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This thesis, WEB-BASED NUTRITION EDUCATION IN GEORGIA SENIOR CENTERS: PILOT TEST OF A DIETARY APPROACHES TO STOPPING HYPERTENSION (DASH) DIET WEBSITE PROTOTYPE, by Ashley Harrison was prepared under the direction of the Master’s Thesis Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Master of Science in the Byrdine F. Lewis School of Nursing and Health Professions, Georgia State University. The Master’s Thesis Advisory Committee, as representatives of the faculty, certify that this thesis has met all standards of excellence and scholarship as determined by the faculty.

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ABSTRACT

WEB-BASED NUTRITION EDUCATION IN GEORGIA SENIOR CENTERS: PILOT TEST OF A DIETARY APPROACHES TO STOPPING HYPERTENSION (DASH) DIET WEBSITE PROTOTYPE by Ashley Harrison

As increasing numbers of baby boomers enter retirement age, Georgia senior centers will be inundated with more computer-savvy seniors than ever before. Web-based nutrition education is a pragmatic option to complement the traditional classroom nutrition education sometimes hindered by the centers’ limited monetary and personnel resources. This exploratory observational study sought to pilot test a companion to classroom nutrition education, a prototype Dietary Approaches to Stopping Hypertension (DASH) diet website, for future implementation in Georgia senior centers. Classroom DASH diet lessons were designed and pilot tested on a convenience sample of community dwelling older adults in 6 metropolitan area centers (n=109). Next, the same lessons were incorporated into a senior-friendly DASH diet website specially designed to meet the needs of older adults and pilot tested on a second convenience sample in one center (n=5). Descriptive and analytical statistics were used to compare baseline and post-website blood pressures, body weights, and DASH-related nutrition knowledge. There was a significant difference in the scores for systolic blood pressure at baseline (M=145.60, SD=8.385) and post-website (M=136.40, SD=9.607) conditions; t(4)=3.74, p =.020. Diastolic blood pressure and weight showed no significant change. A survey of DASH-related knowledge, behaviors, and beliefs showed movement towards desired responses on 44% of survey questions after the intervention. An opinion survey collected seniors’ perspectives on their website experience. 100% of participants reported
satisfaction with the website and willingness to continue using it. Refinements to the alpha-prototype website are recommended before further testing with a larger pilot study group. Although expanded research is necessary, results from this limited pilot test suggest that web-based nutrition education is a promising method to reinforce classroom lessons teaching dietary and lifestyle management of hypertension in Georgia senior centers. Multi-component nutrition education holds potential to address diversity in cultures, learning preferences, and functional limitations of Georgia seniors.
WEB-BASED NUTRITION EDUCATION IN GEORGIA SENIOR CENTERS:
PILOT TEST OF A DIETARY APPROACHES TO STOPPING HYPERTENSION
(DASH) DIET WEBSITE PROTOTYPE

by
Ashley Harrison

A Thesis

Presented in Partial Fulfillment of Requirements for the Degree of

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Department of Nutrition

Georgia State University

Atlanta, Georgia
2014
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### ABBREVIATIONS

<table>
<thead>
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AND</td>
<td>Academy of Nutrition and Dietetics</td>
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<tr>
<td>BMI</td>
<td>Body mass index</td>
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<td>BP</td>
<td>Blood pressure</td>
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<td>CDC</td>
<td>Centers for Disease Control</td>
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<td>CVD</td>
<td>Cardiovascular disease</td>
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<td>DAS</td>
<td>Division of Aging Services</td>
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<td>DASH</td>
<td>Dietary Approaches to Stopping Hypertension</td>
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<tr>
<td>GENIE</td>
<td>Guide for effective nutrition interventions and education</td>
</tr>
<tr>
<td>GRA</td>
<td>Graduate research assistant</td>
</tr>
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<td>GSU</td>
<td>Georgia State University</td>
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<td>HBM</td>
<td>Health belief model</td>
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<td>HTN</td>
<td>Hypertension</td>
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<td>JNC</td>
<td>Joint National Committee</td>
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<td>MED</td>
<td>Mediterranean diet</td>
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<td>NHLBI</td>
<td>National Heart, Lung, and Blood Institute</td>
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<td>RD</td>
<td>Registered dietitian</td>
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<td>RHBM</td>
<td>Revised health belief model</td>
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<td>SBP</td>
<td>Systolic blood pressure</td>
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<td>SPSS</td>
<td>Statistical package for the social sciences</td>
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<td>WBNE</td>
<td>Web-based nutrition education</td>
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CHAPTER I

WEB-BASED NUTRITION EDUCATION IN GEORGIA SENIOR CENTERS: PILOT TEST OF A DIETARY APPROACHES TO STOPPING HYPERTENSION (DASH) DIET WEBSITE PROTOTYPE

Introduction

The older adult population is one of the fastest growing populations in the U.S., with the U.S. Census Bureau projecting the nation's 65 years-and-older population to reach 83.7 million by 2050, almost double in size from the 2012 level of 43.1 million.\(^1\) Along with an aging population comes an increase in age-related chronic diseases such as hypertension (HTN), which is a leading cause of morbidity, mortality, and rising healthcare costs.\(^2\) Increasingly limited patient/healthcare provider interaction, combined with multiple and sometimes inconsistent nutritional messages regarding HTN, can leave older persons with gaps in their HTN knowledge.\(^3\) Although Georgia senior centers offer group nutrition education, the content provided during classroom instruction may be hindered by time, financial and personnel constraints of the centers, and individual learning needs of class participants. These barriers may leave hypertensive older adults, although willing to learn, with less than ideal tools for managing their HTN. There are limited studies on enrichments to traditional classroom education, such as online learning and its potential role as a learning aid in teaching management of HTN through dietary approaches. Furthermore, much of the existing research on Internet usage for any sort of health management has focused on adults under 65 years of age.\(^4\)
Considering the need to reduce HTN in an elder population, combined with the limited resources of senior centers in Georgia and limited face-to-face classroom time, enhancements to traditional elder nutrition education are necessary. As per the Georgia Division of Aging Services (DAS), the current requirement for nutrition education in Georgia senior centers is a minimum of 15 minutes per month. Although many senior centers meet or exceed the minimum, unfortunately, in some centers, because of lack of funds and teaching expertise, the nutrition education is simply a handout.

The Department of Health and Human Services’ Healthy People 2020, in the newly created “Older Adult” health objectives, includes helping older adults manage their own care as an emerging issue and health priority (OA-3, *Increase the proportion of older adults with one or more chronic health conditions who report confidence in managing their conditions*). Web-based nutrition education (WBNE) could be a promising tool to augment traditional nutrition education in Georgia senior centers, giving older adults one more tool with which to manage their own care. WBNE could potentially address the time constraints and limited funding and personnel of classroom lessons. It could also serve to reinforce classroom messages, provide additional information outside the scope of the class, address different learning styles and rates of learning, and function as a back-up reference to those with functional limitations, such as hearing problems. Additionally, it could be an at-home tool for seniors facing mobility and transportation limitations, as well as providing culture-specific information on healthful foods and preparation methods, information that may be outside the time allowed in a regular class. It could also extend the registered dietitian’s (RD) reach to greater numbers of clients than would be possible with classroom education alone.
Lastly, a web-based learning aid is available throughout a person’s stages of change, whereas a classroom lesson is fleeting in nature and may not intersect with a person’s readiness to change at class time.

WBNE is pragmatic in scalability, sustainability, and reach. In many instances, seniors have been diagnosed with HTN by physicians who may not have the time or training to counsel patients about nutrition. WBNE has the potential to offer dietary information on managing HTN with minimal additional burdens on personnel or budgets.

The Dietary Approaches to Stopping Hypertension (DASH) diet is an evidence-based dietary pattern that has been scientifically tested and shown to lower blood pressure (BP) in as little as 14 days. The DASH dietary pattern is high in vegetables, fruits, low-fat dairy products, whole grains, poultry, fish, and nuts and low in sweets, sugar-sweetened beverages, and red meats. The composition of the food is rich in potassium, magnesium, and calcium, as well as protein and fiber, while low in saturated fat, total fat, and cholesterol.

In January 2013, the DAS awarded a grant to the Georgia State University (GSU) Department of Nutrition to develop a series of classroom lessons to teach the DASH diet in Georgia senior centers. Three graduate research assistants (GRAs), under nutrition faculty supervision, designed and pilot tested the lesson program. One of the questions asked during pilot testing focus groups was “What can we do to improve your understanding of the lesson?” Although participants had been given a class handout for each lesson, they repeatedly answered that more learning aids would improve their understanding of the lesson. When asked if they would utilize a web-based application of
the DASH lessons as a resource for additional information, over 50% of them answered in the affirmative. These focus groups served as an informal needs assessment, revealing a gap between participants’ perceived level of DASH comprehension after the classroom lessons and the level at which participants wished to ultimately understand DASH. There appeared a need for instruction beyond what limited classroom time could offer.

After the DASH classroom lessons were completed and delivered to the DAS, one of the GRAs, as a thesis project, created and pilot tested a senior-friendly DASH website. Its content was reflective of the recently designed DASH classroom lessons, its intent being to function as a classroom companion tool. The penultimate goal will be to pilot test the website in senior centers throughout Georgia, with the paramount goal being a DASH website that the DAS may incorporate as an adjunct learning tool to the DASH classroom lessons. However, in order to offer the most pragmatic website design to the DAS, website creation and testing should occur in stages. This study consists of stage one: create a prototypical DASH website and test its performance, obtain and evaluate the seniors’ initial impressions, and evaluate the website’s suitability for a senior audience. Based on pilot study results, website adjustments can be planned before proceeding with expanded testing in multiple senior centers. The alpha prototype of the DASH website was introduced at New Beginnings senior center in Fairburn, Georgia, chosen for its diversity of older adults.

