MIND YOUR HEART:

THE FEASIBILITY AND EFFECTS OF A MINDFUL EATING AND DASH DIET EDUCATION PROGRAM TO ADDRESS HYPERTENSION AND DIET ADHERENCE IN WORKING ADULTS

by

ANITA MARIE REINA

(Under the Direction of Lisa M. Renzi-Hammond & Heather M. Padilla)

ABSTRACT

The DASH diet is efficacious in reducing blood pressure, but its dietary adherence is poor. Workplace health promotion programs offer health initiatives, such as diet and nutrition education to prevent chronic disease yet sustainability remains questionable. Mindful eating may increase adaptive behaviors that improve long-term dietary habits but few have combined mindful eating with diet education. The Mind Your Heart (MYH) curriculum combined DASH diet education and mindful eating tailored for adults and delivered asynchronously through an e-learning platform. The purposes of this project were 1) to examine the feasibility of implementing DASH diet education and mindful eating program in a workplace delivered via an e-learning platform system and 2) to evaluate whether a DASH diet education program with a mindful eating program improves DASH diet adherence compared to DASH diet education alone. In the first phase, 19 participants (M=42.26±12.19 years; 79% female; 16% non-White) were recruited to examine the feasibility of MYH available through an e-learning platform. In phase two, 30 full-time working adults (M=47.10±12.22; 93.3% female; 13.3% non-white) were enrolled in a quasi-experimental,

pseudo-randomized controlled trial to examine the effects of mindful eating on diet adherence and blood pressure. In Phase 1, participants' state mindfulness improved over 3 weeks (t (15) =3.56; p<.01) and was associated perceived usefulness (r = .58; p<.05) and improved attitude (r_s = .71, p< .01) of MYH but inversely related to perceived susceptibility to disease (r = –.50; p<.05). Participants identified evidence-based nutrition tools (MyPlate, nutrition labels, etc.) and mindful eating content as useful, although mindful eating was perceived to be more difficult to apply to daily life. In Phase 2, the DASH education with mindful eating group improved diet quality in saturated fat (Z= 2.24; p<.05; r= .41), calcium (Z= 2.33; p<.05; r= .43), fiber (Z= 1.90; p<.05; r= .35), and overall DASH diet score (Z= 1.79; p<.05; r= .33). Mindful eating may be an effective behavioral tool for improving DASH diet quality, particularly for fiber, saturated fat, and calcium. Together, these studies provide insight into the acceptability of asynchronous delivery and beneficial use of mindful eating as a nonpharmacological intervention to improve dietary adherence.

INDEX WORDS: DASH diet, mindful eating, heart health, hypertension, dietary adherence, eating behaviors

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DEDICATION

This dissertation is dedicated to the love of my life, my daughter Lydia M. Nunnelley. I worked hard all my life so that I could be a strong mother and provider for you. I hope I have inspired you to do great things with your life and realize your own potential through curiosity, perseverance, and strength.

I would also like to dedicate this to my partner, A. Clark Macon who has always believed in me even when I was a puddle of tears on any given Sunday. Your hard work to support Lydia and me in our educational pursuits is the greatest gift you could ever have granted me. Thank you for helping me to remember who I am.

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CHAPTER 1

INTRODUCTION

The leading causes of cardiovascular disease such as stroke, heart failure, and atherosclerosis are partly attributed to chronic hypertension.[1] Hypertension affects nearly half of all adults in the US, although the actual prevalence may be higher due to underdiagnosis and few overt symptoms.[2,3] The American Heart Association recommends lifestyle and dietary changes to prevent hypertension onset and progression, even in prehypertensive and normotensive patients.[4] The Dietary Approaches to Stop Hypertension (DASH) is a quality diet that effectively lowers blood pressure and other cardiovascular risk factors by limiting saturated fats, dietary cholesterol, and sodium while consuming food rich in calcium, magnesium, potassium, and dietary fiber.[5] Despite the health-related benefits of the DASH diet, dietary adherence is inadequate in the US.[6] Consequently, there is a need to investigate ways to improve dietary adherence to the DASH diet and reach more adults who may be unaware of their condition.

Mindfulness can provide a valuable behavioral mechanism to improve cardiovascular disease risk factors, such as poor dietary behaviors.[7] Mindfulness is a psychological approach to skillfully respond to maladaptive thoughts and behaviors with enhanced attention and awareness and is often described as taking an active interest and awareness in daily activities through becoming observant, nonjudgmental, and nonreactive to stimuli.[8,9] Mindful eating, or mindfulness related to eating behaviors, can be described as enhanced attention and awareness of the physical and mental sensations while eating or in the eating environment.[10,11] Mindful eating decreases maladaptive behaviors such as emotional eating, binge eating, and restricted eating[12-14]

Meanwhile, mindful eating also improves adaptive eating behaviors such as consuming less calorie-dense foods, controlled serving sizes, increased preferences for healthier foods, and less impulsive eating.[15,16] However, these adaptive behaviors have not yet been applied to following a prescriptive diet such as the DASH diet. Further, it is vital to reach a larger population who may be unaware of their eating behaviors and their role in hypertension prevention.

Worksites have the potential to reach 133 million adults in the US workforce through workplace health promotion programs (WHPP), initiatives provided by worksites designed to address chronic conditions that can contribute to productivity loss and health-related expenses.[17,18] However, physical space, program cost, employee engagement, and a lack of experienced staff to implement the program pose significant barriers to WHPP implementation.[17] Digital health, delivered via mobile devices (mHealth), computers (eHealth), and wearable technologies, are possible solutions to addressing WHPP barriers and have been increasing in popularity since the rise in remote work access from the COVID-19 pandemic.[19] WHPP have utilized digital health interventions to address a variety of health outcomes, including mental health, weight changes, physical activity, sleep, and hypertension prevention.[20-22] However, digital health WHPP suffer from high attrition and low engagement due to a lack of relevant issues and input from employees interacting with the program.[21,23,24]

Hypertension is a serious yet preventable chronic condition that leads to many fatal diseases. Although the DASH diet is efficacious in lowering blood pressure, adherence to the DASH diet among Americans remains low. Therefore, behavioral interventions that reach various adult populations to raise awareness and improve dietary adherence are warranted. Mindful eating shows promising results for adaptive dietary behaviors but has rarely been combined with dietary education to improve diet adherence. Therefore, the Mind Your Heart program was developed

using mindful eating and DASH diet guidelines to improve dietary adherence. In order to meet the rising popularity and improve logistic convenience, the program was developed using asynchronous digital technology to improve access and reach.

The purposes of this project are 1) to examine the feasibility of implementing a nutrition and mindful eating program in a workplace using a technology delivery system and 2) to evaluate whether a DASH diet education program when combined with a mindful eating program improves DASH diet adherence compared with dietary education alone. The central hypothesis is that DASH diet education and mindfulness will increase individuals' DASH diet adherence and improve their ability to make healthier food decisions. The study was conducted in two phases: In the first phase, the feasibility of the intervention was tested through interviews and validated questionnaires; in the second phase, the intervention was pilot tested in a randomized controlled study with two groups.

Specific Aim 1: Examine the feasibility of a mindfulness intervention administered through technology in a worksite wellness program. The study is designed to 1) adapt mindful eating to a nutrition education eHealth program and 2) test the feasibility and acceptability of the Mind Your Heart (MYH*)* program, a WHPP combining diet education and mindful eating activities. The research questions are: (1) What are the relationships between state mindfulness, HITAM constructs, engagement, and attitudes toward a mindful eating program? (2) How did participants use MYH to support nutrition-related health goals? (3) What factors facilitated or inhibited the use of the MYH program?

Specific Aim 2: Compare the effects of DASH diet education combined with mindful eating and DASH diet education alone on DASH diet adherence using a randomized comparative design. This study examines the effects of mindful eating training on DASH diet adherence and

blood pressure changes over six weeks. The research questions are: (1) Does mindful eating training improve adherence to the DASH diet more than nutrition education alone? (2) Does a mindful eating intervention affect blood pressure more than nutrition education? The central hypothesis is that mindful eating will improve DASH diet adherence, as evidenced by improvements in blood pressure.

The subsequent chapters of this dissertation outline the background rationale, feasibility study, and pilot study used to examine a WHPP called Mind Your Heart, a program that integrates mindful eating with DASH diet education using an e-learning platform. Chapter 2 reviews the literature concerning the impact of hypertension, the therapeutic use of diet to treat hypertension, mindfulness as a concept and applied to eating behaviors, WHPP delivered using technology, and the theoretical underpinnings for evaluating health technology. Chapter 3 is a manuscript to be submitted to the *American Journal of Health Promotion* examining the fit and feasibility of Mind Your Heart, a virtual mindful eating and nutrition program to address hypertension in working adults. Chapter 4 is a manuscript on the results of the Mind Your Heart Pilot study that tests the effect of mindful eating on diet adherence and blood pressure to be submitted to the *Journal of the Academy of Nutrition and Dietetics*. Chapter 5 summarizes the findings from these studies, implications for future research, and conclusions.

CHAPTER 2

LITERATURE REVIEW

Epidemiological significance of hypertension

Hypertension is a chronic condition that affects 116 million Americans, with approximately 92 million who do not have their hypertension under control even with medication.[25] Hypertension is the leading, preventable cause of cardiovascular disease globally and is attributed to several progressive comorbidities such as atherosclerosis, diabetes, overweight, and obesity.[26] The consequences of untreated hypertension are increased risks for stroke, vision loss, heart failure, heart attack, and kidney disease or failure.[27] A recent epidemiological study showed an increasing trend between prehypertension and the prevalence of comorbidities such as prediabetes, diabetes mellitus, overweight, and obesity in US adults.[26] Even moderately elevated blood pressure with systolic blood pressure greater than 115 mm Hg poses a risk of developing chronic diseases such as stroke, heart disease, and renal failure.[28]

According to the American Heart Association, there are five clinical blood pressure categories: Normal (120/80 mm Hg), elevated or prehypertensive (120-129 systolic and less than 80 mm Hg diastolic), hypertension stage 1 (130-139 mm Hg systolic or 80-89 mm Hg diastolic), hypertension stage 2 (140/90 mm Hg or higher), and hypertensive crisis (180/120 mm Hg).[29] The difference in blood pressure between systolic and diastolic measures, known as pulse pressure, further contributes to arterial stiffness and increased risk for stroke and organ damage.[30,31] Since a pulse pressure greater than 40 mm Hg is life-threatening, in 2017, the American Heart Association lowered the blood pressure classification for stage 1 hypertension from 140/90 mm Hg to

130/80mm Hg.[4] Although blood pressure can be self-monitored, medical personnel can diagnose and provide treatment for various hypertension levels.

Hypertension treatment usually includes a combination of mediation and lifestyle changes.[32] Although some contributing risk factors, such as genetics, sex, and race, are nonmodifiable, factors such as poor diet, smoking, alcohol use, physical inactivity, and obesity can be modified to reduce the risk of developing or the progression of hypertension.[4,25] Evidence supports that for every 5 to 10 mm Hg decrease in systolic blood pressure, the relative risk decreases significantly for cardiovascular events (20%), coronary heart disease (17%), heart failure (28%), stroke (27%), and all-cause mortality (13%).[32,33]

The relationship between diet and hypertension

The leading causes of death and disability from hypertension, heart disease, stroke, and diabetes are partially attributed to poor dietary behaviors.[27,34] Dietary patterns consisting of high sodium, low whole grains, and low fruit intake have been estimated to contribute to more than half of diet-related deaths and two-thirds of disability-adjusted life-years worldwide.[35] The Standard American Diet, sometimes referred to as the Westernized diet, consists of elevated levels of saturated fat found in animal foods, excess refined carbohydrates, excess sodium, and inadequate nutrients available in whole grains, fruits, and vegetables.[36] Since the 1950s, Americans have consumed 10% more calories from refined grains and added fats and 4% more from added sugars than in previous years, while fruit and vegetables make up only about 1.4% of calories combined.[36] Approximately 40% of Americans eat less than one fruit daily, and 22.1% eat less than one vegetable daily.[37]

The Dietary Approaches to Stop Hypertension (DASH) diet is a high-quality diet that has been associated with reduced risks for all-cause mortality, cardiovascular disease, cancer, and

diabetes.[38] The primary recommendations for following the DASH diet are to limit saturated fats, dietary cholesterol, and sodium while consuming foods rich in calcium, magnesium, potassium, and dietary fiber. The DASH diet effectively lowers cardiovascular risk factors, reduces fasting insulin concentration, and reduces weight in overweight and obese persons.[39-41]

The DASH diet was initially developed as a controlled feeding trial to examine if dietary patterns influenced blood pressure levels. The controlled feeding trial showed that hypertensive participants who were fed a diet high in fruits and vegetables, low-fat dairy, and reduced saturated fat lowered their blood pressure by 11.4 mm Hg systolic and 5.5 mm Hg diastolic in comparison to the control group who were fed a diet consistent with the standard American diet. Participants without hypertension also lowered their systolic blood pressure by 3.5 mm Hg and diastolic by 3.5 mm Hg compared to the control group.[42] Reductions like these are clinically significant, as it has been estimated that a 5 mm Hg decrease in systolic blood pressure is associated with reduced mortality from stroke by 14% and coronary heart disease by 9%.[6,32]

DASH diet adherence

Despite the health-related benefits of the DASH diet, dietary adherence is below optimal levels.[43] The original DASH diet trial provided participants with meals rich in fruits, vegetables, and low fat for eight weeks resulting in approximately 93% adherence throughout the study.[42] However, compliance with dietary changes is not as high when applied to real-world conditions. A review of NHANES data showed that less than 1% of the population were DASH diet adherent, and less than 20% met half of the guidelines.[44] A systematic review on compliance to the DASH diet found that compared to those provided DASH diet meals, patients who received dietary advice showed lower levels of dietary compliance which further decreased over time.[6] For instance, though increases in fruits and vegetables occurred in the DASH diet group compared to advice

only group in the PREMIER diet trial, only one-third met the recommendations for fruits and vegetables at six months.[45] Although those assigned to a DASH diet condition in the ENCORE DASH diet trial increased from a DASH diet adherence score of around 3.5 to a score of 6.5, this is still lower than the possible score of 9 for perfect adherence.[46]

While adherence in the real world may be less than in feeding trials, several positive changes still occur with moderate adherence to the DASH diet.[6,43] Long-term adherence to the DASH diet is associated with a significantly decreased incidence of stroke and lower levels of C-reactive protein and interleukin-6 in women with cardiovascular disease or diabetes history.[47] A recent meta-analysis of prospective cohort designs found that on a scale of 8 to 40, for every 5-point increment of DASH diet adherence, there was a reduced risk of mortality by 5%, cardiovascular disease by 4%, and a 3% reduction for cancer and stroke.[48] Researchers in the ENCORE study also found that for every two-point increase in DASH diet adherence score, there was a 3.4 mm Hg decrease in systolic blood pressure.[6,46]

Nutrition literacy and education may be one approach to improving DASH diet adherence, as increased nutrition education is associated with increased fruit and vegetable consumption.[49-51] Nutrition literacy is a subset of health literacy, which is the ability to access, understand, and utilize health information.[52] There is evidence that increased nutrition literacy is inversely associated with consuming western diet-related foods such as fried foods, sugar-sweetened beverages, and processed meats.[53] However, a systematic review of health literacy reported that dietary adherence was scarcely affected by health literacy.[52] Even in individuals with high nutrition literacy, nutritional knowledge does not necessarily translate into behavioral implementation.[54]

Therefore, diet adherence barriers extend beyond knowledge into other environmental and psychological factors, including food choice, convenience, and addictive behaviors.[52] Food choice

is a complex issue related to several factors, including food characteristics, individual preferences, and sociocultural-related features.[55] In particular, ultra-processed foods, such as soft drinks, chips, and candies, typically contain sugar, salt, and fats and are cheap, convenient, and may also be addictive.[56] Though the concept of food addiction is high contentious in academic circles,[57] there is evidence that highly palatable food such as those with ingredients found in ultra-processed foods can lead to altered reward centers in the brain.[57-59] Disordered, emotional, and psychological distress impact eating behaviors in ways that resemble addictive behaviors and, therefore, should be considered in interventions to support healthy eating and dietary adherence.[60]

Mindfulness definition and operationalization

Mindfulness is a psychological approach to skillfully responding to maladaptive thoughts and behaviors with enhanced attention and awareness and is often described as taking an active interest and awareness in daily activities through becoming observant, nonjudgmental, and nonreactive to stimuli.[8,9] Originally rooted in traditional Buddhism as a mechanism to cease suffering and attain inner peace, modern definitions can vary.[61] Scholars generally agree that mindfulness is fundamentally composed of attention and awareness.[8,61-63] Essentially, mindfulness involves actively cultivating awareness and attention to be present with, rather than reactive to, mental stimuli.[63,64] It is through awareness and attention that conscious appraisal can occur to support autonomy and self-regulated decisions.[65]

There has been some speculation about whether mindfulness is a stable personality trait or a variable state.[8,66,67] Researchers define trait, or dispositional, mindfulness as embodying qualities of non-judgment, observational attention, and heightened awareness.[61,64] Many studies have measured trait qualities of inherent mindfulness without meditation or awareness-building exercises.[68-70] Scales have been tested with validity and reliability in samples that do not and have

never meditated with comparable results to those who have.[71,72] The issue that arises is that if one is not trait mindful, can they ever have the benefits of those who are mindful through mindful training?

Bishop et al. argue that mindfulness is a context-dependent state requiring a deliberate mode of openness and nonjudgmental orientation to experience that will cease without regular maintenance of attentional self-regulation and curiosity in experience.[8] In support of Bishop's hypothesis, other studies support that mindfulness does change over time despite the trait argument.[71-74] For example, Pang and Ruch [75] examined meditators, former meditators, and non-meditators when validating a trait measure of mindfulness. Though former meditators had greater awareness, non-judgment, and non-reacting scores than non-meditator, awareness levels were still lower for former meditators than current meditators. Further, a subset of the former meditators who had trained longer and more frequently also had higher scores than former meditators who meditated less.[75] This may suggest that as mindful meditation is taught, particular facets such as awareness, observation of experience, non-judgment, and non-reaction may change. However, according to Pang and Ruch,[75] these skills may not be inherent and require maintenance.

Bishop et al. proposed a 2-step approach to operationalize the mindfulness process.[8] The first step is to self-regulate attention to recognize mental events using sustained attention, inhibition of elaborative thinking, and controlled attentional focus. Sustained attention trains the mind to maintain vigilance over an extended period. The mind is primed to inhibit elaborative or ruminative thinking by focusing on direct experiences. When the mind inevitably wanders, the controlled attentional focus is the ability to bring wandering attention back to a single point of focus, such as the breathing process.[8]

The second step is orienting the self to the present experience with curiosity, acceptance, openness, and self-observation. Committing to curiosity allows the individual to observe all thoughts, feelings, or sensations as they arise. When trained to utilize acceptance, the mind becomes experientially open to the present reality and abandons an agenda of having a different experience. Over time, mindfulness leads to dispositional openness to experience, characterized by curiosity and receptivity to new experiences. This sets the stage for self-observation, which is an intentional effort to understand the nature of one's thoughts and feelings.[8]

Mindfulness and health

Mindfulness is well established in clinical environments through Mindfulness-Based Stress Reduction,[76,77] Mindfulness-Based Cognitive Therapy,[78] Acceptance and Commitment Therapy,[79] and Dialectical Behavioral Therapy.[80] Ever since Jon Kabat-Zinn used mindfulness as a pain management tool,[77] health interventions incorporating mindfulness have grown in popularity and are effective in improving psychiatric disorders, stress management, and psychological wellbeing.[81-83] Mindfulness measurement validation studies regularly show correlations with self-regulation and indicators of psychological well-being, such as decreased rumination, increased self-compassion, and improved emotional intelligence.[62,72,84] Mindfulness may also mediate physical health practices such as improved physical activity, healthy eating, healthy weight behaviors, and decreased risk behaviors such as smoking or binge drinking.[12,14,85]

Mindfulness has been related to several positive cardiovascular-related outcomes, though the results are mixed.[86,87] A meta-analysis looking at mindfulness-based stress reduction and mindfulness-based cognitive therapy showed a significant moderate effect size for the reductions in blood pressure for patients with vascular diseases such as hypertension and diabetes mellitus.[88] Further review of the studies in the meta-analysis revealed that those with the highest blood

pressure had the most significant effect sizes.[7,89] However, in a cross-sectional study with healthy adults in the New England Family study, results revealed that individuals with greater dispositional mindfulness were more likely to show better cardiovascular health in fasting blood glucose and healthy body mass index but not in hypertension, total cholesterol, or fruit and vegetable intake.[68] Conversely, in a randomized controlled trial with elderly patients with congestive heart failure, meditation effectively reduced norepinephrine levels in the blood.[90] Though there is evidence for changes in cardiovascular disease due to mindful interventions, the evidence is mixed due to a lack of robust studies.[88] Still, given even the modest reduction of risk factors associated with cardiovascular disease through meditational practices, The American Heart Association states that meditational practices (i.e., mindfulness) may be a cost-effective adjunct lifestyle modification to prevent heart disease.[91]

Mindful eating

Mindful eating, or mindfulness related to eating behaviors, can be described as enhanced attention and awareness of the physical and mental sensations while eating or in the eating environment.[10,11] Mindfulness is typically used to address food behaviors surrounding food choice, emotional eating, behavioral regulation, awareness of physical hunger, and satiety cues.[16,92-94] Greater mindfulness is associated with increased adaptive food behaviors such as consuming less calorie-dense foods, controlled serving sizes, increased preferences for healthier foods, and less impulsive eating.[15,16] Meanwhile, mindfulness is inversely related to maladaptive behaviors such as emotional eating, binge eating, and restricted eating.[12-14]

Both trait and state mindfulness may moderate portion control and healthier food choice. Jordan et al. examined if state or trait mindfulness would affect food consumption behaviors.[16] The participants who received the state mindfulness induction ate 24% fewer calories than the

control group while trait mindfulness was also associated with lower calorie consumption. These results suggest that both state and trait mindfulness may reduce calorie consumption.[16] Jordan et al. also examined whether mindfulness affects attitudinal food preferences and whether mindfulness contributes to self-regulatory capacity to choose healthier foods. Results revealed that greater mindfulness was associated with nutrient-dense fruit choice instead of calorie-dense candy. Self-control alone did not predict snack choice but was associated with greater mindfulness.[16]

In a randomized controlled trial, Papies et al. assessed if a mindful attention condition reduced the effects of hunger on participants' likelihood of choosing unhealthy foods.[95] Although hunger motivated individuals in the control group to choose unhealthy foods, those who received a mindful attention intervention were more likely to choose healthy foods despite hunger. Additionally, the attractiveness of healthy food increased hunger in the control condition, while the mindful condition was unaffected by the attractiveness of foods. Diet motivations did not affect either group's food choices.[95] The effects of this study suggest that mindfulness may attenuate spontaneous behaviors by increasing attentional awareness, as suggested by previous research.[63] Although these results are promising for segmented dietary behaviors, few studies have integrated mindful eating into overall prescriptive diet adherence outcomes, especially with a healthy working population.[96-98]

Reaching adults through worksites and digital health technology

In 2021, approximately 133 million adults were in the United States workforce, making it an ideal network to reach a large percentage of adults.[18] The average American adults spend an average of one-third of their day at work five days a week.[99] A cross-sectional study by the Robert Wood Johnson Foundation and Harvard School of Public Health found that one in four working adults believed that work negatively impacted their eating habits.[100] Likewise, reviews of

healthcare claims and health risk assessments at worksites report that employees with poor diets, obesity, and high stress posed the most significant health risks.[101] Further, poor diet, being overweight, and high stress also contribute to issues surrounding presenteeism or an employee's productivity while at work.[102]

Workplace health promotion programs (WHPP), initiatives provided by employers designed to prevent the onset or progression of disease in workers, have the potential to reach millions of Americans and improve long-term health and quality of life for employees.[103] In the Workplace Health in America survey, it was reported that about half of the 3000 worksites surveyed offered WHPP, with approximately 23% focused on nutrition or healthy eating programs for employees.[17] WHPP often offer nutrition-related interventions aimed at weight loss and obesity, many of which result in modest changes in weight status.[17,104] Evidence supports that WHPP aimed at nutrition quality to improve diet quality, such as increased fruit and vegetable intake and lower fat intake.[105-107] However, a review of long-term calorie restriction diets found that a third to two-thirds of participants rebound their weight in the long-term follow-up, suggesting that dietary restrictions are ineffective for lasting results.[108]

Physical space, program cost, employee engagement, and a lack of experienced staff to implement the program pose significant barriers to WHPP implementation.[17] Digital health, delivered via mobile devices (mHealth), computers (eHealth), and wearable technologies, are possible solutions to addressing WHPP barriers and have been increasing in popularity since the rise in remote work access from the COVID-19 pandemic.[19] The US market forecast for mobile health is expected to increase rapidly into 2025, with health consumers showing the most interest in fitness, lifestyle management, nutrition, and diet.[109] WHPP disseminated through web-based materials has improved diet and nutrition attitudes, self-efficacy, and planning to eat a healthy

diet.[110,111] In addition to meeting the rising demands for health technology, digital-based WHPP allow employees to customize and select programs based on specific concerns.[24]

Although users report that the apps may have high functionality, the level of engagement was a more important predictor of the propensity to use the applications.[112] Employees interreacting with digital WHPP prefer tracking, monitoring, customizing, and quickly accessing information about their weight, diet, and exercise in WHPP applications.[113] Desirable content and functionality features include recipes, interaction, nutrition information, shopping tips, cost-saving, and availability through web-based and mobile app-based delivery.[23,114] Although evidence-based information is an important feature, the acceptance of technology-delivered wellness programs is enhanced by enjoyment when interacting with the program.[113]

However, web-based interventions often suffer from low engagement and high attrition rates.[23] For instance, in a technology-based worksite WHPP addressing personal health, 97% of participants started the program, and only 33% were sustained users throughout the one-year program.[115] Attrition was reduced by incorporating individual challenges, activity logging, and workplace challenges.[23] In a study on determinants of sustained participation in internet-delivered WHPP, participants were five times more likely to visit the website after monthly email reminders than in subsequent periods.[116]

Theoretical framework

A combination of theoretical approaches was used to develop this project. The mindfulness and cardiovascular disease theoretical framework[7] was used for mindful eating curriculum content. The Health Information Technology Acceptance Model (HITAM; Kim and Park [117]) was used to evaluate the program's feasibility. HITAM integrates the Theory of Planned Behavior, Health Belief Model, and Technology Acceptance Model into a framework to examine how health

perceptions influence technology-related behaviors.[117] See *The Rationale for Mind Your Heart: a mindful eating and nutrition education program* for more information about the program.

