RESPONSE OF OLDER ADULTS WITH A PREVIOUS DEPRESSION DIAGNOSIS

TO AN INTERVENTION AIMED AT INCREASING HEALTH PROMOTING

BEHAVIOR IN GEORGIA SENIOR CENTERS

by

JULIE BUHRMAN

(Under the Direction of Mary Ann Johnson)

ABSTRACT

The study's purpose was to explore the relationship between depression and health promoting lifestyle (HPL) engagement before and after a state-wide health promoting behavior intervention in Georgia senior centers. Participants were a convenience sample of 546 older adults (median age 75.0 years, 81.0 percent female, 37.2 percent black, and 22.7 percent depressed). The 12-week intervention's themes were eating healthy, being active, being positive, and getting checked. Pre- and post-tests assessed HPL engagement based on meeting current nutrition, physical activity, tobacco avoidance, and preventive screening recommendations. At pre-test, depression was negatively related to physical activity and overall HPL engagement and positively related to preventive screenings. HPL engagement increased following the intervention. Depression was not a predictor of change in HPL engagement following the intervention. The results provide evidence for the intervention's effectiveness at improving HPL engagement in the target population and depression was not a barrier to these improvements.

INDEX WORDS: Intervention, Older adults, Depression, Health promoting lifestyle, Health promoting behaviors

RESPONSE OF OLDER ADULTS WITH A PREVIOUS DEPRESSION DIAGNOSIS TO AN

INTERVENTION AIMED AT INCREASING HEALTH PROMOTING BEHAVIOR IN

GEORGIA SENIOR CENTERS

by

JULIE BUHRMAN

B.S.F.C.S., The University of Georgia, 2007

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment

of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2009

RESPONSE OF OLDER ADULTS WITH A PREVIOUS DEPRESSION DIAGNOSIS TO AN

INTERVENTION AIMED AT INCREASING HEALTH PROMOTING BEHAVIOR IN

GEORGIA SENIOR CENTERS

by

JULIE BUHRMAN

Major Professor: Mary Ann Johnson

Committee: Joan Fischer
Jung Sun Lee

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
August 2009

DEDICATION

I would like to dedicate this thesis to my family, especially my husband, for all of their love and support. Without their patience and help this would never have been possible.

ACKNOWLEDGEMENTS

I would like to thank my advisory committee, Drs. Johnson, Fischer, and Lee, for their help and guidance throughout graduate school and the thesis writing process. Their knowledge and enthusiasm for nutrition, research, and older adults never fail to inspire and motivate. I would also like to thank Dr. Johnson's and Dr. Lee's lab groups for all of there hard work planning and implementing the intervention. It definitely took a team to make this study possible. I feel so luck to have learned and worked beside such amazing colleagues and professors these last two years.

I would also like to thank the Wellness Coordinators and their staff in all 12 of Georgia's Area Agencies on Aging. They were invaluable for study design, participant recruitment, data collection, and delivery of the intervention. My greatest thanks go to the older adults who participated in the "Live Healthy Georgia" intervention. They taught me that you are only as old as you act, and that it is never too late to learn something new!

Lastly, I would love to thank my family and friends for all of their support and encouragement. I would especially like to thank my husband for being patient with me and helping me try to keep everything in perspective.

TABLE OF CONTENTS

TABLES

CHAPTER 1

INTRODUCTION

The American older adult population is experiencing rapid growth. In 2006, it was estimated that the 37.3 million older adult comprised 12.4 percent of the total United States population. This trend is expected to continue, with an estimated 55 million older adults by 2020 (United States Department of Health and Human Services, Administration on Aging 2007). Georgia's older adult population is also growing rapidly, and is expected to reach 13 percent of the state population by 2020 (United States Census Bureau 2005). One reason for this unprecedented growth is the increased life expectancy of an additional 18.7 years after the age of 65 years (United States Department of Health and Human Services, Administration on Aging 2007). Since age and prevalence of chronic disease are positively associated, increased life expectancy increases risk for chronic disease. At least 80 percent of older adults have at least one chronic condition, and 50 percent have multiple chronic conditions (Centers for Disease Control and Prevention and The Merck Company Foundation 2007). It is estimated that 10 percent of Americans suffer major limitations in activity because of their chronic conditions and 70 percent of mortality is attributed to chronic disease (Centers for Disease Control and Prevention 2008). At least half of all mortality is due to an unhealthy lifestyle (United States Department of Health and Human Services 2000). The American Cancer Society, the American Diabetes Association, and the American Heart Association have agreed that nutrition, physical activity, tobacco avoidance, and preventive screenings are the most important behavior categories for preventing, detecting, and maintaining many chronic diseases (American Cancer

Society 2009; American Diabetes Association 2009; American Heart Association 2009).