Pre- and post-pilot study measures included BP, weight, a questionnaire to determine DASH-related nutritional knowledge, beliefs, and behaviors, and a food diary to determine intake of DASH-specific foods. It was hypothesized that participants’ BP readings would decrease and body mass indexes (BMI) would approach a healthy range,
if not currently there, and that DASH-related nutritional knowledge, beliefs, behaviors, and consumption of DASH-specific foods would increase after the intervention. Additionally, participants completed a post-pilot study survey on their experience with the website, so that website modifications could be made before introducing the website to a larger study group. To best explain the genesis of the website, this manuscript shall describe the creation of both the initial DASH classroom lessons and the website itself.
Chapter II

Review of Literature

Hypertension in a growing elder population

The older adult population is one of the fastest growing populations in the United States, with the U.S. Census Bureau projecting the nation's 65 years-and-older population to reach 83.7 million in the year 2050, almost double in size from the 2012 level of 43.1 million. In a May 6, 2014 press release, the chief of the Census Bureau's Population Projections Branch stated, “a large part of this growth is due to the aging of baby boomers (individuals born in the U.S. between mid-1946 and mid-1964), who began turning 65 in 2011 and are now driving growth at the older ages of the population”. The official additionally stated that a significantly aging population will have implications for health care services and providers.

According to the 2010 Census, there are 1,032,035 seniors aged 65 years and over living in Georgia. Georgia has the 11th fastest growing population of adults aged 60 years and over in the nation. The population aged 60 years and over in Georgia is estimated to increase 65.8% from 2010 to 2030, while the population aged 85 years and over is predicted to increase by 97.6%.

It is reported that 33-39% of Georgia’s population aged 20 years and over suffer from HTN. As the population ages, age related chronic diseases such as HTN are likely to increase. HTN is defined as persistent systolic BP $\geq$140 mm Hg or diastolic BP $\geq$90 mm Hg, or BP that is controlled by taking antihypertensive medicine, or having been told at least twice by a physician or other health professional that one has high BP.
Centers for Disease Control (CDC) estimate that 67 million American adults (31%) have HTN, with only about 47% of those diagnosed having their condition under control. The American Heart Association predicts that by 2030, an additional 27 million Americans will be diagnosed with the condition. It is estimated that half of Americans with HTN do not have their BP under control.

Furthermore, the higher the age of the population, the lesser the awareness and treatment of HTN. According to the Seventh Report of the Joint National Committee (JNC 7) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, “the relationship between BP and risk of cardiovascular disease (CVD) events is continuous, consistent, and independent of other risk factors”. JNC 7 continues, “the higher the BP, the greater the risk of heart attack, heart failure, stroke, and kidney diseases”.

It is estimated that the national overall pervasiveness of HTN in adults aged 60 years and older is 70.8%. In a systematic analysis for the Global Burden of Disease Study 2012, Lim et al. (2013) ranked high BP as the greatest contributor to the global burden of disease. The U.S. Department of Health and Human Services, in 2012, estimated annual costs of HTN to be $156 billion, with medical costs accounting for nearly $131 billion and lost productivity from illness and premature death approximately $25 billion a year.

The World Health Organization’s Global Brief on Hypertension 2013 also enumerates complications associated with HTN including heart disease, stroke and kidney failure, and premature mortality and disability. The document additionally emphasizes the numerous health and economic advantages to early detection, adequate
treatment, and good control of HTN.\textsuperscript{18} JNC 7 cautions that, as the population ages, the incidence of HTN and its associated complications will continue to rise unless “broad and effective preventive measures are implemented”.\textsuperscript{15}

However, increasingly limited patient/healthcare provider interaction, combined with dietary and lifestyle messages that may be confusing to some seniors, can leave older persons with gaps in their healthcare knowledge. Among the many challenges to addressing HTN, JNC 7 includes insufficient health education from healthcare providers and proposes that a public health strategy addressing causal lifestyle factors such as excess body weight, excess sodium consumption, and inadequate intake of fruits and vegetables is warranted to diminish age-related HTN, potentially reducing morbidity and mortality by substantial amounts.\textsuperscript{15}

\textit{Dietary interventions for managing hypertension}

In a review of randomized trials on the role of diet in HTN management, O’Shaughnessy (2006) concluded that for treated HTN patients, lifestyle changes are also key, specifically a reduction in dietary sodium, an increase in dietary potassium, a moderation in alcohol, and a reduction in obesity.\textsuperscript{19} O’Shaughnessy noted that lifestyle changes are most effective when combined into a package, rather than independently, ideally in the context of a “DASH-like or similar diet”. He continued that although numerous trials, most notably DASH and PREMIER (a multicenter randomized controlled trial combining behavioral lifestyle interventions with the DASH dietary pattern) incontrovertibly show the effect of diet on HTN, the general public still does not seem compelled to make dietary changes.
During a meeting of the American Society of Hypertension in May 2008, an expert panel discussed dietary therapy in HTN. The medical doctors discussed the benefits of giving advice in stages, such as serving sizes, eating more fruits and vegetables, or whole wheat vs. refined starches, and concluded that providing stages of information results in better adherence, and thus longer term effects. They pointed to evidence that even partial adherence to DASH has been shown to be effective, and as shown in the Nurses’ Health Study, there appears to be a linear relationship between increasing adherence to the full dietary plan and greater BP control benefits. The expert panel concluded that although the evidence base for lifestyle changes lowering BP has repeatedly been established, the true challenge is implementation, with few established systems for actually guiding people in making lifestyle changes.

In the literature, the DASH diet repeatedly appears as a preferred intervention for controlling HTN via lifestyle modifications. The first DASH diet clinical trials were published in the *New England Journal of Medicine* in 1997, and in the years since its first publication, DASH has been rigorously tested and repeatedly shown to reduce BP. Furthermore, DASH has been named by the National Heart, Lung, and Blood Institute (NHLBI) as one of the most effective lifestyle modifications in controlling HTN. Although the DASH dietary pattern emphasizes potassium, magnesium, calcium, and fiber, it was the effect of the overall dietary pattern that was clinically tested, rather than that of individual components, which were believed key to HTN control. Other lifestyle modifications advised by JNC 7 are also prevalent in DASH, including body weight reduction if overweight, sodium control, regular physical activity, and alcohol moderation. Studies have shown additional benefits of DASH to be lower cholesterol,
improvements in insulin sensitivity, and increased fruit and vegetable consumption, all of which are recommended in the *U.S. Dietary Guidelines for Americans*.\(^{13}\)

Recommendations in JNC 7 and the U.S. Dietary Guidelines for Americans both recommend DASH-like modifications, even when DASH is not specifically mentioned by name.

The Mediterranean diet (MED), similar in composition to DASH, has also been tested for its efficacy to lower HTN. Like DASH, MED is high in fruits, vegetables, whole grains, and lean proteins, with an emphasis on substituting lower fat or fat-free dairy products for higher fat dairy foods.\(^{21}\) MED, however, places a higher emphasis on fatty fish (rich in omega-3 fatty acids), oils (olive or canola), nuts (walnuts, almonds, or hazelnuts) or margarines blended with rapeseed or flaxseed oils (in lieu of butter and other fats). The literature reflects a lack of an exact dietary pattern of MED, but overall, MED dietary patterns tended to be moderate in total fat, low in saturated fat, high in fiber, and increased in polyunsaturated fats, particularly omega-3s.\(^{21}\)

MED does not appear to have the same evidence base that DASH has for HTN control. In a 49 month prospective cohort study of 8594 participants, Nunez-Cordoba et al. found a significant inverse relation between fruit and vegetable consumption and the risk of HTN only among participants with a low olive oil consumption (under 15 grams/day).\(^{22}\) According to the authors, the results suggest that a selective beneficial effect of fruits and vegetables was restricted to participants with a lower olive oil consumption.\(^{22}\) It is important to note that the median age of participants in the trial was 41.1 years and that the majority of them were free of HTN at the trial’s inception. In literature reviewed, Nunez-Cordoba et al. reported other studies suggesting a lower effect
of fruit and vegetable consumption on BP when olive oil consumption was high. However, conflicting studies have suggested that MED does reliably reduce HTN. In literature reviewed by Lazarou and Kouta (2008), research suggests that MED may have a role in the prevention and control of arterial BP and is an effective diet for overall cardiovascular health.\textsuperscript{23}

In the NHLBI’s \textit{Lifestyle Interventions to Reduce Cardiovascular Risk: Systematic Evidence Review from the Lifestyle Work Group}, 2013, evidence analysis on a MED-style dietary pattern’s effect on BP concluded “Strength of evidence: Low” when considering MED’s effect on BP, while rating the “Strength of evidence: High” for DASH and BP.\textsuperscript{21} The Nunez-Cordoba study was one of the studies analyzed by the NHLBI. DASH diet variations, such as those replacing 10\% carbohydrate with the same amount of either protein or unsaturated fat (as in the OmniHeart trial), were rated as moderate in controlling BP.\textsuperscript{21}

\textit{Web-based nutrition education}

Traditionally, group nutrition classes, offered in a series of sessions, are a common nutrition education method for senior adults.\textsuperscript{24} Topics may cover diet, lifestyle, or management of chronic health conditions, such as HTN. Classes offer an efficient way to teach large number of seniors at one time. The literature was searched for alternatives to traditional classroom nutrition education. Recently, the Internet has become a popular tool with the older adult population as an innovative means of providing educational information. In April 2012, the Pew Research Center’s study on Internet usage found that 53\% of American adults aged 65 years and older use the Internet or email.\textsuperscript{25} For an age group that has shown slow growth in Internet usage in recent years (August 2008
Data showed only 38% of adults aged 65 years and older were online; these gains are significant, with 70% of Internet users aged 65 years and older reporting they access the web on a daily basis. The study further examined levels in web usage among seniors, revealing that 58% of adults aged 66–74 years and 30% of adults aged 75 years were regular users.