Mindfulness and cardiovascular disease theoretical framework

Loucks et al.[7] proposed a theoretical framework for mindfulness by utilizing attention control, emotional regulation, and self-awareness to influence the self-regulation of cardiovascular risk factors, such as smoking, diet behaviors, and blood pressure regulation (see **Figure 2.1**). This framework can be utilized to improve the efficacy of mindful eating to improve blood pressure outcomes and has shown efficacy in improving blood pressure and dietary improvement.[118]

Mindful eating involves directing one's attention to physical sensations, emotional reactions, and awareness of health values surrounding eating behaviors. Applying Loucks framework to mindful eating, attention control directs awareness in a focused manner toward an object or experience, such as food or the process of eating. With emotional regulation, individuals gain the ability to respond to the emotions that arise with control and suppression of inappropriate behaviors, such as emotional or binge eating. Through self-awareness, the individual can consciously evaluate behaviors to decide if those behaviors serve personal values and beliefs. This process leads to behavioral regulation, or self-regulation, where the individual reviews cognitive and behavioral function, develops judgment toward those behaviors, and cultivates modifications to that behavior. [7]

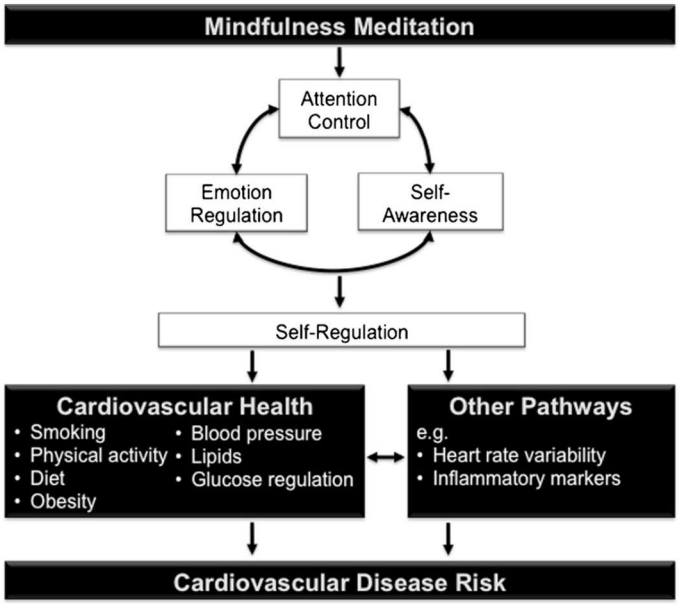

Figure 2.1: Conceptual framework for a mechanism by which mindfulness influences cardiovascular disease risk factors[7]

Assessing health technology acceptance

As previously mentioned, The HITAM[117] integrates the Theory of Planned Behavior, Health Belief Model, and Technology Acceptance Model into a framework to examine how health perceptions influence technology-related behaviors.[117] It is essential to review the constructs within these prior theories before adequately describing HITAM.

Theory of Planned Behavior

The Theory of Planned Behavior (see **Figure 2.2**) is a health theory that identifies motivational determinants predicting the likelihood of performing a health behavior.[119-121] The basic model for the Theory of Planned Behavior is that attitude, subjective norms, and perceived behavioral control lead to an intention to perform and follow through with health behaviors.[119]

Behavioral intentions are central to the Theory of Planned Behavior and indicate the level of exertion an individual is willing to do to perform the planned behavior.[120] Therefore, attitude, norms, and behavioral control are often intervened with to evoke changes in behavioral intentions.

Attitude towards a health behavior is an essential behavioral determinant that can be attributed to an individual's beliefs weighed by subjective appraisal of the behavioral outcome.[119] Similar to intrinsic autonomy when individuals' salient beliefs are elicited from their values, they are more likely to make changes.[120,122] When individuals evaluate the behavior as favorable, they are more likely to follow through with performance than if the behavior is perceived as unfavorable.[120]

Behavioral intentions are also influenced by subjective norms or perceptions that peers will approve or disapprove of performing a particular behavior.[119] This relationship's strength depends on how "important" the appraising peers are to the individual.[120] A positive subjective norm would suggest that an individual believes that important peers would approve of the action, while a negative subjective norm would be associated with perceived disapproval from important peers.[119]

The degree of effort and access to perform the health behavior, or perceived behavioral control, can also influence the intention to follow through with a behavior. Perceived behavioral control varies across situations and may require self-efficacy, which is highly related, to perform the behavior.[120] Though intentions combined with perceived behavioral control lead to behavior achievement, the Theory of Planned Behavior suggests that perceived behavioral control may bypass intentions and lead directly to behavioral achievement.[120]

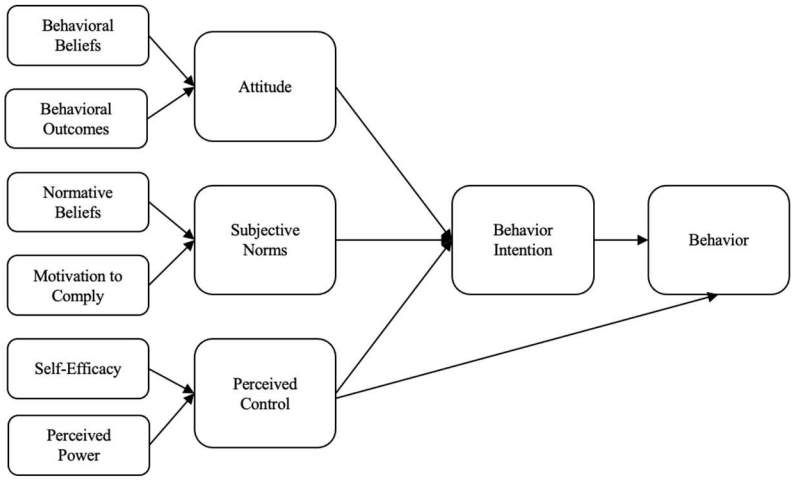

Figure 2.2 The Theory of Planned Behavior[120]

Health Belief Model

The Health Belief Model[123] is a public health theory that was first developed in the 1950s to examine why people failed to screen for tuberculosis.[123] The theory has been adapted to numerous health behaviors in countless public health programs and interventions to explain why people accept or reject health behaviors.[124,125] The constructs included in the Health Belief Model are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.[126,127] Perceived susceptibility and severity are interrelated constructs concerning if the individual believes they are vulnerable to contracting a disease and the degree of seriousness that contracting the disease would impact the individual's health and social status. Individuals may also weigh their perceived benefits which are positive reinforcements to their perceived obstacles that prevent adopting the behavior before carrying out a behavior. Like the Theory of Planned Behavior, the Health Belief Model also acknowledges that self-efficacy, the confidence that one can perform the behavior, may determine the behavioral outcome.[127] Intrinsic

factors, such as symptoms of disease, or external factors, such as physician's referrals, are cues to action that influence health behavior. The Health Belief model also acknowledges that sociodemographic factors such as age, ethnicity, and income play an important role in health behaviors and the ability to execute the behavior.[127] The components of the Health Belief Model are illustrated in **Figure 2.3**.

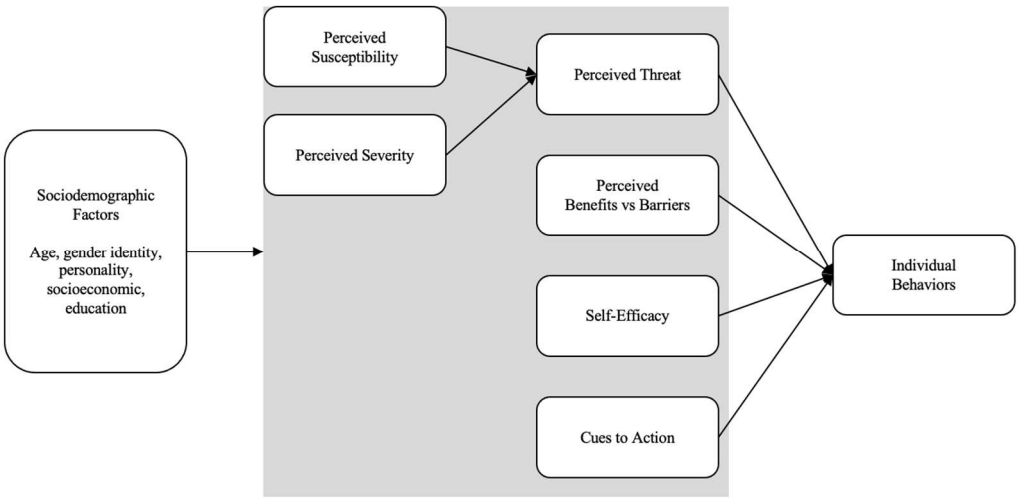

Figure 2.3 Components of the Health Belief Model[123]

Health Information Technology Acceptance Model

The HITAM model is an iteration of the Technology Acceptance Model, which was developed using the earlier version of the Theory of Planned Behavior, the Theory of Reasoned Action, to describe factors that facilitate the adoption of technology, such as a computerized or digital system.[128] The theory introduces perceived usefulness (PU) and perceived ease of use (PEU) as factors that influence attitude and behavioral intention to use technology. PU refers to

the user's perception that the technology will increase job performance. Perceived ease of use refers to the user's expectation of the degree of effort needed to use the application. External factors, such as interactive screens, menus, training, or user support, also play a crucial role in influencing PEU.

Davis et al. hypothesized that PU and PEU interact to positively affects attitudes, defined as the positive or negative feelings toward using a system.[128] Meanwhile, the influence of PEU on attitude toward a system captures intrinsic motivation through improving self-efficacy, which improves attitudes toward the behavior intention. Like the classic Theory of Planned Behavior, a positive attitude is predictive of improved behavioral intentions in the Technology Acceptance Model. However, in the Technology Acceptance Model, PU has a direct effect that bypasses attitudes straight to behavioral intentions meaning that people form intentions toward behaviors that will improve performance despite positive or negative attitudes toward the behavior.[128] For an illustrated model of the Technology Acceptance Model, see **Figure 2.4**.

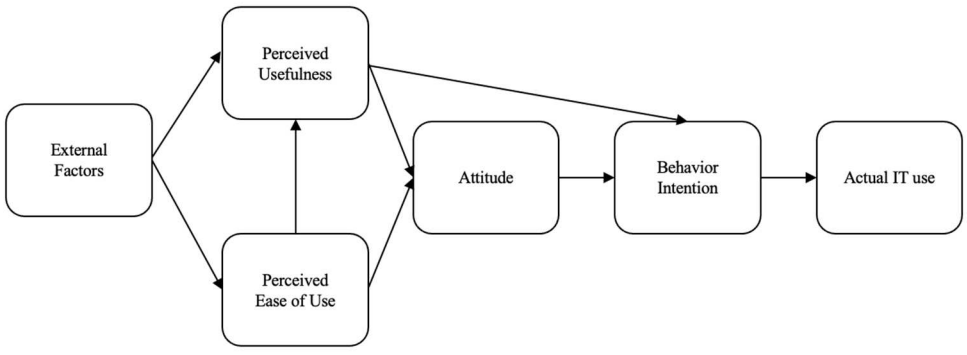

Figure 2.4: Technology Acceptance Model[129]

Though there have been several iterations of the Technology Acceptance Model to address the work environment,[130-133] the constructs have also been translated to assess using technology to

inform health behaviors. HITAM integrates the Theory of Planned Behavior, Health Belief Model, and Technology Acceptance Model that can be described in three zones: health, information, and technology. [117] For this dissertation, the HITAM health zone determinants for technology use will be used. (See **Figure 2.5**) The health zone of the HITAM includes health status, health beliefs, perceived susceptibility, perceived severity, perceived threat, perceived usefulness, perceived ease of use, attitude, and behavioral intentions.[117] Similar to the perceived susceptibility and severity, health status refers to the individual's current state of health, while health beliefs are related to personal beliefs about the threat of illness and the effectiveness of treatment.[117] In HITAM, health status and beliefs predict perceived threats, which is the product of the perceived susceptibility and severity of the disease. The perceived threat of developing the disease impacts the perceived usefulness of the technology, theoretically leading to improved attitude and behavioral intention. Like previous models, PEU leads to attitude directly and indirectly through PU.[117] The HITAM has been used to examine diet, sleep, and health-related internet usage.[134,135]

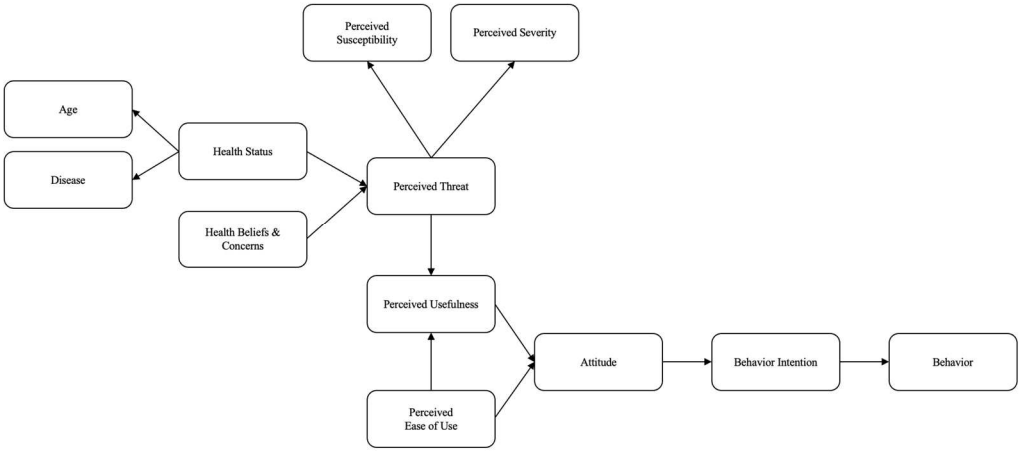

Figure 2.5: Health Technology Acceptance Model health zone[117,136]

The rationale for Mind Your Heart: a mindful eating and nutrition education program

Hypertension prevalence is increasing in the US, warranting more intensive interventions to improve lifestyle changes and address prevention methods.[137] The DASH diet is a heart-healthy dietary pattern that is efficacious in lowering blood pressure, and higher concordance with the DASH diet predicts a long-term decreased risk for developing cardiovascular disease and hypertension.[138] However, the Standard American Diet dietary patterns are opposite to the DASH diet, and few Americans consume adequate DASH nutrient recommendations to reap heart health benefits.[44] Although diet education via health and nutrition literacy interventions has conflicting results, the overall consensus is that diet education may not be enough to address behavioral tendencies and food choices.[52] Therefore, behavioral interventions to raise awareness and improve dietary adherence beyond diet education and counseling are warranted.[6,52]

Mindful eating shows promising results for adaptive dietary behaviors but has rarely been supplemented with dietary education to improve quality diet adherence.[118,139] Therefore, the Mind Your Heart (MYH) program was developed using mindful eating and DASH diet guidelines for working adults to improve dietary adherence. The program was implemented using WHPP, established health initiative formats with the potential to reach a large variety of working adults with varying hypertension diagnosis levels.[17] To meet the rising popularity and improve logistic convenience, [19,109] the program was developed using asynchronous digital technology to improve access and reach.

MYH is a mindful eating and nutrition education program for working professionals seeking to make dietary lifestyle changes to improve heart health and nutrition. The MYH program was designed using an evidence-based DASH diet and mindful eating education tailored to working adults' lifestyles. The diet information was based on the DASH diet,[5] and Dietary

Guidelines for Americans,[140] and American Heart Association guidelines.[141] Diet-related content included consuming a balanced diet based on the DASH diet principles, practicing portion control, and reading a nutrition label. The mindful eating content was developed using attention control, emotional regulation, and self-awareness to improve self-regulation of diet behaviors and cardiovascular disease risk.[7,142,143] Guided mindful eating exercises that meet these constructs were obtained and adapted to the program.[144-146]

Specific Aims

The purposes of this project are 1) to examine the fit for implementing MYH, a nutrition and mindful eating program, in a workplace using a technology delivery system and 2) to evaluate whether a dietary education when combined with a mindful eating program improves DASH diet adherence compared with dietary education alone. The central hypothesis is that DASH diet education and mindful eating will increase individuals' adherence to the DASH diet and improve their ability to make healthier food decisions. Participants were recruited from the University of Georgia (UGA) employee population via the UGA Wellbeing listserv. The study was conducted in two phases: In the first phase, the feasibility of the intervention was assessed through interviews and questionnaires; in the second phase, the intervention was pilot tested in a randomized, comparative effectiveness trial. Both groups received an online DASH diet education program for six weeks in phase two. The intervention group received mindful eating instruction and practice for six weeks. Pre- and posttests measures were examined to quantify adherence to DASH diet recommendations.

Specific Aim 1: Examine the feasibility of a mindfulness intervention administered through technology in a worksite wellness program. The study is designed to 1) adapt mindful eating to a nutrition education eHealth program and 2) test the feasibility and acceptability of the Mind Your

Heart (MYH*)* program, a WHPP combining diet education and mindful eating activities. The research questions are: (1) What are the relationships between state mindfulness, HITAM constructs, engagement, and attitudes toward a mindful eating program? (2) How did participants use MYH to support nutrition-related health goals? (3) What factors facilitated or inhibited the use of the MYH program?

Specific Aim 2: Compare the effects of DASH diet education combined with mindful eating and DASH diet education alone on DASH diet adherence using a randomized comparative design. This study examines the effects of mindful eating training on DASH diet adherence and blood pressure changes over six weeks. The research questions are: 1) Does mindful eating training improve adherence to the DASH diet more than nutrition education alone? 2) Does a mindful eating intervention affect blood pressure more than nutrition education? The central hypothesis is that mindful eating will improve DASH diet adherence, as evidenced by improvements in blood pressure.

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CHAPTER 3

MIND YOUR HEART: THE FEASIBILITY OF A VIRTUAL MINDFUL EATING AND NUTRITION EDUCATION PROGRAM TO ADDRESS HYPERTENSION IN WORKING ADULTS [1]

[1] Reina, A.M., Beer, J.M., Renzi-Hammond, L.M., Padilla, H.M. To be submitted to *American Journal of Health Promotion*

Abstract

Purpose: Test the feasibility and acceptance of the Mind Your Heart (MYH) program, delivered asynchronously online.

Design: Mixed methods.

Setting: Asynchronous program available through a large university e-learning management system.

Participants: Nineteen participants (M=42.26±12.19 years; 79% female; 16% non-White) full-time working adults.

Intervention: MYH is a mindful eating and nutrition education program developed to prevent and reduce the symptoms of hypertension in working adults.

Measures: Health Information Technology Acceptance, state mindfulness, and acceptance of the MYH sample content, examined through questionnaires and a semi-structured interview.

Analysis: Quantitative variables using Spearman's correlation. Qualitative analysis using qualitative content analysis.

Results State mindfulness increased over three weeks using MYH (Mdn=2.60, z=2.64, p<.01). Greater state mindfulness was related to higher perceived usefulness (r_s = .588, p< .05) and more positive attitude toward MYH (r_s = .714, p< .01). Participants identified evidence-based nutrition and mindful eating content as useful, although mindful eating was more difficult to apply to daily life.

Conclusions

Virtual programs are useful in workplaces to address barriers for space and reach. This feasibility study shows that mindful eating and nutrition education can be virtually presented in large

worksites. Based on participant feedback, the final version of the curriculum should include example-based learning to translate abstract concepts, like mindful eating, into action.

Keywords

Mindful eating; workplace health promotion programs; virtual health promotion programs; nutrition education; hypertension

So What? (Section specific to the journal)

142/150 words

What is known about this topic?

Dietary interventions to reduce hypertension risk, such as the DASH diet, are widely recommended, but adherence is poor. Mindful eating strategies may improve adherence, but few workplace health promotion interventions combine mindful eating with nutrition education.

What does this article add?

The Mind Your Heart (MYH) curriculum was developed to combine nutrition education and mindful eating, tailored for online delivery, and designed for adults at large worksites. This feasibility study shows that disseminating curriculum virtually is feasible and acceptable to participants when these topics are delivered together.

What are the implications for health promotion practice or research?

Virtual interventions often suffer from low engagement and high attrition rates. To improve virtual WHPP engagement, program designers must build relevant content that may increase adherence.

Purpose

Poor diet is associated with top death-related diseases and an estimated 70 percent of premature deaths.[1] Specifically, diets low in fiber from fruit and grains and high in sodium contribute to 60 percent of disability adjusted life-years.[1] The standard American diet is particularly problematic due to its low fiber content, high saturated fats, refined carbohydrates, and high sodium content, all of which may contribute to the progression of chronic diseases including diabetes, hypertension, and heart disease.[2] Though epidemiological studies suggest that American diet quality has been increasing over the past decade, national diet trends did not meet the Healthy People 2020 objectives and are not on track to meet the 2025 objectives for a healthy diet.[3] Developing healthy-diet interventions and approaches that encourage and reach more adults continues to be an essential public health need.[4]

In 2021, approximately 133 million adults were in the United States workforce, making it an ideal network to reach a large percentage of adults.[5] As a benefit to employees, worksites commonly provide workplace health promotion programs (WHPP), initiatives designed to promote healthy behaviors and address chronic conditions that can contribute to productivity loss and health-related expenses.[6] Approximately 46% of US worksites offer WHPP with programs most commonly focused on physical activity, nutrition and healthy eating, and obesity weight management.[6,7] Although WHPP aimed at nutrition are effective for modest weight changes and improved diet quality in the short-term, rebounds and poor dietary adherence are common in the long-term follow-up.[8-12] Health literacy, the ability to gain access, understand, and utilize health information, has a ceiling effect when it comes to dietary adherence and behaviors that improve empowerment to deal with temptations, emotions, and stress should also be addressed.[13]

Mindfulness is an attention strategy for recognizing reactive thinking and emotions and bringing awareness to the current experience.[14] Though often used as a stress-reduction method, mindfulness can also be applied to other health behaviors by utilizing attention control, emotional regulation, and self-awareness surrounding health choices.[15] Mindful eating applies mindful health strategies to promote adaptive and decrease maladaptive eating behaviors.[16-19] Increased adaptive behaviors associated with mindful eating interventions include consuming fewer calorie-dense foods while increasing nutrient-dense food preferences and improving portion control.[17,20] Furthermore, mindful eating reduces maladaptive behaviors such as emotional, binge, impulsive, and restrictive eating.[21-23] Although WHPP often use mindfulness as a stress mitigator in the workplace,[24] mindful eating is not often utilized to address nutrition behaviors in WHPP.

Technology-delivered WHPP

Despite the potential benefits of WHPP, employers report significant barriers to offering WHPP, such as physical space, program cost, employee engagement, and a lack of experienced staff to implement the program.[6] Digital health, delivered via mobile devices (mHealth) or computers (eHealth), has long been a part of the health trends but has been further accelerated by the COVID-19 pandemic.[25] Digital health programs may, in part, address implementation barriers by minimizing physical space needs, providing greater accessibility and reach to employees, and allowing employers to customize the program based on their specific concerns.[26] Whether used alone or in combination with in-person interventions, WHPP have utilized digital health interventions delivered through computers, mobile phones, and wearable technology to address a variety of health outcomes including mental health, weight changes, physical activity, sleep, and hypertension prevention.[27-29] However, eHealth interventions often suffer from low engagement and high attrition rates.[28,30] WHPP programs are often digitized without input from users and in

order to improve virtual WHPP engagement, virtual programs must include relevant content and system features that may increase adherence.[26]

Effectively engaging employees in digital health interventions requires consideration of technology acceptance and health behaviors and beliefs. Although technology acceptance has been well researched in virtual systems,[31-33] health behaviors and beliefs have not been accounted for when designing and examining acceptance of eHealth programs for WHPP. The Health Information Technology Acceptance Model (HITAM),[34] a theoretical framework that integrates the Health Belief Model,[35] Theory of Planned Behavior,[36] and the Technology Acceptance Model,[31] can guide the process in identifying employees' health perceptions, attitudes, and engagement with WHPP. According to the HITAM, a user's attitude toward a system is predictive of intentions to follow through with recommended health behavior changes. User's attitudes are affected by perceived ease of use, defined as users' perceptions of the degree of effort for interacting with the technology system, and the system's perceived usefulness, or the subjective evaluation of helpful information for the user to succeed.[34] Content usefulness is further impacted by preexisting health consciousness, status, and beliefs. Although these concepts are theoretically predictive of improved attitudes to follow through with health behaviors, there is a need to examine the role of HITAM in technology delivered WHPP.

Specific Aims

Although nutrition and mindfulness interventions are administered in the workplace, the two are rarely combined using evidence-based practices particularly in virtual WHPP. There is limited information on what engages working adults in virtual WHPP. This study aims to develop and examine the feasibility and acceptability of a mindful eating and nutrition program delivered

asynchronously to full-time working adults. The study is designed to 1) adapt mindful eating to a nutrition education eHealth program and 2) test the feasibility and acceptability of the Mind Your Heart (MYH*)* program, a WHPP combining diet education and mindful eating activities. The research questions are: (1) What are the relationships between state mindfulness, HITAM constructs, engagement, and attitudes toward a mindful eating program? (2) How did participants use MYH to support nutrition-related health goals? (3) What factors facilitated or inhibited the use of the MYH program?

Methods

Design

A single-arm, mixed-methods approach was used to evaluate the MYH program's feasibility, acceptance, and engagement in a pilot sample of full-time working adults. All aspects of the curriculum and study-related instruments were reviewed by the University of Georgia Institutional Review Board. Written and verbal informed consent were obtained from all participants prior to enrollment, and the tenets of the Declaration of Helsinki were adhered to at all times while conducting the study.

Participants

Participants were recruited from the University of Georgia staff population made up of approximately 12,000 working adults, via employee listservs, email forwards from institution wellbeing champions, and department managers. The recruitment emails contained information about MYH, advertised as a healthy heart nutrition education study, eligibility criteria, and a link to complete an inclusion screening questionnaire via a secure link to the Qualtrics survey platform,

hosted by the University of Georgia. Individuals had to be over 18 years of age, full-time university employees, and had access to a computer and smartphone to be eligible. Individuals were excluded if they were pregnant or planning to become pregnant in the next month, on a diet to treat chronic disease, or taking weight loss medications.

A total of 26 employees completed informed consent and were enrolled in the 3-week feasibility program, which contained an abbreviated curriculum. Of those enrolled, four participants withdrew: two gave no reason, one had a family emergency, and one said that holiday travel complicated participation. Three other participants were lost to follow-up. The final sample for analysis consisted of 19 participants ($M = 42.26 \pm 12.19$ years, 78.9% female, 15.8% non-white; see **Table 3.1** for complete demographic information), who completed all three weeks of the abbreviated curriculum and completed all study-related questionnaires and the interview.

Curriculum Development

MYH is a mindful eating and nutrition education program designed for working professionals seeking to make dietary lifestyle changes to improve heart health and nutrition. The curriculum was developed using intervention mapping.[37,38] The MYH curriculum included diet information from the evidence-based Dietary Guidelines to Stop Hypertension (DASH) diet developed by the National Institute of Health's National Heart, Lung, and Blood Institute to address dietary risk factors associated with developing hypertension.[39] Diet-related content included modules on consuming a balanced diet based on the DASH diet principles, practicing portion control, and reading a nutrition label. The mindful eating content was designed using the mindfulness-based blood pressure reduction conceptual framework addressing attention control, emotional regulation, and self-awareness.[15,40] Exercises that met these constructs were obtained

from other established mindfulness programs and adapted to meet the MYH program conceptual framework.[41-43]

Participants were asked to complete three asynchronous sample MYH modules delivered via Desire2Learn (Brightspace Learning; Kitchener, ON), an e-learning management platform. Each 30 to 45-minute module contained information about a nutrition, mindful eating concepts, guided mindful eating exercises, videos (including subtitles), further reading materials and weblinks, and short quizzes with a written goal-setting section. Module overviews are provided in **Table 3.2**.

Quantitative Measures

Demographics. Participants were asked to self-report age, sex, ethnicity, hours of work, education status, and income. Additional health status questions were asked about chronic disease status and current blood pressure medication use.

MYH Usefulness and Ease of Use. The HITAM questionnaire from a scale developed by Ahadzadeh, Pahlevan Sharif, Ong and Khong [44] was used to measure perceived susceptibility to chronic disease, perceived severity of chronic disease, health consciousness, ease of use, and usefulness related to MYH on the e-learning platform. Each construct has shown good reliability from 0.900 to 0.933.[44]

State Mindfulness. The State Mindfulness Scale (SMS) is a 21-item bi-factor scale measured on a 5-point Likert scale (1-"does not describe me" to 5-"describes me extremely well") developed to include the physical (mindful-body) and mental (mindful-mind) components as well as a total score of the state mindfulness construct.[45] The Cronbach's alpha scores range from .85 to .97.[45]

Program Adherence. After the three-week program, participant login access data and time spent interacting with MYH were recorded from the data provided by the e-learning platform.

