small and a larger number of participants would be required to see more significant relationships. Although the ASA-24 provided advantages for collecting dietary data in community settings, there were often substantial technological difficulties using it. Additionally, only one dietary recall was collected from each participant in an effort to reduce participant burden, making it impossible to provide evidence on dietary patterns. Finally, there is a lack of consensus on appropriate data analysis techniques with cortisol that make it difficult to confidently report results. With community-based research, it is possible for collection error with the saliva samples since participants were required to collect and store them without supervision from the research team. Previous clinical studies were identified as a guide for developing the cortisol

collection protocol used here, but this was a preliminary use of this test in community settings. Still, there is a lack of consensus on the appropriate analysis of salivary cortisol, in addition to growing evidence that suggests salivary cortisol may not be the most efficacious biomarker for testing HPA-axis activation in adults.^{130,131}

CONCLUSIONS & IMPLICATIONS

The MES is an important step forward in the development of ME-specific measures. This study contributes to the further validation of the MES by demonstrating a relationship to other well-validated eating behavior measures and marked similarities to previous factor analysis of the MES.⁴⁴ Although the results of our factor analysis support the use of the original factor structure, there were some questions that did not load satisfactorily. Future research should provide more insight into the usefulness of each question and its relation to the factor structure defined by Hulbert-Williams.⁴⁴ Future studies could administer the MES to large, diverse groups of respondents using an in-person or phone interviewer format and concurrently collect data on how the questions are being perceived and use that probe data to revise the MES.

The results in this study highlight important directions for future research. Namely, recruiting a larger sample size will increase statistical power and the field of ME would greatly benefit from a more diverse study population in the development of ME-specific measures. Larger studies will likely be more successful in collecting more frequent measures of self-reported stress, biomarkers, and dietary quality.

CHAPTER 5

The Slow Down Program: A mindfulness-based stress management and nutrition program for mothers of young children

Abstract

Objective:

To determine the impact of a mindfulness-based stress management and nutrition program, the Slow Down Program (SDP), on mothers' eating behavior, stress, and child feeding practices

Target Audience:

Mothers of young children, under the age of five

Theory, Prior Research Rationale:

The SDP is based upon the neuropsychological model of obesity that addresses the relationship between psychological stress and eating, which has not been adequately tested in behavioral interventions, in contrast to the energy model of obesity.

Description:

The SDP was a four-week program designed to help mothers develop a toolbox of mindfulness-based skills to manage stress, practice mindful eating behaviors, and learn about healthy eating for themselves and their families. The SDP uses skills-based experiential meditations, goal setting, and facilitated dialogue. Participants (n=19) were mostly White, educated mothers, living in southwest Virginia. Results

showed statistically significant decreases in participants' trans fat intake and perceived stress and increases in self-efficacy.

Conclusions & Implications:

Participants reported that the SDP facilitated behavior change and self-efficacy in mothers for practicing mindfulness, managing stress effectively, and eating healthfully. Additionally, the benefit of having safe, nonjudgmental opportunities to share personal stories and challenges assisted with stress reduction. Nutrition education programs for adults should incorporate stress reduction and mindfulness to support whole health, in addition to nutrition.

INTRODUCTION

In a response to decades of rising obesity prevalence in U.S. adults, and increasingly, children, the public health system has heightened its focus on body weight issues.¹³²⁻¹³⁴ One of the main contributors to overweight and obesity is an individual's eating behaviors, which are a primary determinant of their overall dietary quality.^{135,136} Often, poor eating behaviors from childhood persist into adolescence and adulthood, creating the increased risk of overweight, obesity, and obesity-related chronic disease with aging.⁸² With this growing prevalence, new targets for intervention and prevention need to be identified and investigated.

The home environment is particularly instrumental in shaping food preferences and eating behaviors, especially in young children.^{76,137} Despite more recent changes in the American family structure, mothers are often still the 'nutritional gatekeeper' of the home, making the majority of feeding decisions in the

household.^{81,82} The first five years of life are a critical developmental period where the majority of taste preferences are formed.⁸² Moreover, early motherhood can be an important intervention point for behavior change.¹³⁸

Research demonstrates a strong relationship among maternal dietary quality and eating behaviors and their children's.^{76,82,139} For example, a 2011 study by Fisk et al measured dietary patterns of mothers and their 3 year-old children.¹⁴⁰ They found that the more mothers' diets complied with typical 'prudent' dietary guidance (e.g. less sweets, more fruits and vegetables), the more their children's did also, regardless of other socio-demographic characteristics like educational attainment, BMI, or screen time.

Compared to fathers, mothers report higher levels of stress and a belief that they are not doing enough to manage stress.^{141,142} Importantly, they also more frequently report eating too many unhealthy foods, laying awake at night, and other physical symptoms like headaches, depression, anxiety, and feeling like they could cry.¹⁴¹ Women consistently report significantly higher levels of stress than men.^{141,142} Women often experience greater struggles with stress eating and stress-related emotional eating than men.^{143,144} Likewise, women also tend to consume more food during stressful experiences, especially foods higher in fat and sugar, which may contribute to a higher risk for overweight and obesity.^{143,145} Parents of overweight and obese children often report higher levels of social, financial, and parenting stress.¹⁴⁶⁻¹⁴⁸ In contrast to other types of stress, maternal stress may have a distinct connection to a child's obesity risk.¹⁴⁹ One recent review and meta-analysis of cross-sectional and longitudinal data found that higher maternal stress altered parenting behaviors like meal preparation and parent sensitivity to attachment bond, reducing

children's ability to utilize or learn self-regulation skills.¹⁴⁹ The association between maternal stress and child Body Mass Index (BMI) appeared to be stronger during toddler years, as compared to infancy.¹⁴⁹ Additionally, Gundersen et al found an association between children's weight and maternal stress in food secure, low-income U.S. households.¹⁵⁰ Although the relationship between maternal stress, eating behaviors, and child BMI has been widely demonstrated in cross-sectional data, presently, to the best of our knowledge, there have been no nutritional interventions specifically attempting to affect maternal stress and dietary behavior.

Due to the abundance of studies showing that programs like Mindfulness-Based Stress Reduction (MBSR) can reduce stress^{11,13}, mindful eating (ME) seems a compelling solution for problematic stress-related eating behaviors that negatively affect dietary quality, such as emotional or uncontrolled eating. Cross-sectional data show that higher scores on mindfulness and ME measures are associated with lower BMI, smaller portion sizes of energy-dense foods, and less disordered eating patterns.^{127,128,151,152} Moreover, a number of studies have demonstrated the use of mindfulness-based interventions on eating behavior and diet, especially with women, but none have targeted mothers of young children.^{57,58} Only one existing study reported on the effects of a mindfulness-based intervention on women's diet and stress.⁶²

The present study was a mixed-methods pilot test of a mindfulness-based stress management and nutrition program for mothers of young children, titled the Slow Down Program (SDP). Primary objectives were to increase mothers' mindfulness and dietary self-efficacy and decrease perceived stress and salivary cortisol.

Additional goals for the SDP included measuring behavior changes related to improving diet, child feeding strategies, and mindfulness practice.

METHODS

Participant recruitment and selection

Participants were recruited in a university town in rural Virginia. Recruitment methods included working mother email list-servs, graduate student email list-servs, web-based and email campus announcements, and records of previous study participants. None of the recruitment materials contained the word ‘mindfulness’; instead, the program was advertised as a stress management and healthy eating program. Mothers were included if they were at least 18 years of age or older and had one child aged 5 or younger living in their home. They were excluded from participation if they were pregnant, breastfeeding, participating in a structured weight loss or diet program, or had been diagnosed with an eating disorder in the last five years.

Participants were verbally or virtually screened for eligibility before baseline data were collected. The intervention took place in two waves, one held in June 2015 and another held in September/October 2015. The first wave had a total of 13 mothers participate and in the second wave there were six mothers (n=19). One mother was dropped from the first wave at the conclusion of the program for failure to attend a minimum of three out of four program sessions. She was not asked to participate in the focus group or interview. Two mothers out of the entire study (one from each wave) did not participate in the interview. One mother revealed she

became pregnant during her interview (after the focus group), so her interview was not used in analysis.

Consent & Ethical Approval

All mothers were provided with detailed explanations of the study objectives and procedures and gave their written consent to participate in advance of any data collection. Confidentiality of information was warranted and guaranteed. Participation in the study was voluntary and they could withdraw from participation at any time without penalty. Ethical approval for this study was granted by the Virginia Tech Institutional Review Board.

Theoretical Framework

The Slow Down Program (SDP) was developed using previously published intervention research and alternative MBSR-based programs, including Kristeller's Mindfulness-Based Eating Awareness Training (MB-EAT).^{153,154} Fishbein's Integrated Model (IM) of behavior guided the framework of the SDP's weekly session activities.¹⁵⁵ This model is a combination of primary constructs of four widely used behavior change theories: Social Cognitive Theory, Theory of Reasoned Action, Theory of Planned Behavior, and the Health Belief Model. The premise of the IM is that these other theories have measured very similar constructs, just utilizing different names, and that only a select set of constructs from these theories needs to be considered to predict and understand behavior.¹⁵⁶ The IM includes behavior change constructs related to social norms, attitudes, self-efficacy, and behavioral intention. Table 5.1 has information on how our intervention components aligned with IM constructs. In

an effort to acknowledge the existing strengths and expertise of the participants, a facilitated dialogue approach was used. This approach, led by a facilitator, encourages participants to share their own experiences and recognizes everyone present as equals, avoiding the teacher/student hierarchical relationship.¹⁵⁷

Table 5.1: Integrative Model of Behavior constructs and intervention components

Integrative Model of Behavior Constructs:	Intervention Component:
INTENTION	SMART Goals and Action Plan
ATTITUDES TOWARDS ACTION	Program skills practice in-session
DESCRIPTIVE NORMS (perceived prevalence & acceptability)	By observing other mothers in the group and also continuing practice of skills at home with family members, the perceived prevalence and acceptability of using mindfulness-based stress management techniques will increase. Mothers will begin to see that others are accepting of MB techniques.
INJUNCTIVE NORMS (perceptions of other's expectations)	Mothers may indicate that they consider people like them or people they want to be like are skilled at managing stress or skilled at eating healthy and this may be an encouragement to their engagement in the program.
BEHAVIORAL BELIEFS COST-BENEFIT/OUTCOME EXPECTANCIES	Mothers may indicate changes in their beliefs about the value or outcomes of using mindfulness-based stress management from beginning to end. They may indicate changes in beliefs about nutrition and the value of eating healthy food and only when hungry.
SELF-EFFICACY	Program skills practice in-session
SKILLS	After introduction by researcher, skills will be practiced during sessions
ENVIRONMENTAL FACTORS	Environmental constraints and triggers will be discussed during group sessions, participants will work to identify ways to better cope or prepare for triggers.

The research team hypothesized the following:

1. Mothers will show increased self-efficacy for mindfulness skills, managing parenting stress, identifying hunger/satiety, eating healthily, and feeding their children healthfully
2. Mothers' cortisol levels and PSS scores will decrease
3. Mothers will engage in less emotional, uncontrolled eating behavior
4. Mothers will identify goals and work to achieve/sustain positive dietary behavior change for themselves and/or their family, as assessed through follow-up interviews

Study Design

This study was a non-randomized quasi-experimental mixed-methods pilot study. All participants received the same intervention, with some content adjusted for individual group differences. Before the program began, participants met with the research team to provide consent, complete baseline data, and receive their saliva collection kit. Participants completed a short interest survey to give the research team an idea of existing gaps in participants' nutrition knowledge and what food-related topics they would find most useful.

After baseline data was collected, participants were asked to attend four weekly 1.5-hour sessions held at a convenient time and location for the majority of the group. There was a main facilitator and a co-facilitator in the room taking notes and assisting the main facilitator. During each session, about 40 minutes was devoted to mindfulness practice and experiential meditation activities and another 40 minutes was devoted to facilitated discussion on nutrition topics such as added sugars, solid fats, child feeding strategies, or healthy meal preparation and food selection. The schedule of mindfulness activities for each session is as follows in Table 5.2:

Table 5.2: Outline of mindfulness topics and activities

	Key Topics	Activity
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Week One	Introduction to mindfulness; inner wisdom vs. outer wisdom; definition of mindfulness	Jon Kabat-Zinn's Raisin Exercise
Week Two	Emotional/stress eating; pausing mid-meal for hunger and satiety checks; deep breathing	Progressive Muscle Relaxation
Week Three	Mind-body connection; taste satiety; sensory awareness	Guided Imagery; Mindful eating chocolate exercise
Week Four	Stress management; nonjudgmental awareness; self-critical inner chatter	Self-forgiveness Meditation

Near the end of each session, participants were asked to reflect on what they were learning and practicing in order to develop SMART goals (specific, measurable, achievable, relevant, and time-bound).¹⁵⁸ The nature or topic of the goals, whether it be nutrition-related or mindfulness, was not specified and participants were encouraged to think about their goals very personally. Occasionally, participants were asked to share their goals with the group. At the beginning of sessions during Week Two through Week Four, participants were asked to reflect on their goal and their experience during the previous week and record a few thoughts. At each session, participants were given examples of how to adapt the exercises for use with their children, while at work, or in other settings where they wouldn't normally consider mindfulness practice. They were provided with resources to facilitate practice on their own and encouraged to do so. Small three-ring notebooks were provided to each participant to store their program resources and record notes, thoughts, or ideas and they were allowed to take them home each week.

Qualitative Design

Participants were asked to participate in a focus group within 1-2 weeks after the conclusion of the program and a one-on-one interview 4-6 weeks after the focus group. Each of the focus groups and the interview scripts (see Appendices for lists of all questions and probes) contained questions on self-efficacy (confidence) and behavior change, both in regards to mindfulness and diet, motivation for making changes, application of the program in their lives, among others. Participants were reminded before each focus group that their honest and open feedback was required. The focus group lasted between 60 and 90 minutes. The research team invited the co-facilitator from the first wave to lead both focus groups as a way to encourage honesty and impartiality since all the participants were aware that this project was part of the main facilitator's dissertation research. The focus group facilitator's extensive experience in qualitative data collection and the small number of participants for each group allowed each participant ample opportunity to participate in the group discussion. Interviews were semi-structured and conducted at the convenience of the participant 4-6 weeks after the focus group and lasted 30 minutes, on average.

Quantitative Measures

Block Fat/Sugar/Fruit/Vegetable Screener

This screener is capable of providing estimates of saturated fat, trans fat, total sugars, "added sugars" (in sweetened cereals, soft drinks, and sweets), fruit and fruit juice, vegetable intake, glycemic load and glycemic index.¹⁵⁹ It contains 55 questions with a series of "adjustment" questions that ask about usual intake of low-fat/trans-fat free or low-carbohydrate/low-sugar versions of various foods. Portion size is asked

for 32 food items. All screeners were analyzed for nutrient estimates by NutritionQuest (Berkeley, CA).

Mindfulness Self-efficacy Scale (MSE)

This measure consists of 15 items that assess whether participants can maintain non-judgmental awareness during different situations.¹⁶⁰ Respondents are asked to pick a number 0 to 100 to represent the percentage amount of their confidence in being able to do the behavior in question. All percentage values were averaged to find a total score for mindfulness self-efficacy. The research team did not expect major changes in mindfulness behavior to take place during four weeks as would be measured by a general mindfulness measure like Mindfulness Attention Awareness Scale¹⁶¹ or Five Factor Mindfulness Questionnaire⁴¹, but instead, hypothesized that self-efficacy for practicing mindfulness would improve and thus, why this measure was chosen. This measure was tested in a sample of mostly Caucasian/White women and the internal consistency was a Cronbach's Alpha of 0.82. The authors ensured content validity of the measure by including items that characterize common sources of adult stress and may also interfere with maintenance of non-judgmental awareness, including frustration during goal-oriented activities (i.e. shopping, driving, and work); interpersonal problems and receiving criticism; and physical or health stressors (i.e. fatigue, pain, sleep, hunger, and receiving results from a medical test).

Perceived Stress Scale

The Perceived Stress Scale (PSS) was first published in 1982 and is used to measure psychological stress. It has the ability to predict both objective biological

markers of stress and increased risk of disease as levels of perceived stress increase. The PSS has been validated in multiple adult populations, mainly college students and adult workers.⁹⁷ The 10-item measure asks the participant general questions about their stress over the last month. Four of the 10 items on the PSS are reverse-scored and then summing across all items provides a total score. Higher scores indicate higher levels of perceived stress.

Three-Factor Eating Questionnaire

The Three-Factor Eating Questionnaire (TFEQ) consists of 3 different scales corresponding to cognitive restraint, emotional eating, and uncontrolled eating.⁹⁸ It was revised to contain only 21 items from the longer version with 51 and then again to 18 items for the TFEQ-R18. Although the TFEQ-R18 scales were derived in obese subjects, factor analysis of the TFEQ-R21 conducted in an adult sample indicates that the instrument is valid also in nonobese individuals and has been validated in the general population, as well.^{98,99} Each item is summed for subscale scores and then for a total score, as well. Higher scores indicate more dysfunctional eating patterns.

Weight/Height

Weight and height were collected from each participant and body mass index (BMI) was calculated and categorized following CDC guidelines.¹⁰⁰ Participants were weighed using a digital scale while wearing light street clothing and removing their shoes. Their height was measured using a standard stadiometer, also after removing their shoes.