Prevalence and mortality from chronic disease is higher in those with depression and

engagement in a health promoting lifestyle is lower (Lambert and Pantelis 2003; Pennix et al.

1998; Romanelli et al. 2002; Bonnet et al. 2005a; Bonnet et al. 2005b). An estimated 8 to 20

percent of community dwelling older adults have depression, and the prevalence of a lifetime

depression diagnosis is 15.7 percent nationally and 18 percent in Georgia (United States

Department of Health and Human Services 1999; Centers for Disease Control and Prevention

and National Association of Chronic Disease Directors 2006) The need for community-based

services to help prevent institutionalization, chronic disease, and disability in this growing older

adult population is compelling (Glass 2005).

The Older American's Act Nutrition Program (OAANP), part of the Older Americans

Act, is one of the oldest and most successful federal programs supporting the independence and

well-being of community-dwelling older adults. This is a national program, administered

through state Area Agencies on Aging (AAA) (Administration on Aging 2008). OAANP's

purpose includes reducing hunger and food insecurity, promoting socialization, and helping older

adults gain access to nutrition and disease prevention and health promotion services to delay

adverse health conditions associated with poor nutrition and physical inactivity (Older

Americans Act Amendment 2006). The services provided by OAANP, which include nutritional

services, social support, and community interaction, are targeted toward those with the greatest

economic and social need (Administration on Aging 2008).

Due to the high prevalence of depression and its relationship with chronic disease and

engagement in a health promoting lifestyle, the purpose of this study was to evaluate the impact

of depression on engagement in a health promoting lifestyle before and after a health promoting

behavior intervention conducted in Georgia's OAANP participants. This theory-driven intervention was implemented in senior centers throughout Georgia's 12 Area Agencies on Aging, and focused on eating healthy, being active, being positive, and getting checked. The study had three parts: a pre-test assessment, a 12 lesson health promoting behavior intervention, and a post-test assessment.

The current intervention was similar to past interventions in Georgia's OAANP participants, except that its focus was broader than in past years (Fitzpatrick et al. 2008; Hendrix et al. 2008; Speer et al. 2008; Teems 2008; Bell 2008; Bell et al. 2009). The important contribution of this study is that it provides evidence for the benefits of a community-based health promoting behavior intervention on the engagement of older adults attending Georgia senior centers in a health promoting lifestyle, and provides information on the role of depression on engagement in a health promoting lifestyle in this target population.

Chapter 2 is a literature review related to the target population of this intervention, prevalence of chronic disease, health promoting lifestyle and the behavior recommendations that form this lifestyle and help modify chronic disease risk and severity, depression prevalence and its effect in older adults, the theoretical model that served as the foundation for this intervention (Health Belief Model), and past health promoting behavior interventions targeted toward older adults.

Chapter 3 is a manuscript to be submitted to *The Forum for Family and Consumer Issues*. The manuscript includes the methods, results, discussion of the effect of depression on the health promoting lifestyle before and after the intervention, and data tables.

Chapter 4 presents a summary of the study's major findings and conclusions concerning depression and engagement in a health promoting lifestyle.

All of the references are provided after Chapter 4, followed by appendices containing material and information obtained from and used to develop the health promoting behavior intervention. Appendix A includes the power analysis used for this study. Appendix B consists of the physician's clearance form required to participate in the physical activity segment of the intervention. Appendix C includes a sample post-test used in the health promoting lifestyle intervention.

CHAPTER 2

LITERATURE REVIEW

Older Adult Population

The demographic composition of America is changing. America is undergoing what researchers have termed a "graying of society." "Graying" refers to the growing number of older adults paralleling the falling number of younger people. This phenomenon is due in part to the aging of the baby boomers and the decreasing birthrates. Potential consequences for society include increased healthcare needs and cost (Outshoorn 2002). In 2006, older adults (65 years or older) comprised 12.4 percent of the United States population, roughly one in eight individuals, reaching 37.3 million, a 9.7 percent increase in just one decade. The trend is expected to continue with the aging population increasing to 40 million in 2010, a 15 percent increase, and to 55 million in 2020. This growth is due in part to the aging of the baby boomer generation and an increased life expectancy. At age 65, the average life expectancy is an additional 18.7 years (Administration on Aging 2007a). While the proportion of older adults in Georgia (9.6% in 2005) is less than the national average, Georgia's older adult population is increasing rapidly and is expected to reach 13 percent of the Georgia population by 2020 (US Census Bureau 2005). Due to the growth in the older adult population and the uncertain caregiver supply, the need for community-based services to help prevent institutionalization, chronic disease, and disability is compelling (Glass 2005).