Qualitative Measures

Participants were asked to complete post-intervention interviews to assess the acceptance of MYH in terms of ease of use, usefulness, attitude toward implementation, satisfaction with the content, and compliance barriers. Previous HITAM inquiries were adapted into semi-structured interview questions about the MYH program,[46,47] included in Appendix C.

Procedures

Consenting participants were enrolled in the MYH program and emailed a welcome packet with information on how to log into the e-learning platform. The participants were asked to complete a sample of three modules, one module per week, over three weeks. Email notifications and reminders were sent twice weekly to encourage participants to log in to the e-learning platform. In addition to the program, participants were sent text messages three times a week around mealtimes with a weblink to a mindfulness questionnaire, asking them to reflect on their most recent meal. After the three weeks, an email was sent to participants asking them to complete a post-study questionnaire about their perceptions and satisfaction with the MYH program. At the end of the questionnaire, participants were automatically directed to a Calendly webpage to schedule a 1-hour video call interview with a researcher to discuss their reactions MYH program. The interviews were recorded via zoom and transcribed verbatim. After transcription, recordings were deleted.

Data Analysis

Descriptive statistics, means, and frequencies were used to describe the sample characteristics and HITAM questionnaire data. The Shapiro-Wilk test of normality was conducted to determine whether the variables were normally distributed. Parametric tests were computed for data that was normally distributed. Non-parametric alternatives were used when the normality assumption was not met. All tests were performed in one tail to increase statistical power given the low sample size, as all *a priori* hypotheses were directional in nature. A $p<0.05$ was used as the criterion for statistical significance; however, given the fact that the purpose of this study was to assess feasibility using a pilot sample, trends ($p<0.1$) will also be reported. The analysis was completed using SPSS software (IBM SPSS for Macintosh, Version 28.0. Armonk, NY).

Interviews were translated verbatim using the zoom automated transcription option and were checked and edited for correctness by three trained research assistants. The data were stored and analyzed using MAXQDA Analytics Pro (2022 version 22.1.1; Foxit Software Company; Berlin, Germany). The codebook was developed using qualitative content analysis to examine deductive and inductive themes (Appendix D). Deductive themes were developed based on the HITAM constructs, and inductive themes were iteratively developed and coded as they emerged in the transcripts. Three researchers individually coded three interview transcripts, researchers iteratively met to discuss disparate coding and arrive at an agreement. After four rounds of coding, the final inter-rater agreement among researchers was 94%, 89%, and 88%. The remaining transcripts were split between researchers for final analysis.

Results

Participant demographics

Out of 26 participants who signed up for the program, 19 completed quantitative measures, 16 completed text message questionnaires, and 17 completed qualitative interviews. Demographic characteristics and descriptive statistics are provided in **Table 3.1**. Participants were 42.26±12.19 years old, predominately White (84.21%), non-Hispanic (89.47%) women (78.95%), and worked an average of 41.45±7.33 hours per week with the most frequently reported income range of $40,000-49,000 per year.

Tests of normalcy

The Shapiro-Wilk test showed a significant departure from the normal distribution in pretest state mindfulness-body (p=.017), perceived ease of use (p=.009) and attitude (p=.037). Minutes spent using the program were also not normally distributed *(p<0.001);* however, two individuals were more than three standard deviations (484.98 minutes and 986.3 minutes; M = 158.5 ± 58.13 minutes for the rest of the sample) above the average time spent accessing content, suggesting that they may have left the program running in the background while not accessing content. Consequently, analyses involving time as a variable have been conducted with and without these outliers. Without the two outliers, minutes spent interacting with the content were normally distributed.

Relations between HITAM constructs and state mindfulness

Changes in mindfulness

The current sample reliability range was total state mindfulness score (α= .97), state mindfulness-mind (α= .96), and state mindfulness-body (α= .93). A paired samples t-test was used to examine the effect of the MYH program on total and state mindfulness-mind. The result indicated a significant difference between pre and posttest state mindfulness for total (t (15) = 3.56, p<.01) and for mind (t (15) =2.87, p<.01). A Wilcoxon Signed Ranks Test was used to examine the change from the first state mindfulness-body due to the departure from normality in the posttest body score. There was a significant difference between pre and posttest body state mindfulness scores (Z= –2.83, p<.01).

Relations between HITAM constructs and state mindfulness, post-intervention

Pearson's correlations showed significant and moderate effect size between age and state mindfulness scores (**Table 3.3**). Therefore, a Pearson's partial correlations controlling for age was computed. Spearman's partial correlations were used for nonparametric variables (attitude and perceived ease of use). When controlling for age, higher total state mindfulness was related to perceived usefulness (r = .585, p< .05) and attitude (r_s = .714, p< .01) but inversely related to perceived susceptibility to disease (r = –.504, p< .05). Similarly, state mindfulness-mind scores were positively associated with perceived usefulness (r = .567 p< .01), attitude (r_s = .727, p< .01), and inversely related to perceived susceptibility to disease (r = –.498, p< .05) but also showed a moderate positive relationship with health consciousness (r = .442, p< .05). Greater state mindfulness-body scores were positively associated with perceived usefulness (r = .592, p< .05) and attitude (r_s = .614, p< .05) and inversely related to perceived severity of disease (r = –.464, p<

.05) and susceptibility to disease ($r = -.491$, $p < .05$). The Pearson's correlation and non-parametric Spearman correlation partial correlations results are summarized in **Table 3.4**.

User perceptions of the platform and curriculum

The interview results are split into three sections: nutrition content usefulness and health goals, factors that facilitated use, and engagement and barriers to implementation. Representative quotes are provided for the sections; however, additional supportive quotes are available in Appendix E. Quotes provided in this manuscript are reported semi-verbatim (filler words and phrases, i.e., um, uh, like, "you know," are excluded).

MYH content and nutrition-related health goals

Participants identified health goals such as eating healthy (65%), weight loss (47%), maintaining health (47%), being more active (41%), and preventing disease (29%). When participants were asked if MYH was useful in supporting their health goals and habits, the majority felt that MYH was useful in supporting their health goals (71%) and changing their health habits (59%).

Nutrition content

Participants found the MYH nutrition content useful (65%), referencing specific content such as the MyPlate, reading a nutrition label, and recommended daily allowances for sugar and salt as especially helpful.

> "I have a really big problem with sodium…as I was doing the program…I would write down the sodium that's in [food] … I'm actually reading the nutrition parts of the food now."

Although six participants did not confirm if the nutrition content was useful or not useful, they mentioned that they had prior nutrition knowledge.

> "Most of that I already knew…But if I was a beginner, I would have found it a lot more useful."

Mindful eating content

The majority (65%) of participants found the MYH mindful eating content useful in changing their eating behaviors. Several brought up that they were more aware of why they would eat other than their hunger. For example:

> "[I was] more aware of how I was hungry because I was bored…But being aware of all those feelings when I was eating or if I was hungry definitely allowed me to be more aware of not binge eating."

Meanwhile, others found it somewhat useful, had mixed feelings, or was not useful. One participant said they were not clear on translating the practice into their daily lives.

> "I just didn't get it, or … didn't quite engage with it was exactly what mindfulness, while you're eating would look like."

Text message content

Although no questions were directly scripted about text messages, nearly half (47%) of the participants commented on the content and the overall experience. Therefore, an emergent "text message" code was added and revealed that participants had mixed reactions to the questionnaire's content. Those satisfied felt that the text messages acted like a reminder to be present in the moment.

"When it was like, 'well, were you aware of the sensations that were going on inside your body?" and I was like, 'whoa, I mean not really.' But then the next meals in the future, I was like, 'Oh, I'm aware… [this food] makes my body feel like this.'"

Participants who were disappointed with the text message content repeatedly stated that they did not understand how the content of the questions related to their eating behaviors. An example of one of the questions was, "I noticed pleasant and unpleasant emotions." One participant said they just stopped answering the text messages because they were dissatisfied with the questionnaire. They explain:

"I just couldn't do it. It did not make sense to me. Like why you would be asking that kind of question about food."

Another participant reflected that they were disappointed with the text messages because they didn't know how to answer the questions due to the question format. They state:

"I found it confusing, and I didn't like the choices at all… I just never think about negative emotions or negative things when I'm eating."

Those who continued to answer the text messages explained that they tended to answer the questions on the lower end of the provided Likert scale because of the confusion. Although other participants were also initially confused by the content of the questions at the beginning of the study, the mindful eating questions made more sense by the end of the study.

Factors that facilitated use

System navigation and design

Participants reported that using MYH on the e-learning platform was easy to navigate, and they had no issues with using the program. Notable features that improved their experiences were a table of contents, bookmarks, and clear directions on navigating between module content.

> "As far as navigation goes, everything was very intuitive. It was very clear. You click 'next' or click 'previous,' or you use the bookmarks could jump between chapters."

Participants also commented on the layout of each module, citing that they liked that the program included a video with subtitles and written content to support the video. One participant commented on the organization of the video before the written content.

> "The video is at the top of the screen… Because of the videos at the top, I can listen to the video while I'm reading paragraphs."

Engagement: Barriers to implementation

Although the participants found that the modules were easy to complete and had no problem fitting the program into their lives, the most cited barriers were commitment to follow through and high demands at work.

> "I think I was just expecting to have downtime at work to complete it, and so, when I didn't, I guess that part surprised me… and so once I do get home, I want to be able to just relax and not focus on anything else."

As for commitment to follow through with the behavior, participants consistently said that personal willpower was a barrier.

"It's just me having to make that commitment …I don't think it's a big goal… I think it's achievable."

Suggestions for improving engagement

Participants provided examples of improving the program, including more interactive programming such as games, goal tracking, and community forums for support. Several participants identified a reoccurring issue: they wished they had a way to go back and review the goals that they wrote down in previous sections but were unable to access those goals.

"One of the things that I would have really loved was somehow for it to have recap what I said my goals were because I couldn't I honestly could not remember from one week to the end."

Participants were satisfied overall with the content being remote and asynchronous. However, some suggested the possibility of a community component to improve engagement.

"Maybe there may be a need for like a community aspect. So maybe a discussion board for people to interact to see how everybody's goals are doing… I think that would be a good way to prevent burnout."

Discussion

Americans are at an increased risk for developing diet-related chronic diseases due to poor adherence to a healthy diet.[1,2] Workplaces have the unique opportunity to reach large groups of adults using WHPP to promote diet changes that can lead to chronic disease.[12] Although many WHPP offer nutrition education or mindfulness, few programs have used mindfulness as a strategy for improving adherence to healthy diet practices, and even fewer programs have been designed to be delivered asynchronously via virtual platforms, and tested acceptance and ease of use of curriculum delivered via technology. This study examined the development, feasibility, and

acceptability of the MYH program, a DASH diet education and mindful eating program designed to be delivered asynchronously to full-time working adults.

Participants reported improvements in their eating behaviors and health goals due to the MYH program. This study showed that state mindfulness during eating times increased after two weeks in the program. Further, those with greater post-study state mindfulness had spent more time using the program, had greater perceptions that MYH was useful, and had a better attitude toward the MYH program. All state mindfulness factors were strongly associated with increased perceived usefulness and positive attitude toward the program when controlling for age. Further, a positive attitude toward MYH was strongly associated with perceived ease of use and usefulness, which have been strongly associated with continued intentions to use eHealth programs in other studies.[48]

Overall, participants positively framed the MYH content in supporting their health goals. Evidence-based tools such as the MyPlate method, nutrition label reading, and goal setting exercise were beneficial for participants' self-reported health behaviors. Nutrition literacy is a specific form of health literacy that involves the ability to access, understand and utilize nutrition information and is an important predictor of nutrition-related self-efficacy.[49,50] Lower nutrition literacy is associated with unhealthy diet patterns indicative of the Standard American Diet.[51] Although this study did not specifically measure changes in nutrition literacy, participants did reference changes in nutrition behaviors due to improved nutrition literacy gained through the MYH program.

Participants viewed the mindful eating content on awareness surrounding the “types of hunger” and identifying their conditioned behaviors as especially helpful to control when and what they ate. However, although some found the content and exercises interesting concepts, they were unclear on how to apply the information to real-world scenarios. This poses a need to utilize

educational learning tools such as example-based learning in addition to conceptual knowledge for personalizing abstract concepts such as mindful eating.[52] Modeling examples, which use observational learning, are also effective methods to improve self-efficacy.[53] Although MYH used videos to illustrate concepts, future adaptations should include modeled examples or activities in which participants can utilize prior knowledge to apply new concepts, such as mindful eating, into scenarios.

This study utilized text messaging to examine changes in state mindfulness during participants' real-time eating behaviors outside of the laboratory. Although some participants were dissatisfied or confused with the content of the text messages, others noted that the text messages served as a cue or reminder to behave more mindfully. Perhaps with careful text wording/design considerations, the text messages data collection method has the potential to act as an additional component of the mindful eating intervention. Just-in-time adaptive interventions, which are interventions in real-time that adapt to the user's changing environment, are often implemented using mobile devices, although health theories are not always utilized for behavior change.[54] Future interventions may utilize health theories with mindful behaviors to improve in-the-moment eating behavior changes with mobile devices.

Technology delivered programs pose a specialized opportunity to utilize multimodal learning with videos, hyperlinks, and interactive tools.[55] Participants reported that the MYH program on the e-learning platform was easy to use, specifically citing the clear directions, interactive table of contents, and bookmarks as facilitators. Further, MYH utilized a multimodal approach using multiple methods of learning visual, audio, illustrations, and written materials to allow the user to choose how they interact with the program. Multimedia approaches and content-related visual images are theorized to create stimulating learning environments while enhancing

educational content understanding, retention, and application.[56] The current study results support the association between perceived ease of use and usefulness in HITAM.[34]

Although participants were satisfied and said they would continue using MYH for a longer period, many suggested the addition of games, community support, and interactive goal feedback to improve their adherence to the program. Although MYH utilized goal setting in the post-test modules quizzes, users complained that they could not access their written goals later in the program. The results of this study agree with other studies that including tailored, interactive health goals and feedback on goal progression would improve the participants' overall experience and engagement when interreacting with health programming.[11]

The results of this feasibility study should be taken in within the confines of some limitations. First, the small sample size limits the statistical power of the results. The results are only generalizable to full-time, predominately White, working adults. Finally, methods to retain participants should be further explored for future asynchronous studies. It should be noted that the study took place on rolling recruitment from October to December with prominent holidays during this time in North America which contributed to the high attrition rate (26%),

This study provides new insights into the relationship between mindful eating as an addition to nutrition education programs in e-learning programs delivered through WHPP. It is important that an e-learning system is easy to use and provides useful content to support health behavior changes such as nutrition habits and mindfulness while eating. Navigation ease, multimodal design, and interactive content should be carefully considered when designing an e-health learning system to improve user engagement and interaction with the program. Evidence-based nutrition content with examples and tools that improve nutrition literacy are important components in improving self-efficacy toward better eating behaviors. Mindful eating may be an

important addition to nutrition education; however, the mindful eating content should be clear with educational concepts such as modeling or observational learning to convey the connection between mindfulness and eating behaviors in real-time. Finally, text messaging sheds further light or provides an additional dissemination tool for mindful eating in real-time environments. However, careful wording to convey mindfulness and eating should be taken when designing the interventions.

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Table 3.1. Demographic characteristics of working adults in the Mind Your Heart study

		N	Mean	SD
	Age	19	42.26	12.19
	Hours	19	41.45	7.33
MYH Access	Times accessed MYH (number)	19	5.74	1.88
	Time spent on MYH (min)*	19	169.24	63.54
State Mindfulness Time 1	State Mindfulness- Total	16	2.11	0.87
	State Mindfulness Mind	16	2.22	0.84
	State Mindfulness Body	16	1.85	0.85
State Mindfulness Time 2	State Mindfulness- Total	16	2.77	1.07
	State Mindfulness Mind	16	2.80	1.04
	State Mindfulness Body	16	2.69	1.18
HITAM	Perceived Susceptibility	19	3.41	1.10
	Perceived Severity	19	3.47	1.19
	Health Consciousness	19	3.47	0.44
	Perceived Ease of Use	19	4.54	0.45
	Perceived Usefulness	19	4.12	0.58
	Attitude	19	4.45	0.50
		N	**%**	
Gender	Male	4	21.05%	
	Female	15	78.95%	
Race Ethnicity	White	16	84.21%	
	Black	1	5.26%	
	Other	2	10.53%	
Hispanic	Yes	2	10.53%	
	No	17	89.47%	
Education	Some college	1	5.26%	
	2-year degree	2	10.53%	
	4-year degree	8	42.11%	
	Professional degree	7	36.84%	
	Doctorate	1	5.26%	
Health Status	No chronic diseases	12	63.20%	
	One chronic disease	7	36.80%	
Blood Pressure Medication	Yes	4	21.10%	
	No	15	78.90%	

Table 3.2 Sample of Mind Your Heart Nutrition Education and Mindful Eating Modules

Module	Nutrition Topics	Theories	Mindfulness Topics	Theories
1	**Diet and disease prevention** Overview of the DASH diet How diet prevents disease SMART Goals	DASH Diet	**Introduction to eating mindfully** What is mindfulness and how does it work? Clarifying your values Formal breathing practice	Self-Awareness—Self-referential processing
2	**Balanced diet** What makes a diet nutritious? Food groups Portion control Water and fluids	DASH Diet	**Internal vs. external cues** What is mindful eating Solutions to types of hunger Guided eating awareness exercise	Self-Awareness—Awareness of present-moment experiences
3	**Planning meals** What is in a nutrition label? Cooking tips and tricks Recipes and menu planning Snacking and deserts	DASH Diet	**Habits and patterns surrounding food** Conditioned behaviors Guided eating awareness exercise	Emotional Regulation— stress response

Table 3.3 The relationship between Health Information Technology Acceptance constructs, attitude, access time, and state mindfulness

		1	2	3	4	5	6	7	8	9	10	11
1	Age											
2	State Mindfulness Total	-0.468*										
3	State Mindfulness Mind	-0.448*	0.994**									
4	State Mindfulness Body	-0.490*	0.973**	0.940**								
5	Total minutes	-0.314†	0.339	0.272	0.461*							
6	Times accessing MYH	-0.324†	0.147	0.084	0.271	0.652**						
7	Perceived Susceptibility	0.120	-0.520*	-0.516*	-0.507*	-0.137	-0.119					
8	Perceived Severity	0.219	-0.494*	-0.471*	-0.520*	-0.138	-0.146	0.627**				
9	Health Consciousness	0.286	0.173	0.213	0.085	-0.178	-0.395*	-0.452*	-0.045			
10	Perceived Ease of Use[1]	-0.193	0.330	0.295	0.315	0.261	0.234	0.183	0.030	-0.214		
11	Perceived Usefulness	-0.123	0.544*	0.533*	0.544*	0.401*	0.354†	-0.273	-0.298	0.161	0.425*	
12	Attitude[1]	-0.061	0.560*	0.633**	0.466*	0.101	-0.155	0.052	-0.171	0.123	0.407*	0.723**

* Correlation is significant at the 0.05 level (1-tailed)
** Correlation is significant at the 0.01 level (1-tailed).
†trending between the .05 to .10 significance
[1] Spearman's correlations values

Table 3.4 The relationship between Health Information Technology Acceptance constructs, attitude, access time, and state mindfulness controlling for age

		1	2	3	4	5	6	7	8	9	10
1	State Mindfulness Total										
2	State Mindfulness Mind	0.992**									
3	State Mindfulness Body	0.965**	0.924**								
4	Total minutes	0.217	0.143	0.360†							
5	Times accessing MYH	-0.020	-0.088	0.122	0.788**						
6	Perceived Susceptibility	-0.504*	-0.498*	-0.491*	-0.089	-0.079					
7	Perceived Severity	-0.434†	-0.409†	-0.464*	-0.166	-0.035	0.621**				
8	Health Consciousness	0.408†	0.442*	0.315	-0.258	-0.369†	-0.652**	-0.267			
9	Perceived Ease of Use[1]	0.267	0.239	0.249	0.233	0.104	0.255	0.043	-0.378†		
10	Perceived Usefulness	0.585*	0.567*	0.592*	0.433†	0.401†	-0.413†	-0.459*	0.011	0.326	
11	Attitude[1]	0.714**	0.727**	0.614**	0.051	-0.106	-0.119	-0.387†	0.051	0.544*	0.716**

* Correlation is significant at the 0.05 level (1-tailed)
** Correlation is significant at the 0.01 level (1-tailed)
†trending between the .05 to .10 significance
[1] Spearman's correlations values

Table 3.5 MYH interview code frequencies

	N	%
Perceived usefulness of MYH in supporting health habits		
Useful	12	71%
Somewhat useful	2	12%
Mixed feelings	2	12%
Not useful	1	6%
Perceived usefulness of MYH in supporting health goals		
Useful	10	59%
Somewhat useful	1	6%
Mixed feelings	2	12%
Not useful	0	0%
Perceived usefulness of MYH nutrition content		
Useful	11	65%
Somewhat useful	0	0%
Mixed feelings	2	12%
Not useful	0	0%
Perceived usefulness of MYH mindful eating content		
Useful	7	41%
Somewhat useful	1	6%
Mixed feelings	2	12%
Not useful	1	6%
Perceived ease of use of MYH System		
Easy to use	16	94%
Unclear how to use	0	0%
Hard to use	0	0%
Familiar with e-learning platform	11	65%
Satisfaction with text message content		
Satisfied with text message content	2	12%
Somewhat satisfied with text message content	0	0%
Dissatisfied with text message content	2	12%
Confused with text message content	6	35%
Useful text message content	4	24%
Satisfaction with email reminders		
Satisfied email reminders	6	35%
Somewhat satisfied email messages	0	0%
Dissatisfied email reminders	0	0%
Issues with implementing the MYH program into life		
Application of information	2	12%
Holiday	2	12%
High work demands	4	24%
Commitment to follow through	5	29%
No Problem fitting into life	7	41%

CHAPTER 4

MINDFUL EATING IMPROVES DIET QUALITY:

FINDINGS FROM THE MIND YOUR HEART PILOT STUDY[1]

[1] Reina, A.M., Padilla, H.M., Beer, J.M., Renzi-Hammond, L.M., To be submitted to *Journal of The Academy of Nutrition and Dietetics*

Abstract

Background: The DASH diet is efficacious in reducing blood pressure, but dietary adherence is notoriously poor. Mindful eating may increase adaptive behaviors that improve adult dietary habits but has rarely been applied to improve dietary adherence.

Objective: To determine whether mindful eating training improves DASH diet adherence and blood pressure over six weeks.

Design: Quasi-experimental, pseudo-randomized controlled trial

Participants/Setting: 30 full-time working adults (M=47.10±12.22; 93.3% female; 13.3% non-white) were enrolled in an asynchronous e-learning diet program.

Intervention: Trait mindfulness was measured at baseline. Participants were pseudo-randomized into two groups based on trait mindfulness scores: virtual, asynchronous DASH education only (n=15) or DASH education with mindful eating training (n=15).

Main outcome measures: Diet adherence (DASH diet score) and blood pressure

Statistical analysis performed: Changes from pre- to post-test for blood pressure, anthropometrics, and DASH diet nutrients were examined using the Mann-Whitney U test between groups and Wilcoxon signed-rank tests for within-group changes.

Results: The DASH education with mindful eating group diet quality improved in saturated fat (Z= 2.24; p<.05; r= .41), calcium (Z= 2.33; p<.05; r= .43), fiber (Z= 1.90; p<.05; r= .35), DASH diet score (Z= 1.79; p<.05; r= .33). The DASH education-only group increased calcium (Z=3.04; p<.05; r=.55), protein (Z=1.89; <.05; r=.35), dietary cholesterol (Z= –1.93; p<.05; r= .35) and sodium (Z=–1.65; p=.05; r= .30). The results show significant changes from pre- to posttest in the diet education-only group for systolic blood pressure (Z= –2.78; p<.05; r=.51), diastolic blood pressure (Z= –2.16; p<.05; r=.39), pulse pressure (Z= –2.44; p<.05; r= .45), and BMI (Z= –2.77;

p<.05; r= .51). The only significant change for the diet education with mindful eating group was BMI (*Z*= – 2.86*; p*<.05; r= .52).

Conclusions: Mindful eating may be an effective behavioral tool for improving DASH diet quality, particularly for fiber, saturated fat, and calcium.

Introduction

Hypertension (systolic blood pressure of 130 mmHg; diastolic blood pressure above 80 mmHg[1]) is the leading cause of cardiovascular disease deaths, including heart disease, stroke, and heart failure.[2] With an age-adjusted prevalence of 45.4 percent, hypertension affects nearly one in two Americans, 85 percent of whom do not have their hypertension under control even with medication use.[3,4] However, with an estimated one in five adults unaware that they meet the criteria for hypertension, the true prevalence is likely underestimated.[5] Evidence further supports that a difference greater than 40 mm Hg between the systolic and diastolic blood pressure values contributes to arterial stiffness and increased risk for stroke and organ damage.[6,7] Due to the life-threatening consequences of hypertension and increased pulse pressure, in 2017, the American Heart Association lowered the blood pressure classification for stage 1 hypertension from 140/90 mm Hg to 130/80mm Hg.[1] Further, new evidence supports that prehypertension, or blood pressure of 120-129/80-89 mmHg, is associated with the increased risk of overt hypertension, ventricular hypertrophy, and metabolic disorders.[8,9] Although some contributing risk factors, such as genetics, may be nonmodifiable, several risk factors such as poor diet, smoking, alcohol use, physical inactivity, and obesity can be modified to reduce the risk of developing or the progression of hypertension.[1,4]

The American Heart Association advocates for dietary and lifestyle changes as a fundamental approach to preventing hypertension's onset or progression.[1,8] The Dietary Approaches to Stop Hypertension (DASH) diet is an evidence-based dietary pattern and lifestyle change guide recommended by the National Heart, Lung, and Blood Institute to prevent and manage hypertension.[10] The DASH dietary pattern promotes vascular and heart health by limiting saturated fats, dietary cholesterol, and sodium while increasing calcium, magnesium, potassium,

and dietary fiber.[10] While feeding trials and epidemiological studies support that the DASH diet is efficacious in reducing systolic and diastolic blood pressure,[11-14] the DASH diet also effectively lowers other risk factors for cardiovascular diseases such as total cholesterol, fasting glucose, and obesity.[15-19] Despite the health-related benefits, effectiveness studies show that DASH dietary adherence after an educational intervention is poor, especially when compared to laboratory-based, controlled DASH dietary feeding trials.[20] Still, a meta-analysis on the effectiveness of DASH diet adherence estimated that even modest adherence is beneficial, and for every incremental increase in DASH diet adherence, cardiovascular disease mortality decreases by five percent.[13] Consequently, there is a need to investigate behavioral interventions to increase dietary adherence to quality diets such as the DASH diet in real-world settings.