DAS, which oversees senior community centers in all 159 Georgia counties, has documented success for its website “www.livewellagewell.info”, which was created to convey information on healthy aging. In 2012, the website totaled 213,078 hits. The site includes general information covering a variety of topics related to senior wellness. Other websites also exist for senior healthcare in general, such as “www.NIHseniorhealth.gov”. Literature reviewed by McMillan and Macias (2008) revealed that, on a national basis, 75% of seniors aged 51–59 years, 54% of seniors aged 60–69 years, and 21% of seniors aged over 70 years go online, with the purpose of all age groups’ online visits frequently being to obtain health information. The most common searches included nutrition, weight loss, and heart disease. In contrast to general senior health sites, which are static in nature, how might WBNE serve as a dynamic educational tool, reinforcing the in-person nutrition education provided in Georgia senior centers?

Several researchers suggest that the web is the tool of the future for elder education. Wood et al. (2010) suggest that the growing senior population plus ever-increasing life spans highlight the need for pragmatic tools, such as computers, which will allow older adults to remain in their own homes as long as possible, functioning as independent, cognitively active, and engaged members of their communities. Furthermore, WBNE can give older adults one more tool with which to competently
manage their chronic health conditions, an objective of The Department of Health and Human Services’ *Healthy People 2020*. In a review of literature on older adults and e-learning, Githens et al. (2007) point to literature espousing older adult online learning as contributing to greater societal good through self-empowerment and self-management.

Baby boomers, defined as persons born between 1946 and 1964, numbered 76.4 million in 2012 and account for about one-quarter of the U.S. population. A large part of the current older adult population growth is being driven by the aging of baby boomers, who began turning 65 in 2011. More baby boomers are familiar with computers and the Internet than previous mature generations; it follows that as baby boomers continue to age, a larger percent of the older adult population than ever before will be comfortable with online activities. Githens et al. warn, however, that educators must consider the needs of those less familiar with technology due to socioeconomic, education level issues, or working at blue-collar jobs, lest they be left behind by online learning. Githens and colleagues stress that these groups must be considered in regards to reading level, as well as technical and computer skills needed, in order to make everyone feel equally at ease. He continues that just as education is vital to the cognitive health of older adults, as is participation in social networks. Online learning tools can help older adults continue to learn and maintain social contact, even when functional mobility is compromised.

Evidenced-based nutrition interventions, such as the DASH diet, are adaptable as an online tool for teaching elders HTN management. Innovative education interventions could potentially combat the rising healthcare costs associated with chronic diseases. The CDC estimates that 47.5 billion dollars are spent annually on direct costs associated
with treating HTN.² The senior community centers overseen by the DAS are often hindered by lack of funding for nutrition education. Currently, classes are not always led by an RD. Furthermore, at some centers, classes are not always possible, and education may exist as nothing more than a printed handout. Seniors may not have a reliable source from which to obtain follow-up information or to clarify items they may not have understood in class or on the handout, thus lowering the effectiveness of the nutrition education. However, the question is, “are the senior centers ready for WBNE?” Current literature is sparse on the subject. According to literature reviewed by Neuenschwander et al., extremely few studies exist comparing traditional classroom nutrition education to web-based nutrition education³³, regardless of the age of the population.

Moore et al. (2008), the original DASH diet creators, tested a WBNE program called DASH for Health.⁷ Moore’s web-based plan was an online application of his original DASH diet. Moore’s web-based approach resulted in some positive outcomes in relation to weight, BP, and overall dietary improvement.⁷ Web-based programs can be developed and delivered to large segments of the population relatively inexpensively.⁷ However, Moore’s web-based DASH education research sample, like much of the other research focused on nutrition-related web-based learning, contained very few older adults.⁷

In a 2012 cross-sectional exploratory study of 149 urban community-dwelling adults over age 60 years, findings support the development of health web portals specially designed for older adults.⁴ The study showed that although seniors are using the Internet for health-related information, barriers such as age related changes in vision, learning style, and mobility hinder their success with online applications.⁴ Further review
of the existing literature suggests that although research on elder web-based nutrition education is scarce, research on classroom nutrition education shows positive nutrition and health related outcomes in older adult populations. Two studies carried out amongst older adult populations in Georgia utilized traditional educational programs. Interventions by Hendrix et al. (2008) and Ellis et al. (2008) focused on increasing knowledge about fruit and vegetable consumption and whole grains, respectively. It was noted by Ellis et al. that having outcomes tailored to and identifiable to the older adult population was found to be most beneficial. Web-based nutrition applications could potentially combine such knowledge of how seniors best assimilate nutrition information in a classroom with the individualistic nature of online learning, resulting in a powerful tool unlike those used in the past. Shapira et al. point out that seniors may engage in individualistic and flexible online learning at their own pace, outside the confines of time, place, other participants, or limited personnel.

While designing an “eSEARCH” tool to enhance the online health literacy of older adults, researchers Manafo and Wong (2013) discovered that there are a very limited number of online health literacy tools for older adults. Health literacy, as defined in their research, is “the ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course” and is grounded in health promotion theory. Seldon et al. (as cited in Lee et al., 2009) define low health literacy as “the limitation in an individual’s capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” and states that it is pervasive among older adults.
Manafo and Wong’s review of the literature further suggests that older adults are generally distrustful of online health information. Furthermore, key informants to their research stressed that online health information for seniors must be accessible in appearance and functionality. In other words, information must be presented in a simple and straightforward manner; fonts must be large, and information should not be “text heavy”. Manafo and Wong proposed and designed an innovative tool to help seniors gain confidence in their ability to find and utilize “credible online nutrition information”. The researchers suggest that online tools can complement nutrition promotion and efforts to manage chronic diseases likely in the senior population, but acknowledge that accessibility issues to current credible online health information could hinder its usefulness in the population.

The intent of the website proposed in the current study is not to replace classroom education in the centers, as they are important hubs of senior social interaction, but to complement classroom nutrition education. Locher et al. (2011), in their B-Nice nutrition intervention for community-dwelling older adults, state that a one-way educational approach eclipses participants’ unique expertise, preferences, barriers, strengths, and abilities to problem solve; nor does it allow for sufficient goal identification and social support and motivation, key tenets of social cognitive theory. Multi-faceted dietary change programs, including the combination of classes and interactive electronic systems (e.g. Internet or intranet), can provide direction when RDs are not available or affordable. Multicomponent dietary interventions have the ability to reach more individuals of a targeted population by appealing to the diverse needs and learning styles of that population. Therefore, this study proposes to explore the efficacy of a web-
based DASH diet teaching tool as part of a multicomponent dietary intervention designed for the diverse needs of older adults in Georgia senior centers.
Chapter III

Methods

This research was a two-part process. Part I was the design and pilot testing of the classroom DASH lessons, which ultimately became the content of the DASH website, as described in Part II.

Part I: Creation and pilot testing of classroom lessons

According to literature reviewed by Higgins and Barkley (2003), older adult nutrition education in the classroom must include more than lectures to be effective. Problem-oriented learning, problem solving to reduce barriers, incorporating life experiences, active participation, demonstration, and goal setting should be included in nutrition educational strategies for older adults. Higgins and Barkley also reviewed literature that indicated older adults desire specific nutrition strategies, such as tips for choosing, shopping, and preparing foods, and even food resource management. They found evidence supporting “a behavioral approach is key” and that successful learning depends on “more than just attending a class”.

In addition to the strategies suggested above, they also found research supporting the importance of social support, active participation, and utilizing peer educators, all the while maintaining sensitivity to age-related physical changes. Their review additionally found support for the idea that nutrition education for older learners should be about 30 to 40 minutes long. In another review of literature by Higgins and Barkley (2004), they stated that group nutrition education classes “may enhance older learners’ adoption of
new behaviors through sharing ideas and experiences and soliciting the support of classmates”. 44

Using the evidence from Higgins and Barkley’s extensive literature reviews, each lesson was built on a foundation of problem-based learning, active participation, and goal setting, with the instructor’s role being to guide and facilitate learners. Lessons included the following components:

- Goals
- Objectives
- Optional materials suggested to enhance learning, such as visual aids relevant to each lesson. Such materials help learners see, touch, and experience lesson topics.
- Introduction to lesson
- Body of lesson
  - Question & Answer sets, designed to stimulate thought. Instructors are encouraged to read questions and pause for class response, as prompted within each lesson.
  - Problem solving, designed to allow participants to come up with challenges and solutions as a class. Problem solving encourages learners to consider barriers to changing their behaviors and address ways to tackle those barriers, using the social support and input of the class. Instructors are encouraged to give participants time to brainstorm together and learn from each other before sharing the examples provided in the lesson.
- “Putting it all together”: A conclusion and summary again phrased in Question and Answer sets, to have learners restate what they learned.