Older Americans Act Nutrition Program

One of the oldest and most successful national programs aimed at improving quality of life by supporting independence and well-being of community-dwelling older adults is the Older Americans Act Nutrition Program (OAANP). Congress established OAANP in 1972 with the passing of the National Nutrition Program for the Elderly, which is now under Title III (Grants for State and Community Programs on Aging) of the Older Americans Act (Administration on Aging 2008a; Older Americans Act Amendment 2006). Under Title III, any American 60 years or older is eligible for these programs, as well as a spouse of any age, or disabled persons who live with or accompany older participants. While any older adult is eligible, OAANP's services are targeted toward those with the greatest need, economically or socially, especially low-income minorities and rural older adults (Older Americans Act Amendment 2006; Administration on Aging 2008a). In 2006, there were 9,516,497 Title III clients, approximately 19.8 percent were minorities, 27.0 percent were below poverty level, and 32.9 percent were rural (Administration on Aging 2008b). The purpose of OAANP is to reduce hunger and food insecurity, promote socialization, and help older adults gain access to nutrition and disease prevention and health promotion services to delay adverse health conditions associated with poor nutrition and physical inactivity. OAANP attempts to meet its purpose by providing congregate and home-delivered meals, nutrition counseling, nutrition education, and other nutritional services (Older Americans Act Amendment 2006).

Evaluation of OAANP shows that it is effectively reaching its goals and serving its desired target population. Participants in the OAANP are older, more likely to live alone, be in a racial or ethnic minority, and live in a rural area compared to the general older adult population (Administration on Aging 2004; Administration on Aging 2007b; Administration on Aging

2008c). OAANP provides more that half of the daily food intake for 56 percent of its congregate

meal participants and 66 percent of the home delivered meal participants. In addition, OAANP

increases the social contact of its participants, with 57 percent reporting increased social

opportunities after utilizing OAANP's congregate nutritional services. Lastly, OAANP provides

on site opportunities for health promotion and disease prevention, with 52 percent of congregate

meal participants responding that they participated in physical activity and 59 percent responding

that they used health screenings when available (Administration on Aging 2004). Due to

OAANP's effectiveness, it provides a platform for implementing interventions that address

chronic disease through nutrition, physical activity, and wellness programs.

Chronic Disease in Older Adults

Chronic diseases (heart disease, stroke, diabetes, arthritis, and cancer) are a burden to

individuals and on society. In 2005, Almost 50 percent of all Americans suffer from at least one

chronic condition (Centers for Disease Control and Prevention 2008). The prevalence of chronic

conditions increases with age; at least 80 percent of older adults have at least one chronic

condition, and 50 percent have multiple chronic conditions (Centers for Disease Control and

Prevention and The Merck Company Foundation 2007; Centers for Disease Control and

Prevention 2003). The medical care costs to treat those with chronic conditions account for a

staggering 75 percent of the nation's $2 trillion medical care costs (Centers for Disease Control

2008). Almost 95 percent of older adult's health care expenditure is for the treatment of chronic

disease (Centers for Disease Control and Prevention and The Merck Company Foundation 2007;

Hoffman, Rice, and Sung 1996). Chronic conditions, by definition, are prolonged and can affect

both quality and years of life. It is estimated that 10 percent of Americans suffer major

limitations in activity because of their chronic conditions and 70 percent of all mortality is

attributed to chronic disease. In 2003, seven of the ten leading causes of death in the United States were related directly or indirectly to chronic disease, with heart disease, cancer, and stroke ranking first through third respectively and diabetes ranking sixth (Centers for Disease Control 2008). Chronic conditions are also the leading cause of death for older adults, with heart disease (32 percent of all deaths), cancer (22 percent), and stroke (8 percent) serving as the three leading causes of death (Centers for Disease Control and Prevention and The Merck Company Foundation 2007). These statistics are not inevitable, because many chronic conditions, including the three major killers, are preventable.