Mindfulness may also be a valuable behavioral mechanism to improve cardiovascular disease risk factors, such as poor dietary habits.[21] Often used as a behavioral intervention for stress, depression, and anxiety, mindfulness is a psychological approach to skillfully respond to maladaptive thoughts and behaviors with enhanced attention and awareness.[22] Mindful eating, or practicing mindfulness specifically related to eating behaviors, can be described as enhanced attention and awareness of the physical and mental sensations while eating or in the eating environment.[23,24] Interventions that utilize mindful eating have been shown to decrease maladaptive behaviors such as emotional eating, binge eating, and overly restricted eating.[25-27] Further, greater dispositional mindfulness is associated with adaptive food behaviors such as decreased calorie-dense foods consumption, improved serving size regulation, and increased healthier food preferences.[28,29] Although these results are promising for various dietary behaviors, few studies have integrated mindful eating into overall prescriptive diet adherence outcomes, especially with a healthy working population.[30-32]

Hypertension is a silent risk factor capable of fatal consequences if left untreated.[33] Quality dietary patterns such as the DASH diet are efficacious in reducing blood pressure in various adult populations.[14-16] However, adherence is crucial to reap the benefits.[13] Mindful eating may increase adaptive behaviors to improve adult dietary patterns but has rarely been applied to an overall dietary nutrient quality.[30-32] To address these needs, the Mind Your Heart (MYH) program was created (see Reina et al., *in preparation*). The MYH curriculum was designed to be delivered virtually and asynchronously to improve access to workers who cannot access a live program at work. Prior work (Reina et al., *in preparation*) investigated the feasibility and acceptance of the virtual platform. This pilot study expanded the curriculum from the three-week feasibility study to a full six-week program. This pilot study aims to examine the effects of the MYH mindful eating training on DASH diet adherence and blood pressure changes over six weeks. The research questions are: 1) Does mindful eating training improve adherence to the DASH diet more than DASH diet education alone? 2) Does DASH diet education with mindful eating improve blood pressure more than DASH diet education? The central hypothesis is that mindful eating will improve DASH diet adherence (DASH diet score) and, consequently, systolic and diastolic blood pressure.

Methods

Participants

Participants were recruited from staff and auxiliary business units at the University of Georgia, a large worksite (more than 10,000 employees) located in the "stroke belt," a region of the country known for having a high prevalence of hypertension, cardiovascular disease, and stroke.[34] Email containing flyers with a web link and a scannable QR code to an inclusion screener

were sent through University of Georgia staff listservs and forwarded by department managers and well-being champions to full-time university staff. Eligibility criteria included being a full-time university staff member, being fluent in English, being able to access a computer, and owning a smartphone with internet access. Individuals were excluded if they were currently or planning to become pregnant in the next three months, on a specialized diet for chronic disease treatment, on weight loss medications, or were simultaneously enrolled in a diet education program or mindfulness program. The study consort diagram is provided in **Figure 4.1**.

Ethics

An external institutional review board approved the study (Sterling IRB; Atlanta, GA), and the University of Georgia Institutional Review Board provided local context for the external IRB review. The external and the internal institutions approved the protocols for the study. All participants provided verbal and written informed consent prior to participating. The tenets of the Declaration of Helsinki were adhered to during the study.

Mind Your Heart Intervention

MYH was designed using the evidence-based DASH diet and mindful eating education tailored to working adults' lifestyles. The diet and nutrition information was based on the DASH diet,[10] Dietary Guidelines for Americans,[35] and American Heart Association guidelines.[36] Diet and nutrition-related content included consuming a balanced diet based on the DASH diet principles, practicing portion control, and reading a nutrition label. The mindful eating content was developed using attention control, emotional regulation, and self-awareness to improve self-regulation of diet behaviors and cardiovascular disease risk.[21,37,38] Guided mindful eating exercises that met these

constructs were obtained and adapted to the program.[39-41] An overview of the module content and theoretical underpinning are provided in **Table 4.1**.

Two MYH programs were created: one with only DASH diet education (DASH education-only) content and the other with DASH diet education and mindful eating content (DASH education + mindful eating). Participants were given access to a new module each week for six weeks via an e-learning management platform, Desire2Learn (Brightspace Learning). Each module included 30 to 45-minutes of content delivered with a multimodal learning approach using video, audio, interactive quizzes, goal-setting exercises, and written text to allow the participant to decide how they would like to interact with the program.

Measures

Demographics. Participants self-reported their age, sex, ethnicity, education status, and income using an online survey (Qualtrics XM; Provo, UT). Additional health-related questions were asked about current blood pressure diagnosis and medication use, i.e., *"Have you ever been told by a doctor, nurse, or other health professionals that you have high blood pressure?"* and *"Are you taking prescription medication to treat high blood pressure?"*

Anthropometrics and Blood Pressure. The research staff was trained to measure and record data using the CDC guidelines for body measurements based on the National Health and Nutrition Examination methods and the World Health Organization.[42,43] Height was measured in centimeters with a calibrated stadiometer (Seca 241). Weight was measured using a digital weight scale (Seca 770). Waist and hip circumference were measured using a soft measuring tape. Measurements were taken three times, and an average was calculated. Waist-to-hip ratio was

calculated using the waist circumference divided by the hip circumference.[43] BMI was calculated using the adult BMI metric calculator via the CDC.[44]

Blood pressure was measured three times during each of the two study visits, and an average was calculated using an automated oscillometric cuff (Hillrom Welch Allyn Spot Vital Signs 4400; City, State). Pulse pressure was calculated using the averaged systolic minus diastolic blood pressure values.[45]

Trait Mindfulness. The Mindful Attention Awareness Scale (MAAS)[46] measured dispositional trait mindfulness. The instrument is a 15-item unidimensional scale measured on a Likert scale from 1 (*almost always*) to 6 (*rarely*). Examples of questions are *"I do jobs or tasks automatically, without being aware of what I'm doing"* or *"I find myself doing things without paying attention."* A mean score was calculated with a higher score on the MAAS, indicating greater mindfulness. Reliability and internal consistency were good in previous studies (α=.82).[46]

Dietary Compliance. Participants used the mobile diet app MyFitnessPal (MyFitnessPal, Inc. Austin, TX) to record their diet diaries for three days at baseline and three days at the end of the six weeks. Participants were trained to scan barcodes, search for foods in the app database, and enter recipes using the app by a trained researcher. At posttest, a researcher obtained daily values for dates scheduled before and after the program from the nutrition tab in MyFitnessPal from the participant's mobile device for the following nutrients: saturated fat, total fat, protein, cholesterol, fiber, sugar, calcium, potassium, and sodium. The daily values were averaged for the three days at pre-and posttest times. The nine nutrient values were then converted to a DASH diet adherence score using methods outlined by Mellen, Gao, Vitolines, and Goff.[47] The DASH diet score is on a scale from 0 to a total maximum score of 9, indicating perfect compliance.[47] Because magnesium is not entered on nutrition labels, it is undetected by MyFitnessPal and was excluded from the

DASH score. A sugar score was added as a ninth component and calculated for a DASH score with sugar (DASH-S). If the three-day average for the nutrient met the DASH diet target, it was given a score of 1. If the nutrient was in the intermediate recommendation range, it was given a score of 0.5. Nutrients that did not meet the recommendations were given a score of 0. A total score was then calculated from the nutrients with a DASH max score of 8 without sugar and a max score of 9 for DASH-S.

Module Compliance Measures. The percentage of modules completed and total time spent in the program were provided by the e-learning management system and used to examine program adherence.

Procedures

Of the 82 employees who inquired about the study, 37 participants (M=47.95 ± 11.38; 91.9% female; 16.2% non-White) met inclusion criteria and were enrolled in the pilot cohort. Participants attended a single baseline visit prior to engaging with the virtual curriculum, where inclusion criteria were confirmed, anthropometrics were measured, questionnaires were given to measure existing dietary habits and demographic factors, and a blood draw was performed. Researchers also trained participants to log into an e-learning management system and use a food tracking mobile app, which participants used to track their diets for three days at the beginning of the study and three days at the end of the six weeks. During the post-study visit, all baseline measures were taken again and food diaries were reviewed with a staff member.

The study design was a quasi-experimental pilot study with two parallel interventions. At baseline, some participants tend to be more naturally mindful than others. Participants' trait mindfulness scores were divided into high or low mindfulness based on being above or below the

group trait mindfulness mean score to mitigate the potentially confounding nature of trait mindfulness.[48] Participants were then matched based on trait mindfulness scores and pseudo-randomly assigned to either the DASH education + mindful eating or the DASH education-only group. Co-workers or participants in a partnership (married or life) with other participants were assigned to the same group to prevent group contamination.

All participants were informed that they were participating in a six-week diet education program with two dietary approaches to education but were not informed which approach they would receive. Both groups received an online DASH diet education program with six modules available for six weeks to be completed using the e-learning management platform. In addition to DASH diet education, the intervention group received mindful eating instructions at the end of each weekly module. Weekly notifications and emailed reminders were sent throughout the study to encourage participants to log into the e-learning system.

Data-Analysis

Descriptive statistics were computed to characterize the groups at baseline, including means, standard deviations, and frequencies. The Shapiro-Wilk test was used to determine whether variables were normally distributed. Levene's test was used when appropriate to determine whether equal variances could be assumed for comparisons between groups. Normally distributed variables were compared using an independent t-test for differences between groups at baseline. Non-parametric alternatives (Mann-Whitney U, Chi-square, Wilcoxon signed-ranks) were used when assumptions of parametric tests were violated. Changes between groups from pre- to posttest for blood pressure, anthropometrics, and DASH diet nutrients were examined using the Mann-Whitney U test. Wilcoxon signed-rank tests were used for within-group and total group changes

in diet nutrients, blood pressure, and anthropometrics from pre- to posttest. The effect size r was calculated using the *Z* statistic divided by the square root of the total sample size.

Given the fact that this study is a pilot test of the MYH curriculum, sample sizes were small. All hypotheses were directional in nature (i.e., that DASH education + mindful eating training would yield *improvements* in the DASH diet score and systolic and diastolic blood pressure, compared to education alone); consequently, only one tail of the distribution was tested to preserve statistical power. In addition to reporting statistically significant values ($p < 0.05$), trends ($p<0.1$) are also reported SPSS software (IBM SPSS for Macintosh, Version 28.0. Armonk, NY) was used to complete all statistical analyses.

Results

Demographics and baseline characteristics

Thirty-seven participants were enrolled, completed baseline measures, and were allocated to a study group. Of those 37, one participant withdrew, two participants did not complete posttest measures, and four participants did not complete diet diaries (see CONSORT diagram). The final analyzable sample included 30 participants (M=47.10±12.22; 93.3% female; 13.3% non-white), 15 in each group. At baseline, a significantly higher proportion of participants in the education + mindful eating group reported that they had been told they had hypertension or prehypertension by a medical professional ($\chi^2(2) =6.00$; $p=.05$). The baseline characteristics for the 30 participants are summarized in **Table 4.2**.

Program completion

Completion rates were acceptable for both groups, with the DASH education-only group at 93.6% completion and the DASH education + mindful eating group at 80.0%. The average time spent on the MYH program was 287±185 minutes. One outlier from the DASH education-only group (more than three standard deviations above the minutes spent accessing curriculum; likely persons who left the program running while away from the computer) spent 792 minutes accessing the curriculum and thus was removed from time completion analyses. The total mean without the outlier was 270 ± 29.9. There were no significant differences in minutes spent on the program nor percent completion between groups.

Dietary changes

The Mann-Whitney U test was used to examine differences between the DASH education + mindful eating and DASH education-only groups after completing the intervention, and the results are summarized in **Table 4.3**. Calcium was significantly higher in the DASH education + mindful eating group (U=46.0; $p<.01$) and waist-to-hip ratio lower in the DASH education + mindful eating group (U=63.5; $p<.05$) at baseline. Although there were differences in the waist-to-hip ratio at baseline, differences at posttest in the DASH education + mindful eating group were still lower than the DASH education-only group (U=55.0; $p<.01$).

The Wilcoxon signed-ranked test was used to examine within-group differences for pre- to posttest changes in nutrients and blood pressure. Specifically, the rank changes between "poor" (scores of 0), "moderate" (scores of 0.5), and "meets" (scores of 1.0) daily recommend values for each nutrient are reported in **Table 4.4**. The results of the Wilcoxon signed-ranks test indicated that posttest positive rank scores were significantly higher than pretest scores for the DASH

education + mindful eating group in saturated fat (Z= 2.24; p<.05; r= .41), calcium (Z= 2.33; p<.05; r= .43), fiber (Z= 1.90; p<.05; r= .35), DASH diet score (Z= 1.79; p<.05; r= .33) and DASH-S (Z= 1.85; <.05; r=.32) but a negative rank direction for protein (Z=–1.89, p<.05; r= –.35). The results of the Wilcoxon signed-ranks test indicated that the DASH education-only group increased calcium (Z=3.04; p<.05; r=.55) and protein (Z=1.89; <.05; r=.35) from pre-test to post-test. However, dietary cholesterol (Z= –1.93; p<.05; r= .35) and sodium (Z=–1.65; p=.05; r= .30) were significant and negative, indicating that the DASH education-only group consumed more dietary cholesterol and sodium at the end of the study. There were otherwise no significant changes in the DASH score or DASH-S score within the DASH education-only group.

Blood pressure and anthropometric changes

Blood pressure and anthropometrics changes were examined using the Wilcoxon signed-rank test. In the DASH education-only group, systolic blood pressure (Z= –2.78; p<.05; r=.51), diastolic blood pressure (Z= –2.16; p<.05; r=.39), pulse pressure (Z= –2.44; p<.05; r= .45), and BMI (Z= –2.77; p<.05; r= .51) all improved. Six participants (40% of the DASH education + mindful eating) took blood pressure medication during the study. Unsurprisingly, the only significant change for the DASH education + mindful eating group was BMI (Z= – 2.86; p<.05; r= .52). Waist-to-hip ratio did not change for either group. The results are summarized in **Table 4.4**.

Discussion

Hypertension is a progressive risk factor for cardiovascular death and disability, and the prevalence is increasing in the US.[49] Healthy dietary patterns are essential to prevent hypertension, but adherence to healthy eating principles is low among the general public, even with educational

interventions.[20,50] Behavioral interventions, including mindful eating, show promise for encouraging adaptive dietary behaviors while deemphasizing maladaptive eating behaviors.[51] This study aimed to examine DASH dietary adherence and blood pressure changes using a DASH education program with a mindful eating behavioral component.

In the current MYH study, both groups received an equal amount of DASH education, and the intervention group received additional mindful eating training. Participants who received the additional mindful eating training improved their diet quality concerning saturated fat, calcium, fiber, and higher DASH scores. Although the DASH education + mindful eating group also decreased protein scores, protein consumption was still within dietary guidelines for healthy adults. Meanwhile, the DASH education-only group was more likely to consume sodium, protein, and cholesterol than the pretest. Although there were no significant differences between groups for sodium or cholesterol intake, the DASH education + mindful eating group was less likely to rank in the "poor" score for dietary sodium and cholesterol categories. Given the increased fiber and decreased saturated fat, protein, sodium, and cholesterol, the mindful eating participants may have been consuming a more plant-based diet than the DASH education-only group, which is beneficial for heart health.[52] Mindful eating has effectively reduced cravings and increased preferences for nutrient-dense foods in other studies.[29,53] Given that the DASH diet encourages increasing beneficial nutrients such as fiber and decreasing potentially harmful nutrients such as sodium, cholesterol, and saturated fat,[10] the DASH education + mindful eating group in this study support preferences toward nutrient-dense foods.

Despite the improvements in the DASH education + mindful eating group, overall diet quality did not significantly differ between groups at posttest. A systematic review on the influence of mindful eating and dietary intake reported that diet quality comparisons are inconsistent

between groups across mindful eating studies.[54] For instance, in a diabetes self-management study comparing an in-depth diet education group to a mindful eating with basic diet information group, researchers found that fiber and saturated fat improved in the in-depth diet education group but not in the mindful eating group. However, the differences between groups were not significant.[30] In another study comparing groups on sweets consumption, the mindful eating group improved over twelve months compared to the control group.[55] Unlike the diabetes self-management study, both groups received DASH education in the current study, but measures were only after six weeks. Longer follow-up measures with a larger sample size are needed to examine if the long-term changes between groups agree with previous studies.[55]

Another aim of this study was to examine how mindful eating impacted blood pressure. This study showed little impact on the DASH education + mindful eating group but significant improvements in the DASH education-only group for systolic blood pressure, diastolic blood pressure, and pulse pressure. More participants in the DASH education + mindful eating group had hypertension or borderline hypertension diagnosis (60%) and taking blood pressure medication (40%) than in the DASH education-only group, which limits our ability to determine how mindful eating practices affect blood pressure. Since this was a pilot study, the low sample size and lack of statistical power prevented the ability to control for blood pressure medication use between groups. A similar study utilizing the Mindfulness-based Blood Pressure Reduction resulted in significantly decreased systolic blood pressure related to a formal meditation practice at one-year follow-up.[56] The current study was only six weeks; therefore, more extended studies with larger sample sizes to statistically account for blood pressure medication use are necessary.

Limitations

The results of this study should be taken within the confines of certain limitations, such as the obvious fact that this study was a pilot study with small sample sizes. Although the study used a treatment and control group, we lacked statistical power to detect key differences between groups and sufficient sample size to control for specific confounds such as blood pressure medication use, current diagnosis of hypertension, and stress. Further, although participants were trained on tracking their diet diaries, self-reporting diet is not without reporting bias, which has been well documented by others.[57,58] We used a commonly used tool (My Fitness Pal)[59,60] to facilitate accurate self-reporting, but due to the app's limitations, we could not collect magnesium data, making the total DASH score incomplete. However, using a mobile device may have improved dietary tracking by providing more accurate information from nutrition labels than the general population could provide on their own. Further, the participants were overall well-educated, primarily White, and affluent females who may have been more motivated than the general population given that they responded to a diet education program for heart health making it difficult to generalize these results to the general public.

Conclusions

Mindful eating may be an effective behavioral tool for improving DASH diet adherence, particularly for fiber, saturated fat, and calcium. Although mindful eating was not superior to DASH education-only for dietary or blood pressure outcomes, the trends within the DASH education + mindful eating group show promising results for overall diet quality. Future behavioral diet interventions may consider mindful eating as a low-cost, nonpharmacological approach to improving dietary behaviors.

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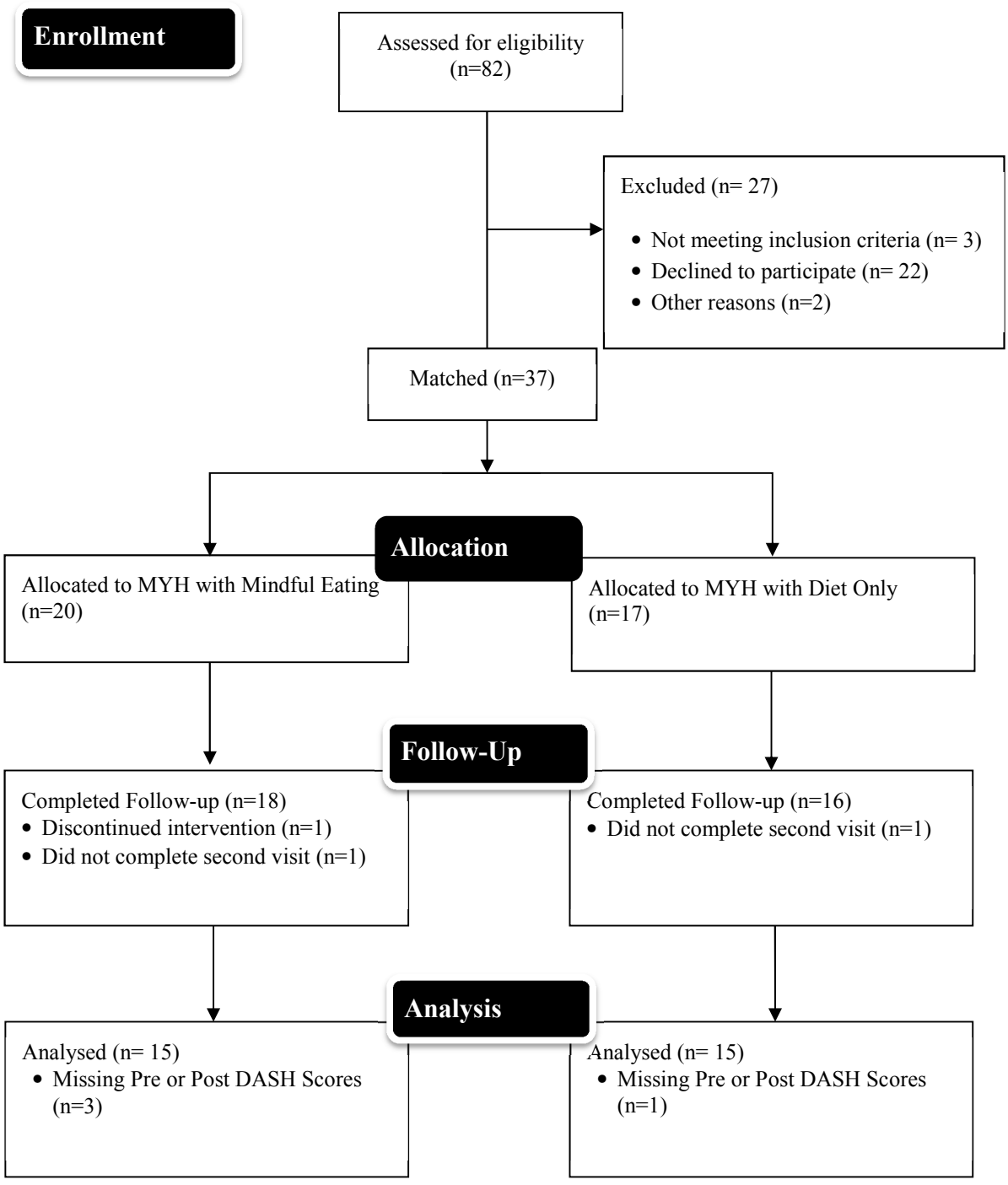

Figure 4.1 Mind Your Heart study CONSORT Flow Diagram

Table 4.1: Mind Your Heart pilot study curriculum content

Module	Diet and Nutrition Topics	Theories	Mindfulness Topics	Theories
1	**Diet and disease prevention** Overview of the DASH diet How diet prevents disease SMART Goals	DASH Diet	**Introduction to eating mindfully** What is mindfulness, and how does it work? What is mindful eating? Clarifying your values Formal breathing practice	Self-Awareness—Self-referential processing
2	**Balanced diet** What makes a diet nutritious? Food groups Portion control Water and fluids Alcohol and heart health	DASH Diet	**Internal vs. external cues** Mindful eating and the everyday adult Solutions to types of hunger Guided eating awareness exercise	Self-Awareness—Awareness of present-moment experiences
3	**Planning meals** What is in a nutrition label? Cooking tips and tricks Recipes and menu planning Snacking and deserts	DASH Diet	**Habits and patterns surrounding food** Conditioned behaviors Guided eating awareness exercise	Emotional Regulation— stress response
4	**Dining away from home** Eating at work Dining at restaurants Work functions and parties	DASH Diet	**Food environments and triggers** Becoming mindful of environmental triggers Guided eating awareness exercise	Emotional regulation—cravings
5	**Lifestyle changes** The truth about fad diets References and resources Consulting health professional Social support	DASH Diet and Social Cognitive Theory	**Satiety cues** Being aware of body sensations Body scan exercise	Attention control
6	**Help and social support** Healthy eating for life Other lifestyle changes	DASH Diet	**Revisiting values** Re-establishing values surrounding food Guided eating awareness exercise	Self-awareness—values clarification

Table 4.2 Descriptive characteristics of the 30 working adults enrolled in the Mind Your Heart pilot study

	Diet Only n=15		Mindful Eating n=15		
Demographics	**n**	**%**	**n**	**%**	**Chi Sq**
Sex					2.143
Female	13	86.7%	15	100.0%	
Male	2	13.3%	0	0.0%	
Race/Ethnicity					2.154
White	12	80.0%	14	93.3%	
Black	1	6.7%	0	0.0%	
Asian	1	6.7%	0	6.7%	
Other	1	6.7%	1	0.0%	
Hispanic	1	6.7%	1	6.7%	
Annual Income					9.371
$30-50K	7	46.7%	5	33.4%	
$50-100K	7	46.7%	8	53.3%	
>$100K	1	6.7%	2	13.4%	
Education					
High School	1	6.7%	0	0.0%	6.000
Some College	2	13.3%	4	26.7%	
2 Year Degree	5	33.3%	1	6.7%	
4 Year Degree	5	33.3%	5	33.3%	
Graduate/Professional	2	13.3%	5	33.4%	
Blood Pressure diagnosis from a doctor					6.00*
High blood pressure	3	20.0%	6	40.0%	
Borderline high blood pressure	0	0.0%	3	20.0%	
Normal blood pressure or not told	12	80.0%	6	40.0%	
Blood pressure medication					1.429
Yes	3	20.0%	6	40.0%	
No	12	80.0%	9	60.0%	
Measure	**M**	**SD**	**M**	**SD**	t-test
Age	45.07	12.40	49.13	12.12	–0.908
MAAS Score	4.45	0.45	4.33	0.73	0.562

*= significant at the .05 level; MAAS= Mindful Attention and Awareness scale

Table 4.3 Comparison of between-groups blood pressure, anthropometrics, and diet nutrients of 30 participants at pre-and posttest

		Pretest				Posttest			
		Mean	SD	Median	U	M	SD	Median	U
Systolic BP	Diet Only	123.67	18.12	120.00	109.0	115.29	17.89	110.00	91.5
	Mindful Eating	124.84	17.32	125.00		121.25	17.22	114.00	
Diastolic BP	Diet Only	79.07	8.69	78.00	104.5	75.22	9.41	72.00	93.5
	Mindful Eating	77.58	8.59	78.00		77.11	8.38	76.00	
Pulse Pressure	Diet Only	44.60	12.11	41.33	85.5	40.07	9.75	37.34	77.0
	Mindful Eating	47.26	9.70	49.00		44.13	10.18	41.00	
BMI	Diet Only	31.11	5.42	29.80	109.0	30.67	5.65	29.20	110.5
	Mindful Eating	32.32	9.18	28.10		31.73	8.88	26.90	
WHR	Diet Only	0.86	0.07	0.84	63.5*	0.86	0.07	0.85	55.0*
	Mindful Eating	0.80	0.08	0.80		0.79	0.07	0.77	
DASH	Diet Only	2.73	1.27	2.50	103.0	2.87	1.23	2.50	81.0
	Mindful Eating	2.57	1.22	2.00		3.27	0.90	3.50	
DASH-S	Diet Only	3.20	1.31	3.00	94.5	3.33	1.28	3.00	79.0
	Mindful Eating	2.87	1.20	2.50		3.63	0.88	3.50	
Sodium (mg)	Diet Only	1975.13	824.12	1893.67	85.0	2125.91	776.95	1987.33	107.0
	Mindful Eating	2374.02	1136.65	2266.67		2103.31	724.75	2065.33	
Sugar (g)	Diet Only	47.76	33.33	32.33	86.0	50.84	38.66	51.67	101.0
	Mindful Eating	59.12	37.15	53.33		52.92	23.52	47.67	
Fiber (g)	Diet Only	17.73	10.45	15.67	103.0	16.51	10.28	16.33	78.0
	Mindful Eating	18.48	10.69	16.33		20.64	8.50	19.33	
Potassium (mg)	Diet Only	1202.20	854.77	953.00	88.0	979.76	679.74	844.67	86.0
	Mindful Eating	1364.86	787.83	1451.33		1196.63	665.02	916.33	
Calcium (%)	Diet Only	52.33	34.16	52.00	46.0**	66.13	51.71	51.00	87.0
	Mindful Eating	123.79	101.87	88.50		91.08	71.55	66.50	
Total Fat (g)	Diet Only	66.02	42.56	52.33	72.0†	61.24	25.23	60.00	88.5
	Mindful Eating	75.47	26.50	72.33		81.00	48.63	79.33	
Saturated Fat (g)	Diet Only	19.36	13.60	16.33	81.5	20.93	10.86	19.67	111.5
	Mindful Eating	22.68	10.74	20.00		21.10	10.34	18.33	
Cholesterol (mg)	Diet Only	154.44	134.28	134.67	69.0†	197.69	116.61	188.33	102.0
	Mindful Eating	223.84	118.90	191.67		201.20	143.10	172.67	
Protein (g)	Diet Only	64.36	24.17	69.67	85.0	65.93	22.80	65.67	111.5
	Mindful Eating	76.22	18.69	70.00		67.74	26.77	65.67	