Also provided with each lesson:

- Class handout: Instructors are asked to distribute the handout before each class and encourage note taking in the space provided. The handout includes a summary of lesson content, step-by-step guidance for setting a lesson-related goal, and the recipe featured in the optional cooking demonstration.
- Pretest, posttest, and answer key: Optional tools for evaluating knowledge before and after each lesson.
- Class participation activity
- Goal setting guidance
- Optional cooking demonstration recipe

The ten-lesson series was comprised of the following:

Lesson 1 ...............Introduction of DASH diet
Lesson 2 ...............Fruits and vegetables
Lesson 3 .............Dairy
Lesson 4 .............Whole grains
Lesson 5 .............Lean protein
Lesson 6 .............Beans, nuts, and seeds
Lesson 7 .............Fats and oils
Lesson 8 .............Sugar and alcohol
Lesson 9 .............Sodium
Lesson 10 .............Dining out, snacking and desserts

In accordance with suggestions in the literature, lessons were designed to be approximately 30 minutes in length. The DAS requested that each lesson to be “deliverable” by any instructor, professional or layperson, regardless of prior nutritional experience. This guideline makes the lessons accessible to all senior center personnel, as well as peer educators. For this reason, the lesson template featured a “scripted” format.

In order to enhance visual and active learning, each lesson featured an optional cooking demonstration recipe. The recipe was also included in the handout, so participants received it regardless of whether or not the instructor performs the demonstration. The recipe provides a “specific nutrition strategy”, a tool, for implementing the lesson, as described in the literature. Recipes highlight foods that are important for that particular section of the diet. For example, the beans and seeds lesson plan included a simple recipe for hummus, while the lean protein lesson contained a recipe for barbecue pork chops. DASH diet equivalents were included at the end of each recipe (for example, “this recipe counts as two vegetables and one grain on the DASH diet”). Recipes were sourced from Mayo Clinic (http://www.mayoclinic.org/healthy-living/recipes/dash-diet-recipes/rcs-20077146) and the DASH diet book (Svetkey L, Moore T, Lin P-H, Karanja N. The DASH Diet for Hypertension. Simon and Schuster; 2011.)
All recipes were tested before inclusion in the lessons. The goal was to include recipes that produced desirable food, thus encouraging class participants to follow the DASH diet. Recipes were evaluated by the GRAs and their colleagues for ease of preparation, affordability and availability of ingredients, and taste. Yield was also a consideration, as many older adults are cooking for one or two. Recipes that did not produce good results or that seemed too laborious or costly for seniors were rejected, and alternates were found. Some recipes were modified to produce better flavor, such as the addition of non-sodium seasonings. Furthermore, senior-friendly suggestions were added to many recipes, such as advice to use frozen or low-sodium canned produce in lieu of fresh to save time and money. Where appropriate, food safety tips were included, such as instructions for safely freezing extra portions. Although physical and financial restraints were the main considerations when choosing senior-friendly DASH recipes, some featured recipes required more preparation time than others. These were included so the spectrum of recipes appealed to various cooking skill levels.

The GSU Institutional Review Board approved the classroom pilot study protocol. Pilot testing of classroom materials occurred at six metro Atlanta senior centers during October and November 2013. A convenience sample of 109 community-dwelling older adults (60 years of age and over) attending the centers were the participants of the exploratory observational study. Lesson designers worked closely with the Atlanta Regional Commission to choose centers representing a diversity of older Georgians. According to the U.S. Census Bureau, the U.S. population is growing significantly more diverse. The older adult population is projected to experience a substantial increase in racial and ethnic diversity over the next four decades, with the 65 years and older
population projected to be 39.1% minority in 2050, up from 20.7% in 2012, and the 85 years and older population projected to be 29.7% minority in 2050, up from 16.3% in 2012. Center managers approved the study protocol and gave permission for participant recruitment. Participants were recruited for approximately 30 days before the pilot lessons through a flyer and sign-up sheet on their centers’ bulletin boards. The only inclusion criterion was attendance at the senior center. Pilot sites included:

<table>
<thead>
<tr>
<th>Center</th>
<th>County/City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawrenceville Senior Center</td>
<td>Gwinnett/Lawrenceville</td>
</tr>
<tr>
<td>Locust Grove Senior Center</td>
<td>Henry/Locust Grove</td>
</tr>
<tr>
<td>New Beginnings Senior Center</td>
<td>South Fulton/Fairburn</td>
</tr>
<tr>
<td>Olivia Haydel Senior Center</td>
<td>Rockdale/Conyers</td>
</tr>
<tr>
<td>Scottdale Senior Center</td>
<td>South Dekalb/Atlanta</td>
</tr>
<tr>
<td>Senior Connections Senior Center</td>
<td>North Dekalb/Atlanta</td>
</tr>
</tbody>
</table>

For pilot testing homogeneity, “Fruits and Vegetables” was the single lesson pilot tested across the six centers. Lesson designers’ goal was to determine whether the lesson’s format and content simply, effectively, and fully conveyed the DASH diet topic. To control for bias in lesson delivery, lesson designers performed no role in teaching. Instead, nutrition graduate students unfamiliar with the study taught the lessons. The volunteers were cautioned against interjecting any additional information into the lesson and advised to strictly adhere to the scripted lesson.

The pilot included a pretest and a posttest designed by lesson creators as a tool for measuring the effectiveness of the lesson plan. The pre- and posttests contained five identical questions. After completion of pilot testing, results from all six centers (n=109), were compiled.

As part of the classroom pilot test process, classroom lesson designers worked collaboratively with the GSU School of Social Work. Based on the study’s potential to
advance community nutrition education for older adults, the GSU Institute of Gerontology awarded funding for the pilot studies. Using these funds, lesson designers created and produced an oversized DASH refrigerator magnet as a gift for all pilot participants, a pictorial serving size guide entitled “What Counts as a Serving on DASH?” Fresh fruit and bottled waters were also offered to participants. Because Higgins and Barkley found evidence that educators can best determine nutrition education needs and interests by means such as interviews and group discussions\textsuperscript{42}, an associate professor from the GSU School of Social Work moderated the post-classroom lesson focus groups. Having the social work professor lead the sessions also served to reduce interviewer bias by having someone other than lesson designers conduct the groups.

The moderator asked participants about their favorite and least favorite lesson content, as well as content on which they desired elaboration and how the lessons could be made more effective. The moderator also asked their thoughts on what the lesson explained clearly, what the lesson was “less than clear” about, and perhaps most importantly, she simply invited any comments the seniors had about the lesson. The sessions lasted approximately 45 minutes. All sessions were recorded and transcribed. All focus group participants were awarded a Kroger gift card for their time, which they were encouraged to use to purchase fruits and vegetables. It is important to note that people were welcome to attend the classes without participating in the pre- and posttests or the focus groups. An average focus group was comprised of 12 self-selected seniors who had attended the class, for a total of 72 focus group participants (66% of class participants participated in the focus groups). In order to encourage an open expression
of opinions, the lesson presenter departed immediately after the presentation and was not in the focus groups. Pre- and posttest scores were compiled, focus group discussions were evaluated, and the lesson template was modified accordingly. The classroom lessons were delivered to the DAS in February 2014 and are currently being implemented in Georgia senior centers.

**Part II: Creation and pilot testing of website**

The Georgia State University Institutional Review Board approved the website pilot study protocol. Part II of this study involved incorporating the DASH classroom lessons into a website that the DAS could adopt as an adjunct learning tool to the classroom lessons. Part II was funded by 1) DAS grant funds not used in the classroom lesson plan project; and 2) researcher’s personal funds. Volunteer participants were recruited from two of the senior centers where classroom lessons had been tested. The centers were chosen because at both centers, approximately 50% of post-classroom lesson focus group participants expressed interest in a DASH website specially designed for seniors. Centers of recruitment were New Beginnings Neighborhood Senior Center in South Fulton County and Locust Grove Senior Center in Henry County. Additionally, the two centers were desirable for 1) their location in areas that represent a diversity of older persons; and 2) to have one more “urban” center and one more “rural” center.

Center managers approved the study protocol and gave permission for participant recruitment.

Eligibility requirements for participation in this study were an age of 60 years or older, the abilities to fluently speak and read English, read online materials, access the internet, and utilize a website (as self-reported by participants). Participants were asked
to attend a pre research meeting and a post research meeting, both of which were at their center. The sampling method was non-probability sampling, specifically a convenience sampling method of volunteers. The study design was exploratory and observational, a single group intervention in which all participants received the intervention. Seniors who participated in the classroom pilot studies were eligible and were invited to participate. Additionally, participants who had not been part of the classroom pilot studies were recruited via flyers and posters at facility bulletin boards and information desks. Recruitment materials enumerated the inclusion criteria and the time commitment that would be requested of participants.

The volunteers were asked to attend a pre-research meeting with the student researcher. The meeting was at their senior center and lasted approximately 90 minutes. A group consent process was performed, and written consent was obtained from all participants prior to data collection. Demographic information, such as age, race, gender, and education level were collected using a written questionnaire (researcher-designed). Also on the questionnaire, participants were asked their height, if they engage in 30 minutes of daily physical activity, if they are currently being treated for high BP, whether or not they live alone, and other demographic and general health information. The questionnaire also included items designed to assess participants’ DASH-related nutritional knowledge, beliefs, and behaviors. The questionnaire may be found in Appendix A.

A food diary with detailed written and pictorial directions was provided for the participants to record three days of their regular eating, any two weekdays and one weekend day of their choice within a 7-day period, beginning the day of the pre-research
meeting. The researcher verbally explained the food diary and led participants in practicing entries. Participants were instructed to mail the food diary back to the researcher in a provided prepaid envelope.