While the risk for chronic disease increases with age, poor lifestyle choices contribute significantly to the development and progression of many chronic diseases. It has been estimated that 35 percent of all deaths in America can be attributed to poor diet, physical inactivity, and smoking (Centers for Disease Control 2003). A person can dramatically reduce their risk for chronic disease by getting regular physical activity, eating a healthy diet, abstaining from tobacco, and getting regular health screenings (Blackman, Kamimoto, and Smith 1999). With the aging of the baby boomers, a focus on prevention and maintenance, through a healthy lifestyle, is needed to help decrease medical spending and mortality and increase the quality of life for older adults.

Health Promoting Lifestyle

According to Healthy People 2010, at least half of all mortality in the United States is due to an unhealthy lifestyle (United States Department of Health and Human Services 2000). While it is generally acknowledged that certain behaviors can either promote or endanger one's health, researchers have failed to come to a consensus regarding the definitions and evaluations of these behaviors. Some of the terms used to try to describe these actions are: "health habits," "positive

health practices," "preventive health behaviors," "health protective behaviors," "risk reduction," and "healthy lifestyle." Based on these definitions, these behaviors may be positive actions to promote health (eating a healthful diet and exercising) or avoidance of risky behaviors (tobacco use) (Kulbok, Baldwin, Cox, and Duffy 1997). Not only are the definitions of the health promoting behaviors unclear, but so are the definitions of prevention.

Initial research involved preventing disease in an asymptomatic state ("health behavior") or maintaining health in a symptomatic state ("sick-role") (Leavell and Clark 1965; Kasl and Cobb 1966; Parsons 1951). Harris and Guten (1979) encompassed these two states in their research and defined health protection as the self-described behaviors adults take to promote, protect, or maintain their health, while health protective behaviors are the actions taken to meet this goal. They also provided evidence for five dimensions of health promoting behavior: personal health practices, safety practices, preventive health care, environmental hazard avoidance, and harmful substance avoidance (Harris and Guten 1979). This more modern view, which builds upon the work of Harris and Guten was emphasized by the work of Walker, Sechrist, and Pender and defines a health promoting lifestyle as "a multidimensional pattern of self-initiated actions and perceptions that serve to maintain or enhance the level of wellness, self-actualization, and fulfillment of the individual" (Walker, Sechrist and Pender 1987 pg 77). They also provided dimensions or subscales: physical activity, spiritual growth, health responsibility, interpersonal relationships, nutrition, and stress management (Walker and Pender 1987). Since at least 80 percent of older adults have at least one chronic disease, Walker et al.'s more modern definition of a health promoting lifestyle is most fitting (Centers for Disease Control and Prevention and The Merck Company Foundation 2007; Centers for Disease Control and Prevention 2003; Walker Sechrist and Pender 1987).

Several tools have been developed to help analyze the terms and concepts involving health promotion. The Personal Lifestyle Questionnaire, developed as a 24 item, six-subscale questionnaire, derived from the work of Harris and Gruten, uses the summation of the six subscales to represent health promoting activities (Brown, Muhlenkamp, Fox, and Osborn 1983; Harris and Guten 1979). The more modern Health Promoting Lifestyle Profile II also uses six subscales and a Likert scale to quantify engagement in a health promoting lifestyle (Walker and Pender 1987). While there are several scales, the common approach to analyze engagement is to construct a summative score to use in statistical analysis (Kulbok, Baldwin, Cox, and Duffy 1997). Not only are there several scales to choose from, there are several behaviors within these subscales. The American Cancer Society, the American Diabetes Association, and the American Heart Associations have agreed that the dimensions of nutrition, physical activity, tobacco avoidance, and preventive screenings are the most important for prevention, detecting, and maintaining many chronic diseases (American Cancer Society 2009; American Diabetes Association 2009; American Heart Association 2009).

Health Promoting Behavior: Nutrition

Diet plays a key role in the development and outcomes of many chronic diseases. The 2005 Dietary Guidelines for Americans have identified three food groups to encourage. These three groups (fruits and vegetables, milk products, and whole grains) were chosen because adequate consumption of these groups contributed to overall health (United States Department of Health and Human Services and United States Department of Agriculture 2005). Eating a diet high in fruits and vegetables has been shown to decrease mortality incidence from many chronic diseases including cardiovascular disease, stroke, hypertension, diabetes, and some cancers (United States Department of Health and Human Services and United States Department of

Agriculture 2005; Bazzano 2006; Bazzano et al. 2002; Appel et al. 1997; Ford and Mokdad 2001). The benefits of a diet high in fiber rich foods, such as fruits, vegetable, and whole grains include decreasing constipation, decreasing blood cholesterol levels, reducing blood pressure, lower risk of coronary heart disease, improved glycemic control, and possibly reducing the risk for colorectal cancer (Anderson, Smith, and Gustafson 1994). The consumption of milk or milk products, which are high in calcium, help reduce the risk of low bone mass, which leads to osteoporosis (Heaney 2000). Every year, more than $33 billion in health care costs and $9 billion in lost productivity can be attributed to poor diet (Centers for Disease Control and Prevention and United States Department of Health and Human Services 2003).