*Significant at <.05 level; **significant at <.01 level; † trending significance at <.10 level; DASH= DASH diet score; DASH-S= DASH with sugar score; WHR= waist-to-hip ratio; BP= blood pressure

Table 4.4 Comparison of within groups DASH diet scores and diet nutrients of 30 participants at pre-and posttest

		Negative ranks			Positive Ranks			Ties	Wilcoxon Signed Rank		
		n	Mean rank	Sum of ranks	n	Mean rank	Sum of ranks	n	Z^a	*p*	r
DASH	Diet Only	5	5.00	30.00	6	8.00	48.00	3	0.72	0.236	0.13
	Mindful Eating	3	4.33	13.00	8	6.63	53.00	4	1.79	0.037*	0.33
	Total Group	9	8.83	79.50	14	14.04	196.50	7	1.79	0.037*	0.33
DASH-S	Diet Only	6	6.33	38.00	7	7.57	53.00	2	0.53	0.298	0.10
	Mindful Eating	3	5.17	15.50	9	9.94	62.50	3	1.85	0.032*	0.34
	Total Group	9	10.83	97.50	16	14.22	227.50	5	1.76	0.039*	0.32
Sodium	Diet Only	7	4.21	29.50	1	6.50	6.50	7	-1.65	0.050*	-0.30
	Mindful Eating	2	2.00	2.00	4	4.25	17.00	9	1.39	0.082	0.25
	Total Group	9	6.33	57.00	5	9.60	48.00	16	-0.29	0.386	-0.05
Sugar	Diet Only	2	3.75	7.50	3	2.50	7.50	10	0.00	0.500	0.00
	Mindful Eating	1	2.50	2.50	3	2.50	7.50	11	1.00	0.159	0.18
	Total Group	3	6.00	18.00	6	4.50	27.00	21	0.58	0.282	0.11
Fiber	Diet Only	5	5.00	25.00	4	5.00	20.00	6	-0.33	0.370	-0.06
	Mindful Eating	1	3.50	3.50	6	4.08	24.50	8	1.90	0.029*	0.35
	Total Group	6	8.00	48.00	10	8.80	88.00	14	1.15	0.126	0.21
Potassium	Diet Only	0	0.00	0.00	0	0.00	0.00	15	0.00	0.500	0.00
	Mindful Eating	1	1.50	1.50	1	1.50	1.50	13	0.00	0.500	0.00
	Total Group	1	1.50	1.50	1	1.50	1.50	28	0.00	0.500	0.00
Calcium	Diet Only	0	0.00	0.00	11	6.00	66.00	4	3.04	0.001**	0.55
	Mindful Eating	0	0.00	0.00	6	3.50	21.00	9	2.33	0.010*	0.43
	Total Group	0	0.00	0.00	17	9.00	153.00	13	3.73	0.001**	0.68
Fat	Diet Only	3	3.67	11.00	2	2.00	4.00	10	-0.97	0.167	-0.18
	Mindful Eating	2	1.50	3.00	1	3.00	3.00	12	0.00	0.500	0.00
	Total Group	5	4.60	23.00	3	4.33	13.00	22	-0.72	0.235	-0.13
Saturated Fat	Diet Only	4	3.50	14.00	2	3.50	7.00	9	-0.82	0.207	-0.15
	Mindful Eating	0	0.00	0.00	5	3.00	15.00	10	2.24	0.013*	0.41
	Total Group	4	6.00	24.00	7	6.00	42.00	19	0.91	0.183	0.17
Cholesterol	Diet Only	6	4.17	25.00	1	3.00	3.00	8	-1.93	0.027*	-0.35
	Mindful Eating	2	5.00	10.00	6	4.33	26.00	7	1.16	0.124	0.21
	Total Group	8	0.00	0.00	7	9.00	153.00	15	-3.73	0.001**	-0.68
Protein	Diet Only	0	0.00	0.00	4	2.50	10.00	11	1.89	0.030*	0.35
	Mindful Eating	5	3.80	19.00	1	2.00	2.00	9	-1.89	0.034*	-0.35
	Total Group	5	5.50	27.50	5	5.00	27.50	20	0.00	0.500	0.00

*Significant at <.05 level; **significant at <.01 level; DASH= DASH diet score; DASH-S= DASH with sugar score; [a] standardized test statistic Z value

Table 4.5 Comparison of within groups blood pressure and anthropometrics changes of 30 participants from pre-to-posttest

		Negative ranks			Positive Ranks			Ties	Wilcoxon Signed Rank		
		n	Mean Rank	Sum of ranks	n	Mean Rank	Sum of ranks	n	*Z*	*p*	r
Systolic BP	Diet Only	13	8.38	109.00	2	5.50	11.00	0	-2.78	0.003**	-0.51
	Mindful Eating	8	9.75	78.00	7	6.00	42.00	0	-1.02	0.153	-0.19
	Total Group	21	17.43	366.00	9	11.00	99.00	0	-2.75	0.003**	-0.50
Diastolic BP	Diet Only	11	8.91	98.00	4	5.50	22.00	0	-2.16	0.016*	-0.39
	Mindful Eating	7	8.43	59.00	8	7.63	61.00	0	-0.06	0.478	-0.01
	Total Group	18	17.39	313.00	1 2	12.67	152.00	0	-1.66	0.049*	-0.30
Pulse Pressure	Diet Only	12	8.58	103.00	3	5.67	17.00	0	-2.44	0.008**	-0.45
	Mindful Eating	8	8.63	69.00	6	6.00	36.00	1	-1.04	0.150	-0.19
	Total Group	20	16.33	326.50	9	12.06	108.50	1	-2.36	0.009**	-0.43
BMI	Diet Only	11	7.73	85.00	2	3.00	6.00	2	-2.77	0.003**	-0.51
	Mindful Eating	12	8.17	98.00	2	3.50	7.00	1	-2.86	0.002**	-0.52
	Total Group	23	15.39	354.00	4	6.00	24.00	3	-3.97	<.001**	-0.73
WHR	Diet Only	9	6.50	58.50	4	8.13	32.50	2	-0.93	0.177	-0.17
	Mindful Eating	7	6.14	43.00	4	5.75	23.00	4	-0.90	0.185	-0.16
	Total Group	16	11.94	191.00	8	13.63	109.00	6	-1.19	0.118	-0.22

*Significant at <.05 level; **significant at <.01 level; † trending significance at <.10 level; DASH= DASH diet score; DASH-S= DASH with sugar score; WHR= waist-to-hip ratio

CHAPTER 5

DISCUSSION

Hypertension is a progressive risk factor for cardiovascular deaths and disability, and the prevalence is increasing in the US.[1] Although the DASH diet is efficacious in lowering blood pressure, diet adherence after educational interventions is lower than in controlled feeding trials.[2,3] Behavioral interventions are needed to improve barriers to diet adherence, such as cravings, feelings of deprivation, and stress eating.[4] Mindful eating encourages adaptive dietary behaviors while deemphasizing maladaptive eating behaviors but has rarely been combined with diet education interventions to improve dietary adherence.[5-7] Further, online-based WHPP may provide an opportunity for reaching working adults at risk for hypertension and maladaptive eating behaviors.[8,9] This study explored the feasibility and effects of MYH, a program developed to address eating behaviors using mindful eating combined with DASH diet education to improve diet adherence. The aims of this study were to 1) examine the feasibility of MYH in a workplace using an e-learning platform delivery and 2) evaluate whether a DASH education program with mindful eating training improves mindfulness, DASH diet adherence and blood pressure compared with DASH education alone. The following discussion will synthesize the key findings from each of the studies, identify limitations for the interpretations, provide practical implications from the results, and make recommendations for future research.

Summary of Key Findings

Mindful eating is an acceptable addition to nutrition education

Participants in phase one reported that MYH supported nutrition-related health goals and increase their awareness of how hunger affected their food choices. State mindfulness increased on average from pre-test state mindfulness, and higher state mindfulness at posttest was associated with greater health consciousness and decreased disease susceptibility and severity perceptions. These interpretations should be taken with the caveat that mixed reactions to the State Mindfulness Scale.[10] While some participants found the scale provided in the random texts beneficial to improving mindful eating, others were confused by the content of the scale, finding it irrelevant to their eating experience. The State Mindfulness Scale was chosen due to the use of mind and body factors contained in the scale that may contribute more insight into the mind and body connection to eating.[10] Although there are questionnaires specific to mindful eating,[11-14] none have been validated for state mindful eating or in-the-moment mindfulness measures. A validated state mindful eating scale would be beneficial to examine the effects of in-the-moment dietary behavior changes.

Meanwhile, participants were satisfied with the ease of use, the usefulness of the content, the functionality of the e-learning platform design, and the convenience of delivery of MYH through a virtual platform. In particular, the participants identified nutrition information and representative tools such as MyPlate[15] and nutrition label reading as applicable to their daily lives. While some perceived mindful eating as a useful approach to eating behaviors, others were unclear about how to adapt the content of mindful eating into their daily behaviors. Future content delivery

should utilize example-based learning of prior knowledge to allow participants to translate mindful eating concepts into adaptable real-life scenarios.[16]

Mindful eating improves diet quality but not blood pressure

In the second phase of the MYH study, participants were pseudo-randomized into a DASH education-only or DASH education +mindful eating group for six weeks to examine the changes in DASH diet adherence and blood pressure. Diet quality improved for the DASH education +mindful eating group from pre-to-posttest for fiber, calcium, saturated fat, and total DASH scores. Meanwhile, the DASH education-only group showed increased calcium, cholesterol, protein, and sodium intake and no significant improvements in overall DASH diet adherence scores. Although the nutrient content differed between groups, the DASH education + mindful eating group diet quality changes from pre-to-posttest are promising. Given preferences toward nutrient-dense foods and a decrease in potentially harmful nutrients such as sodium, cholesterol, and saturated fat, the results of this study agree with other studies that found mindful eating promotes preferences for healthier foods.[6,7] However, more research is needed with larger sample sizes and longer follow-ups to examine if these results are lasting.

The MYH pilot study resulted in no significant changes between groups in diet quality or blood pressure. However, the DASH education-only group and the total group blood pressure were significantly changed from baseline in systolic, diastolic, and pulse pressure, but not for the DASH education + mindful eating group. Contrary to this study, other studies have shown that mindful training was efficacious in lowering blood pressure.[17,18] One explanation for the difference may be that more participants in the DASH education + mindful eating group were diagnosed with hypertension or borderline hypertension (60%) and were using blood pressure medication (40%)

than in the DASH education-only group. The small sample size characteristic of a pilot study limited the statistical power to control for blood pressure medication.

Limitations

The results of this dissertation should be taken within the context of certain limitations such as a small sample size, no true control group, self-reported nutritional measures, and a short window of time between pre-and posttest measures.

Statistical power was limited to control for certain factors, such as blood pressure medication use, due to small sample sizes. The pilot study's findings suggested no changes in blood pressure for the DASH education + mindful eating group. However, this group was more likely to be diagnosed with hypertension and use medication than the control group at baseline. Attrition in the first study was high. Exit reports would help understand what worked and did not work for participants who left the program early. Finally, the sample may have generally been more motivated than the general population to change weight and diet, making this sample less generalizable to other work environments.

Although providing both groups with DASH diet education is an ethical benefit for participants, the effects may have been smaller and less detectable than with a true control group.[19] DASH diet has a known impact on changing blood pressure, and therefore differences between groups may be less observable, even when controlling for other confounders. Future studies may include a third control or "placebo" group to examine the effects of mindful eating and DASH diet education.

Participants in the pilot study used a self-reported nutrition diet diary recorded using MyFitnessPal. MyFitnessPal has been shown to provide lower nutrient calculation but has good

agreement (ICC=.89 to 1.0) in all nutrients but fiber (ICC=.69) with the Nutrition Data System for Research, a validated nutrient analysis software.[20,21] Self-reported serving sizes and app limitations, such as not detecting magnesium, may have underrepresented actual nutrient intake. Although no diet record is perfect, future studies may consider other methods that adequately record nutrition intake while considering participants' ease and convenience of reporting.

Given that both of these were feasibility and pilot studies, these designs are by nature smaller and take place over a shorter time frame. The first study was three weeks and the second study was six weeks. Although six weeks is an adequate amount of time to see changes in blood pressure, behaviors are still developing. The scaffolding information approach was used to deliver content in MYH; therefore, the complete information took six weeks to deliver. Longer-term follow-up is warranted to examine if there are changes in blood pressure within and between groups.

Practical Implications

The results of the feasibility and pilot study indicate that there are some practical uses for MYH. Given that the asynchronous e-learning platform delivery was acceptable, MYH can be quickly disseminated to WHPP that lack skilled staff without the barrier of space limitations. With the rise of remote work demand due to the COVID-19 pandemic, more employees are working from home. WHPP who wish to continue to offer their employees programs can use evidence-based programs like MYH for employees to reduce hypertension risk.

These preliminary results suggest that mindful eating may be an effective way to improve adherence to and quality of prescriptive diets similar to the DASH diet. The mindful eating portion of the program could be translated into other existing programs such as the CDC Diabetes

Prevention Program.[22] Medical professionals, such as dietitians, counselors, nurse practitioners, and other health promotion specialists, could incorporate mindful eating into their existing programs and practices to improve patient dietary behaviors with continuing education training.

This novel approach to integrating mindful eating with evidence-based DASH diet education shows promising effects on diet quality. Future research should investigate the long-term impact of mindful eating on DASH diet quality and biomarkers with larger samples. The feasibility study revealed the unexpected effect of text messaging data collection as an intervention. Further investigation on the impact of just-in-time adaptive interventions may be warranted.

Conclusions

The purpose of the MYH project was to examine the effects of mindful eating on diet adherence using an e-learning platform to deliver content to working adults. The results of these studies show that MYH was useful and acceptable as a technology delivered WHPP. In the short term, participants increased state mindfulness, improving their disease susceptibility and severity perceptions. Mindful eating was also efficacious in improving diet quality. Although no significant changes were found in blood pressure due to mindful eating, further studies with larger sample sizes and longer follow-up may show improvements in line with other mindfulness effects literature.

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APPENDIX A

FEASIBILTY INFORMED CONSENT FORMS

UNIVERSITY OF GEORGIA

CONSENT FORM

Mind Your Heart: A Workplace Mindful Eating and Nutrition Education Program

Researcher's Statement

You are being asked to take part in a research study. The information in this form will help you decide if you want to be in the study. Please ask the researcher(s) below if there is anything that is not clear or if you need more information.

Principal Investigator: Lisa Renzi-Hammond, PhD and Anita Reina, MS

Health Promotion and Behavior

lrenzi@uga.edu; anita.reina@uga.edu

MindYourHeart@uga.edu

The following is key information to consider about your participation.

- The purpose of the study is to learn if nutrition and mindful eating education can be easily provided using web-based technology.
- Your involvement in the study is voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are otherwise entitled.
- From the time that you sign up, the study will last 3 weeks. At the end of the 3 weeks, you will be asked to complete a 10-minute survey and a 1 to 2-hour interview.
- There are no risks in your participation.
- Mindful eating practices may bring up feelings of discomfort, guilt, or anxiety surrounding eating behaviors. Participants will be asked to identify and reflect on these behaviors in order to make informed changes.
- The program uses a 3rd party internet-based program. No guarantees can be made regarding the interception of data sent via the Internet by any third parties, and whenever personal information is collected, there is a small risk of breach of confidentiality.
- There are no direct benefits in participation although this program will allow you to access evidence-based nutrition education and mindful eating behaviors at any time on a web-based platform.
- As an alternative to this research study, the University of Georgia offers nutrition education and mindfulness programs through UGA Well-Being. Contact your human resources department to learn more about how to participate.
- You have been asked to participate because you represent the UGA working employee population. We would like to have your feedback on the content of the program so that we can build a program that fits working adults like you.

If you are interested in participating in the study, please read the additional information on the following pages, and feel free to ask questions at any point.

Study Procedures and Time Commitment

If you choose to participate, you will be asked to:

- Complete 3 educational modules within 3 weeks. Modules last about 30 minutes each. Completing modules at your own pace should take about 3 hours.
- Complete a 10-minute questionnaire about the modules at the end of the 3-week period. The questionnaire will be completed online or on your phone via Qualtrics. You may receive emailed reminders about to complete the questionnaire.
- Complete a 5-minute questionnaire on your meals 3 times a week for 3 weeks (a total of 9 questionnaires) a total of 45 minutes over 3 weeks. These will be texted to your phone.
- Complete a 1-2-hour interview after 3 weeks about the modules. The interview will take place on a recorded virtual call (zoom) scheduled at your convenience. Only the research team will have access to these files. The recording will be destroyed at the conclusion of the study. All personal identifiers will be removed from the transcripts.

Risks and discomforts

There is no charge to participate in this program, and there are no risks to you. Your manager will NOT be informed of your decision to participate, and your decision to participate or not will not affect your employment status, employee evaluations or access to other workplace benefits and services to which you are entitled.

Benefits

There are no direct benefits to you for participating, but you will receive information on how to eat a heart healthy diet. We will use the information that you provide to improve the Mind Your Heart program, which we hope to make available to others in the future. Once the improved program is available, we hope that people who use it eat a healthier diet.

Confidentiality of records

All participants will be assigned a unique ID, which is a combination of letters and numbers unrelated to your identity (e.g., MYH-F 001). After the study is complete, we will delete the code that links your name and contact information to your unique ID. We will only keep information that could identify you long enough to email you reminders and text you questionnaires and match your questionnaire responses with your interview responses. We will not share this information with anyone who is not connected to this research study unless required by law.

After identifiers are removed, the information may be shared with other researchers and/or used for future studies without additional consent.

Participant rights

If you have any questions or concerns regarding your rights as a research participant in this study, you may contact the Institutional Review Board (IRB) Chairperson at 706.542.3199 or irb@uga.edu.

Internet Data Collection

Your confidentiality will be maintained to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties.

Withdrawal from the research study

If you decide to stop or withdraw from the study or the investigator terminates your participation, the information/data collected from or about you up to the point of your withdrawal will be kept as part of the study and may continue to be analyzed.

Incentives/compensation for participation

Participation is not required in order to be entered for a $50 gift card drawing. Email mindyourheart@uga.edu to enter. Your name will be provided to the investigator's departmental business office for tracking purposes if you win. Withdrawal from the study will not affect your eligibility to win the gift card.

By clicking the button below, you acknowledge:

- Your participation in the study is voluntary.
- You are 18 years of age.
- You are aware that you may choose to terminate your participation at any time for any reason.

○ I consent, begin the study (1)

○ I do not consent, I do not wish to participate (2)

Skip To: End of Survey If UNIVERSITY OF GEORGIACONSENT FORMMind Your Heart: A Workplace Mindful Eating and Nutrition Educat... = I do not consent, I do not wish to participate

Display This Question:

If UNIVERSITY OF GEORGIACONSENT FOR Mind Your Heart: A Workplace Mindful Eating and Nutrition Educat... = I consent, begin the study

Q4 Please sign your name using your mouse or track pad.

End of Block: Informed Consent

Start of Block: Participant Info

Q7 The following information will be used to register you in the program. We will only use this information to confirm your identify for registration and link your responses to other parts of the study.

- Your **name** and **UGA user ID number** will be used to confirm your identity when registering you into eLearning Commons (eLC).
- Your **email address** will be used to send you an invitation to login into the program and reminders. We will also use this to link your responses to the follow-up questionnaires
- Your **mobile phone number** will be used to send you text messages with links to questionnaires about your meals during the week.

This data will be replaced with a de-identified code for research purposes. You will be able to be identified at the conclusion of the study. Your information will not be shared with anyone beyond the research team. Your participation is completely confidential.

Q11 What is your name?

- First Name (1) _____
- Last Name (2) _____

Q12 We will need your username or 81 UGAID number in order to register you into the eLC course. This number will not be stored beyond this study. Please provide it below.

_____

Q18 What is your email address?

- Email Address (1) _____

Q12 Please provide you a mobile phone number that we can text you weekly questionnaires about your meals. (This information will not be shared with anyone beyond the research team)

_____

_____

_____

End of Block: Participant Info

APPENDIX B

HEALTH INFORMATION TECHNOLOGY ACCEPTANCE QUESTIONNAIRE

Feasibility Questionnaire

Thank you for completing the Mind Your Heart Program. Please complete the following questionnaire with your feedback on your experience using the program. This questionnaire should take about 10 minutes to complete.

What is your email address? (This information will only be used to link your responses to other parts of the study)

_____

Q1 Which gender do you do you identify as?

- ○ Male
- ○ Female
- ○ Non-binary/ third gender
- ○ Prefer not to say

Q2 What is your race/ethnicity?

- ○ White
- ○ Black or African American
- ○ American Indian or Alaska Native
- ○ Asian
- ○ Native Hawaiian or Pacific Islander
- ○ Other (please specify) _____

Q3 Are you Hispanic of origin?

- ○ Yes
- ○ No

Q4 What is your highest level of education completed?

- ○ Less than high school
- ○ High school graduate
- ○ Some college
- ○ 2-year degree
- ○ 4-year degree
- ○ Professional degree
  - ○ Doctorate

Q5 How old are you in years?

_____

Q6 How many hours per week do you work?

_____

Q7 What department do you work for?

_____

Q8 What is annual income?

- Less than $10, 000
- $10,000 - $19, 999
- $20,000 - $29, 000
- $30, 000 - $39, 000
- $40, 000 - $49, 000
- $50, 000 - $59, 000
- $60, 000 - $69, 000
- $70, 000 - $79, 000
- $80, 000 - $89, 000
- $90, 000 - $99, 000
- $100, 000 - $149, 000
- More than $150, 000

Q9 What is your marital Status?

- Married/Life partnered
- Widowed
- Divorced
- Separated
- Never Married

Q10 How often do barriers such as finances, transportation, issues, or physical challenges prevent you from preparing or eating balanced meals?

- Always
- Most of the time
- About half the time
- Sometimes
- Never

Q11 Do you currently have any of the following chronic health conditions? (Check all that apply)

- ○ Gastrointestinal Disorders
- ○ Hypertension (high blood pressure)
- ○ High Cholesterol
- ○ Kidney Disease
- ○ Diabetes (type II)
- ○ None
- ○ I prefer not to answer
- ○ Other (please specify) _____

Q12 Are you currently on medication to treat high blood pressure?

- ○ Yes
- ○ No

End of Block: Demographics

Start of Block: Perceived Susceptibility to Disease

Q63 In this section, we would like to know about your feelings about developing a chronic disease. The CDC defines chronic diseases as conditions that last 1 year or more and require ongoing medical attention or limit activities of daily living or both.

Some examples of chronic disease include diabetes, heart disease, or cancer. Some factors that make you more likely to develop a chronic disease are smoking, poor nutrition, physical inactivity, and excessive alcohol use. Other factors include family history, obesity, and genetics.

Q1 I have a higher likelihood of getting chronic diseases

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Q2 There is chance that I will develop a chronic disease

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Q3 I would say that I am the type of person who is likely to get a chronic disease

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q4 There is a person with chronic disease among my family members

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q5 I have a strong possibility of health decline from a chronic disease due to improper daily habits (drinking, smoking, dietary habit, lack of exercise, etc.).

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q6 It is likely that I will develop chronic diseases in my lifetime

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

End of Block: Perceived Susceptibility to Disease

Start of Block: Perceived Severity of Chronic Disease

Q7 I am afraid of facing deterioration of health from a chronic disease

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q8 If I face deterioration of health from a chronic disease, I will have difficulty with my work life (or domestic affairs)

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q9 If I face deterioration of health from a chronic disease, I will have difficulty with my personal relationships

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q10 If I face deterioration of health from a chronic disease, I will have persistent problems in my life

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

End of Block: Perceived Severity of Chronic Disease

Start of Block: Health Consciousness

Q11 I have the impression that I sacrifice a lot for my health

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q12 I consider myself very health conscious

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q13 I think that I take health into account often in my life

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Q14 I think it is important to know well how to stay healthy

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Q15 My health is so valuable to me that I am prepared to sacrifice things for it

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Q16 I have the impression that other people pay more attention to their health than I do

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Q17 I do not continually ask myself whether something is good for me

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Q18 I often dwell on my health

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

End of Block: Health Consciousness

Start of Block: Perceived Ease of Use of Mind Your Heart

Q19 My interaction with Mind Your Heart for health information was clear and understandable

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q20 I found Mind Your Heart for health information to be flexible to interact with

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q21 It was easy for me to become skillful at using Mind Your Heart for health information

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

End of Block: Perceived Ease of Use of Mind Your Heart

Start of Block: Perceived Usefulness of Mind Your Heart

Q22 Using Mind Your Heart was useful in managing my daily health

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q23 Using Mind Your Heart for health information and health management is advantageous in better managing my health

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q24 Using Mind Your Heart for health information and health management is beneficial to me

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

End of Block: Perceived Usefulness of Mind Your Heart

Start of Block: Attitude toward health-related tech use

Q25 Using Mind Your Heart for health information and health management would be a good idea

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q26 Using Mind Your Heart for health information and health management would be a wise idea

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q27 I like the idea of using Mind Your Heart for health information and health management

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q28 Using Mind Your Heart for health information and health management would be a pleasant experience

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

End of Block: Attitude toward health-related tech use

Start of Block: End

Q60 Thank you for completing the questionnaire! Please schedule your interview using the link below. (Copy and paste into your browser)

https://calendly.com/anita-reina/myh_interview

End of Block: End

APPENDIX C

MIND YOUR HEART FEASIBILITY INTERVIEW SCRIPT

Mind Your Heart Feasibility Interview Script

Student Researcher: Anita M. Reina, M.S.
Faculty Supervisor: Lisa M. Renzi-Hammond, Ph.D. & Heather Padilla, Ph.D.
Department: Health Promotion and Behavior, The College of Public Health at the University of Georgia

Description: A mixed methods feasibility study exploring the perceived usefulness, perceived ease of use, attitude toward the system, and satisfaction with the DASH Diet Education and Mindfulness Program delivered to the working population at the University of Georgia.

Primary Research Questions:

1. How useful do working individuals find technologically based mindfulness and nutrition education for guiding behavioral intensions?
2. What factors contribute to perceived usefulness and ease of use technologically based mindfulness and nutrition education for working adults?

Secondary Research Questions:

- How satisfied were participants with the overall nutrition education program?
- What changes could be implemented to better support dietary behavior changes?

Materials

- Laptop for Zoom interviews and recording
- Cellphone for phone call interviews
- Note pad and pens

Introduction:

Hello, <name of interviewee> and thank you for taking time to talk with me today about your experience with the *Mind Your Heart* program. My name is <name>. To be certain that I remember to say everything I would like, I am going to read from this script. I am sorry if I sound formal or repetitive.

Topic and Goal:

Over the past 3 weeks you have participated in the Mind Your Heart program delivered on eLC. I would like to talk to you about your experience to get a better understanding of how useful and satisfied you were with the program. The questions I ask you today are about what you liked or did not like about the program. Your reflections will be taken in consideration to make changes to the program for future use with other users like you.