BP and weight were measured for each participant. Personal information was treated with complete confidentiality. Each participant was identified by number only on all study materials. Measures, including methods of measurement, were as follows:

1. BP (calibrated sphygmomanometer, measured by trained GSU graduate nutrition student);

2. Weight (calibrated Tanita scale, measured by trained GSU graduate nutrition student);

3. DASH-related nutritional knowledge, beliefs, and behaviors questionnaire (researcher-designed instrument);

4. 3-day food diary to include 2 weekdays and 1 weekday. Written and pictorial instructions were included.

Over an eight week period following baseline measurements, participants were granted access to a prototypical website where they could learn about the DASH diet (http://aharrison3008.wix.com/dash). The website was designed using a cloud-based web development platform (http://www.wix.com). Website content featured classroom DASH materials, developed by the GRAs as previously described, plus supplemental learning materials such as recipes, healthy cooking techniques, food label and nutrition facts panel reading advice, and healthy shopping on a budget. Website content was updated three times during the study period, and each time, participants were e-mailed a reminder to check the website.

Even when a website is intended for older adults, website design often does not take into account age-related preferences and limitations. Taking into consideration this
common design shortcoming, the DASH website was designed specifically for the needs of older adults and followed the National Institute of Aging’s “Checklist for Making Your Website Senior Friendly” in regards to comfortable typeface, size, and weight (Helvetica 14 point in medium weight), color (avoid sharp juxtapositions of color), and backgrounds (avoid patterns). Furthermore, information was presented in clear, familiar, and positive language. Writing was on an eighth-grade reading level, broken into short sections, and avoided technical terms. Animation and video were avoided to avoid slow download time on older computers. Overall website organization was simple and straightforward, with the same design elements and icons consistently used throughout. Text was incorporated onto buttons where relevant, and large buttons were used that did not require precise mouse clicks for activation. An e-mail address for the student researcher/website designer was provided, along with a telephone number in case the seniors wanted to talk to a person. Images were chosen carefully, using a mix of intergenerational and ethnically diverse photos, as were words. Care was taken to circumvent words such as “elderly” and “senior”. Age-specific language was largely avoided, but the phrase “older adult” was used where prudent.

Macias and McMillan (2008) interviewed 31 persons, median age 72.8 years, about their views on the Internet and health information. Content quantity, specifically an aversion to too much information, as well as advertisements, was important to the seniors. Content quality, specifically what seniors perceived as misinformation, websites that were not user-friendly, or unreliable content was seen as off-putting to the participants. Furthermore, participants expressed higher trust in what they perceived as “neutral” and unbiased websites, such as from government or educational institutions. In
consideration of existing research, the DASH website was designed with restraint in amount of information presented, to enhance ease of reading and increase understanding. Additionally, an ad-free format was utilized.

At the end of the eight week period, participants were asked to attend a post-intervention meeting at their senior center. The measures described for the pre-intervention meeting were repeated. Participants were issued another food diary, which they were asked to complete and return in a prepaid envelope. BP, weight, and questionnaire responses after visiting the website were compared to baseline. A survey (researcher-designed) was administered regarding participants’ experience with the website. The website survey may be found in Appendix B. At both the pre-research and post-research meeting, participants received a small study-related gift (collapsible colander, pasta measurer, or soft-grip strawberry huller) and were offered light refreshments.

Statistical analysis

All statistical analyses were performed with IBM SPSS Statistics software (Version 20). All $P$ values were two-sided, and statistical significance was determined at the $P<0.05$ level. Shapiro-Wilk tests of normality confirmed measures of BP and weight were normally distributed. Baseline versus post-website comparisons were performed with paired t-tests. Statistically significant results had $P$ values less than 0.05. There was a significant difference in the scores for systolic BP (SBP) baseline ($M=145.60$, $SD=8.385$) and SBP post-website ($M=136.40$, $SD=9.607$) conditions; $t(4)=3.74$, $p=.020$. No significant difference was found for diastolic BP or weight.
Chapter IV

Results

Part I: Classroom lessons

The pilot study of the DASH “Fruits and Vegetables” classroom lesson included a five question pre- and posttest as a tool for measuring the effectiveness of the lesson plan:

1. Fruits and vegetables are usually a good source of ______________.
   a. Fiber
   b. Calcium
   c. Protein
   d. Fat

2. What is the daily DASH combined fruit and vegetable goal?
   a. Combined, 8-12 servings of fruits and vegetables
   b. Combined, 5 servings of fruits and vegetables
   c. Combined, 3-4 servings of fruits and vegetables
   d. Combined, 2 servings of fruits and vegetables

3. Fresh produce is more nutritious than frozen and canned produce.
   a. True
   b. False

4. Which of the following is the most healthful method for cooking vegetables?
   a. With a little butter
   b. Fried
   c. Steamed
   d. Breaded

5. One serving of cut up fruits or vegetables is generally:
   a. A palmful or 1/2 cup
   b. 1 cup
   c. 2 cups
   d. 12 ounces
After completion of pilot testing, results from all 6 centers, totaling 109 participants, were compiled and analyzed using Microsoft Excel software. Only paired pre-and posttests were used in the analysis. Data from any participant who did not fully complete both tests were excluded. An overall score analysis by question may be seen on Figure 1.

![Pre/Posttest Question Analysis](image)

**Figure 1. Classroom lesson pre- and posttests, total combined correct answers for all centers**

The 6 different centers averaged scores ranging from approximately 1.7 on the pretest (a score of 34%) to approximately 3.9 (a score of 78%) on the posttest (Figure 2). Improvement was seen across all centers. Pilot testing results suggested lesson comprehension across diverse center audiences.
Lesson revision after focus groups

A qualitative interviewing method was used to gather seniors’ perspectives of the lessons. Comments and suggestions from the focus group allowed classroom lesson designers to rework the lesson template accordingly. Although the seniors offered many invaluable comments, researchers chose to focus on 1) the most frequently expressed ideas and concerns; and 2) the suggestions that could most benefit a diversity of older Georgians. Additionally, researchers closely timed and monitored the lesson delivery to ensure it was within the 30-40 minutes suggested by the literature, noting where the script did not flow smoothly or gave the instructor pause.

The “Goals” section was substantially reworked after the pilot lessons. Specifically, researchers amended the lesson template to include more detailed step-by-step instruction in constructing a “SMART” goal, “SMART” being an acronym for
specific, measurable, attainable, realistic, and time-bound. Furthermore, instructor notes were added, encouraging instructors to give participants time to thoughtfully construct a goal and share it with their peers. Another consistency among all 6 focus groups was the desire to have more cooking tips. Based on this recurrent request, the lesson template was refined so that cooking methods and healthful ways to flavor foods comprise a substantial portion of every DASH lesson.

The section that proved most confusing to pilot group seniors was the number of daily servings recommended on DASH “Fruits and Vegetables”. Learners consistently expressed confusion, with comments such as, “I always thought I should aim for five fruits and vegetables a day; why eight or more on DASH?” Because this confusion was expressed in all six focus groups, lesson designers returned to the script for “Fruits and Vegetables” and added this:

“You may be familiar with general guidelines to eat five fruits and vegetables a day. And now DASH is telling you to eat eight or more a day? You see, instead of about five big servings of fruits and vegetables, DASH encourages smaller portions of a wider variety of fruits and vegetables. Stay tuned; we’ll learn more about that in a moment.”

With this addition, instructors can preemptively meet the objection/barrier, freeing learners to focus on the material, rather than wondering about conflicting “daily servings”. As a result of the pilot participants’ comments, serving sizes became a prominent part of every lesson, rather than a quick list of measures.

During the pilot lesson, participants were asked their thoughts on visual aids used during the lesson. Visual aids for “Fruits and Vegetables” included: baseball, tennis ball, golf ball, and computer mouse to show how serving sizes compare to the size of
everyday objects; measuring cups; an actual half cup serving of fresh berries; and a clear plastic cup filled with red liquid, to show what a serving of juice actually looks like. Participants unanimously agreed that visual aids helped them grasp the lesson material. Participants at the larger centers said they would have liked a PowerPoint presentation to go along with the lesson, that this would have made the material easier to follow. However, since a DAS guideline was that lessons be applicable at any Georgia senior center, the lessons had to be capable of “standing alone”, not reliant on a PowerPoint, in consideration of the many centers without such technological resources. It is interesting to note that only seniors at the larger, more metropolitan centers expressed a desire for PowerPoint, as they are likely more accustomed to learning in this manner. However, the seniors’ request for more visual information contributed to the inception of the DASH website idea.

One of the basic lesson components was a problem solving session, in which learners expressed their barriers to behavior change and with the social support of their peers, actively thought of solutions together. However, researchers learned during the pilot lessons that the lessons, as originally scripted, did not offer a natural flow to this process. It was noted that instructors would greatly benefit from a “flow chart process”; therefore, the lesson template was revised to include an easy to follow problem-solving format to guide instructors (Figure 3).
Instructor asks class for possible barriers to behavior change (i.e. what prevents you from eating more fruits and vegetables?).

Instructor is prompted to WAIT and let participants come up with their own personal barriers. Examples are provided in case learners need prompting (i.e. chewing difficulties; cost of fruits and vegetables).

Instructor is prompted to let participants work as a class to come up with solutions together. Example solutions are provided in case learners need help (i.e. puree or blenderize fruits and vegetables; purchase frozen instead of fresh).

Figure 3. Instructors are encouraged to guide learners in peer-assisted problem solving.