Due to the impact of these foods on one's health, specific recommendations have been made regarding adequate consumption. The 2005 Dietary Guidelines for Americans increased the fruit and vegetable recommendation from five servings a day to seven to ten servings a day for those requiring 1,600 to 2,200 calories daily, such as older adults. The new recommendations translate to three and a half cups of fruits and vegetables per day for a 1,600 calorie diet and five cups for a 2,200 calorie diet. In order to reap the benefits of consuming whole grains, three or more one ounce equivalents of whole grains are recommended daily. Three servings of milk or milk products are recommended daily for those requiring 1,600 to 2,200 calories daily (United Stated Department of Health and Human Services and United States Department of Agriculture 2005).

Many Americans, older adults included, are not meeting these nutritional recommendations. While older adults (ages 65 years and older) consume more fruits and vegetables than younger adults, many are still not meeting the recommendations (United States Department of Agriculture, Centers for Nutrition Policy and Promotion 2007). More than 69

percent of older American adults are not even consuming five servings of fruits and vegetables daily. Georgia's older adults eat fewer fruits and vegetables, with around 76 percent not consuming five or more a day, ranking 44th nationally (Centers for Disease Control and Prevention and The Merck Company Foundation 2007). A study in Georgia's OAANP participants found that they consume more fruits and vegetables with 89 percent consuming five or more servings daily, and 58 percent consuming seven or more servings daily (Hendrix et al. 2008). Nationally, only 6.1 percent of older adults (aged 51 and over) are meeting the 2005 Dietary Guideline recommendations for whole grain consumption (United States Department of Agriculture, Centers for Nutrition Policy and Promotion 2005). American adults are only consuming 1.54 servings of milk products daily (0.9 of fluid milk and 0.6 of cheese). Only 18 percent of men and 10 percent of women are meeting the current milk product recommendations (Beydoun et al. 2008).

Health Promoting Behavior: Physical Activity

It has been well established that physical activity contributes substantially to one's health. Regular physical activity can help to control or prevent many health problems that plague older adults such as high blood pressure, depression, obesity, diabetes, heart disease, arthritis symptoms, and colon cancer risk (Centers for Disease Control and Prevention and The Merck Company Foundation 2007; Centers for Disease Control and Prevention 2007a). Physical activity can also help to build strong bones, muscles and joints. Physical activities can impact disease state and overall health, by decreasing the need for hospitalizations, physician's visits, and medications (Centers for Disease Control and Prevention 2007a). In 2000, more than $76 billion of health care expenditures was associated with physical inactivity. Financial benefits would be seen with increased engagement in physical activity. If only 10 percent of adults began

a walking program, $5.6 billion dollars associate with the treatment of heart disease could be saved and physical activity programs for older adults who have suffered a hip fracture would result in a $4.5 return for every $1 invested (Centers for Disease Control and Prevention and United States Department of Health and Human Services 2003).

Due to physical activity's well established benefits, many authoritative organizations have made physical activity recommendations. The 2005 Dietary Guidelines for Americans recommend that adults amass at least 30 minutes of moderate physical activity on most days of the week to help reduce their risk for chronic disease (United States Department of Health and Human Services and United States Department of Agriculture 2005). The American Heart Association and the American College of Sports Medicine have jointly developed physical activity guidelines, recommending that older adults accumulate at least 30 minutes of moderate intensity aerobic activity five days per week or vigorous intensity activity for 20 minutes three days per week. The 30 minutes of moderate intensity aerobic activity can be accrued in three ten minute bouts (Nelson et al. 2007). The Physical Activity Guidelines for Americans recommend 150 minutes of moderate physical activity or 75 minutes of vigorous activity of some combination of the two per week for older adults. It also recommends at least two days of muscle-strengthening activities per week (United States Department of Health and Human Services 2008).