Compensation

Mothers were compensated for providing data with the possibility of earning \$85 total. They could receive \$10 for providing data at each of the following contact points: providing baseline survey and saliva data, attending each of 4 weekly sessions, providing post-intervention survey and saliva data, and participating in the post-intervention focus group. If they participated in the follow-up interview, they were compensated an additional \$15. If they did not attend a minimum of 3 sessions, they were not asked to participate in the focus group or interview; however, they were asked to complete a short exit interview about the barriers they experienced to participating in the program for \$5.

Data Analysis

Of particular interest to the researchers were the following questions, to be answered quantitatively or qualitatively:

1. How did the SDP affect mothers' self-efficacy for mindfulness?
2. What is their experience and perception of mindfulness after participating?
3. What is their experience or perception of healthy eating after participating?
4. What types of benefits did they receive from the program while participating?

Qualitative Analysis

Audio files from each participant interview and both focus groups were transcribed and participant statements were coded and common themes identified. The inductive thematic analysis was used to capture the frequency of topics as well as the intensity and extensiveness of discussion in relation to each topic.^{162,163} Two researchers coded and analyzed themes independently to reduce bias and to

enhance conformability. Any discrepancies were resolved via consensus. Participant statements are used to illustrate common themes and important perceptions or behavior change in participants.

Quantitative Analysis

Analyses for the survey measures used in the SDP were carried out in JMP ® (Version 11, SAS Institute Inc., Cary, NC, 2013) using matched pairs t-tests and simple linear regression to determine if the intervention would be effective at developing self-efficacy for both mindfulness and healthy eating behaviors, decreasing perceived stress, and demonstrating dietary behavior change.

RESULTS

Sample characteristics

The socio-demographics of all participants are summarized in Table 5.3. In total, nineteen mothers participated in the program and provided baseline and post-intervention data. There were 13 mothers in Wave 1 and 6 mothers in Wave 2. Data from each wave of mothers were combined for analyses. The average age of the mothers was 34.16 (± 4.39) and they ranged in age from 24 to 43 years old. All mothers except one had at least a Bachelor's degree and more than half of the sample had advanced or terminal degrees ($n=12$). Mean BMI for the sample was 28.04, with 68% of the sample considered overweight or obese according to CDC guidelines ($n=12$).¹⁰⁰

Table 5.3: Socio-demographic characteristics of sample population

Participant characteristic		N (%)
Marital Status	Single	1 (5.26)
	Married	17 (89.47)
	Separated	1 (5.26)
Race	White/Caucasian	14 (73.68)
	Black/African-American	2 (10.53)
	Asian	2 (10.53)
	Hispanic/Latina	1 (5.26)
Body Mass Index (Weight Status)	19.99 or less (Underweight)	1 (5.26)
	20 - 24.99 (Healthy Weight)	6 (31.58)
	25-29.99 (Overweight)	8 (42.11)
	30-34.99 (Obese)	0 (0)
	35 or more (Obese)	4 (21.05)
Number of children	1	12 (63.16)
	2	5 (26.32)
	3	2 (10.53)

Quantitative results

TFEQR-18

For the 'Emotional Eating' subscale of the TFEQR-18, there was a decrease in mean scores from baseline to post-intervention, but it was not significant. The 'Uncontrolled Eating' subscale showed a statistically significant decrease in scores from baseline to post-intervention ($p=0.008$). There was an increase in the 'Cognitive Restraint' subscale for mothers after participating in the SDP ($p=0.004$).

PSS

Participants reported significantly decreased levels of perceived stress post-intervention compared to baseline ($p=0.037$).

MSE

Participants reported a significant increase in their self-efficacy for mindfulness ($p<0.000$).

Diet

After participating in the SDP, mothers reported statistically significant decreases in their trans fat intake ($p=0.029$). Analyses comparing intake of saturated fat, total fat, added sugars, fruits, vegetables, protein and carbohydrates did not produce any significant results.

Weight

Weight loss was not an intended or expected outcome of this study, given the brief duration. Weight status, loss, or maintenance were never discussed during the program or encouraged. In spite of this, there was evidence of weight loss for some participants ($n=10$) from baseline to post-intervention ($p=0.0579$), with an average loss of 0.46 (standard error=0.28).

Qualitative results

Changes in mindfulness

There were five sub-themes related to mindfulness that participants reported making changes with both during the focus group and at the follow-up interview: Daily Practice/Practice (self), Family Practice, Increased Awareness, Automatic Process, and Living in the Moment. Most participants reported changes related to their practice of mindfulness skills and practices (see Table 5.4). For some participants, the mindfulness skills they learned were so compelling that they found themselves automatically practicing a skill or exercise. One mother stated:

“It was one of those things where I didn't sit down and say, “Okay, I'm going to be mindful right now.” I would notice myself being in the moment, and be like, “Oh, well this is kind of nice.” It would be like I wasn't thinking about work when I got home, and I wasn't thinking about what I was going to do at work the next day when I was at home.”

Another mother decided to practice mindfulness with her toddler by creating a song based on one of the exercises learned in the SDP. She reported in her follow-up interview that she had been singing it with him at night as a bedtime ritual to help them slow down as a family and prepare for sleep. Most mothers spoke of a broader, increased awareness. For example, one mother related:

“You're not enjoying time, you're just getting through the time. I've definitely become more aware of that and I've made ... I think that's probably one of the things I've made the most progress with is like I'll put everything aside until she goes to bed, and trying to do better with that. Actually enjoying the moment and paying attention to her, because it goes too fast. A lot of people just let it go by and it's important to make that change and be aware of it.”

Many mothers similarly described attempting to live more in the present moment, especially with their young children, as a result of the program. They expressed a new desire to put down their wireless devices (phones, tablets) and other distractions to focus more intently on their growing child and the happy or silly moments they could experience without distraction. One mother stated:

“I've noticed I'm more mindful with my son. Even if he's like, “Read this book to me! Read this book to me,” and I've got to do my hair and do my makeup and I'm still running around in a towel, [‘Ill say] “Okay. Let's take out the five minutes and read this book. I may be five minutes late to work, but I'm going to sit down with you, and we're going to read it. And then we've got to run. But let's be mindful for a moment.”

Table 5.4: Qualitative results of changes in mindfulness practice

MAJOR THEME	SUB-THEMES	QUOTES
	Daily Practice	“I think I definitely practice

<p>MINDFULNESS PRACTICE</p>	<p>Increased Awareness</p> <p>Family Practice</p> <p>Automatic Process</p> <p>Living in the Moment</p>	<p><i>Mindfulness on a daily basis."</i></p> <p><i>"I am definitely more conscious of things. Things like sugar, salt, different types of that. All the things that we talked about. I am thinking about things like processed foods...I am thinking about what is the sugar content, or maybe, just not even eating. Trying to not even eat processed foods."</i></p> <p><i>"I am trying to practice the mindful stuff. It's still working right before bed, [child] and I still do that relaxation song...With or without the singing. Just about every night we sing. I've been stretching it out to do, I just don't do foot, I do toes, and soles, and heels."</i></p> <p><i>"I haven't had to set a timer and say, "You need to think about this." It's planted. The seed has been planted. And the more it comes up organically, the more I tend to do that, try to go back to that."</i></p> <p><i>"Through the program and kind of just being reminded of it, I am now kind of trying to think about things as they are happening as opposed to either in the past or in the future. I am trying to be a little bit more in the moment and not worrying about the things I don't have any control over</i></p>
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		<i>right now."</i>
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Changes in mindful eating

The intervention introduced two ME-specific exercises that many of the mothers connected with. They found new sensory experiences through these exercises that resulted in large concurrent changes in their dietary behaviors also. See Table 5.5 for results. For example, one mother stated:

“But I also learned that I can have some and then I say, "Am I full? Do I really want another slice of pizza?" Because I just normally get it and eat and keep on going. Or, "Am I full now?" I've been more mindful of, "That one filled me up. I don't need it now.”

Previous formative work revealed a gap, specifically in working mothers, in sensory awareness of foods (see Chapter 3). The SDP aimed to address that gap by teaching mothers ME concepts like taste satiety and encouraging them to slow down and savor the first bite or first few bites of a food or a meal. After participating, one mother said:

“I have noticed that when I am eating, I do try to savor it more. It's not usually the first bite because I forget, but I remember at some point towards the beginning of the meal trying to remind myself to really taste it and enjoy it.”

Table 5.5: Qualitative results of changes in mindful eating

MAJOR THEME	SUB-THEMES	QUOTES
MINDFUL EATING	Improved Mindful Eating	<i>“I think I kind of had an inkling of that before this, but I think it's made it very clear to me that that's what I'm trying to do. I need to slow down and stop doing that because, yes, I do want a piece of the chocolate or whatever, but I'm trying to fill</i>

	Taste Satiety	<p><i>up everything with the chocolate; whereas, if I just take a few minutes and enjoy a piece of chocolate and try and figure out other ways to "fill up" the time or stress or whatever it is, that's good."</i></p> <p><i>"That thing that Lauren said about chasing the first bite has really stuck with me. That's probably one of the things I do almost every time I eat now is that first whatever. The first sip of the fruit smoothie, the first bite of the whatever, I will sit and really enjoy that first bite. I've thought about it ever since she said it, that lady. It's so true. That's exactly what you're doing. It's like, that first bite is so good and you're like, "Oh, I just want to hurry up and shove the rest of the whole sandwich on down, it tastes so good!" But it's never as good as the first bite."</i></p>
	Sensory Awareness	<p><i>"That's something that I noticed I was doing. "Why do I eat this?" I learned through the raisin activity that I like certain flavors to go together. When I ate the raisin, I wanted something salty or I wanted cheese with it. Or if I eat pizza, I want a Coke with it. I've learned that there's similar flavors that I like."</i></p>

Changes in diet

Most of the mothers reported making some dietary changes for themselves, their children, or their household in regards to food purchasing or meal preparation (see Table 5.6). Before participation in the SDP, many mothers were unaware of the sugar or fat content of foods they regularly purchased for their children and noted that the discussions on those nutrients were enlightening for them, spurring changes in purchasing healthier, less-processed foods. They also described new or renewed awareness in healthy meal preparation for their families. There was considerable overlap between participants' dietary changes and the changes in mindful eating behaviors.

Table 5.6: Qualitative results of dietary changes

MAJOR THEME	SUB-THEMES	QUOTES
DIET CHANGE	Self Eating Behavior	<i>“Personally, I have been more mindful of the treats that I have; so, I love sweets and every day I want something chocolate, but I've discovered that one or two Dark Chocolate Hershey Kisses is sufficient and it satisfies the craving. I don't need an entire bar or a cupcake or a candy bar. A couple of Hershey Kisses is sufficient.”</i>
	Self-Regulation	<i>“The first change was that I reduced my portion size. Before that whatever was on my plate, I used to finish all of it. Now, even in the middle of the meal, if I feel full, I just stop eating.”</i>
	Child Feeding Strategies	<i>“I think the program helped me realize some of the choices I</i>

	Purchasing Behavior	<p><i>was making were not good, some of the sugary stuff I was giving [my son] and I really wasn't thinking about how much sugar was in that. That's definitely been on my mind and something I am trying to cut back with him on."</i></p> <p><i>"Well, definitely with, I would say, just looking at labels and trying to purchase healthier food for my family. Even when we're grocery shopping, making the decision, okay, I'm going to look at comparing items, or if it's something that we would have purchased before, seeing if they have a healthier version of the item. I felt like that's been good. Usually, it's worked well. The food still tastes good. [laughter] I definitely can say that's been a change I've made that I will stick with."</i></p>
	Healthy Meal Preparation	<p><i>"Then, [I'm] starting to get back into cooking healthier dinners for all of us. I wasn't doing really good there for a while, before my son, but I'm trying to get back into that, fixing healthier dinners so we all will feel better, my husband and I especially."</i></p>

Many of the mothers adapted ME skills like sensory awareness to introduce to their children. They often mentioned changing their feeding strategies for children

that were picky eaters by encouraging them to taste or touch their foods as opposed to pressuring them to eat. One mother stated:

“We are, instead of making my little boy eat things, I tell him that it's okay to try it; to touch it or smell it or taste it, and if he doesn't want to eat that, that it's okay. But let's at least try a bite or get familiar with it, for him.”

Several other mothers related stories about adding fruit or vegetables to their children's packed school lunches and some mothers mentioned replacing high-sugar snacks like fruit snacks or cookies with fruits.

Self-efficacy for mindfulness

The SDP is designed to provide mothers with resources and skills they can use for managing stress. In order to measure this qualitatively, we asked participants to describe their confidence in things like managing stress and practicing mindfulness. Most mothers expressed high confidence in the focus group and their follow-up interview for making changes related to the program concepts and taking changes they had already initiated further (see Table 5.7). In spite of this improved self-efficacy, most of the moms also expressed conflicted emotions about the feasibility of implementing frequent, consistent practice of mindfulness. For example, one mother felt she didn't have enough time alone to focus, saying:

“I would say my confidence that I could do it is maybe 75 percent, but finding the time to have that quiet time ... I would love to be able to just close my eyes, relax, relax my body. I like that one. Even if it's just talking to myself, 'okay, you've got this.' I would love to have that time. It's finding it, it's trying to figure out how I can have that moment to do that. I know it could be something really quick. I don't know...it's hard for me because I think if I felt it's like a circle, if I felt less stressed, or if I felt like I had that moment to actually be by myself. I feel like I'm never by myself and I think that's probably the problem. I'm never by myself.”

Still, other mothers expressed low self-efficacy for a variety of reasons (See Barriers to mindfulness and diet changes below), but often, they felt conflicted. Some mothers felt that they had been given the tools they needed, but lacked the ability to plan, remember, or implement. For example, one mother stated:

“I'd say I lack confidence in that arena [practicing mindfulness], but as far as generally how to deal, I've got tools now so I feel a little more confident.”

Table 5.7: Qualitative results of changes in self-efficacy

MAJOR THEME	SUB-THEMES	QUOTES
SELF-EFFICACY	High	<p><i>“I feel fairly confident that I have what I need, and I'm moving in the right direction to have the time that I need to do it.”</i></p> <p><i>“I feel like I've been given the tools and I can do it...It's just a matter of doing it. The meditation and stuff, I'm totally on board, it's working. I know how to use it.”</i></p>
	Low/Conflicted	<p><i>“I'm confident that I can do it, I'm just not confident that I will do it.”</i></p>

Barriers to mindfulness and diet changes

Related to self-efficacy, mothers reported a variety of barriers to initiating changes or following through with changes initiated during or after the program (see Table 5.8). In the focus group, mothers cited seasonal barriers to making healthy dietary choices, saying that it was easier to put healthy meals on the table during winter, compared to summer when the first Wave was taking place. Two commonly

cited barriers to both mindfulness and healthy food choices were time and lack of buy-in from the rest of the family or not having full support from the partner. Mothers often explained they didn't having enough time to practice ME during family mealtimes because their children were so young. They acknowledged that when their children were older and did not need to be fed or taken care of so much, they hoped to have more time to focus on their own ME skills. They expressed a desire to have their partners and/or children included in the program, as a way to relieve them of having to be the sole person responsible for teaching everything they learned to the other family members or trying to force-implement large dietary changes in the household alone. They often expressed their feeling that it was difficult to make healthy choices if the other members of the family were not willing to make those choices too.

Table 5.8: Qualitative results of barriers to behavior change

MAJOR THEME	SUB-THEMES	QUOTES
BARRIERS	Various	<p><i>"I feel like there's just always something in the way."</i></p> <p><i>"Somebody else to be doing all the work in the house. That is what I need to be successful to be able to mindfully eat."</i></p> <p><i>"That's actually a really interesting point, because as much as we feel like ... When I get home in the winter time, it's dark and I just want to crawl in my bed and not do anything ... It's still for some reason easier to put a good meal on the table in the wintertime than it is in the summertime."</i></p> <p><i>"And now you don't want to</i></p>

		<p><i>drink alone! You're like, "I'm the only one drinking a beer in this house."</i></p> <p><i>"I feel like it's harder with the kids, having picky kids. It is harder, even if both of us, we adults got on board together, you've still got the kids that you're fighting against. It would be nice if we were all in it together."</i></p> <p><i>"I don't know about you, but when you do try to cook the healthier meals and they refuse to eat it, I get mad."</i></p>
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Benefits

Participants described a multitude of added benefits they experienced as a result of participating in the program, many of which were unintended by the research goals (see Table 5.9). One mother became emotional during her interview, explaining how her sleep habits had improved tremendously since her participation in the SDP. Previously, she said she woke often in the middle of the night and would be unable to return to sleep, but since learning the mindfulness exercises like guided imagery, she was able to relax at night and fall back asleep quickly, providing a multitude of mental, emotional, and physical benefits for her. A few mothers told us their parenting had improved, extending their patience with their young children and allowing them to detach from negative emotions. By far, the benefit most often cited by mothers during the focus group and the interviews was the experience of sharing with each other, a sub-theme we termed Shared Humanity. Mothers benefitted from

hearing that other women are struggling with the same issues they are facing. Some comments from the mothers included:

“And I got support from other moms, to find out I'm not the only one that has random things that our kids eat or I'm stressed-out at work but I'm figuring it out or whatever. It was really a beneficial encouragement.”

“I think the main thing in this program, it made me feel like there's others going through the same things, that are struggling with the same things. I think that was probably the most helpful for me. I needed to take that break for myself.”

“We're all very isolated and lonely because you're so focused on your family. You're not taking time for yourself. This problem and that one hour a week gives you time to just do what you want to do and be with other mothers that you know you've got a ton of stuff in common with. It's huge.”