Part II: Website

The GSU Institutional Review Board approved the website pilot study protocol. The website study protocol requested a much greater time and effort commitment on the part of study participants than did the classroom lesson study protocol. Inasmuch, volunteer participation was not as high. After a 30 day recruitment period, the center chosen for its location in a rural area had zero participants sign up; therefore, the website pilot study was only conducted at the center chosen for its location in an urban area. Even at that center, participation was unfavorable for statistical analysis (Figure 4).
The remaining five participants were all female, ranging in age from 61-75 (mean age 67.8 years, mean BMI 32.9 kg/m²). Additional descriptions of participants appear in Table 1; all three participants who reported having HTN were currently on antihypertensive medication.
Table 1. Characteristics of website study participants.

<table>
<thead>
<tr>
<th>Variable</th>
<th>DASH website visitors (n=5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
</tr>
<tr>
<td>Black or African-American</td>
<td>4</td>
</tr>
<tr>
<td>White or Caucasian</td>
<td>1</td>
</tr>
<tr>
<td>What is the highest level of education you have completed?</td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>1</td>
</tr>
<tr>
<td>Graduated from high school</td>
<td>3</td>
</tr>
<tr>
<td>Graduated from college</td>
<td>1</td>
</tr>
<tr>
<td>Are you the primary meal preparer in your household?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>How often do barriers such as finances, transportation issues, or physical challenges prevent you from preparing or eating balanced meals?</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>3</td>
</tr>
<tr>
<td>Sometimes</td>
<td>2</td>
</tr>
<tr>
<td>Current chronic health conditions</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>HTN and high cholesterol</td>
<td>2</td>
</tr>
<tr>
<td>HTN, high cholesterol, and diabetes</td>
<td>1</td>
</tr>
<tr>
<td>Do you exercise 30 minutes a day, at least five days a week?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
</tr>
</tbody>
</table>

A nutrition questionnaire (Appendix A) was designed to function as a pre-and posttest, polling participants’ knowledge on DASH related subjects taught on the website. Pre-website, or baseline responses, are followed parenthetically by post-website responses, as seen in Table 2.
Table 2. Baseline and post-website nutritional questionnaire responses.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can control my health through what I eat.*</td>
<td>2(3)</td>
<td>2(2)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>1(0)</td>
</tr>
<tr>
<td>Buying nutritious foods is too expensive.*</td>
<td>0(0)</td>
<td>2(1)</td>
<td>1(2)</td>
<td>2(2)</td>
<td>0(0)</td>
</tr>
<tr>
<td>I am confused by conflicting nutrition advice I hear.</td>
<td>0(0)</td>
<td>1(2)</td>
<td>1(0)</td>
<td>2(3)</td>
<td>1(0)</td>
</tr>
<tr>
<td>I am capable of eating a healthful diet.</td>
<td>1(3)</td>
<td>4(2)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>When I buy packaged foods, I look for items marked &quot;low&quot; or &quot;no&quot; sodium.</td>
<td>1(2)</td>
<td>3(2)</td>
<td>1(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>I eat more than 5 restaurant or takeout meals a week.</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>3(3)</td>
<td>2(2)</td>
</tr>
<tr>
<td>It is important to eat a wide variety of fruits and vegetables.</td>
<td>4(3)</td>
<td>1(2)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>I know how much protein I should eat each day.*</td>
<td>1(0)</td>
<td>0(3)</td>
<td>2(0)</td>
<td>2(2)</td>
<td>0(0)</td>
</tr>
<tr>
<td>If a person wants to eat more healthfully, they should cut carbohydrates out of their diet.*</td>
<td>1(0)</td>
<td>1(1)</td>
<td>0(0)</td>
<td>1(1)</td>
<td>2(3)</td>
</tr>
<tr>
<td>A fat-free diet is the best way to keep my weight under control.</td>
<td>0(0)</td>
<td>1(1)</td>
<td>0(0)</td>
<td>3(3)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Alcohol can affect my blood pressure.</td>
<td>0(0)</td>
<td>0(0)</td>
<td>1(1)</td>
<td>3(3)</td>
<td>1(1)</td>
</tr>
<tr>
<td>I should snack between meals.</td>
<td>1(1)</td>
<td>3(2)</td>
<td>1(2)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>It's too much trouble to eat right.*</td>
<td>0(0)</td>
<td>1(0)</td>
<td>0(0)</td>
<td>2(4)</td>
<td>2(1)</td>
</tr>
<tr>
<td>When it comes to bone health, calcium is the only nutrient that really matters.*</td>
<td>0(0)</td>
<td>2(1)</td>
<td>1(0)</td>
<td>2(3)</td>
<td>0(1)</td>
</tr>
<tr>
<td>I know how to cook tasty food without adding salt.</td>
<td>1(1)</td>
<td>2(1)</td>
<td>0(2)</td>
<td>2(1)</td>
<td>0(1)</td>
</tr>
<tr>
<td>Serving sizes of the different food groups (vegetables, grains, etc.) are confusing.*</td>
<td>0(0)</td>
<td>1(1)</td>
<td>2(1)</td>
<td>1(2)</td>
<td>1(1)</td>
</tr>
</tbody>
</table>

*Items reflecting a post-intervention shift towards the desired response.
On 19% of items (3 out of 16), baseline responses were already in the desired range and remained there on the posttest. For example, on the statement, “I am capable of eating a healthful diet”, everyone agreed or strongly agreed on the pretest and the posttest. On 38% of items (6 out of 16), baseline and post-website responses reflected no move towards the desired responses or moved from a “desired” response to an “undesirable” response. For example, on the statement, “I know how to cook tasty food without adding salt”, one person agreed before the intervention, but changed her answer after the intervention. These results suggest that website material may need enhancement to better teach: purchasing low sodium foods, fat in the diet, alcohol, snacking, and cooking without added salt. On 44% of items (7 out of 16), baseline and post-website responses reflected movement towards the desired response; these items are noted with an “*” in Table 2. For example, on the statement, “I can control my health through what I eat”, one person moved from disagree into the agree range, and on the statement, “I know how much protein I should eat each day”, two people moved from neutral into the agreement range, which are post-intervention shifts towards the desired response. However, as previously stated, the very small number of participants was not conducive to drawing reliable conclusions.

Baseline and post-website measures for BP and weight may be found in Table 3. Participants experienced a significant change in systolic BP, which suggests an association between BP and website visits. However, a shortcoming of this study was that only one pre- and one post-intervention BP reading were taken. Ideally, more than one pre- and post BP-reading would be obtained.
Additionally, participants were asked to complete a post-website survey (Appendix B) to assess their perspectives on the prototypical website. This information was collected in preparation of larger scale pilot studies of the website. Participants’ perspectives should be considered when making website revisions prior to subsequent pilot testing. A descriptive summary of responses may be found in Table 4.

Due to time constraints, a focus group was not conducted with the participants, but would have been conducive to soliciting perspectives expressly covered by the questions. There was, however, an open-ended question asking for suggestions and comments, and participants wrote in responses including:

“Beautiful and very helpful site. Will continue to use it. Loved the smoothie in the recipe”;

“The website were (sic) helpful to me in planning my meals”;

“It is wonderful and very helpful. I can't think of what improvement would be needed”.

100% of participants agreed that the website helped them understand the DASH diet and that they would recommend the website to others at their center. 100% of participants

---

**Table 3. Baseline and post-website measures for blood pressure and weight.**

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Baseline Systolic (mm Hg)</th>
<th>Baseline Diastolic (mm Hg)</th>
<th>Baseline Weight (lbs.)</th>
<th>Eight Week Systolic (mm Hg)</th>
<th>Eight Week Diastolic (mm Hg)</th>
<th>Eight Week Weight (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>154</td>
<td>92</td>
<td>172.2</td>
<td>147</td>
<td>87</td>
<td>174.2</td>
</tr>
<tr>
<td>03</td>
<td>134</td>
<td>81</td>
<td>161.6</td>
<td>128</td>
<td>75</td>
<td>161.0</td>
</tr>
<tr>
<td>07</td>
<td>141</td>
<td>90</td>
<td>230.0</td>
<td>134</td>
<td>92</td>
<td>228.2</td>
</tr>
<tr>
<td>08</td>
<td>146</td>
<td>95</td>
<td>217.2</td>
<td>127</td>
<td>83</td>
<td>219.2</td>
</tr>
<tr>
<td>10</td>
<td>153</td>
<td>89</td>
<td>217.6</td>
<td>146</td>
<td>75</td>
<td>218.8</td>
</tr>
</tbody>
</table>
also agreed that the website was well organized, clear and concise, and made them want to return, specifically after receiving the e-mail message that content had been updated. 100% of participants agreed that the design and colors of the website were easy on their eyes, the type was big enough to comfortably read, and the site was easy to navigate. However, according to the survey results, it appears that improvements are needed to help people understand DASH to the extent that they could restate it. Improvements may also be needed to increase instances of actually performing the behaviors encouraged on the site. Two items in particular spoke to the participants’ acceptance of WBNE overall: 1) four participants agreed that the website was as useful as an in-person class, with the fifth disagreeing; 2) two participants said they prefer learning in a classroom instead of a website, with three being undecided on the question. Finally, 100% of participants agreed they want to see more nutrition information presented on websites such as this one.
Table 4. Participants’ impressions of website.