Despite the benefits of physical activity many older adults are not meeting the physical activity recommendations. By age 65, 28 percent of Americans do not engage in any leisure-time physical activity, which fails to meet the Healthy People 2010 goal of only 20 percent (Centers for Disease Control and Prevention and The Merck Company Foundation 2007; United States Department of Health and Human Services, Office of Disease Prevention and Health

Promotion 2000). Georgia ranks 49th in the nation in leisure-time physical activity, with 40

percent of older adults (65 years and older) engaging in no leisure-time physical activity (Centers

for Disease Control and Prevention and The Merck Company Foundation 2007). For those who

engage in some leisure-time physical activity, only 26 percent of older Americans engage in at

least 30 minutes of light to moderate physical activity at least five days per week or vigorous

physical activity three days of the week (Kruger et al. 2007). Nationally, 36.9 percent of older

adults fail to meet the 2005 Dietary Guidelines for Americans physical activity

recommendations, but 39.4 percent fail to meet it in Georgia (Centers for Disease Control and

Prevention, National Center for Chronic Disease Prevention and Health Promotion 2007; United

States Department of Health and Human Services and United States Department of Agriculture

2005). A study in Georgia's OAANP participants found that on average these older adults were

engaging in 24.8 minutes of physical activity per day (Fitzpatrick et al. 2008).

Health Promoting Behavior: Tobacco Avoidance

Smoking is the most important source of preventable morbidity and mortality. It is

estimated that 438,000 Americans die each year due to smoking-related diseases, which

translates to an estimated 18% of all mortality in the United States (American Lung Association

2008a; Centers for Disease Control and Prevention 2009). Around 8.6 million people in the

United States have at least one serious illness that can be attributed to smoking, such as chronic

obstructive pulmonary disease (COPD) (including chronic bronchitis and emphysema), coronary

heart disease, stroke, abdominal aortic aneurysm, acute myeloid leukemia, cataract, pneumonia,

periodontitis, and cancers of the bladder, esophagus, larynx, lung, oral cavity, throat, cervix,

kidney, stomach, and pancreas (American Lung Association 2008a). Older adults are at an

increased risk for smoking related complications because they have smoked for a longer time,

they tend to smoke more heavily, and they are less likely to see smoking as harmful. Smoking is a significant risk factor for three of the leading causes of death for those over 50 years of age (coronary heart disease, stroke, and lower respiratory infection). Older men who smoke are twice as likely to die from stoke, and older women are one and a half times as likely. Older smokers are at a 60 percent increased risk from succumbing to a heart attack than older non-smokers. Cigarette use in older adults also increases the risk for dementia and cataracts (American Lung Association 2008b).

Currently, 10 percent of older Americans smoke (American Lung Association 2008b; Centers for Disease Control and Prevention 2007b). Those who smoke are more likely to be male, American Indian/Alaska native or African American, less educated, and live below the poverty level (Centers for Disease Control and Prevention 2007b) While the consequences of smoking may be well known, many older adults do not think that smoking cessation in later life will provide any health benefits. Smoking cessation has shown to be beneficial even in older age. If an older adult stops smoking, circulation improves and the lungs start to mend. One year post-smoking, the additional risk for heart disease is halved, and the risk for stoke, lung disease, and cancer also diminishes. In addition, older men who quit smoking will gain an additional 1.4 to 2.0 years of life and women will gain 2.7 to 3.4 years (American Lung Association 2008b).

While many think that smokeless tobacco (chewing tobacco and snuff) is less harmful than cigarette use, it is still hazardous to one's health. Smokeless tobacco contains 28 carcinogenic agents, and significantly increases one's chance of developing oral cancer, even when compared with cigarette use. It is estimated that 3% of adults currently use smokeless tobacco. While smokeless tobacco use is highest among young white males, it is still abused by older adults (American Lung Association 2006; Centers for Disease Control 2007c).

Health Promoting Behavior: Preventive Screenings

Preventive screenings, leading to early detection and treatment of disease or maintenance of known disease states, are imperative to maintaining health and well-being. Recommendations have been made for the frequency of screenings for low bone mineral density, high blood cholesterol and blood pressure, poor vision and hearing, and podiatric complications. Many of these preventive screenings (bone mineral density, blood cholesterol, and eye examinations) are covered by Medicare, because they have recognized the impact of preventive screenings on health and medical care costs (United States Department of Health and Human Services, Centers for Medicare and Medicaid Services 2007).