Before I begin, I would like to clarify a few things:

- Your opinions and reflections are valuable to us. I will not be offended by any of your answers.
- Please do not feel as if you must answer all the questions.
- There are no right or wrong answers and it is ok to say you do not know or do not have an opinion.
- Your answers will not impact your job position. Your manager will not have any information about your responses today.
- If at any point you would like to stop the conversation or no longer participate, please say so and you are free to stop.
- All your answers will remain anonymous.

Before we begin, do you mind if I record our call for later review? The video will not be shared with anyone other than the research team. The publication will not identify you in any way. Can I confirm your consent to record, please?
Do you have any questions before I get started?

Ice breaker Questions

Let's start with just a couple of easy questions.

1. **What is your employment designation (full-time, part-time, hourly, salary, etc)?**

2. **Tell me about your health goals**

Attitude Toward Health-Related Technology Questions:

My next 2 questions are about technology in general and not specific to the current program.

3. **Tell me how you use technology to manage or learn about health? (Clarification: smartwatches, internet, health apps, etc.)**

4. **Do you find health technology useful? Why or why not?**

Perceived Ease of Use Questions:

Now I'm going to ask you some questions about using Mind Your Heart on eLearning Commons. Later, I'll ask more about the content itself, but for now let's focus on the way that the program was presented on eLC.

5. **What was <u>easy</u> about using Mind Your Heart (MYH) on eLC?**
    - Prompt

- Were there particular features you found helpful when using MYH on eLC?

6. **What was <u>difficult</u> about using you Mind Your Heart (MYH) on eLC?**
   - Prompt:
     - Were there particular features on ELC that seemed unclear?
     - Are/were there any parts of the website you didn't use because they were complicated?
     - Was it easy to read? (Font sizes, shapes, headings etc.)
     - Was there a bit of a learning curve with eLC?
7. **Was it typically clear what to do next (navigating) on the website?**
   - Prompt:
     - Was the order clear (in which you were supposed to do things)? Why or why not
     - Did you sometimes wonder if you are using the website the right way?
     - Can you give me an example?

Perceived Usefulness Questions:

Now I would like to shift to the content of the program. This has more to do with what you learned from Mind Your Heart.

8. **How useful did you find the MYH website for managing your day-to-day eating habits? *(Useful: degree that the content assists with health)***
   - Prompt:
     - What features did you find useful for your eating habits?
     - What features would have been more helpful for your eating habits?
9. **How did the MYH content support your health goals?**
   - Prompt:
     - How did you apply what you learned?
     - Can you give me examples?
     - What made it difficult apply?
10. **What did you find useful about the <u>nutrition education program</u>?**
    - Prompt

- Do you feel that the nutrition education program changed your confidence in understanding of nutritional information?

11. **What did you find useful about the <u>mindful eating program</u>?**

- Prompt
    - Do you feel that the mindful eating program changed your confidence in eating differently?

Satisfaction with the Program:

Let's talk now about your satisfaction with the program.

12. **Were you satisfied with the time taken to perform the tasks (module times) in Mind Your Heart?**

- Prompts:
    - Time to complete the modules, time to get feedback

13. **Were you satisfied with the delivery of Mind Your Heart using technology?**

- Prompts:
    - Does/did Mind Your Heart fulfil your health needs? Why or why not?
    - Do/did you enjoy sessions with the MYH website?

14. **How satisfied were you with the topics covered in the <u>nutrition content</u>?**

- Prompts:
    - Were there specific topics you wish were talked more about in the nutrition education program?
    - Were there topics that seemed unnecessary or redundant?

15. **How satisfied were you with the topics covered in the <u>mindful eating program</u>?**

- Prompts:
    - Were there specific topics you wish were talked more about in the mindful eating program?
    - Were there topics that seemed unnecessary or redundant?

Compliance Barriers

The next few questions are about any difficulties you might have had completing the program. It's ok if you were not able to complete the program. We just want you to be honest about it.

16. **How did you feel about the timing (in terms of weeks) to complete the program?**

- Prompts:
    - Where there parts that felt like they took longer than others? Which ones?
    - What would have been a more reasonable timeframe?

17. **Were you able to complete all the modules?**
    - Prompts:
        - If not, why do you think you were unable to complete all the modules?
        - How do you think that situation could have been addressed better?
        - Did you feel bored or uninterested?
18. **Were there any other issues that would keep you from implementing this program into your daily life?**
    - Prompts:
        - What would make it easier to fit the content into your daily life?

Closing Questions:

I just have a few more questions before we wrap up.

19. **How would you define mindful eating to someone who didn't know what it was?**
20. **Would you recommend this program to friends, family, or colleagues? Why or why not?**
21. **If this program were longer in terms of weeks, would you continue to engage with it? Why?** (Intention to use)
22. **Is there anything else you would like to tell me that wasn't in this interview?**

Closing Statement and Questions

Thank you so much for talking with me today about the Mind Your Heart Program. Your feedback will help us figure out how to make the program better going forward.
Before we end our call, is there anything else you want to add about the nutrition education program? The drawing will be done when we are done with data collection. You will be contacted if you won.

APPENDIX D

QUALTITATIVE INTERVIEW CODEBOOK

Table A.1 Qualitative Analysis codebook and definitions

Segment	Code	Definition
MYH Tech Delivery		The way that the participant used the MYH program
	Prefer phone	Used MYH on the phone
	Prefer phone/mobile devise	Used MYH on both the computer and phone
	Prefer computer	Preferred using the MYYH program on the computer
	Suggestions for delivery	
	Other	
Health Goals		Ambition or aim for a desired health status
	Maintain health	Perceives themself as healthy and wants to maintain that health status Overall health; nonspecific
	Disease prevention	Is concerned about developing a disease and wants to prevent the disease from happening
	Disease management	Currently has a disease and wants to prevent the disease from progressing
	Eat healthy	Has an interest in or goal of improving healthy eating
	Be more active	participant has a goal to be more active; exercise and physical activity
	Weight loss	Has a goal to lose weight or improve body composition
	Struggles	Struggles with maintaining goals toward health
	Other Health Goals	
Attitude General Tech use		General tech use refers to the use of technology for supporting health; what kinds of tech they use if any
	Positive Att. Gen tech use	Views general tech use for health in as beneficial
	Mixed Att. Gen Tech	The participant has either both positive and negative attitude toward tech or they feel neutral toward tech use Mixed can be neutral; Has insight on usefulness for even other people
	Negative Att. Gen Tech Use	Views general tech use for health in as NOT beneficial
	Wearable devices	uses wearable devises such as smart watches or rings to track fitness or health
	Internet	Uses the internet to research or learn about health, Internet use can still be tech
	Phone app use	Uses phone applications (apps) to track or learn about health or fitness
	Do not use health tech	Does not use any health technology
	Other Att. Gen Tech	

Segment	Code	Definition
Attitude Tech Useful		Attitudes toward how useful participants feel that health technology are for managing their health.
	Useful Att. Tech	The participant feels that general health technology is useful in managing health
	Mixed feeling Att. Tech	Participant is unsure or has mixed feelings about how they feel about using technology to manage their health
	Not useful Att. Tech	The participant DOES NOT feel that general health technology is useful in managing health
	Other att. Tech	
PEU System		
	Easy to use (PEU)	The participant describes the navigation system as free from effort or easy to use
	Unclear how to use (PEU)	The participant says they were not clear or unsure on how to use the system.
	Hard to use (PEU)	The participant describes the navigation system as difficult to use or unclear to navigate
	Familiar with ELC (PEU)	The participant was already familiar with using ELC
	Helpful Features (PEU)	Features refers to the design elements used in MYH to assist the participant in using the program (i.e., font size, videos, etc)
	Features that need Improvement	The participant identifies features that need to be improved in order to make the system easier to use. Doesn't have to be a bad feature. Needing improvement isn't necessarily negative
	Suggestions to improve (PEU)	Participant makes a suggestion of something that would help to improve the navigation but is not already present in the system.
	Other (PEU nav)	
PU Habits		How useful the information from MYH was in supporting or changing habits
	Useful (PU habits)	Participant perceived MYH useful in supporting or changing habits
	Somewhat Useful (PU habits)	The participant perceived MYH somewhat useful in changing habits
	Not useful (PU habits)	The participant did not perceive MYH as useful for changing habits
	Mixed feelings (PU habits)	Felt mixed feelings about the usefulness. Can be neutral or can be a mix of both positive and negative.
	Suggestions to improve (PU habits)	The participant provided some examples of how to make MYH more useful for changing habits

Segment	Code	Definition
	Examples of PU in habits	The participant describes how they used the information to change their habits
	Other (PU habits)	
PU health goals		Participant's perception of how useful that MYH was in supporting them in achieving their goals
	Useful (PU HG)	Participant perceived MYH as useful in achieving their health goals
	Somewhat useful (PU HG)	Participant perceived MYH as somewhat useful in achieving their health goals
	Not useful (PU HG)	Participant DID NOT perceive MYH useful in achieving their health goals
	Mixed feelings (PU HG)	Mixed Feelings about the usefulness
	Suggestions to improve (PU HG)	Participant gave examples of how MYH could be more useful in supporting their health goals
	Example of PU to Goals	The participant describes an example of how they used the information from the program to work toward their goals.
	Other (PU HG)	
PU Nutrition Content		participants' perception of how useful the nutrition information provided in MYH was to them
	Useful (PU NC)	Participant found nutrition content useful
	Somewhat useful (PU NC)	Participant found nutrition content to be somewhat useful
	Not useful (PU NC)	Participant DID NOT find nutrition content useful
	Useful approach (PU NC)	Tone or strategy for presenting information; Mechanism to relay information
	Mixed feelings (PU NC)	Mixed Feelings about the usefulness of the nutrition content. Can also be a neutral feeling.
	Increased confidence (PU NC)	The participant felt that they increased their confidence to follow through with nutrition behaviors
	Learned new information (PU NC)	mentions new information not previously known
	Prior knowledge (PU NC)	The participant already knew the information
	Application of content (PU NC)	applies information into habits Actual behavior that incorporates the information
	Examples of useful content (PU NC)	new or old information that was a helpful tool for behavior change- didn't necessarily use it but thought the tool was useful.
	Suggestions to improve (PU NC)	The participant gave suggestions on how to improve the nutrition content
	Other (PU NC)	

Segment	Code	Definition
PU Mindful Eating Content		participants' perception of how useful the ME information provided in MYH was to them
	Useful approach (PU MEC)	
	Useful (PU MEC)	Participant found mindful eating content useful
	Somewhat useful (PU MEC)	Participant found mindful eating content somewhat useful
	Not useful (PU MEC)	Participant DID NOT find mindful eating content useful
	Mixed feelings (PU MEC)	Mixed feelings about the usefulness of the mindful eating content.
	Increased confidence (PU MEC)	The participant felt that they increased their confidence to follow through with Mindful eating behaviors
	Learned new information (PU MEC)	mentions new information not previously known
	Prior knowledge (PU MEC)	The participant already knew the information
	Application of Content (PU MEC)	applies information into habits
	Examples of useful content (PU MEC)	The participant gave examples of how the Mindful eating content was helpful. new or old information that was a helpful tool for behavior change- didn't necessarily use it but thought the tool was useful.
	Suggestions to improve (PU MEC)	The participant gave suggestions on how to improve the mindful eating content
	Other (PU MEC)	
Satisfaction MYH Time		Satisfaction with the time it took to complete the modules
	Satisfied with time	Participant was satisfied with how long it took to complete the modules
	Somewhat satisfied with time	
	Dissatisfied with time	The participant was dissatisfied with how long it took to complete the modules.
	Other (sat time)	
Satisfaction MYH Technology		Satisfaction with using MYH via technology
	Satisfied (MYH Tech)	Satisfied with the delivery of MYH using a technology
	Somewhat satisfied (MYH Tech)	
	Dissatisfied (MYH Tech)	Dissatisfied with the delivery of MYH using a technology
	Other (MYH Tech)	
Text Message Prompts		The act or getting (the text messages in real time)
	Satisfied with TM prompts	Liked having text message prompts from the phone
	Somewhat satisfied TM prompts	neutral/mixed feeling toward text prompts
	Dissatisfied TM prompts	didn't like getting prompts on phone
	Useful TM prompts	found the act of getting TM useful for behavior change

Segment	Code	Definition
	Suggestions for TM prompts	ways to use text prompts for reminders or other changes
	Other TM prompts	
Text Message Content		Liked the content of the text messages
	Satisfied-TM content	Satisfaction with text messages
	Somewhat satisfied TM content	neutral/mixed feeling toward the content
	Dissatisfied TM content	did not like the content of the text messages
	Useful TM content	found the content useful for behavior change
	Confused with TM content	confused on how to answer or purpose of questions in text message content
	Suggestions for TM content	suggestions on how to change text message questions to improve data collection or behavior
	Other TM content	
Satisfaction with Email Reminders		Reactions to email reminders
	Satisfied Email Reminders	Satisfied with email reminders
	Somewhat satisfied email messages	Neutral/mixed feeling with email reminders
	Dissatisfied email reminders	Dissatisfied with email reminders
	Suggestions for email reminders	gave examples of how to improve email reminders
	Other email reminders	
Satisfaction Nutrition Topics		Satisfaction with the nutrition topics covered in MYH on ELC
	Satisfied with nutrition topics	Satisfied with the topics covered in the nutrition content sections
	Somewhat satisfied with nutrition topics	Somewhat satisfied with the topics covered in the nutrition content sections
	Dissatisfied with nutrition topics	Dissatisfied with nutrition content
	Advanced Content	Overly intellectual and advanced information. At times, the content may have felt over their heads.
	Good balance of nutrition Content	content was not too intellectual or scientific. Can be used by laymen. They may have felt challenged but it was not out of reach
	Foundational Content	Too easy. better for a beginner, easy to understand for laymen. May describe as too easy or already knew the information
	Helpful content nutrition topics	Examples of content that was helpful
	Suggestions of more nutrition topics	Suggestions or examples of content that should be added for the future
	Other nutrition topics	
Sat. ME Topics		Satisfaction with the Mindful Eating (ME) Topics covered in MYH on ELC

Segment	Code	Definition
	Satisfied with ME topics	Satisfied with ME topics covered in MYH If not said explicitly that they were satisfied or not, then don't code.
	Somewhat satisfied ME topics	Somewhat satisfied with ME Topics If not said explicitly that they were satisfied or not, then don't code.
	Dissatisfied ME topics	Dissatisfied with ME topics If not said explicitly that they were satisfied or not, then don't code.
	Helpful ME topics	Examples of content that was helpful
	Advanced content (ME)	Overly intellectual and advanced information. At times, the content may have felt over their heads.
	Good balance of content (ME)	Good balance of content—content was not too intellectual or scientific. Can be used by laymen. The may have felt challenged but it was not out of reach
	Foundational content (ME)	Foundational content—better for a beginner; easy to understand for laymen; May describe as too easy or already knew the information
	Suggestions of ME topics	Suggestions or examples of content that should be added for the future
	other ME Topics	
Compliance Time		Compliance Time here refers to the amount of time that it took to complete the program and if this was a barrier or not
	Enough time	The participant felt they had enough time to complete the full program (3 weeks)
	Too slow	Participant felt the program progressed too slowly and they had too much left-over time.
	Not enough time	The participant felt they did NOT have enough time to complete the full program (3 weeks)
	Suggestions compliance time	Suggestions for improving completion time
	Other compliance time	
Module Completion		The completion in part or full of the modules for MYH
	Completed all modules	Completed all the modules
	Incomplete modules	Did not complete the modules
	Bored with modules	Bored with the modules
	Engaged with modules	Engaged with or interested in the modules
	Suggestions to improve (module Completion)	Suggestions to improve the modules
	Other module completion	

Segment	Code	Definition
Issues to Implement in Life		Issues that participants identified that would keep them from implementing or using MYH in their lives
	Application of Information	The participant isn't sure how to connect the knowledge to the behaviors or cannot see how to make information into the real world.
	Commitment to follow through	The participant knows how to do the behavior in the real world but may struggle in the commitment or motivation to follow through.
	Family responsibilities	Family time got in the way of using the program
	High work demands	Work demands and interference with completion
	Holiday	The holiday season made it difficult to complete the program
	No Problem fitting in life	Participant felt there would be no problem fitting into their life
	Suggestions to improve fitting in life	Suggestions to address issue to fitting into their lives
	Other (issues fitting in life)	
Recommendations		Recommendation here refers to the willingness to tell others about the program
	Recommend-Yes	The participant would recommend MYH to others
	Recommend to certain people	The participant feels that the program will only appeal to certain types of people.
	Recommend-No	The participant would NOT recommend MYH to others
	Recommend with changes	The participant would recommend with certain changes to the program
	Others would like	The participant things others would like the program
	Others would NOT like	The participant things others might not like the program
	other (recommend MYH)	
Engagement		Engagement refers to the participants' continued interest and attention in the program
	Continue to use	participant would continue to use the program if it were longer
	Continue to use with improvements	The participant thinks there should be improvements before they would continue to use the program.
	Would not continue to use	participant would NOT continue to use the program if it were longer
	Longer program (engagement)	Thinks the program should be longer (than 3 weeks)
	Shorter program (engagement)	Thinks the program should be shorter (than 3 weeks)
	Suggestions for engagement	Suggestions to improve engagement
	Other (engagement)	

APPENDIX E

FEASIBILITY INTERVIEW QUOTATIONS TABLE

Table A.2 Selected quotes from participants in the MYH feasibility study

	Useful	Not Useful	Suggestions
Perceived Usefulness of MYH Program			
Habits and Health Goals	It has made me start looking at labels more because that was one of the things I always did...and I could have looked this up, but mind your heart helped me ... When I'm looking at sugar .... how much sugar... I know, to look for not having added sugars and I, ... different corn syrup ... Things I eat (like) milk and things that have natural sugars, how much sugar is okay and... I thought, some of that... translating...to when you're actually looking at it and definitely giving the numbers was helpful giving some guidelines.	... so, I'm going to say, not as useful as I wanted it to be. For a couple of reasons. One of the things that I would have really loved was somehow for it to have recap what I said, my goals were. Because I couldn't I honestly could not remember from one week to the end and I think that some of the other technology, where you can set up your goals on it, or ... say like it'll tell you or there's some way to measure Your goal,	it would really have been helpful for me to have said, ... oh here's your recap of your goals in week one, and then, maybe, every day, I could have gone on there, or something and clicked and said Oh, I did this today or.... I don't know or some sort of measurement because I think we're busy right. And just forget and it's yeah you can set a goal, but you think you're going to remember it and then I was I honestly don't even remember. What I said I was going to do. And so, it would have really been helpful to have a way to go back into that
	I thought it was a great. ... I know a lot of my goals that I put in there were to increase my meal prepping for either lunch or dinner, and so therefore being able to figure out how to do that in the beginning or end of the week before the next week started was definitely very helpful. It allowed me to be more understanding of the food that I was eating specifically with like the amount of sodium that I was taking in or anything like that. I felt after through the modules, I realized that I was not eating as healthy as I thought I was, but it's also a good thing, because that allowed me to be more aware of my eating habits later on.	I like the information it's giving me but, again, my issue was the goal goals. be a little box, you would say types of goals here and I type them in and they just sort of disappeared into the ether, and I never saw them again and I didn't know how to get back to them. And then, in the next module it's like so how you did, on your goals and ... oh yeah I set some goals didn't I wonder what they were. Then that's my main issue.	it's the goal tracking if I had a little checkmark or a little print out or something that said Hey how many vegetables, ... I eat my vegetables with lunch today and check it off and see the progression that would help me. .... When you call it like a bullet journal where. You track the things you're trying to track and then every day you color in a little box or do something that says yes, I did or no I didn't and then you can have a visual representation of how well, you did over time.

	Useful	Not Useful	Suggestions
Habits and Health Goals	"That's the thing that kept sticking out to me was the specific goals like ... 'cut out this like two times a week' or 'add this a couple of times a week' and that way, once you do it and you do it this week, and you do it the next week, then you pretty much have learned it and then it becomes a habit to you after so many weeks, and then you don't really have to think about it you're just like 'Oh, I want vegetables on my plate' or 'I don't need that extra piece of chocolate.'"		
Nutrition Content	Oh, can I add one more thing to that. I really liked the my plate, which I know is I guess usda but I don't know to me a food, the food pyramid that we have grown up with, or at least my .....comes to visualizing ... how you want to arrange your plate to make sure that you're ... kind of eating along healthy guidelines so that was good too I'm glad y'all brought that into the session.	: Most of that I already knew just because I am… I mean I have been kind of into fitness and stuff like that, for many, many years. But if I was a beginner, I would have found it a lot more useful because—not that it wasn't useful for me, it's just something ... I already pretty much knew a lot of that—but, like I said, if I was a beginner ..., because it talks about the sodium and it talked about ... the fats and trans fats and what kind of foods to eat to help you get this or that. So yes, it was it was useful.	I think that was that was really it, I think I think it was useful, I think. I would benefit from more and more follow up and repetition, I do think like it's easy like as you're asking me questions now because it's been a while, since I did it right, and I remember some things but, as you asked me this and I'm not 100% sure I ... I remember, so I think it will be good, I think it would be good to expand it I would think it would be good to offer ... to like to keep it available that you could go back if there was something else ... you went back into the question forgot something. But I think it was well done, you got to fix the subtitles, but it was well organized your voice is really good the pictures were good, I think ... it's well it's well done otherwise.

	Useful	Not Useful	Suggestions
Nutrition Content	Oh, I thought that was I thought that was well done, I thought that was very good and I always think it's important to remember that the labels are just ... provide so much information and you don't even realize you've just ate four servings. ..., when you really thought you were eating one, so I think that was really helpful.		MYH-F-007: And I don't remember I think this was in there. But I But I'm not 100% sure how I don't remember exactly But When you're looking at the labels, if you if you look at the food label the different ways that Or the some of the different terms that are used that You wouldn't necessarily know translate into like sugar or ... the $6 words that great ... when you look at it simply are just sugar but To look at it, you wouldn't Know mono-sodium whatever is okay, or I guess that would be more of a salt But ... the way you get you kind of get tricked or turned not really realizing that that's just okay that's another word for sugar.
	More so of how to read a nutrition label. I felt that was a great one; I feel like a lot of people like students and then also pro-staff are very unaware of what it entails fully on a nutrition label, so I thought that was some great content to be able to enlighten a lot of people who are part of the study on that. I was not familiar with the DASH diet, or anything and then, also taking into consideration for the amount of sodium I needed or anything like that. I never— that's also on me for not doing as much research, but I think this that it's specifically for that that allowed me to be more aware and learn a lot more than I could apply to my daily life.		

	Useful	Not Useful	Suggestions
Mindful Eating Content	Okay, it definitely got me thinking about food... I would say almost every time I would sit down to eat I would think about like what kind of hunger, I was having and what the food was what I was appreciating about it, ..., like just what tastes, I was noticing and I feel like I was noticing not rather than just sort of like gulping down food, I was really noticing what I was eating and appreciating that so you know just the different tastes	I was excited about it; I say that mindfulness is one of those weird things that I think would be great if I could ever learn how to do it. But I really struggle with it, so I really wanted it to be useful and I didn't find it as useful as I wanted it to be. I just didn't get it or didn't miss it or didn't quite engage with it was exactly what mindfulness while you're eating would look like. ...Okay, am I supposed to be thinking about the taste of the food, am I supposed to be thinking about how much I'm eating, am I supposed to be thinking about the temperature or ..., and it was like a really wasn't clear how to be what that meant.	MYH-F-016: I think a video would have been would have been useful, ... just somebody like .... This is Jen and she's ... this is how she's mindful when she's eating, ... she's. Making sure that her plate has different colors on it, or you know I don't know something like that, and then have a few examples of what that might mean that might be more relatable.
Text message Content	those random questionnaires, that would be sent out about meals I started to me started to notice, as I went on in the Program. Earlier in the program I wasn't thinking about like where are my thoughts where are my emotions how's my posture how in the moment, am I during eating towards the end of the program …could feel like what was happening like was I started to feel full how does this taste versus How does this taste, what is the sensation so I definitely realized…we take eating for granted, because we have to do that, so you do that, every day, and ... it becomes a mindless thing. But there's layers of layers of experience there to be had.	Yeah It was more because they were not specific, they were very general, and I put I didn't I went more of the middle ground, most of the time, then sometimes I feel that way or passionately it's like yeah it was me some of time it was me some of the time ... what I meant I chose the middle answer most of the time.	

	Useful	Not Useful	Suggestions
Text message Content	"I think, just for the first like week or week and a half, I was a little bit confused just by the verbiage of [the questions], and then I think after we got into the mindfulness, it started to make more sense about like did you feel the pleasant or unpleasant feelings and ... some of those questions like I began to understand way more."	Some of the questions I was fine with some of the questions I thought were a little odd. uhm I'm trying to remember now exactly what the questions were but the one there's one question that was kind of like. I don't know something about did you understand what was happening inside of your body, and I was like I'm not sure what you're getting at there, ... I mean I'm not sure if you're supposed to be like yours tommy's not growing anymore I ... I know or how hot the food was I don't know anyway, some of them I was like yeah no that's not me.	
		"There was one question I just remember being like, 'why does this matter to y'all?' it does matter, right, but just kind of like 'were you angry while you were eating?'… I just remember at the beginning being a little bit confused by the questions, just because I didn't understand how those types of questions applied to how much salt I'm eating."	
Perceived **Ease of Use of MYH on ELC System**			
Navigation and features	"I liked...that D2L has a table content... being able to bounce around from things if you needed to or if you wanted it to. The ease that you could go back and review the modules if you wanted to, it wasn't closed right away, so that was nice to be able to do that."		

	Useful	Not Useful	Suggestions
Email	yeah and I thought the reminders were helpful and I probably could have benefited from more reminders, but I also know that ... people's inboxes get so get so full that they probably wouldn't want ... one extra email every day saying hey go to this module hey go do this module I probably would have liked that but I could see where ... for other people one a week was probably plenty.		Since we were using Our phones and the text messages for the questionnaires maybe Again this this goes back to that ... what's that balance to be had but ..., to get a reminder text. With a link to the modules over the weekends, I think that would have helped me, sometimes, but ... then you're. Then you're texting people on the weekend, so I. It would be good for me,
Engagement with the MYH Program and Content			
Barriers		especially since this is something from through uga I didn't like have an issue with doing it, while I had downtime at work and I think I was just expecting to have downtime at work to complete it, and so, when I didn't I guess that part surprised me and then I do just try to separate like work things from home things and so it's like once I do get home, I want to be able to just like relax and not focus on anything else, even though this isn't like actually a work thing this was like a voluntary thing that I signed up for I think just in my brain that's how I divided it.	"I think it would be asking a lot to say use this for every meal every day for the rest of your life …If you fail or fall off the wagon for a bit, ... that's fine, but ... you remember this and come back to it if it's been especially busy, and you have 15 minutes between one meeting and another, and you have to eat something, by all means, eat something before your next meeting, so you don't fall out, or you're not falling asleep you don't have low blood sugar. But, wherever you can help it, make sure that you make that time where you can sit down and actually have a mindful eating experience because it's very good to actually experience those different things and to be mindful about what's going on and to just take that break."