Table 5.9: Qualitative results of the benefits of participation

MAJOR THEME	SUB-THEMES	QUOTES
BENEFITS	Parenting	<p><i>“I find that my discipline style with the kids is getting a little more controlled. Before it wouldn't take very much to get me to blow, like full on meltdown so I'm like the third child in the room. I'm finding myself listening to them more and trying to be more calm with the way I'm speaking.”</i></p>
	Stress Relief	<p><i>“I can sort of pull myself back a little bit better. It is sort of being able to pull myself back, I think is what the mindfulness training really does. It allows you that, that space to say, okay, let's think about what I am stressed about, this is what I am stressed about. That's, I think, mindfulness, it sort of helps me think about that, because you get so wrapped up into everything that is going</i></p>

	<p>Sleep</p> <p>Tools/Preparation</p> <p>Shared Humanity</p>	<p>on.”</p> <p><i>“Really, I could get emotional so I'm like "This stuff works, it has changed so much for me, I'm actually getting rest every night." Even on the nights when things are rough, I'm still able to get back to sleep and get a little bit of sleep in between. It's been huge.”</i></p> <p><i>“I think I feel pretty confident about being able to do those things. I feel confident that I've got the resources I need now, even more than I thought I did before. I was like, I've been to Weight Watchers, I know what you're supposed to eat. I feel more confident in understanding nutrition a lot better now, and I feel more confident in having, like I said, resources for when I do get stressed out that can access.”</i></p> <p><i>“It was nice to be in a group where people said, "I do this because I need it to be able to take care of my family." It was almost that encouragement that I needed to say, "Yes, for an hour my husband can keep my child twice a week and it's okay.”</i></p> <p><i>“I think mentally, it helped me to come and see, "I'm not the only one.”</i></p>
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		<p><i>"I think the comment about, "We're all in this together and it's good to know that I'm not the only one that's going through this," is important. I think that along with that self-affirmation, we need to remember, there are a whole lot of other people who are doing this very same thing right now."</i></p>
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Diffusion

Mothers reported several ways that the program affected other areas of their life, including sub-themes like Diffusion (where participants transferred knowledge and skills to other individuals), Crossover (when participants reported that the program had effects on other areas of their lives), and Peer Education (when participants expressed that other mothers in the group influenced their knowledge or skills, independently of the SDP facilitators) (see Table 5.10). Most often, participants reported Diffusion as sharing the information they were learning with their spouses and parents. It was more rare that they shared the information with their children, although that did occur too. The most important sub-theme of the Diffusion theme was Perception Change. Participants described major transformations in their understanding of mindfulness, but also a greater understanding of their own reactivity to stressors. One mother in particular described a new understanding of self-respect and value of self and others because of her participation in the SDP. She said:

"I guess if you'd said mindfulness before, I'd have thought hippie, flaky, things that I'm generally not. I generally didn't think about that, at all. I was just like,

"I'm hungry. I'm eating all that." No regard for the long-term effects. I was a very kind of short-sighted person, but after thinking about it, it's not ... It's about the fact that what I'm putting in my body or what I'm putting in my family's bodies is important not just today to get dinner over with, but long-term and results in my own life and habits for my kids. Yeah, it's just one little meal or it's just one little snack or whatever, but it's going to have long-term consequences. I need to think about doing better things and being respectful of the fact that I should take the time to make something better, I should take a little extra money to do something as opposed to just whatever to get it done, because we're worth that."

Table 5.10: Qualitative results of diffusion

MAJOR THEME	SUB-THEMES	QUOTES
DIFFUSION	Knowledge Gained	<i>"I did not know that much about trans fats, or saturated, or unsaturated. That's I'm watching a lot on. Then sugars, I'm trying to avoid as much as every sugars that I can."</i>
	Diffusion	<p><i>"It was helpful because then I used to go back home I was sharing whatever somebody was saying with my husband. He was like, "That's a great resource." Like we never get to know all this, but just meeting 10 other moms, or 5 other moms, is just helpful."</i></p> <p><i>"I've mentioned to him a lot of stuff that I've learned and whatever about the nutrition facts and stuff that I've learned. We haven't been to McDonald's since then. I think we once once in the past maybe three months or so, and we were both so disgusted by it that we haven't been back since. We where going probably once a week. Like on Saturday afternoon we'd take the kids for lunch there. We're</i></p>

		<p><i>not doing that now."</i></p>
	Crossover	<p><i>It's every part of my life more now. Decisions that I make, choices that I make, my actions, how I communicate ... Even just, "Why am I looking at my phone? Put that down." You know what I mean? Just enjoy this time. I don't need all this technology. I feel like I'm just more aware in general, overall."</i></p>
	Perception Change	<p><i>"Now on a day to day basis, I'm still eating Oreos. I don't want to give you that impression, but I think I've just realized that it's not so much what I deserve or what I don't deserve, it's that I deserve to respect myself and make better choices for myself."</i></p> <p><i>"I have thought more about being Mindful of things and I never truly understood Mindfulness until this class. I thought you were Mindful of what you ate or how much you ate; I didn't think about Mindfully just, how does this taste? Or, they didn't have to do what they did. It was a kind gesture. It taught me to broaden my definition."</i></p> <p><i>"Before that I always thought that meditation was something that not everybody can do."</i></p> <p><i>"I was like, "No, this is something for slow people."</i></p>

	Peer Education	<p><i>Then I went to this program the way your guys explained it, and the exercises that we had, and talking to the people, is just not being slow. It's just being enjoying the moment kind of thing. That was helpful."</i></p> <p><i>"Learning from other people in the program too. I think Holly was the one who said, "Mix the wheat noodles with the white noodles." That's a tip that I've been using, so that was helpful."</i></p>
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Two mothers described realizations that mindfulness could be used to accept negative emotions like frustration or tedious activities like sweeping the floor. Many of the mothers described the applicability of the mindfulness skills to other areas of their lives because their definition of mindfulness had changed or broadened. They now understood mindfulness to include gratitude for short moments alone, quiet time, gaining admission to an exclusive preschool, or other small, but positive events in daily life.

DISCUSSION

Stress is a major component of eating behavior, not to mention overall health. Maternal stress may affect not only their own eating behaviors, but it can have effects on their children's diets and eating behaviors as well. The SDP showed

promising results that mindfulness-based interventions can have measurable effects on stress, in addition to diet, child feeding, self-efficacy, and various other benefits. For example, mothers who participated in the SDP showed significant reductions in self-reported stress using the Perceived Stress Scale. Many of them also reported in focus groups and interviews that they had seen benefits in their stress management, such as being able to pull back and recognize their own behavior patterns related to stress in order to be less reactive. For enhanced rigor, future studies should consider a more dynamic, layered procedure for collecting data on stress. This could include asking participants to collect saliva on high stressor days and low stressor days to compare the differences and employing a participant diary design.^{164,165} Although it would be impossible to eliminate all stressors from participants' lives, these findings show that mindfulness-based stress management skills can help adjust their reaction to stress to be more manageable, more positive, and healthier.

The SDP also showed significant improvements in self-efficacy for mindfulness, both quantitatively and qualitatively. This extends other preliminary findings showing that mindfulness-based stress reduction can help individuals acquire 'present-centered attention awareness,' which is considered foundational to mindfulness by some researchers,^{10,160} and likely contributed to stress reduction. For a brief program like the SDP, cultivation of self-efficacy for behaviors and skills is crucial for lasting changes.^{166,167} More studies are needed that show how long the effects of a program like the SDP can last and if participants continue with behavior changes initiated during the program for longer than 4-6 weeks.

The 'Emotional Eating' subscale of the TFEQ-R18 decreased, but it was not significant. Although ME and hunger/satiety awareness may affect behaviors like

emotional eating, the research team and main facilitator did not spend an inordinate amount of time discussing emotional eating in specifics, and thus may be why the change did not reach significance. The 'Uncontrolled Eating' subscale is measuring the tendency to overeat because of subjective feelings of hunger and inability to control food intake and there was a statistically significant decrease in participant scores.⁹⁹ This is an important outcome because it demonstrates the effect the SDP had on self-regulation of hunger, satiety, and consumption. For the 'Cognitive Restraint' subscale, scores increased, which is reasonable given that this subscale is measuring participants' conscious restriction of food in order to lose weight or maintain weight. For the SDP, ME was taught as a strategy to avoid dietary practices like restriction, and instead, focus on internal cues for hunger and satiety; moreover, weight was not discussed.

In regards to diet, the quantitative results only showed improvements in trans fat. This is likely due to the emphasis of avoiding sources of trans fat in the nutrition component of the SDP. Although there were not statistically significant changes in other nutrients, participants reported making changes qualitatively. It is possible that the Block Screener used in this study was not sensitive enough to detect changes in eating patterns after only four weeks or that participants simply did not prioritize making substantial dietary changes for themselves. The SDP was not administered as a nutrient-focused program, instead the focus was more on food, sensory, taste, and quality. This could have also partially contributed to the limited quantitative changes in dietary intake.

Of particular interest was the trend toward weight loss for participants in this study. Although the weight loss from baseline to post-intervention was not statistically

significant, it was approaching significance. This is an important indication of the potential for mindfulness and nutrition programs to impact weight status, specifically in mothers who have similar socio-demographics as the participants in our sample and for a relatively short, 4-week intervention. This effect has been statistically significant in other mindfulness studies, but is typically seen in studies of much longer duration and in which weight loss was an intended outcome.^{57,59,62} In order for ME and mindfulness-based programs to be useful in broad public health interventions, more research is needed to understand if this effect could also be seen in populations with different socio-demographics, including socioeconomic status, educational attainment, and gender.

One of the goals of this program was to make mindfulness accessible and feasible for a mother to implement. Mindfulness is a highly abstract concept and because of the various degrees to which it can be practiced, coupled with many myths, it is often considered difficult to practice by average individuals.¹⁶⁸ Commonly, mindfulness is thought of as an activity that takes long periods of time and incredible amounts of self-control to sit still and quiet for long periods of time. The SDP aimed to revise the practice of mindfulness to be brief, yet effective, and easily practiced by mothers who have young children and busy lives. The SDP proved to be successful at this approach, given that many of the mothers reported changes in how they perceived the practice and definition of mindfulness.

The benefits of participating in this program are numerous. Of particular importance are the benefits mother reported from sharing perspectives and experiences within a group setting of their peers. The majority of mothers in this study mentioned the immense benefit they perceived by sharing their challenges with

other mothers who could relate, understand, and normalize their experiences. This social support can have diffuse effects on mothers' marital stability and the quality of their maternal-child interactions.¹⁶⁹ Coincidentally, a few of the mothers in this study also reported they felt the program had benefited their parenting abilities and interactions with their children. The ability of these unintended benefits to have an impact on the intended outcomes of the SDP should not be discounted.

Despite the success of the SDP, there were several factors that limit the generalizability of this pilot study. The sample size was fairly homogenous with the majority of mothers being Caucasian/white and highly educated. More evidence of the use of mindfulness with a racially and ethnically diverse sample is needed. As most of the mothers in this study were highly educated, their incomes reflected this. It will be important to investigate the effects of the SDP on samples that are low-income to see if results are similar. The follow-up length for this study was only 4-6 weeks and a longer follow-up could demonstrate the need for longer programs or additional training periods to maintain lasting effects.

The strengths of this program are that it is relatively short, allowing even working mothers to participate compared to longer, more intensive and expensive interventions. Compared to the existing evidence that more intensive approaches to dietary behavior and weight control for mothers of young children are effective, the success of the SDP at affecting change in as little as four weeks is encouraging.¹⁷⁰⁻¹⁷² For example, one such intervention that focused on low-income mothers showed modest weight loss (-2.7 kg; $p < .001$), fewer perceived barriers, and improved attitudes related to healthy eating following an 8-week intervention with 2-hour classes, compared to the SDP's 4-weeks and 1.5-hour classes.¹⁷³ The intervention

lacked a focus on stress management or use of mindfulness like the SDP, but topics included emotional eating, stress management, and self-efficacy. Another intervention targeting mothers who were 6-weeks post-partum, lasted 9-months and included eight healthy-eating sessions, 10 physical activity sessions, six telephone-counseling sessions, a sport stroller, a pedometer, and various other exercises and recipes. Again, similar to the SDP, this intervention covered topics like stress and overeating, identifying fullness, and slowing down to eat, but the intervention was not centered on these skills. The SDP is considerably less intensive for mothers to participate in compared to these other typical interventions, but still provides skills beneficial for behavior change. The addition of stress management skills, like mindfulness, and the successive benefits of improved stress management may aid behavior change related to diet and weight status, as seen here with the SDP. It is also a dynamic and responsive program, creating a program environment that encourages nonjudgmental discussion and participation and meets individuals where they are, instead of providing base lectures. It encourages mothers to act as peer educators, while also providing necessary instruction for skills and behaviors that mothers can retain as a 'toolbox' for future use.

CONCLUSIONS

Stress and eating behavior are compelling, but understudied areas that contribute to the public health concern for rising obesity prevalence. The SDP was a mindfulness-based stress management and nutrition program for mothers of young children that showed favorable results in most of the intended outcomes of this pilot study. The SDP could benefit from more studies with racially and socioeconomically

diverse populations and randomized controlled study designs. Additionally, studies that have longer follow-up periods could shed more light on the lasting effects of mindfulness training.

Chapter 6 Summary & Implications

Mindful eating (ME) is a new, but growing area of research for the nutrition field. As an abstract concept, it is difficult to measure and sometimes hard to explain what its effects look like. Formative research seen here shows that ME can be difficult to conceptualize or visualize, but through application and practice of mindfulness skills, behavior change can occur. The application of ME and general mindfulness seen in this dissertation research shows enormous benefits, confirming decades of psychological research on the use of mindfulness to alleviate a variety of mental and physical conditions.

The Mindful Eating Scale (MES) proves to effective with white, female, educated audiences, but more studies are needed to validate the measure in more diverse populations to ensure generalizability and to gain a better understanding of how other populations experience ME and mindfulness. Additionally, it is important to understand more about how people unfamiliar with mindfulness pay attention to what and how they eat and their thoughts and cognitive experiences around eating. The research presented here is not clear enough to know the efficacy of the MES for use in cross-cultural studies with diverse populations. There are still gaps in our understanding of how to convey ME to populations that may be unfamiliar with mindfulness or may not prioritize mindfulness as a behavior. For example, food-insecure mothers may not respond to questions about hunger and fullness the same way that a food-secure mothers responds. More research on the perceptions of ME and mindfulness could provide evidence to aid the development of new ME-specific measures and resources for a wide variety of audiences and nutrition programs and

interventions. Previous studies have shown that women can also over-estimate their ME behaviors prior to receiving training on ME.⁵⁸ This is likely due to the abstract nature of mindfulness and lack of familiarity or awareness of their eating behaviors. It could also be due to the language used by researchers and practitioners that many individuals have little to no experience using in their own lives. This was reflected in the photo-elicitation study reported in this dissertation, where mothers struggled to verbally and visually represent ME constructs in their own lives. They used their own language to describe ME and their own context, markedly different than the explanations given to them by the research team. In the development of any future instruments, programs or interventions, it will be important to ensure that respondents can understand and relate to the language.

The focus of new research should also be directed from testing strict and specific practices of ME, in the form of mindfulness meditation, towards more general mindfulness practices. One of the mechanisms of ME's ability to impact eating behavior is found in general mindfulness skills. ME is just one part of mindfulness as a whole. Based on the results from the Slow Down program, we found it may not be as important for individuals to embrace formal meditation practices to reap the benefits of mindfulness. The Slow Down Program attempted to take traditional Mindfulness-Based Stress Reduction-style (MBSR) programs and adapt them to be accessible to those unfamiliar with mindfulness meditation. We were striving to develop a program that busy mothers would find comfortable and feasible. Traditional MBSR-style programs can be considered lengthy, burdensome, and likely intimidating or overwhelming for those unfamiliar with mindfulness and limited on time.^{16,92} We made a concerted effort to develop mindfulness exercises that were

brief, effective, and adjustable for a variety of needs. The program was much shorter than typical programs, which has great implications for adoption at a public health level, not to mention practice. Health practitioners should identify new opportunities to make mindfulness and meditation accessible to the general public. Population-level data on mindfulness could provide information on where to target interventions. Future research and practice should continue with this flexible approach to mindfulness, especially for introductory purposes

Additionally, mindfulness-based stress management skills, including ME skills, can have a significant effect on maternal eating behaviors, self-efficacy skills, stress, not to mention sleep and overall well-being. This implies that the inclusion of mindfulness in practice-based public health programs is warranted and that the focus of new studies, as well as nutrition and/or weight management programs, should include mindfulness-based stress management skills.

While the studies presented here were made up of predominantly white, educated mothers, we did make concerted efforts to recruit diverse samples of mothers. Much of the mindfulness literature uses Caucasian, educated, middle to upper class samples, posing several challenges. First, it limits the external validity or generalizability of findings to other populations. Second, it continues to present mindfulness and meditation as a health behavior that is primarily for educated, affluent white women. Stress affects everyone, however, and may even affect low-income mothers disproportionately, given added financial-related constraints. Mindfulness-based stress management skills could also benefit all mothers regardless of race, ethnicity, or socioeconomic status, given the rushed climate of our culture and the decrease in meaningful social connection that climate brings.