An estimated 44 million Americans over the age of 50 years have osteoporosis or low bone mineral density, increasing their risk for osteoporosis-related fracture (National Osteoporosis Foundation 2008). The costs associated with osteoporosis-related fractures are staggering. In 2005, osteoporosis-related fractures cost $19 billion and costs are expected to increase to $25.3 billion by 2025 (National Osteoporosis Foundation 2008). Due to its high incidence and cost, the National Osteoporosis Foundation recommends bone mineral density testing for all women aged 65 years and older, but bone densitometry has also been shown to be cost-effective in older men who are also at risk for osteoporosis (National Osteoporosis Foundation 1999; Schousboe et al. 2007). In Maryland, 34 percent of women with health coverage and 13 percent without health coverage have had a bone mineral density test (Maryland Behavior Risk Factor Surveillance System 2007).

High serum cholesterol is a major risk factor for coronary heart disease, which is the leading cause of death for both men and women in the United States. Periodic screening of blood cholesterol can help detect those at risk for coronary heart disease and help physicians

monitor treatment for those already diagnosed with coronary heart disease (Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention 2007).   Based on the benefit of early detection, it is recommended that all adults should have their fasting blood cholesterol levels measured every five years (National Cholesterol Education Program 1993). Georgia ranks 16th nationally, with 91.2 percent of its older adults meeting the blood cholesterol screening recommendations (Centers for Disease Control and Prevention and The Merck Company Foundation 2007).

Those with high blood pressure are at an increased risk for coronary artery disease, peripheral vascular disease, stroke, renal disease, and retinopathy. Approximately 1 in 3 American adults have high blood pressure, and it killed 49,707 Americans in 2002. Early detection and treatment are important to help control high blood pressure and reduce the risk of possible consequences (Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention 2006). The American College of Physicians and the National High Blood Pressure Education Program of the National Heart, Lung, and Blood Institute recommend that adults get their blood pressure measured at least every two years and more if warranted (American College of Physicians 1991; National High Blood Pressure Education Program 1990). Older adults are more likely to meet this recommendation, with 97.8 percent of individuals 65 years and older meeting the recommendation compared to 95.7 percent of individuals between 45 and 65 years and 93.0 percent of individuals between 20 and 44 years, after adjusting to reflect the population in 2000. Almost all Georgians are meeting the blood pressure screening recommendation. After adjustment to reflect the population in 2000, 95.9 percent of Georgians were meeting the blood pressure screening recommendation (Centers for Disease Control and Prevention 2002).

Loss of vision increases with advanced age. Approximately 5.0 percent of older adults aged 60 to 79 years and 23.7 percent of those aged 80 years and older have blindness or low vision (United States Department of Health and Human Services and National Institutes of Health, National Eye Institute 2008). Common visual disorders include: cataracts, macular degeneration, glaucoma, and diabetic retinopathy. These diseases can affect a person's ability to care for themselves, decrease quality of life, and increase risk of premature death (Maylahn and Melnik 2008). Vision screenings are ranked as one of the top ten most effective clinical preventive services for older adults (aged 65 and older) (Maciosek et al. 2006). The American Academy of Ophthalmology recommends that older adults should have their vision checked every one to two years and those with diabetes should have their vision checked on a yearly basis (American Academy of Opthamology 1992). A five state study of Behavioral Risk Factor Surveillance System (BRFSS) data found that 33.2 percent of adults 60 to 69 years of age have not visited an eye care professional, but those numbers decrease to 20.7 percent for those over 80 years of age (Centers for Disease Control and Prevention 2006). In New York, 38.8 percent of older adults 60 to 69 years had not visited an eye care professional, and those numbers also decreased to 16.5 percent of those over 80 years not visiting an eye care professional in the past year (Maylahn and Melnik 2008).

Hearing loss can be identified in one out of every three persons aged 65 and older, and up to one in every two persons aged 85 and older (Mulrow and Lichtenstein 1991). Older adults with hearing impairment are prone to suffering emotional and social disabilities, such as social and emotional isolation, clinical depression, and limited activity, as a result of their hearing loss (Bess et al. 1989). With hearing loss identification and proper use of hearing amplification older adults have shown improvement in social, cognitive, emotional, and communication functions

(Mulrow and Lichtenstein 1991; Mulrow et al. 1990). Based on the benefits of identification and treatment of hearing loss, the Institute of Medicine recommends audiometric testing once during each age period of 60-74 and 75 and over (National Academy of Sciences, 1978).