	Useful	Not Useful	Suggestions
Barriers	Just because a lot of times when I would be doing the like going through each module it would be when I had downtime at work and usually at those times, or it would just be when I would have a free second that usually wasn't during a meal time and so sometimes, like if I did have a snack I would try to focus on that or I would have my attention drawn away by like emails or something so I just kind of found it was just difficult to have the time to do that, or to like be hungry, in order to do that and I just kind of struggled with that one a little bit and I kept trying to be like oh I'll go back to it and I didn't really have the time, so I think at just one point I just ended up listening to it, and I was like okay I'll just put this in my pocket, and the next time I'll eat I'll think about these things.	healthy eating is the thing you have to commit to over and over again, because there's so much unhealthy food out there it's just ... people bring doughnuts to the office all the time. And you have to work on your willpower to resist eating,	
Suggestions	Because I found it useful, and I would think maybe it would incorporate ... the say, like, for instance, the smart goals you set the goals and it asks you how you did, but you could, it could say "okay well now continue your smart goals for so many weeks" and "how did you do after two weeks" or "how did you do after three weeks," and then ... as far as like the taking the time to figure out why you're eating. Are you eating because you're emotional? ..., give somebody some more practice doing that.		I think I would just because I've enjoyed the content. I think if it were to be longer for some people, and maybe to avoid people getting burnout or bored with the program there may be there may be a need for like a community aspect so maybe a discussion board for people to interact to see how everybody's goals are doing. Obviously I'm sure there's a wave on elc to make it anonymous for when people post, but I think that would be a good way to prevent burnout for people that may get bored after three or four weeks.

APPENDIX F

MIND YOUR HEART PILOT STUDY INFORMED CONSENT

PARTICIPANT INFORMED CONSENT FORM AND AUTHORIZATION TO USE AND DISCLOSE MEDICAL INFORMATION

STUDY TITLE:	Mind Your Heart: A Workplace Nutrition Education Program
PROTOCOL NO:	PROJECT00003799
STUDY INVESTIGATOR:	Lisa Renzi-Hammond, PhD and Anita Reina, MS
STUDY SITE:	University of Georgia Hudson Hall Health Science Campus 102 Spear Rd Athens, GA 30602
TELEPHONE:	(706) 542-2539

You are being asked to take part in a research study. The information in this form will help you decide if you want to be in the study. Please ask the researcher(s) below if there is anything that is not clear or if you need more information.

Study Investigators:

Lisa Renzi-Hammond, PhD and Anita Reina, MS

Health Promotion and Behavior

lrenzi@uga.edu, anita.reina@uga.edu, MindYourHeart@uga.edu

The following is key information to consider about your participation.

- The purpose of this study is to examine if nutrition education improves eating habits and health measures, such as blood lipids and blood pressure.
- Your involvement in the study is voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are otherwise entitled.
- If you choose to participate, you will first be asked to visit the Institute of Gerontology on the Health Science Campus. We will ask you to provide information about your eating habits, and you will have blood drawn by a trained phlebotomist to measure your blood lipids, like cholesterol. We will measure your blood pressure and measure nutrients in your eyes during an eye exam. Before and after the 6-week period, you will be asked to complete an online questionnaire and provide follow-up blood samples, blood pressure measurement, and an eye exam. This visit should take about an hour to complete.
- You will be given access to the Mind Your Heart program on e-Learning Commons (eLC). You will be asked to review 6 modules online over the next 6 weeks. Each module should take between 20-30 minutes to complete. The full program may take 4 to 6 hours over 6 weeks.
- After the 6-weeks is over, we will ask you to return to the Institute of Gerontology to repeat the tests you completed on your first visit.

- There are no direct benefits in participation, although this program will allow you to access evidence-based nutrition education and eating behaviors at any time on a web-based platform. You will also have access to your pre- and post-study health screening including blood pressure, cholesterol levels, and eye nutrient levels.
- As an alternative to this research study, the University of Georgia offers nutrition education and mindfulness programs through UGA Well-Being. Contact your human resources department to learn more about how to participate
- You have been asked to participate because you are a UGA employee and have confirmed that you meet the inclusion criteria for the study. If you are interested in participating in the study, please read the additional information on the following pages, and feel free to ask questions at any point.

Study Procedures and Time Commitment

The purpose of this study is to learn whether virtual nutrition education can effectively help you learn and maintain healthy eating habits.

Approximately 50 people aged 18 and older will participate in this study.

If you choose to participate, you will be asked to:

1. Attend an initial study visit. During this visit, you will:
    - Complete the informed consent process.
    - Receive training on how to access Bright Space Desire2Learn electronic learning management system, also known as eLC. (15 minutes)
    - Be given access to and trained on how to record a food diary using MyFitnessPal (15 min)
    - Complete a questionnaire on your existing health habits (20-30 min)
    - Complete an eye exam to measure nutrient levels in your eye (10 min)
    - Provide a blood sample (5 min),
    - Have your blood pressure measured (5 min)
    - Have height, weight, and body fat percentage measured (5-10 min)

    The total time for visit 1 is **1.5 hours**
2. Use the eLC platform to complete the educational modules. Participants will be assigned by chance, like the flip of a coin, to one of two different approaches for presenting nutrition education virtually. Regardless of the approach you are assigned, you will receive a total of 6 modules, each designed to take about 30 minutes each to complete. You should complete these modules at your own pace within the 6-week period. Completing modules at your own pace should take less than **6 hours total.**
3. Each week during the 6-weeks, you will receive 3 questionnaires. These questionnaires will be texted to you using the phone number you provide. Two of the weekly questionnaires will be texted to you on weekdays, and one of the weekly questionnaires will be texted to you on a weekend day. Each questionnaire will take about 5 minutes to complete. Over the 6-week period, you will ultimately complete 18 questionnaires, which will take **a total of 90 minutes** over the 6-week period.
4. After you have completed the education and questionnaires, you will be asked to attend a final in-person visit. During this visit, you will be asked to:
    - Complete a questionnaire about your health habits (20-30 min)
    - Complete the eye exam for nutrient levels (10 min),
    - Provide a blood sample (5 min),
    - Have your blood pressure measured (5 min)
    - Have height, weight, and body fat percentage measured (5 min)

The total time for this visit is **1 hour**

Risks and discomforts

There is no charge to participate in this program, and there are no risks to you. Although you may have heard about this program from your manager or a co-worker, no one will be informed of your decision to participate, and your decision to participate or not will not affect your employment status, employee evaluations, or access to other workplace benefits and services to which you are entitled.

Some nutritional behavioral practices may bring up feelings of discomfort, guilt, or anxiety surrounding eating behaviors. Participants will be asked to identify and reflect on these behaviors to make informed changes, but doing so may be uncomfortable, and you may skip any items or tasks that make you feel uncomfortable.

Blood will be collected during your study visits, and there is always mild risk of swelling and infection from a blood draw, as well as dizziness and fainting. To reduce these risks, a trained phlebotomist will conduct all blood draws, using standard procedures for infection control. We ask that you fast (no food or drink, other than water) for 8 hours before coming to the in-person study visits. Some people feel dizzy, weak, or faint after fasting. We will provide you with healthy snacks after your blood draw to minimize this risk. The total amount of blood drawn during this study is 4 tablespoons.

When personal information is collected about you, there is always some risk of a breach of confidentiality, which happens when people outside of the study team get access to personal, identifiable information. To learn more about this risk and the additional risks of information transmitted over the internet, please see the **confidentiality of records** and **internet data collection** sections below.

Benefits

There are no direct benefits to you for participating, but you will receive information on how to eat a heart-healthy diet. We will use the information that you provide to improve the Mind Your Heart program, which we hope to make available to others in the future. Once the improved program is available, we hope that people who use it eat a healthier diet.

You will also be given access to your cholesterol and blood glucose levels, as well as your eye exam information, after both in person visits. You should feel free to share this information with your healthcare provider.

Research-Related Injury

If you experience an injury related to the study procedures, you should contact the study investigator right away and will be referred to your personal physician for treatment of the injury. No money has been set aside to compensate you for the costs of treatment for a study-related injury. You do not waive any of your legal rights by signing this form.

Confidentiality of records

All participants will be assigned a unique ID, which is a combination of letters and numbers unrelated to their identity (for example, MYH-P 001). After the study is complete, we will delete the code that links your name and contact information to your unique ID. We will only keep information that could identify you long enough to send email reminders, text message links to questionnaires, and match your questionnaire responses with your questionnaire and biomarker data. After these matches have been made, we will delete your personal identifying information. We will not share this information with anyone who is not connected to this research study unless required by law. After identifiers are removed, the information may be shared with other researchers and/or used for future studies without additional consent. If the results of the study (including your research or health information) are published, your identity will remain confidential.

Your study file will be labeled with your unique ID only and stored in a locked file cabinet in a locked room in the Institute of Gerontology that is only accessible to study team members. Electronic data will be stored on a secure web-based storage platform provided by the University of Georgia, available only to study team members.

Internet Data Collection

Questionnaire information will be collected using the Qualtrics surveying tool. Diet information will be recorded using a third-party app (My Fitness Pal). These technologies are not maintained by the University of Georgia. To use My Fitness Pal, you will be asked to agree to the terms or service and privacy policies created by the makers of this app. Your confidentiality can be maintained only to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties.

Withdrawal from the research study

If you decide to stop or withdraw from the study or the study investigator ends your participation, the information/data collected from or about you up to the point of your withdrawal will be kept as part of the study and may continue to be analyzed.

Incentives/compensation for participation

At the completion of the initial visit, you will receive a free lunch box and measuring cup. You will receive a $20.00 gift card for completing both visits to the laboratory. The gift card will be available at the completion of the second visit to the Institute of Gerontology on the Health Science Campus at the University of Georgia.

Participant rights

Please feel free to ask questions about this research at any time. You can contact the study investigators at the email addresses provided on the first page of this form.

If you have any questions or concerns regarding your rights as a research participant in this study, you may contact the Sterling Institutional Review Board Regulatory Department at telephone number 1-888-636-1062 (toll free) or info@sterlingirb.com.

By clicking the button below, you acknowledge:

- Your participation in the study is voluntary.
- You are 18 years of age.
- You are aware that you may choose to terminate your participation at any time for any reason.

○ I consent, begin the study (1)

○ I do not consent, I do not wish to participate (4)

Only display if participant consents

Please sign your name using your mouse or track pad.

The following information will be used to register you in the program. We will only use this information to confirm your identity for registration and link your responses to other parts of the study.

- Your **name** and **UGA user ID number** will be used to confirm your identity when registering you into eLearning Commons (eLC).
- Your **email address** will be used to send you an invitation to login into the program and reminders. We will also use this to link your responses to the follow-up questionnaires
- Your **mobile phone number** will be used to send you text messages with links to questionnaires about your meals during the week.

This data will be replaced with a de-identified code for research purposes. You will be able to be identified at the conclusion of the study. Your information will not be shared with anyone beyond the research team. Your participation is completely confidential.

What is your name?

- First Name _____
- Last Name _____

We will need your username or 81 UGAID number in order to register you into the eLC course. This number will not be stored beyond this study. Please provide it below.

_____

What is your email address?

- Email Address (1) _____

Please provide you a mobile phone number that we can text you weekly questionnaires about your meals. (This information will not be shared with anyone beyond the research team)

_____

End of Block: Participant Info

APPENDIX G

MIND YOUR HEART: INTERNAL LAB INFORMATION FORMS

Mind Your Heart Study

Participant Number MYH-P-____ Date_____

Experimenter_____

Participant Checklist

❑ First Visit	❑ Second Visit
Check in ❑ Confirm participant identity and inclusion criteria ❑ Informed Consent ❑ Assign a study number **Measures** ❑ Blood draw o Provided snack after fasting ❑ Blood pressure ❑ Anthropometrics ❑ Macular Pigment ❑ Participant completes questionnaire **Training** ❑ MyFitnessPal/Food Diary ❑ eLC ❑ Schedule days for food diary (2 weekdays 1 weekend) o Pretest dates o Posttest dates **Checkout** ❑ Schedule a posttest date for data collection ❑ Give lunchbox and measuring cup incentive ❑ Provide MYH Participant Info sheet **Tracking** ❑ Record Qualtrics information into participant tracking form _____ date_____	**Check in** ❑ Confirm participant identity and ID number **Measures** ❑ Blood draw o Provided snack after fasting ❑ Blood pressure ❑ Anthropometrics ❑ Macular Pigment ❑ Participant completes questionnaire **Food Diary** ❑ MyFitnessPal Data o Pretest o posttest **Checkout** ❑ Give $20 gift card ❑ Provide print out of the lab measures for participant **Tracking** ❑ Record Qualtrics information into participant tracking form _____ date_____

Notes:

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 1: Anthropometrics

Participants Sex M/F: _____

	Measurement 1	Measurement 2	Measurement 3	Average
Height (cm)				
Weight (kg)				
Waist Circumference (cm) (nearest .1 cm)				
Hip Circumference (cm) (nearest .1 cm)				
BMI (calculated)				
Waist-Hip Ratio Calculated WHR= WC/HC				

Notes:
Use CDC Adult BMI Calculator:
https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/metric_bmi_calculator/bmi_calculator.html

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 1: Blood Pressure

Measurement	Systolic (mmHg)	Diastolic (mmHg)	Time
Measure 1			
Measure 2			
Measure 3			
Average			

Notes:

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 1: Blood Analysis

Lipid Panel Plus

Biomarker	Suggested Value Range	Actual
Total Cholesterol (CHOL)	Desirable < 200 Borderline High 200-239 High > 240	
High-density lipoproteins (HDL cholesterol)	Low HDL - Risk Factor < 40 High HDL - Negative Risk Factor (Desirable) > 60	
Triglycerides (TRIG)	Normal < 150 Borderline High 150-199 High 200-499 Very High > 500	
Alanine transaminase (ALT) – lipid panel plus	4-36 U/L	
Aspartate aminotransferase (AST) – lipid panel plus	8-33 U/L	
Glucose (fasting)	73-118 mg/dL	
Calculated non-HDL cholesterol (nHDLc)	Optimal < 130 Increased Risk 130–189 High Risk > 189	
Calculated total cholesterol: HDL ratio TC/H	Low Risk < 5 (M) <4.5 (F) High Risk > 5 (M) > 4.5 (F)	
Low-density lipoproteins (LDL cholesterol)	Optimal < 100 Near Optimal 100-129 Borderline High 130-159 High 160-189 Very High > 190	
Very low-density lipoproteins (VLDL)	Normal < 30 High > 30	

Notes: Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Paste a copy of the
Visit 1: Lipid Panel Plus
printout here

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 1: Blood Analysis

MetLyte Plus CRP

Biomarker	Suggested Value Range	Actual
Glucose	73-118 mg/dL	
Blood Urea Nitrogen (BUN)	7-22 mg/dL	
Creatinine (CRE)	0.6-1.2 mg/dL	
Creatine Kinase (CK)	(Female) 30-190 U/L (Male) 39-380 U/L	
Sodium (Na+)	128-145 mmol/L	
Potassium (K+)	3.6-5.1 mmol/L	
Chloride (CI-)	98-108 mmol/L	
Total Carbon Dioxide (tCO_2)	18-33 mmol/L	
C-Reactive Protein (CRP)	< 7.5 mg/L	
eGFR		

Notes:

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Paste a copy of the
Visit 1: MetLyte Plus CRP
printout here

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 1: Macular Pigment Data Collection

1. LFF Determination

Ascending 1: Descending 1:

Ascending 2: Descending 2:

Ascending 3: Descending 3:

Computational Average:

2. Research Densitometer, 460 nm "Blue" stimulus

LFF 30: LFF 7:	Raw Blue 30-min (Target 2)	Raw Green 30-min (Target 2)	Raw Blue 7-deg (Target 5)	Raw Green 7-deg (Target 5)
Trial 1				
Trial 2				
Trial 3				
Trial 4				

Trial 5				

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

30-min Average Blue

7-deg Average Blue

30-min Average Green

7-deg Average Green

MPOD

MPSD

Notes:

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 2: Anthropometrics

Participants Sex M/F: _____

	Measurement 1	Measurement 2	Measurement 3	Average
Height (cm)				
Weight (kg)				
Waist Circumference (cm) (nearest .1 cm)				
Hip Circumference (cm) (nearest .1 cm)				
BMI (calculated)				
Waist-Hip Ratio Calculated WHR= WC/HC				

Notes:
Use CDC Adult BMI Calculator:
https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/metric_bmi_calculator/bmi_calculator.html

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 2: Blood Pressure

Measurement	Systolic (mmHg)	Diastolic (mmHg)	Time
Measure 1			
Measure 2			
Measure 3			
Average			

Notes:

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 2: Blood Analysis

Lipid Panel Plus

Biomarker	Suggested Value Range	Actual
Total Cholesterol (CHOL)	Desirable < 200 Borderline High 200-239 High > 240	
High-density lipoproteins (HDL cholesterol)	Low HDL - Risk Factor < 40 High HDL - Negative Risk Factor (Desirable) > 60	
Triglycerides (TRIG)	Normal < 150 Borderline High 150-199 High 200-499 Very High > 500	
Alanine transaminase (ALT) – lipid panel plus	4-36 U/L	
Aspartate aminotransferase (AST) – lipid panel plus	8-33 U/L	
Glucose (fasting)	73-118 mg/dL	
Calculated non-HDL cholesterol (nHDLc)	Optimal < 130 Increased Risk 130–189 High Risk > 189	
Calculated total cholesterol: HDL ratio TC/H	Low Risk < 5 (M) <4.5 (F) High Risk > 5 (M) > 4.5 (F)	
Low-density lipoproteins (LDL cholesterol)	Optimal < 100 Near Optimal 100-129 Borderline High 130-159 High 160-189 Very High > 190	
Very low-density lipoproteins (VLDL)	Normal < 30 High > 30	

Notes:

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Paste a copy of the
Visit 1: Lipid Panel Plus
printout here

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 2: Blood Analysis

MetLyte Plus CRP

Biomarker	Suggested Value Range	Actual
Glucose	73-118 mg/dL	
Blood Urea Nitrogen (BUN)	7-22 mg/dL	
Creatinine (CRE)	0.6-1.2 mg/dL	
Creatine Kinase (CK)	(Female) 30-190 U/L (Male) 39-380 U/L	
Sodium (Na+)	128-145 mmol/L	
Potassium (K+)	3.6-5.1 mmol/L	
Chloride (CI-)	98-108 mmol/L	
Total Carbon Dioxide (tCO_2)	18-33 mmol/L	
C-Reactive Protein (CRP)	< 7.5 mg/L	
eGFR		

Notes:

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Paste a copy of the

Visit 2: MetLyte Plus CRP

printout here

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Visit 2: Macular Pigment Data Collection

1. LFF Determination

Ascending 1: Descending 1:

Ascending 2: Descending 2:

Ascending 3: Descending 3:

Computational Average:

2. Research Densitometer, 460 nm "Blue" stimulus

LFF 30: LFF 7:	Raw Blue 30-min (Target 2)	Raw Green 30-min (Target 2)	Raw Blue 7-deg (Target 5)	Raw Green 7-deg (Target 5)
Trial 1				
Trial 2				
Trial 3				
Trial 4				
Trial 5				

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

30-min Average Blue

7-deg Average Blue

30-min Average Green

7-deg Average Green

MPOD

MPSD

Notes:

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Food Diary 1

Pretest Diary

Tab	Nutrient	Day 1 Date_____	Day 2 Date_____	Day 3 Date_____	Avg
Calories Tab	**Calories (total)**				
Nutrient Tab	**Protein (g)**				
	Fiber (g)				
	Sugar (total)				
	Total fat (g)				
	Saturated fat (g)				
	Cholesterol (mg)				
	Sodium (mg)				
	Potassium (mg)				
	Calcium (%)				

Notes:
Record Food Diary 2 on back of page

Data Recorded in Data Form (Initials)_____Date Recorded_____

Mind Your Heart Study

Participant Number MYH-P-____ Date_____ Experimenter_____

Food Diary 2

Posttest Diary

Tab	Nutrient	Day 1 Date_____	Day 2 Date_____	Day 3 Date_____	Avg
Calories Tab	**Calories (total)**				
Nutrient Tab	**Protein (g)**				
	Fiber (g)				
	Sugar (total)				
	Total fat (g)				
	Saturated fat (g)				
	Cholesterol (mg)				
	Sodium (mg)				
	Potassium (mg)				
	Calcium (%)				

Notes:

Data Recorded in Data Form (Initials)_____Date Recorded_____

APPENDIX H

MIND YOUR HEART: PARTICIANT LAB INFORMATION SHEET

Participant Name: _____ Date: _____ Experimenter Initials: _____MYH-P-_____

Dear Participant, **MIND YOUR HEART**

We would like to provide you with a copy of all the tests we completed today that are relevant to your health. Below, you will find a table that contains each of the laboratory tests, recommended values for those tests, your information, and suggestions for interpreting your health information. We encourage you to share this report with your doctor. Please note, we collected this information for research purposes. We are not medical doctors and cannot use this information to provide you with health advice, or a diagnosis.

<table>
<tr><th></th><th>Why this is important</th><th>Pretest</th><th>Posttest</th></tr>
<tr><td>Sex</td><td rowspan="3">Used to calculate Body Mass index</td><td></td><td></td></tr>
<tr><td>Height (cm)</td><td></td><td></td></tr>
<tr><td>Weight (kg)</td><td></td><td></td></tr>
<tr><td>BMI (calculated)</td><td>Underweight <18.5
Normal or healthy weight 18.5-24.9
Overweight 25-29.9
Obese >30</td><td></td><td></td></tr>
<tr><td>Waist Circumference (cm)</td><td>Larger waist circumference is related to increased risk for heart disease. For best results keep at:
<table>
<tr><th>WC for Female</th><th>WC for Male</th><th>Classification</th></tr>
<tr><td>Below 80cm</td><td>Below 94cm</td><td>Low Risk</td></tr>
<tr><td>80-88 cm</td><td>94-102cm</td><td>High Risk</td></tr>
<tr><td>More than 88cm</td><td>More than 102cm</td><td>Very High Risk</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>Hip Circumference (cm)</td><td>Use to calculate waist to hip ratio</td><td></td><td></td></tr>
<tr><td>Waist-Hip Ratio Calculated</td><td>Higher waist-to-hip Ratio is related to risk for heart disease.
<table>
<tr><th>WHR for Female</th><th>WHR for Male</th><th>Classification</th></tr>
<tr><td>Below 0.80</td><td>Below 0.95</td><td>Low Risk</td></tr>
<tr><td>0.81 to 0.84</td><td>0.96 to 1.0</td><td>Moderate Risk</td></tr>
<tr><td>More than 0.85</td><td>More than 1.0</td><td>High Risk</td></tr>
</table></td><td></td><td></td></tr>
</table>

Blood Panel

Biomarker	Suggested Value Range	Why this is important	Pretest	Posttest
Total Cholesterol (CHOL)	Desirable < 200 Borderline High 200-239 High > 240	Maintaining a healthy blood lipid profile is important for preventing heart diseases.		
High-density lipoproteins (also called HDL cholesterol)	60 mg/dL or above			
Triglycerides	Less than 150 mg/dL or 1.7 mmol/L			
Calculated non-HDL cholesterol	Less than 130 mg/dL or 3.37 mmol/L			
Calculated total cholesterol: HDL ratio	Below 5, but ideally 3.5			
Low-density lipoproteins (aka LDL cholesterol)	Less than 100 mg/dL			
Very low-density lipoproteins	2-30 mg/dL			
Glucose (fasting)	73-118 mg/dL	High blood glucose can indicate issues such as diabetes		
Alanine transaminase (ALT)	4-36 U/L	These enzymes are important markers of liver health.		
Aspartate aminotransferase (AST)	8-33 U/L			
Sodium (Na+)	128-145 mmol/L	Electrolytes are minerals in the body related to the amount of fluids in the body.		
Potassium (K+)	3.6-5.1 mmol/L			
Total Carbon Dioxide (tCO_2)	18-33 mmol/L			
Chloride (CI-)	98-108 mmol/L			

Biomarker	Suggested Value Range	Why this is important	Pretest	Posttest
Blood Urea Nitrogen (BUN)	7-22 mg/dL	Waste products removed from your blood by your kidneys.		
Creatinine	0.7–1.2 mg/dl (males) 0.5–1.0 mg/dl (females)			
Creatine Kinase (CK)	30-190 U/L (Female) 39-380 U/L(Male)	Enzyme produced by the brain, muscles, and heart. Elevated levels are related to muscle damage.		
C-Reactive Protein (CRP)	< 7.5 mg/L	Indicates the level of inflammation in your body. Inflammation may lead to increased risk for heart disease		

Biomarker	Suggested Value Range	Why this is important	Pretest	Posttest
Macular Pigment Optical Density (MPOD)	0.0-1.5	Macular pigment is a measure of antioxidants from your food that become embedded in your retina. Higher MPOD is better. MPOD below 0.3 increases risk for macular degeneration.		

Biomarker	Why this is important		Pretest	Posttest
Blood Pressure	Hypertension is a risk factor for a number of cardiovascular conditions.			
	Blood Pressure	Measure		
	Normal	120/80 mm Hg		
	Prehypertensive	120-129 mm Hg systolic and less than 80 mm Hg diastolic		
	hypertension stage 1	130-139 mm Hg systolic or 80-89 mm Hg diastolic		
	hypertension stage 2	140/90 mm Hg or higher		

Thank you for your participation. This is not a diagnosis and intended for educational purposes only. See your doctor if any of your numbers are concerning.

MIND YOUR HEART

If you have any questions about the study, don't hesitate to contact
Anita Reina, MS
706-542-2539
Or email mindyourheart@uga.edu.

APPENDIX I

MIND YOUR HEART PILOT QUESTIONNAIRE

MYH Pilot DASH Diet Questionnaire

Start of Block: WELCOME

WELCOME

The following questionnaire will be used to examine your current and follow-up diet, food knowledge, and eating behaviors. The questionnaire should take you about 30 minutes to complete.

MYH_ID_a Please provide your research code number. If you do not know it, it will be supplied to you by a research assistant.

_____

End of Block: WELCOME

Start of Block: Demographics

Q157
Demographic Questions

AGE_a How old are you in years?

_____

Gender_a What is your gender?

- Female
- Male
- Non-binary / third gender
- Prefer not to say

MARITAL What is your marital Status?

- Married
- Widowed
- Divorced
- Separated
- Never married
- Other _____

Race_a What is your race/ethnicity?

- White
- Black or African American
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Other _____

HISP_a Are you of Hispanic origin?

- Yes
- No

EDUC What is your highest level of education completed?

- Less than high school
- High school graduate
- Some college
- 2-year degree
- 4-year degree
- Professional degree (MS, MA, etc)
- Doctorate

INCOME_a What is your annual income?

- Less than $10,000
- $10,000 - $19,999
- $20,000 - $29,999
- $30,000 - $39,999
- $40,000 - $49,999
- $50,000 - $59,999
- $60,000 - $69,999 (15)
- $70,000 - $79,999 (16)
- $80,000 - $89,999 (17)
- $90,000 - $99,999 (18)
- $100,000 - $149,999 (19)
- More than $150,000 (20)

HOURS_a How many hours per week do you work?

_____

End of Block: Demographics

Start of Block: Health Information

Q158
Health Information

In this section, we will ask questions about your current health status. These questions are related to your cardiovascular disease risks factors.

BP_a Have you ever been told by a doctor, nurse, or other health professional that you have **high blood pressure**?

- Yes
- Yes, but only during pregnancy
- No, Told borderline high or pre-hypertensive
- No
- I don't know

BP_MED_a Are you taking prescription **medication** to treat **high blood pressure**?

- Yes
- No
- I do not know (00)

CHOL_a Have you ever been told by a doctor, nurse, or other health professional that your **blood cholesterol** is high?

- Yes
- No
- I don't know (00)

CHOL_MED_a Are you currently **taking medicine** prescribed by your doctor or other health professional for your **blood cholesterol**?