Building on research from positive psychology, governments around the world have even begun to adopt policies that recommend a greater focus on well-being and happiness, both individually and collectively.¹⁷⁴ O'Brien (2013) defines the concept of sustainable happiness as, "*happiness that contributes to individual, community, and/or global well-being without exploiting other people, the environment, or future generations.*" The inclusion of sustainability in this definition of happiness signifies that it can contribute to a sustainable lifestyle and likewise, sustainable eating behaviors like those encouraged through ME and programs like the SDP.

Several opportunities for further research and/or practice, building upon the Slow Down Program exist. First, it may be useful to design interventions or programs that are family-based or at least, that include a child or spouse. Many mothers in this study reported lack of family buy-in as a barrier to making dietary changes they wanted to make. They also indicated that they were not the only ones making food and diet choices for the household, so they somewhat resented being targeted that way through our intervention. They wanted to be alleviated of their perceived burden to be the family grocery-shopper, family chef, and family educator on mindful eating and healthy diet. Another approach that would likely be popular with busy mothers (or fathers) is use of mhealth or ehealth technologies. This is a rapidly growing area of research and use of app technology could not only improve participation in interventions and programs by providing an additional "place" to connect, but because of our increasing reliance on Smartphones and push notifications, it could also improve outcomes related to practice and skills development. Since mothers reported substantial benefits from the in-person component of the Slow Down Program, mhealth and eahealth technologies should be considered supplementary.

Finally, the concept of ME could greatly benefit from the supplementation of neuroimaging evidence, such as the use of fMRI. There have been some previous studies showing neurobiological changes in the brain due to mindfulness training^{175,176} and it would be interesting to see if ME training shows similar changes. It could also be useful to understand how a program like SDP could initiate changes in the brain and how long those changes last.

While this research shows that mindfulness-based stress management and nutrition programs like the SDP can have an impact on maternal stress and diet in a relatively short amount of time, very little is known about the longitudinal effects of a brief 4-week program like the SDP. It would be helpful to have interventions that involve longer follow-up periods to determine the prolonged effects of a 4-week training period. This could prove the legitimacy of alternative obesity models at creating lasting behavior change and weight maintenance. As this research did not involve an active control group, testing the SDP using a randomized controlled design would lend additional evidence to its effectiveness.

Perhaps the biggest lesson from this research is that it illustrates that instructing individuals to simply “eat less and move more” to lose weight and maintain weight loss is not enough. Instead, it is critical to provide individuals with tools on ‘how’. The scientific community and public health officials must begin to acknowledge alternative obesity models other than just the simple energy balance model if the prevalence of obesity is to decrease. A good starting place would be to consider the neuropsychological model of obesity that this dissertation cites, a model that includes psychological health and stress as determinants of eating behaviors. This model is the foundation for inclusion of mindfulness and MBSR in nutrition

programs and weight management programs. An important aspect of alternative models like these is that they are more complex and more holistic. The success of programs like the SDP shows that a healthy lifestyle also includes self-care. Individuals can make healthy food choices and they can exercise, but in order to demonstrate lasting effects and total health, taking care of oneself and being mindful of one's own emotional and physical needs, may also be especially important.

APPENDICES

Appendix A: IRB Approval Letter, "Photo-elicitation Study"



Office of Research Compliance
Institutional Review Board
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MEMORANDUM

DATE: November 5, 2015
TO: Elena L Serrano, Lauren Elaine Kennedy, Sarah Anne Misyak
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires July 29, 2020)
PROTOCOL TITLE: Mindful Eating Focus Groups (Photovoice)
IRB NUMBER: 13-166

Effective November 4, 2015, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the Continuing Review request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 6,7**
Protocol Approval Date: **November 5, 2015**
Protocol Expiration Date: **November 4, 2016**
Continuing Review Due Date*: **October 21, 2016**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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Date*	OSP Number	Sponsor	Grant Comparison Conducted?

* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

Appendix B: IRB Approval Letter, "Cross-sectional Study"



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website <http://www.irb.ut.edu>

MEMORANDUM

DATE: September 10, 2015
TO: Elena L Serrano, Lauren Elaine Kennedy
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires July 29, 2020)
PROTOCOL TITLE: Mindful Eating - Cortisol - Observational Study
IRB NUMBER: 14-977

Effective September 10, 2015, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the Continuing Review request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 3,7**
Protocol Approval Date: **October 8, 2015**
Protocol Expiration Date: **October 7, 2016**
Continuing Review Due Date*: **September 23, 2016**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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Date*	OSP Number	Sponsor	Grant Comparison Conducted?

* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

Appendix C: IRB Approval Letter, "Slow Down Program Pilot Study"



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MEMORANDUM

DATE: September 22, 2015
TO: Elena L Serrano, Lauren Elaine Kennedy, Jennifer Louise Helms-Culhane,
Georgianna Rhodes Mann, Kim Saunders
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires July 29, 2020)
PROTOCOL TITLE: SlowDown Program Pilot
IRB NUMBER: 15-453

Effective September 22, 2015, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 3,4,6,7**
Protocol Approval Date: **April 29, 2015**
Protocol Expiration Date: **April 28, 2016**
Continuing Review Due Date*: **April 14, 2016**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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Date*	OSP Number	Sponsor	Grant Comparison Conducted?

* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

Appendix D: Photo-elicitation Informed Consent

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY Focus Group Informed Consent

Title of Project: Mindful Eating Photovoice
Investigators: Lauren Kennedy, Elena Serrano

I. Purpose of this Research/Project

The purpose of this study is to operationalize the concept of mindful eating, to understand how mothers of young children understand the concept of mindful eating, and how that concept can be communicated effectively.

II. Procedures

In agreeing to participate, you will be asked to fill out three short surveys and to take part in a series of three video and audio-recorded group discussions with other mothers from the community, after a brief informational meeting. These will be weekly discussions and each is expected to last less than 1.5 hours. We will first ask you to tell us a little about yourself and over the course of the weekly meetings, we will ask you more specifically to share your opinions about your conceptualization of mindful eating.

To help facilitate the discussions, we ask that you use your own Smartphone to take pictures, or if you don't have a Smartphone, we will be providing you with a digital camera. We will ask you to participate by taking photographs of any of your activities related to food and eating. This could include shopping for food, preparing meals, eating or mealtimes, etc. It will involve you taking pictures that are representative of your everyday life and our particular discussion topics (e.g. "What is or isn't mindful eating to you?"; "What is or isn't mindful eating to your family?") to bring to the next group meeting. Introductions and guidance on the photo project will be provided in detail during our first meeting.

III. Risks

The proposed research presents minimal risks to subjects.

IV. Benefits

Besides monetary compensation, there is no direct benefit or promise of benefit to participants in the study that would encourage participation. There may be some social benefit in the women exploring their thoughts on mindful eating and their families with other mothers contending with similar circumstances and decisions.

The wider benefit of this research is in its contribution to the academic knowledge in the field of mindfulness and healthy eating behaviors impacting health. The research will also be used to inform a future program designed to help mothers and families incorporate mindful eating into their daily lives and try slowing down to live healthier lives overall.

V. Extent of Anonymity and Confidentiality

Only the investigators listed above will have access to the audio, video and digital image files associated with the focus groups unless you agree to share your photographs by signing a media release form. To help maintain confidentiality your name will be assigned a code when the focus group data is transcribed and coded.

Any photographic images acquired concerning the participants will be carefully managed to maintain confidentiality. Such images will only be used for group discussions during the course of the project and may be used for presentations at academic conferences. Images may also be used as references during the

transcribing and coding processes. At no time will participant images be associated with the participant's real name or other personal information.

We will carefully maintain procedures to protect confidentiality. At no time will the researcher release the focus group audio, video and/or digital image files that feature identifiable persons to anyone other than individuals working on the project without your written consent.

VI. Compensation

You will be compensated for your time if you choose to participate. Compensation on a sliding scale will be used for the three Photovoice Sessions. Participants will receive \$15 for participating in the first session, \$15 for the second session, and \$20 for the third session. Lunch will also be provided free of charge during the sessions.

VII. Freedom to Withdraw

You are free to withdraw from the study at any time without penalty. You will receive compensation for the portions of the study you do complete.

VIII. Subject's Responsibilities

I voluntarily agree to participate in this study. I have the following responsibilities:

- Attend the three Photovoice focus group sessions
- Attend brief informational meeting
- Use a your Smartphone or a digital camera to document your experience with mindful eating
- Submit your photos prior to each Photovoice session
- Complete three short surveys
- Return the digital camera (if necessary)

IX. Subject's Permission

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

Participant's Signature _____ **Date** _____

Printed Name _____

Researchers' Signature _____ **Date** _____

Printed Name _____

A copy of this form has been given to me to keep. If I have any questions in the future about this project I can contact the following

Dr. Elena Serrano,
Principal Investigator, serrano@vt.edu/540- 231-3464, 201 Wallace Annex (0430), Virginia Tech Blacksburg,
VA 24061

Dr. David Moore
IRB Chair, moored@vt.edu/540-231-4991, Office of Research Compliance, Virginia Tech Blacksburg, VA 24061

Appendix E: Photo-elicitation Study Discussion Guide

Capturing Mindful Eating

Pre-Group Preparation

First Meeting:

- Name cards
- Marker pens
- Post it pads
- Blackboard and chalk or (better) flip chart
- Video and audio recording set up
- Cameras
- Notebooks

Second, Third and Fourth Meetings:

- Computer and photo printer
- Name cards
- Marker pens
- Post it pads
- Blackboard and chalk or (better) flip chart
- Video and audio recording set up

Discussion Guide

First Meeting

Introduction (10 mins)

(Ensure name cards are completed)

Hello. Thank you for coming. My name is [Lauren and I am a student] at Virginia Tech. We are here to start a series of discussions about your thoughts and opinions on the idea of mindful eating or eating intuitively. In agreeing to participate, you will be asked to fill out three short surveys and to take part in a series of three video and audio-recorded group discussions with other mothers from the community, after our brief informational meeting. These will be weekly discussions and each is expected to last less than 1.5 hours. We will first ask you to tell us a little about yourself and over the course of the weekly meetings, we will ask you more specifically to share your opinions about your conceptualization of mindful eating. A couple of my colleagues are also in the room – they are here to take notes so we can focus together on the discussion. This helps me remember what we discussed so I can reflect on it afterwards (or whatever you will use the information for).

To help facilitate the discussions, we ask that you use your own Smartphone to take pictures each week, or if you don't have a Smartphone, we will be providing you with a digital camera. We will ask you to participate by taking photographs of any of your activities related to food and eating. This could include shopping for food, preparing meals, eating or mealtimes, etc. It will involve you taking pictures that are representative of your everyday life and our particular discussion topics (e.g. "What is or isn't mindful eating to you?"; "What is or isn't mindful eating to your family?") to bring to the next group meeting. Introductions and guidance on the photo project will be provided in detail during our first meeting.

We will carefully maintain procedures to protect confidentiality. Only the investigators listed above will have access to the audio, video and digital image files associated with the focus groups unless you agree to share your photographs by signing a media release form. To help maintain confidentiality your name will be assigned a code when the focus group data is interpreted.

You will be compensated for your time if you choose to participate. Compensation on a sliding scale will be used for the three Photovoice Sessions. You will receive \$15 for participating in the first session, \$15 for the second session, and \$20 for the third session. Lunch will also be provided free of charge during the sessions.

Before we begin, we have Consent Forms for you to read carefully and sign at the bottom, if you wish to participate in the study. If you have any questions about what is in the Consent Form, please ask me. Then, we have a survey we would like you to fill out that provides us with some basic demographic information. (Co-investigators will hand out surveys for participants to fill out and collect when completed).

I expect our first meeting to take about an hour. We will be spending this first session getting to know each other, talking about the topic, and going over the basics of the photo project. Throughout our discussions and interactions, remember I value your honest opinion above all. We do ask that we all keep each other's identities, participation and remarks private (confidential, nothing said goes out of this room which is important to build trust and allow for honest exchanges which is our goal). We hope you'll feel free to speak openly and honestly. There is not a right or wrong answer here, anything you provide during discussion will be helpful.

To start off, let's get to know each other a little. (*Respondents to introduce themselves briefly with the following details: name, occupation, number of children, favorite food, etc. Record summary details below. Keep to one or two sentences.*)

Topic Introduction

We realize that the concept of 'mindfulness' has many meanings and associations that differ depending on when and where we are, so we would like to tell you what we consider mindfulness to be: an open attention to and awareness of present events and experiences, taking place in the now. We are interested in you helping us understand attitudes and behaviors associated with mothers' perceptions of 'mindful eating'. It is not our intention to nail down a single definition, but to get a fuller picture of this rather nebulous term. We feel that this can be helpful to moms who are faced with many food and mealtime choices or a variety of situations with mealtimes. The problem with mindful eating is that not only is it a vague term, but it is abstract and sometimes difficult to describe. With your help, we can gain a better understanding of how mothers perceive this term and maybe even help move the conversation forward with appropriate messages to use with education programs, products, and services.

Photo Project Introduction

Most of us often don't have the time to contemplate how we define what is mindfulness or what isn't mindfulness or when this is important when we eat. This is where we feel the photo project will come in handy. Over the next three weeks, we will ask you to take photographs that reflect what your personal opinion about what is mindful eating, how it's important to you as a mother, and how it relates to your family. We will give you a broad question each week and your assignment will be to take as many pictures as you want that reflect your opinion on the question. Each week when we reconvene, we will ask you to look through your photographs and select the top five or so to be printed that best represent your individual opinion on the question. We will then ask everyone to talk about what their photos represent and then discuss the photos as a group.

For this photo project, we ask that you use your own personal Smartphone to take the weekly photos. If you do not have a Smartphone, we will be providing you with a digital camera to borrow, which you must return to us at the conclusion of final focus group. As mentioned in the consent form, we will not use the pictures outside of our discussion group without your consent, but we do ask you to keep your personal safety and individual privacy in mind when taking pictures. Please ask permission before taking an individual's photo and do not risk your personal safety to take a picture.

Now for our first photo project assignment: we want you to think about the questions from your perspective, "What is mindful eating?" and "What isn't mindful eating?" We would like you to take pictures that represent how you might answer these questions. Remember there is no right or wrong answer. We're just looking to gather information, so don't second-guess yourself when taking a picture related to these questions. What you think is the least interesting, might produce the greatest amount of insight.

We have a notepad for you that contains some of the information we outlined today about the photo project that might be helpful. We have also added in the first questions for your assignment. Feel free to use this pad to jot down any notes about your thoughts on the question or about pictures you take.

Second Meeting

Have each participant select their top photos that represent the questions for discussion and print them out. The photos will also be projected on the wall for the entire group to see.

Have a participant volunteer to go first and share one of their photos:

> What do you see in this photo?

Probes:

> What does this this photo represent to you?

> How do you feel when you view this photograph?

> Is there a story this picture is telling you?

> Does this picture tell you anything about your life or cultural values?

Each participant will take a turn sharing their photographs with the group and the other group members will be asked to comment on the picture as well. Participants will then ask to collaborate on finding themes by making categories or clusters of photos. The discussion around making these clusters will be promoted by the following questions:

- > Are there pictures that everyone responded to?
- > Are there common themes for one or more pictures (resonate with most of the group)?
- > What did many people mention?
- > Are there pictures that evoke opposite responses, ideas?
- > Are there ideas/behaviors you saw repeatedly?
- > Which themes were obvious?

After the themes are created by the group and individuals have a chance to comment on why they agree or disagree with certain categorizations of the photos, we will provide the assignment for the following week's discussion.

For next week, we would like you to focus on your children and your family's connection to mindfulness. The question for next week's photo project is: "What does mindful eating mean for your child or for your family?" or "What isn't mindful eating for you're your child or for your family?"

Third Meeting

The next two sessions will follow a similar outline to the second meeting. Have each participant select their top photos that represent the questions for discussion and print them out. The photos will also be projected on the wall for the entire group to see.

Have a participant volunteer to go first and share one of their photos:

- > What do you see in this photograph?

Probes:

- > What does this this photo represent?
- > How does this photograph make you feel?
- > What do you think about this?
- > How does this relate to our lives?

Each participant will take a turn sharing their photographs with the group and the other group members will be asked to comment on the picture as well. Participants will then ask to collaborate on finding themes by making categories or clusters of photos. The discussion around making these clusters will be promoted by the following questions:

- > What ideas are related?
- > What did many people mention?
- > Did someone else say the opposite?
- > Are there ideas/behaviors you saw repeatedly?
- > Which issues were obvious?

After the themes are created by the group and individuals have a chance to comment on why they agree or disagree with certain categorizations of the photos, we will provide the assignment for the following week's discussion.

Because we are interested in your insight and what public policy makers and companies can learn from listening to consumers like you, we would like the group to come up with some messages you all think should be explored for our final meeting. Consider all of the photos, themes, and words we have used to describe what mindful eating means to you as mothers and then what it means to your families and we would like you to generate a few messages that could be used to encourage mindful eating to other mothers and families. Please email them to Lauren before our next meeting. Once we meet for the final time, we will discuss all of your ideas.

Fourth (Final) Meeting

All of the messages generated during the photovoice meetings and ones emailed in from participants will be printed out on cards and participants will sort and rank them on preference/impact/desirability at the beginning of the session.

ME-Moms:

Please take the next ten minutes to read through the messages that our group came up with and rank them based on how effective you think they are or how well they communicate mindful eating to you as a mother.

Each participant will take a turn sharing their rankings with the group and the other group members will be asked to comment.