<table>
<thead>
<tr>
<th>Question</th>
<th>4+ times</th>
<th>3 times</th>
<th>Twice</th>
<th>Once</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many times did you visit the website?</td>
<td>N=2</td>
<td>N=2</td>
<td>N=1</td>
<td>N=0</td>
<td>N=0</td>
</tr>
<tr>
<td>The website helped me understand the DASH diet.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I can now explain DASH to a friend.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>I tried one or more things I learned on the DASH website.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>The website was personally useful to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The website was well-organized.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I wanted to keep coming back to the site to see what was new since my last visit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Website content was clear and concise.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I used the links to other websites.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>I could identify with the people and the foods in the pictures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The design and colors of the website were easy on my eyes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The type was big enough for me to comfortably read.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>It was easy to navigate around the website.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I visited the website after I got an e-mail reminder to do so.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The website was as useful to me as an in-person nutrition class at my senior center.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>I would recommend the website to others at my senior center.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I want my senior center to provide more nutrition topics on a website like this one.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I prefer learning in a regular classroom instead of a website.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Regarding the food diary forms provided, although verbal, written, and pictorial instructions were given to participants, compliance was low for food diary completion. Only one of the five participants sufficiently completed her pre-and post-study diary entries. Therefore, there is no food diary analysis for this research, as was originally planned.
Chapter V

Discussion and Conclusions

Part I of this study, design and pilot testing of senior center classroom lessons, provides an evidence-based design template for future lessons on any number of nutrition-related topics. The lessons were patterned on evidence for effective older adult nutrition education compiled from peer-reviewed journals. The lessons were designed with a high regard for the diverse ethnicities, cultures, and learning abilities of Georgia seniors, as well as a respect for statewide personnel and funding differences across senior centers. Based on feedback received from classroom pilot study participants, as well as participants interviewed in the existing literature, learners want nutrition lessons to include adjunct visual aids and hands-on cooking classes applicable to each lesson.

Participants at the larger centers said they would have liked a PowerPoint presentation to go along with the lesson, that this would have made the material easier to follow. Duay and Bryan (2008) in a study of effective learning methods for older adults, conducted in-depth verbal interviews with 36 participants, average age 76.5 years, as well as observing seniors in a variety of learning situations in a large metropolitan area in the southeastern United States. Their main findings were that seniors want to be actively involved in the learning process, participate in stimulating question and answer sessions, and have a knowledgeable and personable instructor. They found that many seniors use classes as a strategy for staying involved and engaged with the outside world. Furthermore, visual displays, such as PowerPoint, helps them stay focused and learn more effectively. Focus group results echoed these researchers’ findings and lessons.
were designed accordingly. Additional suggestions from this study’s participants, yet not reflected in the literature, were a nutrition website specifically designed for older adults, as well as a coordination effort between center educators and center food service personnel so that congregate meals feature the foods and cooking techniques highlighted in the lessons.

For homogeneity of delivery across centers, only one classroom lesson was piloted. However, the classroom pilot study may have been limited by this protocol. Although prohibited by time and budget constraints, ideal pilot testing conditions would have allowed for testing of all lessons, as seniors provided thoughtful and constructive tips for improving “Fruits and Vegetables”.

According to Windhauser et al., as part of the DASH Collaborative Research Group (1999), translating DASH into easy to follow patient directives may be a challenge. Even when people understand that dietary changes will likely improve their HTN, they may still express reluctance to make dietary changes and need assistance to actually enact behavioral changes. Windhauser et al. recommend gradual dietary changes, such as one food group at a time, a focus on “allowed” foods, rather than “restricted” foods, and an acceptance of setbacks as part of the change process. The classroom lessons were designed in accordance with a “gradual” introduction of material, each lesson building upon the next. However, so seniors who did not attend past classes would not be at a disadvantage, each lesson begins with a brief introduction to the tenets of DASH, allowing the lessons to be taught as a series or as stand-alone components.

When asked their thoughts on a cooking demonstration, participants echoed the results in literature reviewed by Higgins and Barkley (2004): seniors want pragmatic
daily tips and visual instruction, not merely a classroom lecture. Based on their
overwhelming request for more cooking tips, the lesson template was refined so that
cooking methods and healthful ways to flavor foods became part of every DASH lesson.
The lesson template, based on the literature, was based on a foundation of problem-
solving, in which learners express their barriers to behavior change and with the social
support of their peers, actively think of solutions together.

The DASH website, Part II of this study, was also presented to participants in
stages, a few topics at a time, per suggestions in the literature. Furthermore, as suggested
by Windhauser et al., the classroom lessons and the website encouraged an acceptance of
setbacks. For example under the topic “Special Occasions” on the website, participants
were reminded, “Most importantly, if you overindulge, forgive yourself and start fresh
the next day. DASH is a lifestyle, not a one-day event”.

Regarding the potential objection or barrier that DASH foods are expensive,
Windhauser et al. cite data that a DASH shopping basket priced at local markets was in
the low to moderate cost range, as established by the U.S. Department of Agriculture
Center for Nutrition Policy and Promotion. In each lesson, as well as in three separate
areas of the website, participants were advised how to most affordably purchase DASH
foods. Affordability tips on the website included suggestions such as meatless meals,
shopping for in-season and on-sale produce, and using frozen vegetables. One of the
nutrition questionnaire items was designed to gather participants’ opinions about the
price of healthful foods, “buying nutritious foods is too expensive”, a statement with
which two participants disagreed both before and after the website. However, one
participant changed her response from “agree” to “neutral” after visiting the website.
The DASH research group went on to say that one must not assume that everyone who expresses interest in DASH is actually ready for dietary change and that different approaches must be used when teaching the diet to different individuals. Perhaps one contributing factor to the web study attrition rate was that participants simply had no interest in the website or did not think it applied to them. One must not assume that participants will visit the website simply because access was granted. Learners are in various stages of change; a “one-size-fits-all” view of learners does not take into account the different perspectives with which each participant arrived to the website. Gajewska et al. (2010) expand upon Windhauser’s writings, concluding from their literature review that “it is not clear which educational strategy is the most effective in helping patients to make long-term lifestyle changes” and that education must at once be both comprehensive and tailored for each patient. Tailoring nutritional educational strategies (both classroom and website) should ideally take into account each participant’s readiness to change, which was not measured in this study.

Stages of change theory suggests that readiness to make dietary changes may be assessed along a continuum. In the pre-contemplation stage, a participant is not considering change. In the contemplation stage, the participant may have vague plans to change, but has made no actual attempts at change. In the preparation stage, the participant actually plans to change and has made attempts at changing. In the action stage, participants have followed a DASH eating pattern for under six months, and in the maintenance stage, participants have followed a DASH eating pattern for six months or more. While the classroom lessons are, by nature, static, future prototypes of the website could ideally provide dynamic support for participants at each stage of change, as well as
allowing participants to socially support and encourage each other. A frequent theme in the literature was that in spite of all that is known about HTN control through dietary measures, people remain generally reluctant to make changes. Enhancements to future website prototypes should further examine helping participants explore their barriers, or causes of reluctance towards making dietary changes.

The concept of self-efficacy involves an individual’s personal belief that he or she can make behavioral changes towards a health goal, while the concepts of social cognitive theory and health communication theory suggest that modeling and support from peers will resonate most strongly with the user. Classroom nutritional interventions combined with the website hold promise as a mix of social and cognitive support for dietary behavior change. The conceptual framework used in this intervention is the revised health belief model (RHBM), which is a combination of the original health belief model (HBM) the self-efficacy theory. The HBM has been widely used in intervention studies to predict behaviors and incorporates factors that affect health behavior, such as perceived susceptibility, severity, benefits, barriers, and motivation. The website content addressed each of the tenets of HBM described above. For example, “susceptibility and severity” were covered under a BP tab on the website. However, items such as “barriers”, although somewhat addressed on the website, may be better suited for an in-person class, addressed by peer problem-solving strategies.

Many nutrition educators consider self-efficacy to be the single most important factor affecting behavioral change; indeed, it has been incorporated into most individual behavior theories. Self-efficacy, a major concept of the social cognitive theory, was added to the constructs of the HBM theory with the understanding that belief or
confidence in one’s ability to successfully perform an action (activity or behavior) is useful in understanding behavior. The classroom lessons and the website aimed to bolster the self-efficacy of participants through means such as simple and affordable recipes, no-stress ways to measure and track servings, and repeated encouragement. A multi-component nutrition education program advances a public health strategy to diminish age-related HTN, addressing causal lifestyle factors, such as excess body weight, excess sodium consumption, and inadequate intake of fruits and vegetables. Additionally, the website holds potential to evolve and change with the dynamic needs of seniors as they move through the stages of changes towards living a DASH lifestyle.

The DASH website prototype closely followed aesthetic and content guidelines suggested in the literature for older adult website design.\textsuperscript{45,46,47,38} Furthermore, the website intervention, when analyzed by GENIE (Guide for Effective Nutrition Interventions and Education) created by the Academy of Nutrition and Dietetics (AND), scored highly across most measures. GENIE is an evidence-based validated online checklist tool to evaluate nutrition education, providing evidence-based criteria for designing quality nutrition education programs.\textsuperscript{54} According to a press release issued by AND on March 18, 2014, “program planners and evaluators are able to use GENIE to identify areas of their program that are missing or need strengthening.”

GENIE identifies 9 categories with 35 quality criteria. The website prototype project scored well on criteria related to feasibility, a defined target group and need, measurable proximal and distal goals, an evidence-based framework, multiple instructional techniques, consideration of social, cultural, educational, and age needs, and sustainability with potential for broader reach and replication. Areas that need
strengthening include realistic recruitment and retention of participants, reliable and valid evaluation tools, and a plan for program evaluation at multiple time points.

The website demonstrated several strengths in addition to its senior-friendly design. First, the data were researcher-collected data (BP and weight) instead of self-reported. Second, although future website prototypes will ideally have an interactive feature (i.e. “question and answer” feature), this study avoided any researcher-participant contact to control for bias. Moore’s review of web-based nutrition education found that programs with personal interaction generally led to greater participant retention and health benefits. Therefore, this study’s lack of interaction may have concurrently been a strength (avoided bias) and a limitation. Third, it featured open access to seniors without having to remember passwords.