- Yes
- No
- I don't know (00)

DIAB_a Have you ever been told by a doctor, nurse, or other health professional that you have **diabetes (type 2)**?

- Yes
- Yes, but only during pregnancy
- No, but I was told I have pre-diabetes or borderline diabetes
- No

End of Block: Health Information

Q162

Attention and Awareness

For the following questions, reflect on how you feel on a normal basis. This is when you aren't normally stressed.

MAAS_1a I could be experiencing some emotion and not be conscious of it until some time later.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_2a I break or spill things because of carelessness, not paying attention, or thinking of something else.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_3a I find it difficult to stay focused on what's happening in the present.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_4a I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_5a I tend not to notice feelings of physical tension or discomfort until they really grab my attention.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_6a I forget a person's name almost as soon as I've been told it for the first time.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_7a It seems I am "running on automatic" without much awareness of what I'm doing.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_8a I rush through activities without being really attentive to them.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_9a I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_10a I do jobs or tasks automatically, without being aware of what I'm doing.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_11a I find myself listening to someone with one ear, doing something else at the same time.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_12a I drive places on "automatic pilot" and then wonder why I went there.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_13a I find myself preoccupied with the future or the past.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_14a I find myself doing things without paying attention.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

MAAS_15a I snack without being aware that I'm eating.

- Almost Never
- Rarely
- Sometimes
- Often
- Most of the Time
- Almost Always

End of Block: Mindful Attention Awareness Scale

APPENDIX J

MIND YOUR HEART SCREENSHOTS

Mind Your Heart Screenshots

The following pages contain screenshots of the Mind Your Heart (MYH) technology delivered program through the University of Georgia eLearning Commons (Bright Space Desire2Learn) eLearning platform. When participants entered MYH through the home page (**Figure A.1**), a tutorial was available to train them how to navigate the system. The program was administered asynchronously via a module system. Each of the six module contained submodules with nutrition content. **Figure A.2** shows an example of Module 1 as well as a table of contents for navigation ease. Each module contained an overview page to inform the participant what would be covered in the module (see **Figure A.3**). Submodules contained written, video content, and interactive quizzes embedded in the videos (see **Figure A.4** and **Figure A.5**). The mindful eating content contained an additional guided meditation activity in each module. The guided meditation practice included written information and a guided video. A screenshot of a typical mindful meditation practice is provided in **Figure A.6.** Participants were also encouraged to write new goals each week with the option to review former goals from previous weeks. The written goals were recorded in a private discussion board forum only available to the participant and the research team. Participants could not see other participants' posts. (See **Figure A.7**)

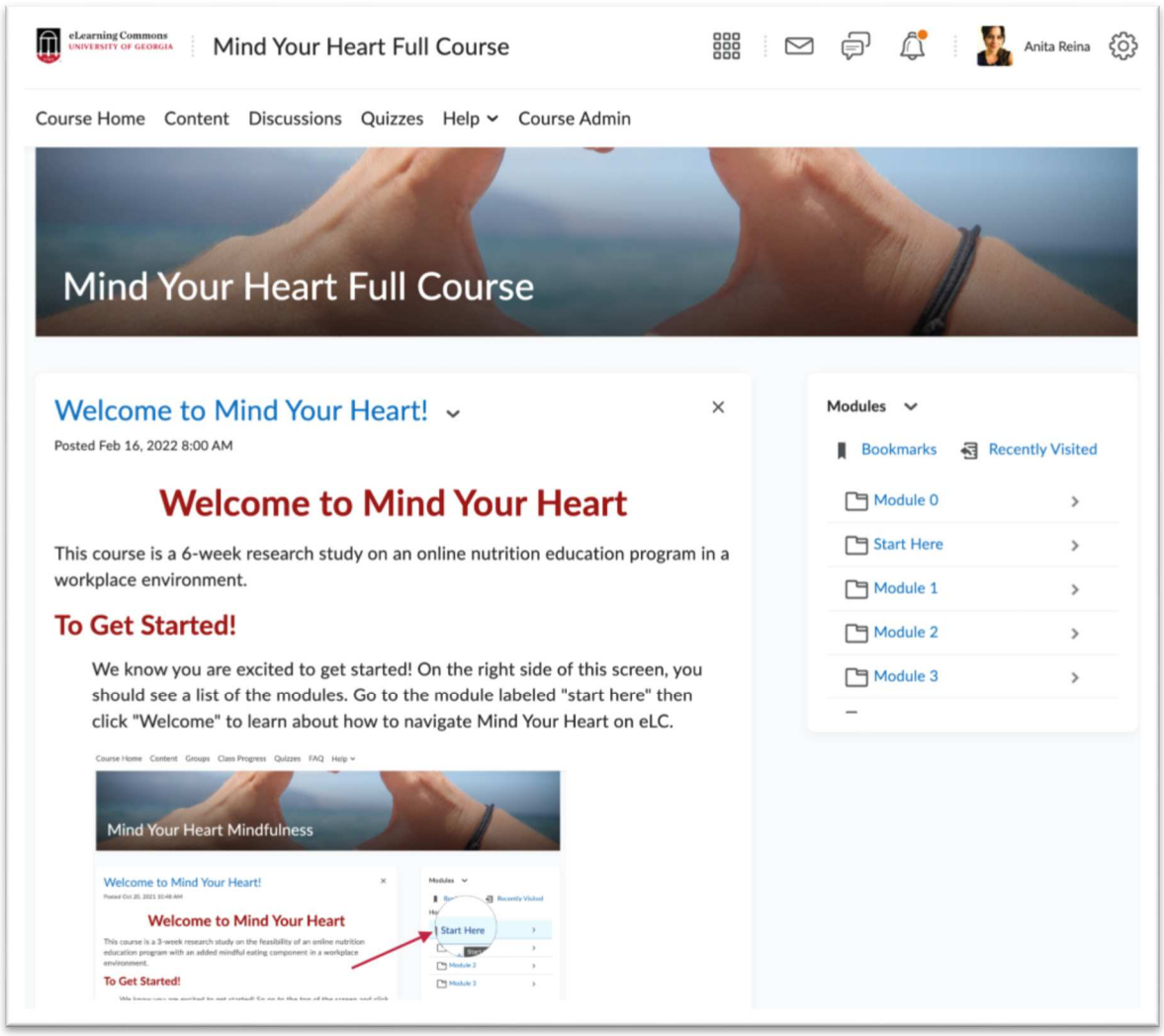

Figure A.1 MYH home page with tutorial screenshot

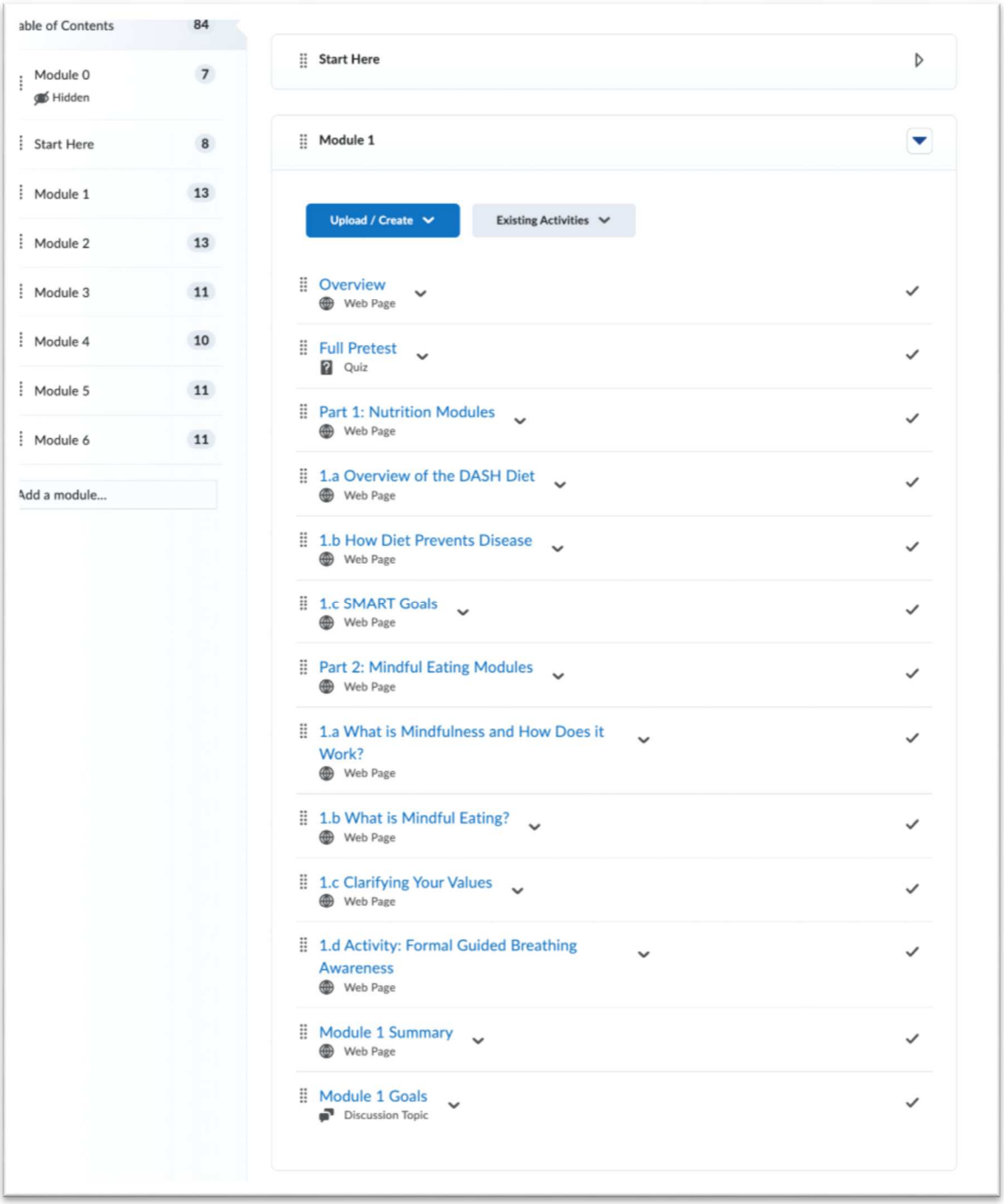

Figure A.2 MYH Module 1 layout example screenshot

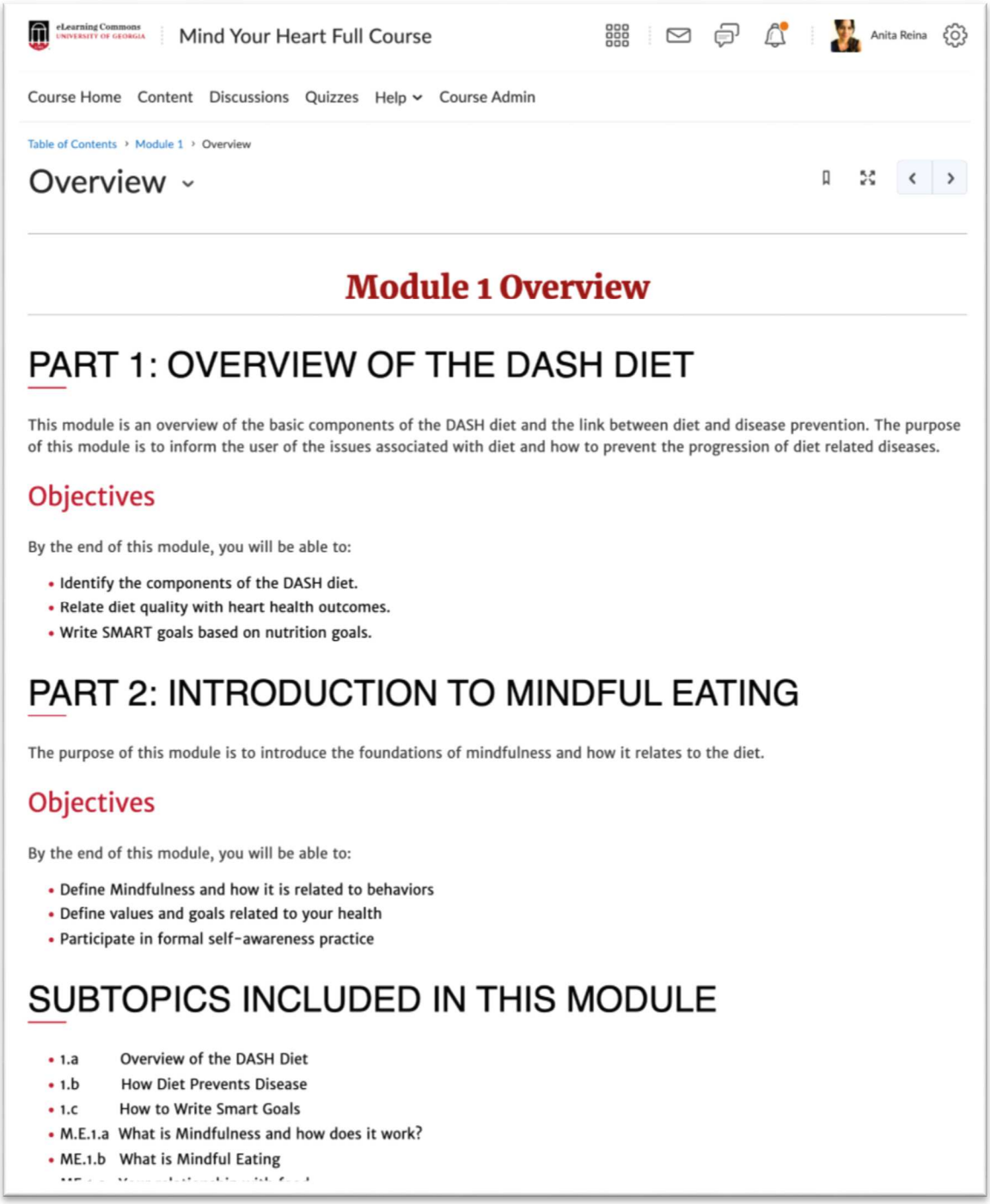

Figure A.3 MYH Module overview page screenshot

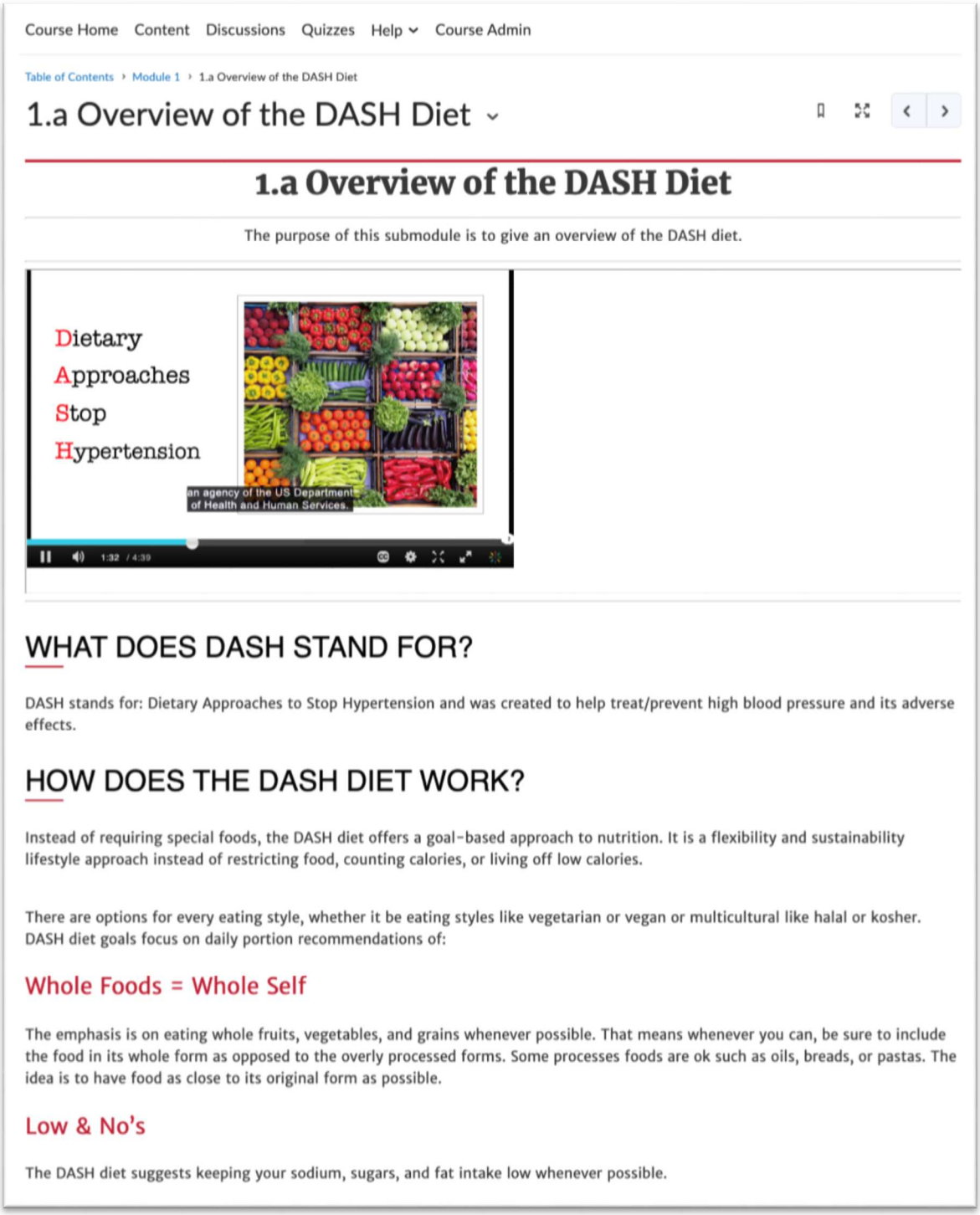

Figure A.4 MYH module content page with video content screenshot

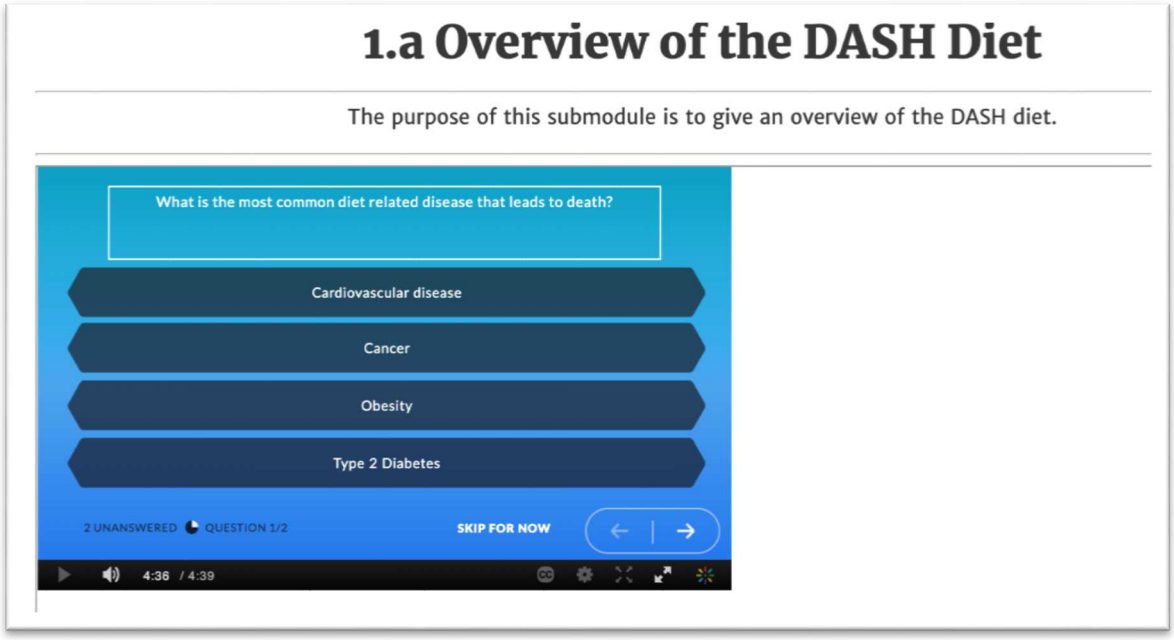

Figure A.5 MYH interactive video quiz example screenshot

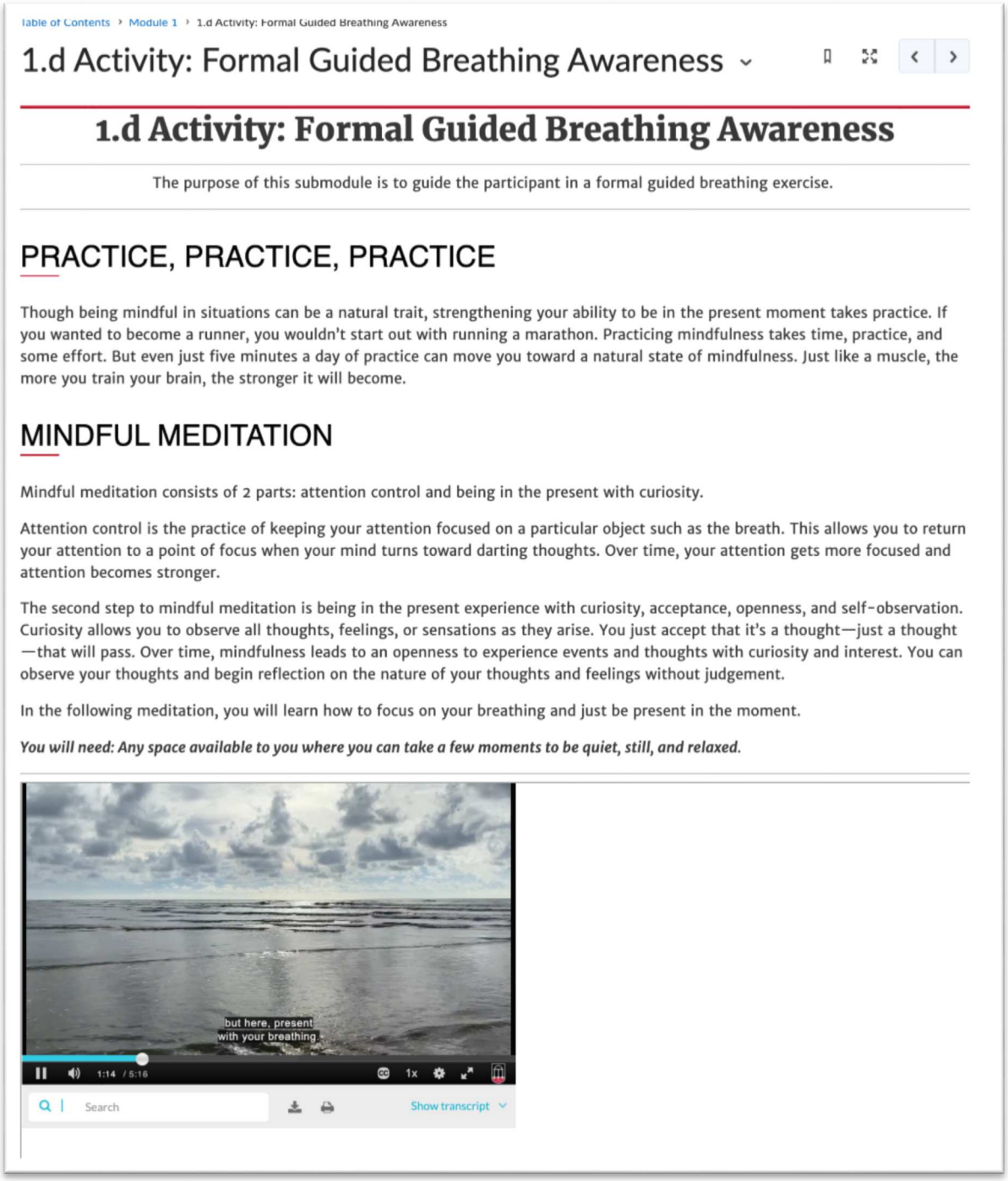

Figure A.6 MYH guided activity page example with video screenshot

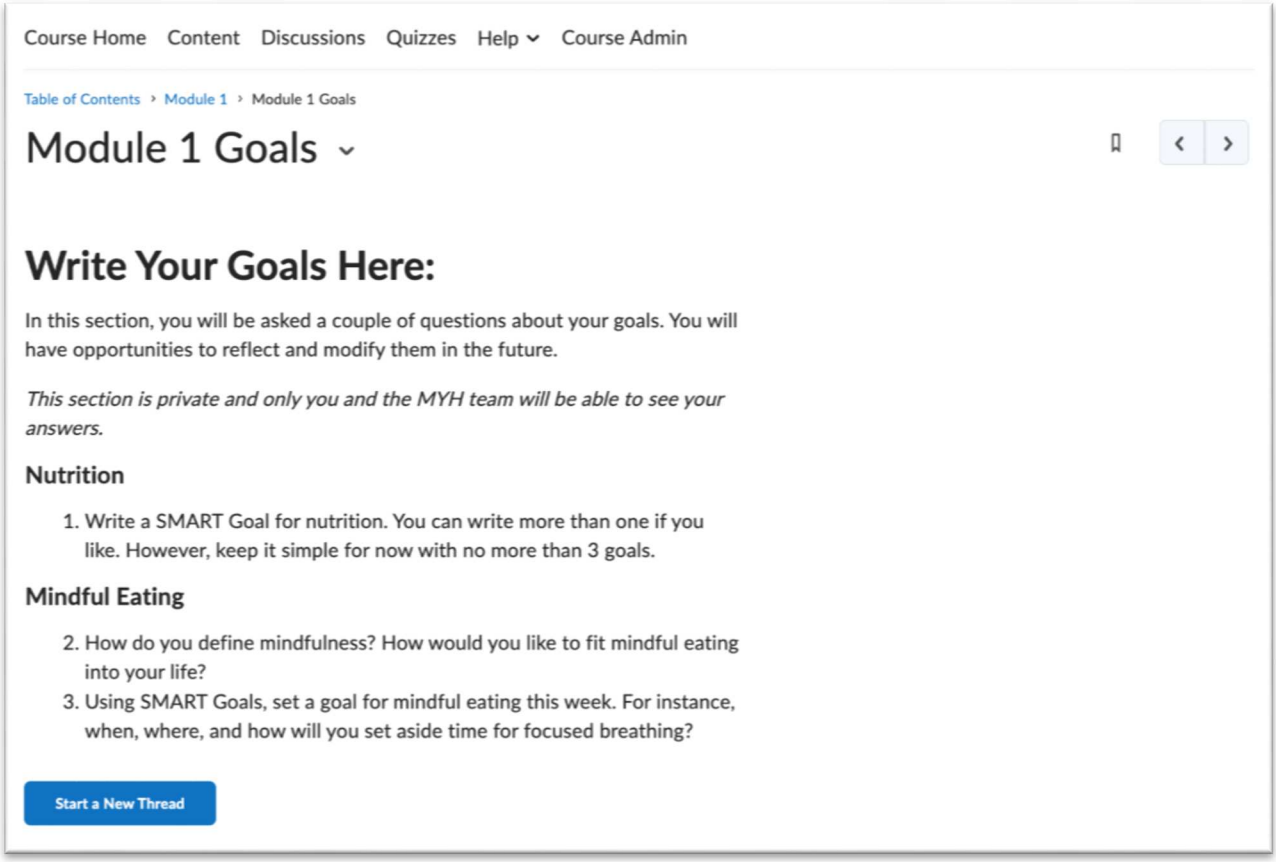

Figure A.7 MYH goal tracking exercise example screenshot