Probes:

- > What does this this message represent?
- > How does this message make you feel?
- > What do you think about this?
- > How does this relate to our lives?
- > Others?

ME-Children/Families:

Please take the next ten minutes to read through the messages that our group came up with and rank them based on how effective you think they are or how well they communicate mindful eating to you as a mother.

Each participant will take a turn sharing their rankings with the group and the other group members will be asked to comment.

Probes:

- > What does this this message represent?
- > How does this message make you feel?
- > What do you think about this?
- > How does this relate to our lives?
- > Others?

Before we go, we would like you to take two short surveys. One is related to mindful eating; it is called the "Mindful Eating Questionnaire". The other survey contains questions about decisions you make with food and your children. Please take a few moments to fill these out and let me know if you have questions about them.

For the final meeting, after the themes are created and surveys completed, we ask participants if they have any final thoughts on the process or personal insights into the experience that they would like to share. We will then thank the participants for their time and effort and will provide each participant with a \$50 gift card as a thank you.

Appendix F: Cross-sectional Study, Informed Consent

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent

Title of Project: Stress and Eating Behavior Quantitative Study

Investigators: Lauren Kennedy, Elena Serrano

I. Purpose of this Research/Project

The purpose of this study is to investigate the role of salivary cortisol in perceived stress, eating behavior, and mindful eating.

II. Procedures

In agreeing to participate, you will be asked to fill out five short questionnaires, provide four saliva samples within a 24-hour period to test levels of cortisol, which is a stress hormone, and provide a 24-hour dietary recall.

You will be given a choice of three dates/times to see the research team during a given week. At that meeting, you will fill out the questionnaires and receive a saliva collection kit with instructions. You will have one week to collect the saliva and freeze each of your samples. After the saliva has been collected you will meet the research team again to provide your frozen saliva samples.

III. Risks

The proposed research presents minimal risks to subjects.

IV. Benefits

Besides monetary compensation, there is no direct benefit or promise of benefit to participants in the study that would encourage participation. There may be some possible health outcomes-related benefits to receiving the optional "stress report card" because it may provide insight on ways to reduce stress in your daily life and make healthier choices.

The wider benefit of this research is in its contribution to the academic knowledge in the field of healthy eating behaviors impacting health and disease. The research will be used to design a pilot test to study the effects of an intervention on stress and eating behavior.

V. Extent of Anonymity and Confidentiality

Only the investigators listed above will have access to the files associated with the study. To help maintain confidentiality your name will be assigned a code when it is analyzed.

We will carefully maintain procedures to protect confidentiality. At no time will the researcher release the files that contain identifiable information to anyone other than individuals working on the project without your written consent.

VI. Compensation

You will be compensated for your time if you choose to participate. Compensation will be provided on a sliding scale, with a total of \$40 available if you complete the questionnaires at the first meeting and return the saliva samples and collection kit. Participants will receive \$10 for participating in the initial data collection (including surveys and dietary recall) and \$30 for returning four frozen saliva samples and the saliva collection kit within 7 days. As part of saying "thank you" for working with us, we will also provide you with a "stress report card" once your data has been analyzed that will provide information on your cortisol levels and making healthy choices (this is optional).

VII. Freedom to Withdraw

You are free to withdraw from the study at any time without penalty. You will receive compensation for the portions of the study you do complete.

VIII. Subject's Responsibilities

I voluntarily agree to participate in this study. I have the following responsibilities:

- Attend the initial data collection meeting (surveys, dietary recall)
- Collect 4 salivary samples and freeze them until collected by researcher (at 2nd meeting)
- Return the frozen saliva samples and saliva collection kit within 7 days of receiving it

IX. Subject's Permission

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

Participant's Signature _____ **Date** _____

Printed Name _____

Researchers' Signature _____ **Date** _____

Printed Name _____

A copy of this form has been given to me to keep. If I have any questions in the future about this project I can contact the following

Dr. Elena Serrano,
Principal Investigator, serrano@vt.edu/540- 231-3464, 201 Wallace Annex (0430), Virginia Tech Blacksburg,
VA 24061

Dr. David Moore
IRB Chair, moored@vt.edu/540-231-4991, Office of Research Compliance, Virginia Tech Blacksburg, VA 24061

Appendix G: Recruitment Flyer for Cross-sectional Study



Stressed Out?

Researchers at Virginia Tech are looking for mothers to participate in a study about eating behavior and cortisol, a hormone found in saliva that is present during stressful times.

Participation involves attending one of the drop-in sessions held near you to fill out a few surveys and receive your saliva collection kit. You will be asked to collect four saliva samples, freeze them immediately, and return them to the research team within one week of receiving the kit.

To say thank you for participating, you will receive \$15-30 and can opt to have a "stress report card" mailed to you, with results of your saliva sample testing.

To participate, you must be:

- ✓ A mother who is 18 or older with a child under the age of 18 living in your home
- ✓ Not currently pregnant or breastfeeding
- ✓ Not currently participating in a diet or weight loss program

If Interested, call/text Lauren 540-808-5358 or email slowdownvt@gmail.com

slowdownvt@gmail.com
540-808-5358

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slowdownvt@gmail.com
540-808-5358

Appendix H: Saliva Collection Protocol

DIRECTIONS FOR SALIVA COLLECTION:

Don't forget:

- Saliva should be collected at (B1)8am, (B2)12pm (noon), (B3)4pm, and (B4)8pm
- Use a new straw for each saliva collection
- Make sure it is frozen immediately or kept as cold as possible until it can be frozen
- Please choose an ordinary day – one that is not overly stressful, nor too laidback.
- DO NOT eat or drink 60 minutes prior to collection
- Try not to engage in vigorous exercise directly before collection
- Rinse mouth with water before collection and wait 10 minutes to avoid diluting the sample.

1. Before you begin, make sure you have selected the correct vial (based on what time of day it is) and that you have your straw ready and a freezer nearby.
2. Unscrew the vial and insert the “straw” with the ribbed or star-shaped end going down into the vial and the smooth end sticking out.
3. Open your mouth slightly. Allow your saliva to pool into the bottom of your mouth on the sides and underneath your tongue.
4. Once you have a pool of saliva formed, hold the straw up to your mouth and drool into it.
5. Continue to pool your saliva in the mouth and drool until you have filled the vial up to the 1.8mL line. Do not overfill.
6. Discard the straw and place the cap on the vial.
7. **Freeze the vial with the saliva in it immediately** in your home freezer or other freezer you have access to. Don't let it thaw once frozen.
8. Please bring your frozen samples to the survey data collection or the focus group

THANK YOU! ☺

If you have **any** questions, PLEASE don't hesitate to call or email!

Lauren Kennedy

(540)808-5358

kennedy0@vt.edu

Appendix I: The Three-Factor Eating Questionnaire-Revised 18

Appendix: Item content* of revised scales

Cognitive Restraint

1. I deliberately take small helpings as a means of controlling my weight.
definitely true/mostly true/mostly false/definitely false
2. I consciously hold back at meals in order not to gain weight.
definitely true/mostly true/mostly false/definitely false
3. I do not eat some foods because they make me fat.
definitely true/mostly true/mostly false/definitely false
4. How frequently do you avoid 'stocking up' on tempting foods?
almost never/seldom/usually/almost always
5. How likely are you to consciously eat less than you want?
unlikely/slightly likely/moderately likely/very likely
6. On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never 'giving in'), what number would you give yourself?
eat whatever I want, whenever I want it/constantly limiting food intake, never 'giving in'

Uncontrolled eating

1. When I smell a sizzling steak or a juicy piece of meat, I find it very difficult to keep from eating, even if I have just finished a meal.
definitely true/mostly true/mostly false/definitely false
2. Sometimes when I start eating, I just can't seem to stop.
definitely true/mostly true/mostly false/definitely false

3. Being with someone who is eating often makes me hungry enough to eat also.
definitely true/mostly true/mostly false/definitely false
4. When I see a real delicacy, I often get so hungry that I have to eat right away.
definitely true/mostly true/mostly false/definitely false
5. I get so hungry that my stomach often seems like a bottomless pit.
definitely true/mostly true/mostly false/definitely false
6. I am always hungry so it is hard for me to stop eating before I finish the food on my plate.
definitely true/mostly true/mostly false/definitely false
7. I am always hungry enough to eat at any time.
definitely true/mostly true/mostly false/definitely false
8. How often do you feel hungry?
only at mealtimes/sometimes between meals/often between meals/almost always
9. Do you go on eating binges though you are not hungry?
never/rarely/sometimes/at least once a week

Emotional eating

1. When I feel anxious, I find myself eating.
definitely true/mostly true/mostly false/definitely false
2. When I feel blue, I often overeat.
definitely true/mostly true/mostly false/definitely false
3. When I feel lonely, I console myself by eating.
definitely true/mostly true/mostly false/definitely false

Appendix J: Perceived Stress Scale

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

Name _____ Date _____

Age _____ Gender (Circle): **M** **F** Other _____

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly? 0 1 2 3 4
2. In the last month, how often have you felt that you were unable to control the important things in your life? 0 1 2 3 4
3. In the last month, how often have you felt nervous and "stressed"? 0 1 2 3 4
4. In the last month, how often have you felt confident about your ability to handle your personal problems? 0 1 2 3 4
5. In the last month, how often have you felt that things were going your way? 0 1 2 3 4
6. In the last month, how often have you found that you could not cope with all the things that you had to do? 0 1 2 3 4
7. In the last month, how often have you been able to control irritations in your life? 0 1 2 3 4
8. In the last month, how often have you felt that you were on top of things?.. 0 1 2 3 4
9. In the last month, how often have you been angered because of things that were outside of your control? 0 1 2 3 4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? 0 1 2 3 4

Appendix K: Sample Demographics Questionnaire

Slow Down Program

Date: _____

Code: _____

Please complete the following questions:

1. How old are you? _____ years
2. What is your marital status? Please check the appropriate box.
 - Single
 - Married
 - Separated
 - Divorced
 - Widowed
3. How many children do you have living at home? Please check the appropriate box.
 - 1
 - 2
 - 3
 - 4 or more
4. Please indicate the age and gender of your children:

Age: _____	<input type="checkbox"/> Female	<input type="checkbox"/> Male
Age: _____	<input type="checkbox"/> Female	<input type="checkbox"/> Male
Age: _____	<input type="checkbox"/> Female	<input type="checkbox"/> Male
Age: _____	<input type="checkbox"/> Female	<input type="checkbox"/> Male
Age: _____	<input type="checkbox"/> Female	<input type="checkbox"/> Male
5. Would you describe yourself as...
 - American Indian/Native American
 - Asian
 - Black/African American
 - White/Caucasian
 - Pacific Islander
 - Other
6. Would you describe yourself as...
 - Hispanic/Latino
 - Non-Hispanic/Non-Latino
7. What is the highest level of education you have completed?
 - Some high school
 - High School

Slow Down Program

Date: _____

Code: _____

- Trade or vocational school
- Associate's Degree
- Some College
- Bachelor's Degree
- Master's Degree
- PhD
- MD

8. What is your annual household income? Please check the appropriate box.

- <\$10,000
- \$10,001 - \$20,000
- \$20,001 - \$30,000
- \$30,001 - \$40,000
- \$40,001 - \$50,000
- \$50,001 - \$60,000
- \$60,001 - \$70,000
- \$70,001 or more

9. Which of the following programs do you currently participate in? Check all that apply.

- None
- WIC
- SNAP/Food Stamps
- Head Start
- Commodity Supplemental Food Program
- Food Bank
- Free or Reduced School Breakfast/Lunch
- Other: _____

10. How many times per week do YOU eat outside the home?

- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

Slow Down Program

Date: _____

Code: _____

11. How many times per week do you eat away from home with your family, including with your child(ren)?

- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

12. Would you be interested in participating in a 4-week program of group sessions to learn more about stress and eating behavior?

- Yes; please contact me via email/phone _____
- No

13. Would you like to receive the personalized stress report card based on your individual results?

- No
- Yes; my email address or home address is:

Thank you for your time!!

Appendix L: Mindful Eating Scale – Response Form

Response Form

	Never	Sometimes	Often	Usually
I become very short tempered if I need to eat.	1	2	3	4
I snack without being aware that I'm eating.	1	2	3	4
I multi-task whilst eating.	1	2	3	4
I don't pay attention to what I'm eating because I'm daydreaming, worrying or distracted.	1	2	3	4
I need to eat like clockwork.	1	2	3	4
I can tolerate being hungry for a while.	1	2	3	4
I tell myself I shouldn't be hungry.	1	2	3	4
I criticise myself for the way I eat.	1	2	3	4
When I get hungry, I can't think about anything else.	1	2	3	4
I have a routine for what I eat.	1	2	3	4
I tend to evaluate whether my eating is right or wrong.	1	2	3	4
I eat the same thing for lunch each day.	1	2	3	4
I notice how my food looks.	1	2	3	4
I eat something without really being aware of it.	1	2	3	4
I stay aware of my food whilst I'm eating.	1	2	3	4
I wish I could control my hunger.	1	2	3	4
It's easy for me to concentrate on what I'm eating.	1	2	3	4
I notice the smells and aromas of food.	1	2	3	4
I eat the same thing on the same day of each week.	1	2	3	4
I eat between meals.	1	2	3	4
Once I've decided to eat, I have to eat straight away.	1	2	3	4
I have a routine for when I eat	1	2	3	4
I wish I could control my eating more easily.	1	2	3	4
I snack when I'm bored.	1	2	3	4
I eat automatically without being aware of what I'm eating.	1	2	3	4
I notice flavours and textures when I'm eating my food.	1	2	3	4
I eat at my desk or computer.	1	2	3	4
I tell myself I shouldn't be eating what I'm eating.	1	2	3	4

Appendix M: Mindful Eating Scale – Scoring key

Scoring Key

I become very short tempered if I need to eat.	r	non-reactivity
I snack without being aware that I'm eating.	r	distractibility
I multi-task whilst eating.	r	unstructured
I don't pay attention to what I'm eating because I'm daydreaming, worrying or distracted.	r	distractibility
I need to eat like clockwork.	r	non-reactivity
I can tolerate being hungry for a while.		non-reactivity
I tell myself I shouldn't be hungry.	r	acceptance
I criticise myself for the way I eat.	r	acceptance
When I get hungry, I can't think about anything else.	r	non-reactivity
I have a routine for what I eat.	r	routine
I tend to evaluate whether my eating is right or wrong.	r	acceptance
I eat the same thing for lunch each day.	r	routine
I notice how my food looks.		awareness
I eat something without really being aware of it.	r	distractibility
I stay aware of my food whilst I'm eating.		awareness
I wish I could control my hunger.	r	acceptance
It's easy for me to concentrate on what I'm eating.		awareness
I notice the smells and aromas of food.		awareness
I eat the same thing on the same day of each week.	r	routine
I eat between meals.	r	unstructured
Once I've decided to eat, I have to eat straight away.	r	non-reactivity
I have a routine for when I eat	r	routine
I wish I could control my eating more easily.	r	acceptance
I snack when I'm bored.	r	unstructured
I eat automatically without being aware of what I'm eating.	r	distractibility
I notice flavours and textures when I'm eating my food.		awareness
I eat at my desk or computer.	r	unstructured
I tell myself I shouldn't be eating what I'm eating.	r	acceptance

Appendix N: Slow Down Program Pilot, Informed Consent

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent

Title of Project: Slow Down Program Pilot

Investigators: Lauren Kennedy, Elena Serrano

I. Purpose of this Research/Project

The purpose of this study is to investigate the effects of an intervention designed to assist mothers in slowing down to share with their family at mealtimes, manage stress effectively, and reconnecting with food and healthy eating behaviors.

II. Procedures

In agreeing to participate, you will be asked to:

1. Fill out some short questionnaires, provide four saliva samples from a 24-hour period to test levels of cortisol, which is a stress hormone, and be weighed and measured.
2. Then, you will also be asked to take part in a series of four audio-recorded group education sessions with other mothers from the community. These will be weekly meetings and each is expected to last 1.5 hours or less. We will first ask you to tell us a little about yourself and over the course of the weekly meetings, we will practice stress management techniques and discuss nutrition.
3. If you participate in at least 3 out of 4 weekly program sessions, we will also ask you to take part in a 60-minute focus group session where we will ask you to give us feedback on your experience in the study. At the conclusion of this focus group, you will be asked to fill out questionnaires, provide saliva samples, and be weighed and measured – the same as in the beginning.
4. Four weeks after the focus group, we will contact you via email or phone to complete an interview on your experience with the program that will last an hour or less.
5. If you do not complete at least 3 out of 4 weekly program sessions, we will ask you to complete a short measure on your experience with the program, instead of the focus group and interviews.

We will ask you to participate by attending the weekly sessions and working on goals at home, too. The home-based activities will be customizable through your own goals and important for the flow of the weekly group sessions. Introductions and guidance on the home-based activities will be provided in detail during each meeting.

III. Risks

The proposed research presents minimal risks to subjects.

IV. Benefits

Besides monetary compensation, there is no direct benefit or promise of benefit to participants in the study that would encourage participation. There may be some social benefit in exploring your thoughts on eating and your families with other mothers contending with similar circumstances and decisions. You may also experience lessened stressful feelings and become better managers of inevitable stress in your life.

The wider benefit of this research is in its contribution to the academic knowledge in the field of healthy eating behaviors impacting health and disease. The research will be used as a pilot test to determine the effects of the concepts explained during the program and those practices at home.