Perhaps the most important strength of this study was its dynamic nature. According to the original DASH creator, “there are thousands of websites on the Internet that provide nutrition information, including more than 400,000 websites that mention the DASH diet, but most of these websites provide static content and are not true education programs.” The constructs of this intervention hold potential to be an actual education program.

Limitations to the website portion of this study, in addition to those already mentioned, include evaluating neither the mental status nor the basic computer skills of participants before beginning the study. Furthermore, more extensive testing of participants’ current nutrition knowledge may be useful before designing further content. The pre- and posttest used (nutrition questionnaire) was researcher-designed and was neither reliable nor validated. Although many existing surveys were researched, none
asked exactly what was needed for this study, and time and budget constraints eclipsed designing and testing a new tool before study commencement. Additionally, it may be useful to ask future participants how much they actually use the Internet for health information. Although the literature suggests a growing body of seniors is using online health resources, it is not prudent to expect research participants to embrace a DASH website when they are not currently in the habit of using the Internet for dietary or health information. The results of this study, although very limited by participant recruitment, retention, and a small sample size, are nonetheless a basis for future research with greater generalizability. Short study duration, which did not allow for evaluation at multiple time points, also limited this study.

Furthermore, although the website is intended to complement to classroom instruction, the current study design was not a true study of a hybrid classroom/website learning experience. Ideally, participants would have been randomized into two groups, a control group receiving classroom instruction only, and an experimental group receiving classroom instruction plus website access. Regarding current study participants who began the research but did not attend the post-intervention meeting, study design did not allow for alternative collection of their data, thus excluding it from analyses.

To encourage website visits in future pilot studies, it may be helpful to guide seniors through a demonstration of the website, perhaps during the consent process and study introduction. Different food diary strategies should be used in subsequent studies, as changes in dietary habits could not be analyzed as planned with the quality of food diaries that were returned.
Suggestions for website enhancement before the next pilot study include incorporating a social-cognitive learning feature and an interactive feature with which users could track their daily consumption of DASH-specific foods. A qualitative interviewing method, such as a focus group, would be helpful to gather seniors’ perspectives and experiences with the website, information outside the scope of a written survey. Perhaps most importantly to future research, it must not be assumed, as Githens et al. caution, that all seniors are ready to embrace online learning. Just as we are exploring online nutrition education as an adjunct to classroom nutrition education, we must consider the needs of those less familiar with technology due to socioeconomic or education level issues and consider how to enhance their classroom nutrition education, as well. Basic computer education may be needed for many seniors so they can embrace the technology offered at the computer labs at many Georgia senior centers.

For online nutrition education to be successful, the erroneous belief that older adults cannot or will not use computers, or have frustration using them, must be put aside (Taylor, Rose, & Wiyono, 2004, as cited in Githens). Chaffin and Harlow (2005) point to the persistently “subtle belief in American society” that even though a great number of older adults are proficient online, “old people are unable to do much”. The rapidly growing baby boomer population, more familiar with computers and the Internet than any aging population before now, will be equipped and ready to embrace online activities in their retirement years. Results from this study suggest that WBNE in Georgia senior centers is a promising method to reinforce classroom lessons teaching dietary and lifestyle management of HTN. Georgia is facing an inevitable growth in numbers in its senior centers, along with ever-lengthening life spans during which HTN is almost
guaranteed to be a factor. These circumstances demand innovative, cost-effective, and diversity-friendly solutions. Multi-component nutrition education, combining classroom learning and WBNE, is a pragmatic tool with which Georgia seniors can better manage their own health and successfully age in place.
REFERENCES


5. Quick question for thesis - aharrison3008@gmail.com - Gmail. Available at: https://mail.google.com/mail/u/0/#inbox/145c6e0f8a4ca38a. Accessed May 7, 2014.


APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. DASH-related nutritional knowledge, beliefs, and behaviors questionnaire</td>
<td>59</td>
</tr>
<tr>
<td>B. DASH website survey</td>
<td>63</td>
</tr>
</tbody>
</table>
## Nutrition Education Research Questionnaire

This survey is created by Georgia State University researchers. We are studying nutrition education materials for older adults. Knowing the characteristics of people in our study helps us apply what we learn to similar groups of people. Knowing your thoughts about nutrition helps us design more useful education. Please answer each question as well as you can. If a question is unclear, you may ask a researcher for clarification. This survey should take about 20 minutes. Thank you for your time.

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Date of data collection (researcher use only)</td>
<td></td>
</tr>
<tr>
<td>2. Participant number (researcher use only)</td>
<td></td>
</tr>
<tr>
<td>3. Height (researcher use only)</td>
<td></td>
</tr>
<tr>
<td>4. Weight (researcher use only)</td>
<td></td>
</tr>
<tr>
<td>5. Blood pressure (researcher use only)</td>
<td></td>
</tr>
<tr>
<td>6. What is your gender?</td>
<td>Female, Male</td>
</tr>
<tr>
<td>7. Are you Black or African-American, White, or another race?</td>
<td>Black or African-American, White, Another race</td>
</tr>
<tr>
<td>8. What is your age?</td>
<td></td>
</tr>
<tr>
<td>9. Please choose the statement that best describes your living situation.</td>
<td>I live in a nursing home or assisted living facility, I do NOT live in a nursing home or assisted living facility.</td>
</tr>
<tr>
<td>10. Are you the primary meal preparer in your household?</td>
<td>Yes, No</td>
</tr>
</tbody>
</table>
Nutrition Education Research Questionnaire

11. How often do barriers such as finances, transportation issues, or physical challenges prevent you from preparing or eating balanced meals? Choose one answer.

☐ I never have any barriers to preparing or eating balanced meals.
☐ I sometimes have barriers to preparing or eating balanced meals.
☐ I usually have barriers to preparing or eating balanced meals.

12. What is the highest level of education you have completed? Choose one answer.

☐ Less than high school
☐ Graduated from high school
☐ Graduated from college
☐ Completed graduate school

13. Do you suffer from any of the following ailments? Please select all that apply.

☐ Gastrointestinal Disorders
☐ High Cholesterol
☐ Hypertension (high blood pressure)
☐ Kidney disease
☐ Diabetes
☐ I do not suffer from any of these ailments
☐ I prefer not to answer

14. Are you currently on medication to treat high blood pressure?

☐ Yes
☐ No

15. Do you exercise 30 minutes a day, at least five days a week? Exercise includes activities like walking, group exercise class, working outside, or heavy housework.

☐ Yes
☐ No
<table>
<thead>
<tr>
<th>Nutrition Education Research Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the following statements, please mark the one circle that best matches your agreement with the statement.</td>
</tr>
</tbody>
</table>

1. I can control my health through what I eat.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

2. My doctor told me to eat better or to lose some weight, but did not tell me how to do so.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

3. Buying nutritious foods is too expensive.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

4. I am confused by conflicting nutrition advice I hear.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

5. I am capable of eating a healthful diet.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

6. When I buy packaged foods, I look for items marked "low" or "no" sodium.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

7. I eat more than 5 restaurant or takeout meals a week.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

8. It is important to eat a wide variety of fruits and vegetables.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

9. I know how much protein I should eat each day.
   - Strongly Disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly Agree

10. If a person wants to eat more healthfully, they should cut carbohydrates (carbs) out of their diet.
    - Strongly Disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly Agree
### Nutrition Education Research Questionnaire

11. A fat-free diet is the best way to keep my weight under control.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

12. Alcohol can affect my blood pressure.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

13. I should snack between meals.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

14. It’s too much trouble to eat right.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</table>

15. When it comes to bone health, calcium is the only nutrient that really matters.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</thead>
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</table>

16. I know how to cook tasty food without adding salt.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

17. Serving sizes of the different food groups (fruits and vegetables, dairy, grains, etc.) are confusing.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
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</table>
## DASH Website Evaluation Form

### Participant Number

This survey is created by Georgia State University researchers. Please use it to share your thoughts about the DASH website. It helps us learn about online nutrition education for older adults. This survey should take about 10 minutes. Your answers will be completely anonymous. Thank you for your time.

### 1. How many times did you visit the DASH website?

- [ ] None
- [ ] Once
- [ ] Twice
- [ ] Three times
- [ ] Four or more times

For the following statements, please mark the one circle that best matches your agreement with the statement.

### 2. The website helped me understand the DASH diet.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

### 3. I can now explain DASH to a friend.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

### 4. I tried one or more things I learned on the DASH website.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

### 5. The website was personally useful to me.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

### 6. The website was well-organized.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

### 7. I wanted to keep coming back to the website to see what was new since my last visit.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

### 8. Website content was clear and concise.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
### DASH Website Evaluation Form

9. I used the links to other websites.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</thead>
<tbody>
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</tbody>
</table>

10. I could identify with the people and the foods in the pictures.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</table>

11. The design and colors of the website were easy on my eyes.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</thead>
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</tbody>
</table>

12. The type was big enough for me to comfortably read.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</tbody>
</table>

13. It was easy to navigate around the website.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
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</table>

14. I visited the website after I got an e-mail reminder to do so.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
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</table>

15. The website was as useful to me as an in-person nutrition class at my senior center.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
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<tbody>
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</table>

16. I would recommend the website to others at my senior center.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

17. I want my senior center to provide more nutrition topics on a website like this one.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

18. I prefer learning in a regular classroom instead of a website.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

19. How can we improve our website?

[Blank space for input]