V. Extent of Anonymity and Confidentiality

Only the investigators listed above will have access to the audio files associated with the study. To help maintain confidentiality your name will be assigned a code when the group data is transcribed and coded. We will carefully maintain procedures to protect confidentiality. At no time will the researcher release the group audio that features identifiable persons to anyone other than individuals working on the project without your written consent.

VI. Compensation

You will be compensated for your time if you choose to participate. Compensation will be provided on a sliding scale, with a total of \$85 available if you participate in every stage. Participants will receive \$10 for participating in the initial data collection (including surveys, dietary recall, and saliva sample) and \$10 per session for participating in the four weekly sessions. If you do not attend at least 3 out of 4 of the weekly program sessions and you complete a short measure about your experience in the program, you will receive an additional \$5 (not available to those participants who complete 3 or more out of 4 sessions). If you attend 3 or more of the weekly program sessions, you will receive \$20 for providing follow-up data and participation in the focus group. If you participate in the interview, you will receive another \$15.

VII. Freedom to Withdraw

You are free to withdraw from the study at any time without penalty. You will receive compensation for the portions of the study you do complete.

VIII. Subject's Responsibilities

I voluntarily agree to participate in this study. I have the following responsibilities:

- Attend the initial data collection meeting (surveys, weight/height)
- Collect 4 salivary samples and freeze them until collected by researcher (both at the beginning and conclusion of the study)
- Attend each of the four weekly group sessions, the focus group session, and the interview
- Engage in the home-based exercises provided
- Complete the final survey collection (surveys, weight/height)

IX. Subject's Permission

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

Participant's Signature _____ **Date** _____

Printed Name _____

Researchers' Signature _____ **Date** _____

Printed Name _____

A copy of this form has been given to me to keep. If I have any questions in the future about this project I can contact the following:

For questions about this research study:

Dr. Elena Serrano,

Principal Investigator, serrano@vt.edu/540- 231-3464, 201 Wallace Annex (0430), Virginia Tech Blacksburg, VA 24061

For questions about your rights as human research participants:

Dr. David Moore

IRB Chair, moored@vt.edu/540-231-4991, Office of Research Compliance, Virginia Tech Blacksburg, VA 24061

Appendix O: Child Feeding Questionnaire

Child Feeding Questionnaire

1. When your child is at home, how often are you responsible for feeding her/him?
 - Never
 - Seldom
 - Half of the time
 - Most of the time
 - Always

2. How often are you responsible for deciding what your child's portion sizes are?
 - Never
 - Seldom
 - Half of the time
 - Most of the time
 - Always

3. How often are you responsible for deciding if your child has eaten the right kind of foods?
 - Never
 - Seldom
 - Half of the time
 - Most of the time
 - Always

4. During your childhood (5 to 10 years old), you were:
 - Markedly underweight
 - Underweight
 - Normal
 - Overweight
 - Markedly overweight

5. During your adolescence, you were:
 - Markedly underweight
 - Underweight
 - Normal
 - Overweight
 - Markedly overweight

6. During your twenties, you were:
 - Markedly underweight
 - Underweight
 - Normal
 - Overweight
 - Markedly overweight

7. At present (leave blank if 29 or younger), you are:
 - Markedly underweight
 - Underweight
 - Normal
 - Overweight
 - Markedly overweight

Questions 8-9 will ask about your child's weight. If they have not progressed to the age or developmental stage mentioned in the question, you can leave it blank.

8. Your child during the first year of life:

- Markedly underweight
- Underweight
- Normal
- Overweight
- Markedly overweight

9. Your child as a toddler:

- Markedly underweight
- Underweight
- Normal
- Overweight
- Markedly overweight

10. Your child as a pre-schooler:

- Markedly underweight
- Underweight
- Normal
- Overweight
- Markedly overweight

11. How concerned are you about your child eating too much when you are not around her/him?

- Unconcerned
- A little concerned
- Concerned
- Fairly concerned
- Very concerned

12. How concerned are you about your child having to diet to maintain a desirable weight?

- Unconcerned
- A little concerned
- Concerned
- Fairly concerned
- Very concerned

13. How concerned are you about your child becoming overweight?

- Unconcerned
- A little concerned
- Concerned
- Fairly concerned
- Very concerned

14. I have to be sure that my child does not eat too many sweets (candy, ice cream, cake or pastries)

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

15. I have to be sure that my child does not eat too many high fat foods

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

16. I have to be sure that my child does not eat too much of her favorite foods

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

17. I intentionally keep some foods out of my child's reach

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

18. I offer sweets (candy, cake, ice cream, pastries) to my child as a reward for good behavior

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

19. I offer my child her/his favorite foods in exchange for good behavior

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

20. If I did not guide or regulate my child's eating, she/he would eat too many junk foods

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

21. My child should always eat all of the food on her/his plate

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

22. I have to be especially careful to make sure my child eats enough

- Disagree
- Slightly disagree
- Neutral

- Slightly agree
- Agree

23. If my child says "I'm not hungry", I try to get him/her to eat anyway

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

24. If I did not guide or regulate my child's eating, she/he would eat much less than she should

- Disagree
- Slightly disagree
- Neutral
- Slightly agree
- Agree

25. How much do you keep track of the sweets (candy, ice cream, cake, pies, pastries) that your child eats?

- Never
- Rarely
- Sometimes
- Mostly
- Always

26. How much do you keep track of the snack food (potato chips, Doritos, cheese puffs) that your child eats?

- Never
- Rarely
- Sometimes
- Mostly
- Always

27. How much do you keep track of the high-fat foods that your child eats?

- Never
- Rarely
- Sometimes
- Mostly
- Always

Appendix P: Block Fat/Sugar/Fruit/Vegetable Screener

FOOD QUESTIONNAIRE

RESPONDENT ID #

0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

TODAY'S DATE

<input type="radio"/> Jan	DAY	YEAR
<input type="radio"/> Feb		
<input type="radio"/> Mar	0 0	2008
<input type="radio"/> Apr	1 1	2009
<input type="radio"/> May	2 2	2010
<input type="radio"/> Jun	3 3	2011
<input type="radio"/> Jul	4	2012
<input type="radio"/> Aug	5	2013
<input type="radio"/> Sep	6	2014
<input type="radio"/> Oct	7	2015
<input type="radio"/> Nov	8	2016
<input type="radio"/> Dec	9	2017

ABOUT YOU

SEX

Male
 Female

AGE

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

WEIGHT pounds

0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

HEIGHT ft. in.

0
1
2
3
4
5
6
7
8
9
10
11

SEX

Male
 Female

If female, are you pregnant or breast feeding?

No
 Yes
 Not female

ABOUT THIS SURVEY

- This form is about the foods you usually eat. It will take about 10 - 15 minutes to complete.
- Please answer each question as best you can. Estimate if you aren't sure.
- USE ONLY A NO. 2 PENCIL.
- Fill in the ovals completely, and erase completely if you make any changes.

INSTRUCTIONS

Think about your eating habits over the past year or so. Remember breakfast, lunch, dinner, snacks and eating out.

There are two kinds of questions for each food:

- “How Many Days per Week”,** on average, do you usually eat the food
- “How Much”** do you usually eat of the food.

	HOW MANY DAYS PER WEEK?						HOW MUCH ON THOSE DAYS?		
	NONE OR LESS THAN 1	1 DAY	2 DAYS	3-4 DAYS	5-6 DAYS	EVERY DAY			
1. Glasses of milk, not counting on cereal or coffee (any kind).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Real 100% fruit juice, like orange juice, apple juice, or fruit smoothies. Don't count fruit flavored soft drinks or drinks like Sunny Delight.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Vegetable juice, like tomato juice, V8, carrot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Snapple, Koolaid, instant lemonade, instant iced tea, cordial - regular or sugar-free.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Drinks with some juice, like Hawaiian Punch, Sunny Delight, Knudsen, Hi-C, cranberry juice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Any kind of soft drink, soda or pop, like Coke, cola, Sprite, Gingerale, Crush, Fanta, regular or sugar-free.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Beer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PLEASE DO NOT WRITE IN THIS AREA

<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	SERIAL #
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------

	HOW MANY DAYS PER WEEK?						HOW MUCH ON THOSE DAYS?		
	NONE OR LESS THAN 1	1 DAY	2 DAYS	3-4 DAYS	5-6 DAYS	EVERY DAY			
8. Eggs, or breakfast sandwiches with eggs, like Egg McMuffins (McDonalds).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 egg	<input type="radio"/> 2	<input type="radio"/> 3+
9. Cold cereal, any kind.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 small bowl	<input type="radio"/> 1 medium bowl	<input type="radio"/> 1 large bowl
10. Hot Cereal, cooked cereal like oatmeal or porridge, grits, or cream of wheat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 small bowl	<input type="radio"/> 1 medium bowl	<input type="radio"/> 1 large bowl
11. Real sugar or honey in coffee or tea or on cereal.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 tsp	<input type="radio"/> 2	<input type="radio"/> 3+
12. Cheese, sliced cheese or cheese spread, including on sandwiches.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 slice	<input type="radio"/> 2	<input type="radio"/> 3+
13. Lunch meats like bologna, salami, sliced ham, turkey lunch meat, or any other cold meat cuts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 slice	<input type="radio"/> 2	<input type="radio"/> 3+
14. Hamburgers, cheeseburgers, meat balls or meat loaf.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 small/3 oz	<input type="radio"/> 1 large	<input type="radio"/> 2 large
15. Hot dogs, or sausage like Polish, Italian or chorizo.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 hotdog	<input type="radio"/> 2	<input type="radio"/> 3+
16. Other beef or pork, such as steak, roast beef, ribs, or in sandwiches, tacos, burritos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 3 oz small	<input type="radio"/> 4-6 oz medium	<input type="radio"/> 7+ oz large
17. Fried chicken, including chicken nuggets, wings, chicken patty.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 medium piece	<input type="radio"/> 2 medium pieces or 6 nuggets	<input type="radio"/> 3 medium pieces
18. Fish, any kind.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 2 oz	<input type="radio"/> 4 oz	<input type="radio"/> 6 oz
19. Pizza.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 slice	<input type="radio"/> 2	<input type="radio"/> 3+
20. Spaghetti, lasagna, other pasta, or noodles.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 cup	<input type="radio"/> 2	<input type="radio"/> 3+
21. Rice, or dishes made with rice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 cup rice	<input type="radio"/> 2	<input type="radio"/> 3+
22. Green salad and vegetables you put in green salad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 cup	<input type="radio"/> 2	<input type="radio"/> 3+
23. Any kind of fruit, fresh or canned (not counting juice).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 fruit or 1/2 cup	<input type="radio"/> 2 fruits or 1 cup	<input type="radio"/> 3 fruits or 2 cups
24. French fries, home fries, hash browns.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> small (McD)	<input type="radio"/> medium	<input type="radio"/> large
25. Potatoes not fried, like baked, mashed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1/2 cup or 1/2 potato	<input type="radio"/> 1 cup	<input type="radio"/> 2+ cups
26. Vegetable soup, or stew with vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 cup	<input type="radio"/> 1 1/2 cups	<input type="radio"/> 2+ cups

	HOW MANY DAYS PER WEEK?						HOW MUCH ON THOSE DAYS?		
	NONE OR LESS THAN 1	1 DAY	2 DAYS	3-4 DAYS	5-6 DAYS	EVERY DAY			
27. ALL other vegetables you eat, as a side dish or in any kind of dish, not counting salad or potatoes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1/2 cup altogether	<input type="radio"/> 1 cup	<input type="radio"/> 2 cups
28. Bread, rolls, bagels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 slice	<input type="radio"/> 2	<input type="radio"/> 3+
29. Biscuits, muffins, croissants.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3+
30. Snack chips like potato chips, tortilla, corn chips, Fritos, Doritos, popcorn (not pretzels).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 small handful	<input type="radio"/> 1 oz bag 1 cup	<input type="radio"/> Big bag 2 cups
31. Crackers, like Ritz, soda-crackers, Cheez-Its, or any other snack cracker.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 3-4 small crackers	<input type="radio"/> 5-10 crackers	<input type="radio"/> a lot
32. Ice cream, ice cream bars.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1/2 cup	<input type="radio"/> 1 cup	<input type="radio"/> 2+ cups
33. Doughnuts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3+
34. Cake, cookies, or snack cakes like cupcakes, Twinkies or any other pastry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 small piece	<input type="radio"/> 1 medium	<input type="radio"/> 2+
35. Pie including fast food pies or snack pies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 small piece	<input type="radio"/> 1 medium	<input type="radio"/> 2+
36. Chocolate candy like chocolate bars, M&Ms, Mars Bars, Reeses.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 mini	<input type="radio"/> 1 medium	<input type="radio"/> 1 large
37. Any other candy (not chocolate) like hard candy, Lifesavers, Skittles, Starburst.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1-2 pieces	<input type="radio"/> 1/2 package	<input type="radio"/> 1 package
38. Margarine (not butter) on bread or on vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 teaspoon	<input type="radio"/> 2 teaspoons	<input type="radio"/> 3 teaspoons
39. Butter (not margarine) on bread or on vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 1 teaspoon	<input type="radio"/> 2 teaspoons	<input type="radio"/> 3 teaspoons
40. Fat or oil in cooking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			

For each of the questions below, please fill in the oval that best describes your usual eating habits.

41. What kind of milk do you usually drink?	<input type="radio"/> Whole milk	<input type="radio"/> Skim milk	<input type="radio"/> I don't drink milk or soy milk	
	<input type="radio"/> Reduced-fat 2% milk	<input type="radio"/> Soy milk		
	<input type="radio"/> Low-fat 1% milk	<input type="radio"/> Rice milk		
42. If you drink soft drinks or pop, is it usually:	<input type="radio"/> Diet or sugar free soft drinks	<input type="radio"/> Regular	<input type="radio"/> I don't drink soft drinks	
43. If you drink Snapple, KoolAid, instant iced tea, or instant lemonade, is it usually:	<input type="radio"/> Sugar-free	<input type="radio"/> I don't drink these		
	<input type="radio"/> Regular			
44. If you eat hot dogs, are they usually:	<input type="radio"/> Low Fat or turkey hot dogs	<input type="radio"/> Regular hot dogs	<input type="radio"/> I don't eat hot dogs	
45. If you eat lunch meats, are they usually:	<input type="radio"/> Low Fat or turkey	<input type="radio"/> Regular	<input type="radio"/> I don't eat lunch meats	
46. If you eat snacks like chips, are they usually:	<input type="radio"/> Trans-fat free	<input type="radio"/> Regular	<input type="radio"/> I don't know	<input type="radio"/> I don't eat them

Appendix Q: Mindfulness Self-efficacy Scale

Using the scale below, please indicate how confident you are that you can complete the following tasks. A score of 100 per cent confidence indicates that you are completely confident that you can complete the task (e.g. 100 per cent confidence that you can brush your teeth). A score of 0 per cent confidence indicates that you do not believe you can accomplish the task at all (e.g. 0 per cent confidence that you can jump 10 feet in the air).

0 10 20 30 40 50 60 70 80 90 100 (percent)
no confidence moderate confidence complete confidence

How confident are you in your ability to maintain moment-to-moment non-judgmental awareness that will keep you peaceful:

- When you must wait on an express line in a supermarket because shoppers with too many items are ahead of you.
- When you are hungry and see yourself reaching for junk food.
- When you do not have enough free time for yourself.
- When your boss gives you extra work at the end of the day.
- When someone you love hurts you deeply.
- When you have a fight with your significant other.
- While you are experiencing fatigue and still have six more hours of work.
- While you are experiencing pain of five on a scale of 1 to 10.
- While you are experiencing pain of eight on a scale of 1 to 10.
- When you have difficulty sleeping and have an important meeting the next day.
- When your physician is telling you that the result of a test does not look good.
- When your boss is telling you that you have done a task incorrectly.
- When your significant other is criticizing a bad habit of yours.
- While you are stuck in a traffic jam on a day off from work.
- When you are stuck in a morning traffic jam and you are already late for work.

Appendix R: Acceptability Form

Participant ID: _____

Date: _____

Program Acceptability Questionnaire

We would like to know your thoughts about today's meeting!

Please circle one:

1. Overall how satisfied were you with today's meeting?

1	2	3	4	5
Not at all satisfied	Somewhat satisfied	Moderately Satisfied	Very satisfied	Extremely Satisfied

2. What was most helpful about today?

3. What was not helpful?

4. Other comments, ideas, suggestions?

Appendix S: Slow Down Program Focus Group Script

Results:

1. Think back on these mindfulness activities. Rate them based on your favorites:
 - a. Raisin Exercise
 - b. Chocolate comparison
 - c. Guided Imagery
 - d. Progressive Muscle Relaxation
 - e. Self-acceptance Meditation
 - i. Probes: what attributes of the exercise caused you to rank it higher/lower?
2. Describe a moment where you found yourself using what you learned in the program to manage stress or eating.
 - a. Probe: That is a wonderful experience to share. What motivates you to make these changes?
 - b. Probe: Can you describe other areas of your daily life where changes in how you respond to stress an eating have occurred?
3. Are there any changes (with eating/stress management) that you would like to make, but for any number of reasons, have not been able to?
 - a. Probe: What do you think you might need to be more successful?
4. Take a moment and reflect on what mindfulness means to you now, after participating in the program. Has the meaning changed? How do you use it in daily life?
5. Please share how your experience of daily stress has changed after participating in the program

Evaluation:

1. Describe the applicability of this program to your life
2. Describe your experience with goal-setting each week during the program
3. Tell me how you would improve the program for other mothers
4. What topics in the program did you find most impactful in your life?
 - a. Probe: What topics do you feel you still need?
5. How manageable did you feel four 1.5-hour sessions were?
 - a. Would you have still participated if the sessions had been longer? If there had been more sessions? (Typical MBSR programs are 8-12 weeks, 2 hour sessions, with a 4-6 hour Saturday "retreat")

Is there anything else that you would like to share about your experience that we have not covered?

Appendix T: Slow Down Program, Post-intervention Interview Script

SEMI-STRUCTURED INTERVIEW:

1. What changes have you made?
 - a. Thinking specifically about managing stress, diet, mindfulness
 - b. If so, what motivates you to make these changes?

2. Tell me about your confidence in your ability to:
 - a. Practice mindfulness, skills learned in the program
 - b. Manage stress effectively
 - c. Eat for hunger rather than other external reasons, to identify hunger and identify fullness
 - d. Taking changes you've made further

3. Thinking about the program, what resources or what tools do you think that the program could offer that would help you or maybe a mother in the future, to make changes that maybe you wanted to make but didn't during the program or during the period after the program or could take the changes that you have made further? So, resources or tools that the program could offer that might help.

4. After reflecting on the program, what suggestions do you have to improve the program?

5. Then reflecting on the program, what suggestions do you have that maybe on our outside of resources or tools that we could use to improve the program?

6. What else might you need to keep the changes that you've made going, to keep what you've learned going?

7. How important, at least for you and your family, do you think stress management and healthy eating are?

*Note: As interview progresses and emergent themes and ideas present, questions may be added or altered.

References

1. Jauch-Chara K, Oltmanns KM. Obesity - A neuropsychological disease ? Systematic review and neuropsychological model. *Progress In Neurobiology*. 2014;114:84-101.
2. Hafekost K, Lawrence D, Mitrou F, O'Sullivan TA, Zubrick SR. Tackling overweight and obesity: does the public health message match the science? *BMC Medicine*. 2013;11(1):41-41.
3. Mark AL. Dietary therapy for obesity is a failure and pharmacotherapy is the future: A point of view. *Clinical and Experimental Pharmacology and Physiology*. 2006;33(9):857-862.
4. Wooley SC, Garner DM. Obesity treatment - the high cost of false hope. *Journal Of The American Dietetic Association*. 1991;91(10):1248-1251.
5. Jeffery RW, Drewnowski A, Epstein LH, et al. Long-term maintenance of weight loss: Current status. *Health Psychology*. 2000;19(1S):5-16.
6. Wells JCK, Siervo M. Obesity and energy balance: is the tail wagging the dog? *European Journal Of Clinical Nutrition*. 2011;65(11):1173-1189.
7. Sturm R, Hattori A. Morbid obesity rates continue to rise rapidly in the United States. *International Journal Of Obesity*. 2013;37(6):889-891.
8. Kit BK, Ogden CL, Flegal KM, Carroll MD. Prevalence of Childhood and Adult Obesity in the United States, 2011-2012. *JAMA*. 2014;311(8):806-814.
9. Nhat Hạnh Tc, Vo-Dinh M. *The miracle of mindfulness: a manual on meditation*. Vol Rev. Boston: Beacon Press; 1987.
10. Brown KW, Ryan RM. The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*. 2003;84(4):822-848.
11. Fjorback LO, Arendt M, Ørnbøl E, Fink P, Walach H. Mindfulness-Based Stress Reduction and Mindfulness-Based Cognitive Therapy – a systematic review of randomized controlled trials. *Acta Psychiatrica Scandinavica*. 2011;124(2):102-119.
12. Kabat-Zinn J, Lipworth L, Burney R. The clinical use of mindfulness meditation for the self-regulation of chronic pain. *Journal Of Behavioral Medicine*. 8(2):163.
13. Cramer H, Lauche R, Paul A, Dobos G. Mindfulness-based stress reduction for breast cancer-a systematic review and meta-analysis. *Current Oncology*. 2012;19(5):E343-E352.
14. Allen TD, Eby LT, Conley KM, Williamson RL, Mancini VS, Mitchell ME. What do we really know about the effects of mindfulness-based training in the workplace? *Industrial and Organizational Psychology*. 2015;8(4):652.
15. Chiesa A, Serretti A. Mindfulness-Based Stress Reduction for stress management in healthy people: A review and meta-analysis. *Journal Of Alternative And Complementary Medicine*. 2009;15(5):593-600.
16. Praissman S. Mindfulness-based stress reduction: A literature review and clinician's guide. *Journal Of The American Academy Of Nurse Practitioners*. 2008;20(4):212-216.

17. Adam TC, Epel ES. Stress, eating and the reward system. *Physiology & Behavior*. 2007;91(4):449-458.
18. Torres SJ, Nowson CA. Relationship between stress, eating behavior, and obesity. *Nutrition*. 2007;23(11):887-894.
19. Jaaskelainen A, Nevanpera N, Remes J, Rahkonen F, Jarvelin MR, Laitinen J. Stress-related eating, obesity and associated behavioural traits in adolescents: a prospective population-based cohort study. *BMC Public Health*. 2014;14(1):321-321.
20. Rutters F, Nieuwenhuizen AG, Lemmens SGT, Born JM, Westerterp-Plantenga MS. Acute stress-related changes in eating in the absence of hunger. *Obesity*. 2009;17(1):72-77.
21. Michels N, Sioen I, Braet C, et al. Stress, emotional eating behaviour and dietary patterns in children. *Appetite*. 2012;59(3):762-769.
22. Framson C, Kristal AR, Schenk JM, Littman AJ, Zeliadt S, Benitez D. Development and validation of the mindful eating questionnaire. *J Am Diet Assoc*. 2009;109(8):1439-1444.
23. Wanden-Berghe RG, Sanz-Valero J, Wanden-Berghe C. The application of mindfulness to eating disorders treatment: A systematic review. *Eating Disorders*. 2010;19(1):34-48.
24. Godsey J. The role of mindfulness based interventions in the treatment of obesity and eating disorders: An integrative review. *Complementary Therapies In Medicine*. 2013;21(4):430-439.
25. Godfrey KM, Gallo LC, Afari N. Mindfulness-based interventions for binge eating: A systematic review and meta-analysis. *Journal Of Behavioral Medicine*. 2015;38(2):348-362.
26. Ogden CL, Johnson CL, Flegal KM, Carroll MD. Prevalence and trends in obesity among US adults, 1999-2000. *JAMA*. 2002;288(14):1723-1727.
27. Yanovski SZ, Yanovski JA. Obesity prevalence in the United States – up, down, or sideways? *The New England Journal of Medicine*. 2011;364(11):987-989.
28. Kit BK, Ogden CL, Flegal KM, Carroll MD. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA*. 2012;307(5):491-497.
29. Haslam DW, James WPT. Obesity. *Lancet*. 2005;366(9492):1197-1209.
30. Han Y. Relationships between obesity indexes of national physical fitness evaluation standard and risk factors for common chronic diseases. *Journal of Shenyang Institute of Physical Education*. 2013;32(2):89-92.
31. Siervogel RM, Wisemandle W, Maynard LM, Guo SS, Chumlea WC, Towne B. Lifetime overweight status in relation to serial changes in body composition and risk factors for cardiovascular disease: The Fels Longitudinal Study. *Obesity Research*. 2000;8(6):422-430.
32. Hartmann AS, Hilbert A. Child and adolescent obesity, psychosocial consequences and treatment strategies. *Bundesgesundheitsblatt-Gesundheitsforschung-Gesundheitsschutz*. 2013;56(4):532-538.
33. Hill JO, Peters JC. Environmental contributions to the obesity epidemic. *Science*. 1998;280(5368):1371-1374.
34. Brennan LK, Kemner AL, Donaldson K, Brownson RC. Evaluating the implementation and impact of policy, practice, and environmental changes to

- prevent childhood obesity in 49 diverse communities. *Journal Of Public Health Management And Practice*. 2015;21 Suppl 3:S121.
35. Huang TTK, Cawley JH, Ashe M, et al. Mobilisation of public support for policy actions to prevent obesity. *Lancet*. 2015;385(9985):2422-2431.
 36. U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015 – 2020 Dietary Guidelines for Americans. 8th Edition. December 2015. Available at <http://health.gov/dietaryguidelines/2015/guidelines/>.
 37. Basiotis PP, Lino M, Dinkins JM. Consumption of food group servings: people's perceptions vs. reality. *Family Economics and Nutrition Review*. 2002;14(1):67.
 38. Edwards JSA, Engstrom K, Gustafsson I-B. Body Mass Index (BMI), perceptions of portion size, and knowledge of energy intake and expenditure-A pilot study. *Journal of Culinary Science & Technology*. 2008;6(2):151-169.
 39. Dockett, K. H., Dudley-Grant, G. R., & Bankart, C. P. (2003). Psychology and Buddhism: From individual to global community. Springer Science & Business Media.
 40. Kabat-Zinn J. Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology-Science And Practice*. 2003;10(2):144-156.
 41. Baer RA, Smith GT, Lykins E, et al. Construct validity of the Five Facet Mindfulness Questionnaire in meditating and nonmeditating samples. *Assessment*. 2008;15(3):329-342.
 42. Lau MA, Bishop SR, Segal ZV, et al. The Toronto Mindfulness Scale: Development and validation. *Journal of Clinical Psychology*. 2006;62(12):1445-1467.
 43. Baer RA, Smith GT, Allen KB. Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment*. 2004;11(3):191-206.
 44. Masuda A, Price M, Latzman RD. Mindfulness moderates the relationship between disordered eating cognitions and disordered eating behaviors in a non-clinical college sample. *Journal of Psychopathology and Behavioral Assessment*. 2012;34(1):107-115.
 45. Butryn ML, Juarascio A, Shaw J, et al. Mindfulness and its relationship with eating disorders symptomatology in women receiving residential treatment. *Eating Behaviors*. 2013;14(1):13-16.
 46. Pivarunas B, Kelly NR, Pickworth CK, et al. Mindfulness and eating behavior in adolescent girls at risk for type 2 diabetes. *International Journal of Eating Disorders*. 2015;48(6):563-569.
 47. Pidgeon A, Lacota K, Champion J. The moderating effects of mindfulness on psychological distress and emotional eating behaviour. *Australian Psychologist*. 2013;48(4):262-269.
 48. Levin ME, Dalrymple K, Himes S, Zimmerman M. Which facets of mindfulness are related to problematic eating among patients seeking bariatric surgery? *Eating Behaviors*. 2014;15(2):298-305.
 49. Camilleri, G. M., Méjean, C., Bellisle, F., Hercberg, S., & Péneau, S. Association between mindfulness and weight status in a general population from the Nutrinet-Santé Study. *PloS one*. 2015;10(6), e0127447.

50. Wolever R, Kristeller J. Mindfulness-Based Eating Awareness Training: Treatment of overeating and obesity. 2014;119-139.
51. Hong PY, Lishner DA, Han KH. Mindfulness and eating: An experiment examining the effect of mindful raisin eating on the enjoyment of sampled food. *Mindfulness*. 2014;5(1):80-87.
52. Hong PY, Lishner DA, Han KH, Huss EA. The positive impact of mindful eating on expectations of food liking. *Mindfulness*. 2011;2(2):103-113.
53. Hendrickson KL, Rasmussen EB. Effects of mindful eating training on delay and probability discounting for food and money in obese and healthy-weight individuals. *Behaviour Research and Therapy*. 2013;51(7):399-409.
54. Stites SD, Singletary SB, Menasha A, et al. Pre-ordering lunch at work: Results of the what to eat for lunch study. *Appetite*. 2015;84:88-97.
55. Lacaille J, Ly J, Zacchia N, Bourkas S, Glaser E, Knauper B. The effects of three mindfulness skills on chocolate cravings. *Appetite*. 2014;76:101-112.
56. Timmerman GM, Brown A. The effect of a mindful restaurant eating intervention on weight management in women. *Journal Of Nutrition Education And Behavior*. 2012;44(1):22-28.
57. Kidd LI, Graor CH, Murrock CJ. A mindful eating group intervention for obese women: a mixed methods feasibility study. *Archives Of Psychiatric Nursing*. 2013;27(5):211.
58. Dalen J, Smith BW, Shelley BM, Sloan AL, Leahigh L, Begay D. Pilot study: Mindful Eating and Living (MEAL): Weight, eating behavior, and psychological outcomes associated with a mindfulness-based intervention for people with obesity. *Complementary Therapies in Medicine*. 2010;18(6):260-264.
59. Mantzios M, Wilson JC. Exploring mindfulness and mindfulness with self-compassion-centered interventions to assist weight loss: Theoretical considerations and preliminary results of a randomized pilot study. *Mindfulness*. 2015;6(4):824-835.
60. Mantzios M, Wilson JC. Making concrete construals mindful: A novel approach for developing mindfulness and self-compassion to assist weight loss. *Psychol. Health*. 2014;29(4):422-441.
61. Daubenmier J, Kristeller J, Hecht FM, et al. Mindfulness intervention for stress eating to reduce cortisol and abdominal fat among overweight and obese women: An exploratory randomized controlled study. *Journal of Obesity*. 2011;2011:1-13.
62. Papias EK, Marchiori DR. A brief mindfulness intervention reduces unhealthy eating when hungry, but not the portion size effect. *Appetite*. 2014;75:40-45.
63. Mason AE, Epel ES, Kristeller J, et al. Effects of a mindfulness-based intervention on mindful eating, sweets consumption, and fasting glucose levels in obese adults: data from the SHINE randomized controlled trial. *Journal of Behavioral Medicine*. 2015, 1-13.
64. Gravel K, Deslauriers A, Watiez M, Dumont M, Dufour Bouchard A-A, Provencher V. Sensory-based nutrition pilot intervention for women. *Journal of the Academy of Nutrition and Dietetics*. 2014;114(1):99.
65. Bush HE, Rossy L, Mintz LB, Schopp L. Eat for life: a work site feasibility study of a novel mindfulness-based intuitive eating intervention. *American Journal Of Health Promotion*. 2014;28(6):380.

66. Kearney DJ, Milton ML, Malte CA, McDermott KA, Martinez M, Simpson TL. Participation in mindfulness-based stress reduction is not associated with reductions in emotional eating or uncontrolled eating. *Nutrition Research*. 2012;32(6):413-420.
67. Jacobs J, Cardaciotto L, Block-Lerner J, McMahon C. A pilot study of a single-session training to promote mindful eating. *Advances In Mind-Body Medicine*. 2013;27(2):18.
68. Jordan CH, Wang W, Donatoni L, Meier BP. Mindful eating: Trait and state mindfulness predict healthier eating behavior. *Personality and Individual Differences*. 2014;68:107-111.
69. Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: The development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventive Medicine*. 1999;29(6):563-570.
70. Diliberti N, Bordi PL, Conklin MT, Roe LS, Rolls BJ. Increased portion size leads to increased energy intake in a restaurant meal. *Obesity*. 2004;12(3):562-568.
71. Albers S. *Eat, drink, and be mindful*. Oakland: New Harbinger Publications; 2008.
72. Glasgow RE, Klesges LM, Dzewaltowski DA, Bull SS, Estabrooks P. The future of health behavior change research: What is needed to improve translation of research into health promotion practice? *Annals of Behavioral Medicine*. 2004;27(1):3-12.
73. Glasgow RE, Lichtenstein E, Marcus AC. Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. *American Journal of Public Health*. 2003;93(8):1261-1267.
74. Reid M, Worsley A, Mavondo F. The obesogenic household: Factors influencing dietary gatekeeper satisfaction with family diet. *Psychology & Marketing*. 2015;32(5):544-557.
75. Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. *Pediatrics*. 1998;101(3):539-549.
76. Kristeller JL, Hallett CB. An exploratory study of a meditation-based intervention for Binge Eating Disorder. *Journal of Health Psychology*. 1999;4(3):357-363.
77. Sojcher R, Gould Fogerite S, Perlman A. Evidence and potential mechanisms for mindfulness practices and energy psychology for obesity and binge-eating disorder. *Explore (New York, N.Y.)*. 2012;8(5):271-276.
78. Hepworth NS. A mindful eating group as an adjunct to individual treatment for eating disorders: A pilot study. *Eating Disorders*. 2010;19(1):6-16.
79. Marek RJ, Ben-Porath DD, Federici A, Wisniewski L, Warren M. Targeting premeal anxiety in eating disordered clients and normal controls: A preliminary investigation into the use of mindful eating vs. distraction during food exposure. *International Journal of Eating Disorders*. 2013;46(6):582-585.
80. Chadwick P, Crawford C, Ly L. Human food choice and nutritional interventions. *Nutrition Bulletin*. 2013;38(1):36-42.

81. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: conception to adolescence. *The Journal of Law, Medicine & Ethics*. 2007;35(1):22-34.
82. Clark-Ibáñez M. Framing the social world with photo-elicitation interviews. *American Behavioral Scientist*. 2004;47(12):1507-1527.
83. Harper D. Talking about pictures: A case for photo elicitation. *Visual Studies*. 2002;17(1):13-26.
84. Lorenz LS, Kolb B. Involving the public through participatory visual research methods. *Health Expectations*. 2009;12(3):262-274.
85. Heisley DD, Levy SJ. Autodriving: A photoelicitation technique. *Journal of Consumer Research*. 1991;18(3):257-272.
86. NVivo qualitative data analysis Software [computer program]. Version Version 102013.
87. Michaelson V, McKerron M, Davison C. Forming ideas about health: A qualitative study of Ontario adolescents. *International Journal Of Qualitative Studies On Health And Well-Being*. 2015;10:1-12.
88. Johnson CM, Sharkey JR, McIntosh AW, Dean WR. "I'm the Momma": Using photo-elicitation to understand matrilineal influence on family food choice. *BMC Women's Health*. 2010;10(1):21-21.
89. Jenkins NK, Woodward R, Winter T. The emergent production of analysis in photo elicitation: Pictures of military identity. Paper presented at: Forum Qualitative Sozialforschung/Forum: Qualitative Social Research2008.
90. Gravel K, St-Hilaire GO, Deslauriers A, et al. Effect of sensory-based intervention on the increased use of food-related descriptive terms among restrained eaters. *Food Quality And Preference*. 2014;32:271-276.
91. Williams H, Simmons LA, Tanabe P. Mindfulness-Based Stress Reduction in advanced nursing practice: A nonpharmacologic approach to health promotion, chronic disease management, and symptom control. *Journal of Holistic Nursing*. 2015;33(3):247.
92. O'Reilly GA, Cook L, Spruijt-Metz D, Black DS. Mindfulness-based interventions for obesity-related eating behaviours: a literature review. *Obesity Reviews*. 2014;15(6):453-461.
93. Hulbert-Williams L, Nicholls W, Joy J, Hulbert-Williams N. Initial validation of the Mindful Eating Scale. *Mindfulness*. 2014;5(6):719-729.
94. National Cancer Institute. *Automated Self-Administered 24-Hour Recall (ASA24)*. Bethesda, MD. 2014.
95. Kirkpatrick SI, Subar AF, Douglass D, et al. Performance of the Automated Self-Administered 24-hour Recall relative to a measure of true intakes and to an interviewer-administered 24-h recall. *American Journal Of Clinical Nutrition*. 2014;100(1):233-240.
96. Guenther PM, Kirkpatrick SI, Reedy J, et al. The Healthy Eating Index-2010 Is a valid and reliable measure of diet quality according to the 2010 Dietary Guidelines for Americans. *Journal Of Nutrition*. 2014;144(3):399-407.
97. Lee EH. Review of the psychometric evidence of the Perceived Stress Scale. *Asian Nursing Research*. 2012;6(4):121-127.

98. Cappelleri JC, Bushmakin AG, Gerber RA, et al. Psychometric analysis of the Three-Factor Eating Questionnaire-R21: Results from a large diverse sample of obese and non-obese participants. *International Journal of Obesity*. 2009;33(6):611-620.
99. de Lauzon B, Romon M, Deschamps V, et al. The Three-Factor Eating Questionnaire-R18 is able to distinguish among different eating patterns in a general population. *Journal Of Nutrition*. 2004;134(9):2372-2380.
100. Centers for Disease Control and Prevention. Body Mass Index (BMI). <http://www.cdc.gov/healthyweight/assessing/bmi/>. Accessed 10 December, 2015.
101. Tabachnick BG, Fidell LS. *Using multivariate statistics*. Vol 6th. Boston: Pearson Education; 2013.
102. Comrey AL, Lee HB. *A first course in factor analysis*. Vol 2nd. Hillsdale, N.J: L. Erlbaum Associates; 1992.
103. Yong AG, Pearce S. A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in Quantitative Methods for Psychology*. 2013;9(2):79-94.
104. Venkaiah K, Brahmam GNV, Vijayaraghavan K. Application of factor analysis to identify dietary patterns and use of factor scores to study their relationship with nutritional status of adult rural populations. *The Journal of Health, Population and Nutrition*. 2012;29(4).
105. Aardal E, Holm AC. Cortisol in saliva—reference ranges and relation to cortisol in serum. *European Journal Of Clinical Chemistry And Clinical Biochemistry*. 1995;33(12):927-932.
106. Patel RS, Shaw SR, Macintyre H, McGarry GW, Wallace AM. Production of gender-specific morning salivary cortisol reference intervals using internationally accepted procedures. *Clinical Chemistry And Laboratory Medicine*. 2004;42(12):1424-1429.
107. Grossman P. On measuring mindfulness in psychosomatic and psychological research. *Journal of Psychosomatic Research*. 2008;64(4):405-408.
108. Park T, Reilly-Spong M, Gross CR. Mindfulness: a systematic review of instruments to measure an emergent patient-reported outcome (PRO). *Quality of Life Research*. 2013;22(10):2639-2659.
109. Adjoian TK, Firestone MJ, Eisenhower D, Yi SS. Validation of self-rated overall diet quality by Healthy Eating Index-2010 score among New York City adults, 2013. *Preventive Medicine Reports*. 2016;3:127-131.
110. Larson NI, Story MT. Food insecurity and weight status among US children and families: A review of the literature. *American Journal Of Preventive Medicine*. 2011;40(2):166-173.
111. Cooper CE, McLanahan SS, Meadows SO, Brooks-Gunn J. Family structure transitions and maternal parenting stress. *Journal of Marriage and Family*. 2009;71(3):558-574.
112. Atlas JG, Smith GT, Hohlstein LA, McCarthy DM, Kroll LS. Similarities and differences between Caucasian and African American college women on eating and dieting expectancies, bulimic symptoms, dietary restraint, and disinhibition. *International Journal of Eating Disorders*. 2002;32(3):326-334.

113. Bardone-Cone AM, Boyd CA. Psychometric properties of eating disorder instruments in black and white young women: Internal consistency, temporal stability, and validity. *Psychological Assessment*. 2007;19(3):356-362.
114. Pruessner JC, Hellhammer DH, Kirschbaum C. Burnout, perceived stress, and cortisol responses to awakening. *Psychosomatic Medicine*. 1999;61(2):197-204.
115. Wüst S, Federenko I, Hellhammer DH, Kirschbaum C. Genetic factors, perceived chronic stress, and the free cortisol response to awakening. *Psychoneuroendocrinology*. 2000;25(7):707-720.
116. Feizi A, Aliyari R, Roohafza H. Association of perceived stress with stressful life events, lifestyle and sociodemographic factors: a large-scale community-based study using logistic quantile regression. *Computational And Mathematical Methods In Medicine*. 2012;2012:151865.
117. Vreeburg SA, Kruijtzter BP, van Pelt J, et al. Associations between sociodemographic, sampling and health factors and various salivary cortisol indicators in a large sample without psychopathology. *Psychoneuroendocrinology*. 2009;34(8):1109-1120.
118. Simpson EEA, McConville C, Rae G, et al. Salivary cortisol, stress and mood in healthy older adults: The Zenith study. *Biological Psychology*. 2008;78(1):1-9.
119. Hellhammer DH, Wüst S, Kudielka BM. Salivary cortisol as a biomarker in stress research. *Psychoneuroendocrinology*. 2009;34(2):163-171.
120. Doustmohammadian JA, Dorostymotlagh AR, Keshavarz A, Sadrzadehyeganeh H, Mohammadpour-Ahrangani B. Socio-demographic factors associated with body mass index of female adolescent students in Semnan City, Iran. *Malaysian Journal Of Nutrition*. 2009;15(1):27.
121. El Kishawi RR, Soo KL, Abed YA, Muda WAMW. Obesity and overweight: prevalence and associated socio demographic factors among mothers in three different areas in the Gaza Strip-Palestine: A cross-sectional study. *BMC Obesity*. 2014;1(1):7-7.
122. Park S-Y, Murphy SP, Wilkens LR, et al. Dietary patterns using the Food Guide Pyramid groups are associated with sociodemographic and lifestyle factors: the multiethnic cohort study. *The Journal of Nutrition*. 2005;135(4):843-849.
123. Fogelholm M, Anderssen S, Gunnarsdottir I, Lahti-Koski M. Dietary macronutrients and food consumption as determinants of long-term weight change in adult populations: A systematic literature review. *Food & Nutrition Research*. 2012;56:1-45
124. Newby PK, Muller D, Hallfrisch J, Qiao N, Andres R, Tucker KL. Dietary patterns and changes in body mass index and waist circumference in adults. *The American Journal Of Clinical Nutrition*. 2003;77(6):1417-1425.
125. Lafay L, Mennen L, Basdevant A, et al. Does energy intake underreporting involve all kinds of food or only specific food items? Results from the Fleurbaix Laventie Ville Sante (FLVS) study. *International Journal Of Obesity*. 2000;24(11):1500-1506.
126. Bove CF, Olson CM. Obesity in low-income rural women: qualitative insights about physical activity and eating patterns. *Women & Health*. 2006;44(1):57-78.

127. Beshara M, Hutchinson AD, Wilson C. Does mindfulness matter? Everyday mindfulness, mindful eating and self-reported serving size of energy dense foods among a sample of South Australian adults. *Appetite*. 2013;67:25-29.
128. Moor KR, Scott AJ, McIntosh WD. Mindful eating and its relationship to body mass index and physical activity among university students. *Mindfulness*. 2013;4(3):269-274.
129. Miller CK, Kristeller JL, Headings A, Nagaraja H. Comparison of a mindful eating intervention to a diabetes self-management intervention among adults with type 2 diabetes: A randomized controlled trial. *Health Education & Behavior*. 2014;41(2):145-154.
130. Karb RA, Elliott MR, Dowd JB, Morenoff JD. Neighborhood-level stressors, social support, and diurnal patterns of cortisol: The Chicago Community Adult Health Study. *Social Science & Medicine*. 2012;75(6):1038-1047.
131. Heim C, Ehler U, Hellhammer DH. The potential role of hypocortisolism in the pathophysiology of stress-related bodily disorders. *Psychoneuroendocrinology*. 2000;25(1):1-35.
132. Ebbeling CB, Pawlak DB, Ludwig DS. Childhood obesity: public-health crisis, common sense cure. *Lancet*. 2002;360(9331):473-482.
133. Wyatt SB, Winters KP, Dubbert PM. Overweight and obesity: prevalence, consequences, and causes of a growing public health problem. *The American Journal Of The Medical Sciences*. 2006;331(4):166-174.
134. Visscher TL, Seidell JC. The public health impact of obesity. *Annual Review Of Public Health*. 2001;22(1):355-375.
135. Nicklas TA, Baranowski T, Cullen KW, Berenson G. Eating patterns, dietary quality and obesity. *Journal of the American College of Nutrition*. 2001;20(6):599-608.
136. Rolls BJ. The relationship between dietary energy density and energy intake. *Physiology & Behavior*. 2009;97(5):609-615.
137. Patrick H, Nicklas TA. A review of family and social determinants of children's eating patterns and diet quality. *Journal of the American College of Nutrition*. 2005;24(2):83-92.
138. Landry SH, Smith KE, Swank PR, Assel MA, Vellet S. Does early responsive parenting have a special importance for children's development or is consistency across early childhood necessary? *Developmental Psychology*. 2001;37(3):387.
139. Clark HR, Goyder E, Bissell P, Blank L, Peters J. How do parents' child-feeding behaviours influence child weight? Implications for childhood obesity policy. *Journal of Public Health*. 2007;29(2):132-141.
140. Fisk CM, Crozier SR, Inskip HM, et al. Influences on the quality of young children's diets: the importance of maternal food choices. *British Journal of Nutrition*. 2011;105(2):287-296.
141. Association AP. *Stress in America: Paying with our health*. 2009.
142. Association AP. *Stress in America: Paying with our health*. 2015.
143. Grunberg NE, Straub RO. The role of gender and taste class in the effects of stress on eating. *Health Psychology*. 1992;11(2):97.

144. Epel E, Lapidus R, McEwen B, Brownell K. Stress may add bite to appetite in women: a laboratory study of stress-induced cortisol and eating behavior. *Psychoneuroendocrinology*. 2001;26(1):37-49.
145. Klein L, Faraday M, Grunberg N. Gender differences in eating after exposure to a noise stressor. *Annals of Behavioral Medicine*. 1996;18:S103.
146. Parks EP, Kumanyika S, Moore RH, Stettler N, Wrotniak BH, Kazak A. Influence of stress in parents on child obesity and related behaviors. *Pediatrics*. 2012;peds. 2012-0895.
147. Stenhammar C, Olsson GM, Bahmanyar S, et al. Family stress and BMI in young children. *Acta Paediatrica*. 2010;99(8):1205-1212.
148. Suglia SF, Duarte CS, Chambers EC, Boynton-Jarrett R. Cumulative social risk and obesity in early childhood. *Pediatrics*. 2012;129(5):e1173-e1179.
149. Tate EB, Wood W, Liao Y, Dunton GF. Do stressed mothers have heavier children? A meta-analysis on the relationship between maternal stress and child body mass index. *Obesity Reviews*. 2015;16(5):351-361.
150. Gundersen C, Lohman BJ, Garasky S, Stewart S, Eisenmann J. Food security, maternal stressors, and overweight among low-income US Children: Results from the National Health and Nutrition Examination Survey (1999-2002). *Pediatrics*. 2008;122(3):e529-E540.
151. Taylor MB, Daiss S, Krietsch K. Associations among self-compassion, mindful eating, eating disorder symptomatology, and body mass index in college students. *Translational Issues in Psychological Science*. 2015;1(3):229-238.
152. Anderson LM, Reilly EE, Schaumberg K, Dmochowski S, Anderson DA. Contributions of mindful eating, intuitive eating, and restraint to BMI, disordered eating, and meal consumption in college students. *Eating and Weight Disorders*. 2015.
153. Kristeller JL. Mindfulness-based eating awareness training: An introduction to clinical use. *Annals Of Behavioral Medicine*.43:S1.
154. Kristeller JL, Sheets V, Wolever R, Bolinskey K. Mindfulness-Based Eating Awareness Training (MB-EAT): conceptual foundations and research evidence. *Annals of Behavioral Medicine*.43:S77.
155. Fishbein M. The role of theory in HIV prevention. *AIDS Care*. 2000;12(3):273-278.
156. Fishbein M, Cappella JN. The role of theory in developing effective health communications. *Journal of Communication*. 2006;56(s1):1-17.
157. Scheyett A, Kim M. Can We Talk? *Journal of Teaching in Social Work*.24(1):39-54.
158. Bovend'Eerd T, Botell RE, Wade DT. Writing SMART rehabilitation goals and achieving goal attainment scaling: A practical guide. *Clinical Rehabilitation*. 2009;23(4):352-361.
159. Lalonde I, Graham M, Slovinec-D'Angelo M, Beaton L, Brown J, Block T. Validation of the block fat/sugar/fruit/vegetable screener in a cardiac rehabilitation setting: Poster #9. *Journal of Cardiopulmonary Rehabilitation and Prevention*. 2008;28(5):340.

160. Chang VY, Palesh O, Caldwell R, et al. The effects of a mindfulness-based stress reduction program on stress, mindfulness self-efficacy, and positive states of mind. *Stress and Health*. 2004;20(3):141-147.
161. MacKillop J, Anderson EJ. Further psychometric validation of the Mindful Attention Awareness Scale (MAAS). *Journal of Psychopathology and Behavioral Assessment*. 2007;29(4):289-293.
162. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 3(2):77-101.
163. Braun V, Clarke V. What can "thematic analysis" offer health and wellbeing researchers? *International Journal of Qualitative Studies on Health and Well-Being*. 2014;9:1-2.
164. Piazza JR, Almeida DM, Dmitrieva NO, Klein LC. Frontiers in the use of biomarkers of health in research on stress and aging. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*. 2010;65(5):513-525.
165. Bolger N, Davis A, Rafaeli E. Diary methods: Capturing life as it is lived. *Annual Review of Psychology*. 2003;54(1):579-616.
166. Strecher VJ, DeVellis BM, Becker MH, Rosenstock IM. The role of self-efficacy in achieving health behavior change. *Health Education & Behavior*. 1986;13(1):73-92.
167. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*. 1977;84(2):191.
168. Gunaratana B, Gunaratana H. *Mindfulness in plain English*. Simon and Schuster; 2011.
169. Crnic KA, Greenberg MT, Ragozin AS, Robinson NM, Basham RB. Effects of stress and social support on mothers and premature and full-term infants. *Child Development*. 1983:209-217.
170. Klohe-Lehman DM, Freeland-Graves J, Anderson ER, et al. Nutrition knowledge is associated with greater weight loss in obese and overweight low-income mothers. *Journal of the American Dietetic Association*. 2006;106(1):65-75.
171. Stolley MR, Fitzgibbon ML. Effects of an obesity prevention program on the eating behavior of African American mothers and daughters. *Health Education & Behavior*. 1997;24(2):152-164.
172. Østbye T, Krause KM, Lovelady CA, et al. Active Mothers Postpartum: a randomized controlled weight-loss intervention trial. *American Journal of Preventive Medicine*. 2009;37(3):173-180.
173. Jordan KC, Freeland-Graves JH, Klohe-Lehman DM, et al. A nutrition and physical activity intervention promotes weight loss and enhances diet attitudes in low-income mothers of young children. *Nutrition Research*. 2008;28(1):13-20.
174. O'Brien C. Who is teaching us about sustainable happiness and well-being? *Health, Culture and Society*. 2013;5(1):294-307.
175. Chiesa A, Serretti A. A systematic review of neurobiological and clinical features of mindfulness meditations. *Psychological Medicine*. 2010;40(8):1239-1252.

176. Zeidan F, Grant JA, Brown CA, McHaffie JG, Coghill RC. Mindfulness meditation-related pain relief: Evidence for unique brain mechanisms in the regulation of pain. *Neuroscience Letters*. 2012;520(2):165-173.