Feet have been called the "mirror of health" because feet can show signs of conditions such as diabetes, arthritis, and circulatory problems. Diabetes in particular can affect the lower extremities, causing serious foot problems (American Podiatric Medical Association 2009). Diabetes is the leading cause of amputation in the United States, causing an estimated 82,000 amputations a year. While there are over 300 different foot ailments, many foot problems in older adults can be treated successfully, relieving pain and increasing mobility (American Podiatric Medical Association 2009). It is recommended that those with diabetes should have their feet checked at least annually (National Guideline Clearinghouse 2009). While no consensus has been reached for older adults without diabetes, they are also at risk for podiatric complications and should be checked regularly (Plummer and Albert 1996; American Podiatric Medical Association 2009). In 2002, roughly 68 percent of adults with diabetes reported having a foot examination within the last year. Among those with diabetes, the age-adjusted prevalence of those who had there feet examined by a health care professional in the past year was 69.4 percent nationally and 70.3 percent in Georgia (Centers for Disease Control and Prevention, National Center for Chronic Disease and Health Promotion 2007).

Depression and Aging

Almost 20% of older Americans (55 years or older) experience mental disorders that are not typical of normal aging (United States Department of Health and Human Services 1999). There are several different types of depressive disorders in older adults: major depressive disorder, minor depressive disorder, dysthymic disorder, bipolar I disorder, and adjustment

disorder with depressed mood (Alexopoulos 2005).   It is estimated that the prevalence of major depression in this population is 3.8 percent, minor depression is 3.7 percent, dysthymia is 1.6 percent, and bipolar I is 0.2 percent. Based on this prevalence, roughly 10 percent of the older adult population suffers from a depressive disorder, but estimates have ranged from 8 to 20 percent in community-dwelling older adults and up to 37 percent in primary care (United States Department of Health and Human Services 1999). In 2006, 15 percent of American older adults reported having depression, and 18 percent of Georgia's older adults reported having depression (Centers for Disease Control and Prevention and National Association of Chronic Disease Directors 2008). Depression is more common in females and non-Hispanic black persons (Pratt and Brody 2008). While the risk for depression increases with lower socioeconomic status, for those 60 years of age or older, poverty status does not significantly impact the prevalence of depression (Lorant 2003; Pratt and Brody 2008). An individual's health status may increase their risk for depressive like symptoms. Certain medications (e.g. steroids) and medical conditions, such as hypothyroidism and anemia, have symptoms that mimic those of depression (University of Illinois at Chicago Department of Psychiatry 2008). The typical course of depression involves periods of depression and remission, but the incidence of the depression becomes more chronic in later life (Cole 1997). Since depression tends to be recurrent, those who were diagnosed as depressed during their younger years are at increased risk for depression in later life and an estimated 90 percent of people who experience a depressive episode will have at least one recurrent episode of depression within three years (American Psychological Association 2003; Reynold, Frank, Perel, and Imber 1999).

Cost and Outcomes for Those with Depression

Depression across the aging spectrum is one of the most costly disorders in the United

States (Hirschfeld et al. 1997). It is estimated that the direct and indirect costs of depression total

$43 billion a year (United States Department of Health and Human Services 1999). Cost for

depression in older adults increases, because they are more likely to visit their doctors or the

emergency room, take more medications, have higher outpatient charges, and stay in the hospital

longer than those without depression (Callahan et al. 1994; Cooper-Patrick, Crum, and Ford

1994; Callahan and Wolinsky 1995; Unutzer et al. 1997). In addition, the medical care costs for

those with major depression are 50 percent greater than the cost for those with chronic conditions

in the absence of depression (Katon 2003). A cost-of-illness study looking at depressive

disorders specifically in older adults (65-97 years) found direct costs per case per year to be

$4354, indirect costs to be $4030 and excess costs to be $324 (Luber et al. 2001). Not only is

depression monetarily costly, it also causes distress and suffering for both the patient and

caregiver, and can lead to physical, mental, and social functioning impairments. Serious

consequences of late-life depression include increased illness and suicide mortality (United

States Department of Health and Human Services 1999). The mortality rate for depressed older

adults is higher than for their peers who are not depressed (American Psychological Association

2004).

As previously mentioned, depression is associated with increased illness, but the

relationship between illness and depression is still unclear. Many illnesses may be unrelated to,

cause, or be a result of depression (National Institutes of Mental Health 2007). Many chronic

conditions (diabetes, hyperlipidemia, cardiovascular disease, hypertension, obesity, cancer, and

osteoporosis) are common in those with mental illness such as depression (Lambert and Pantelis

2003). Almost 25 percent of people who suffer a heart attack or undergo cardiac catheterization have major depression, and half of them had at least one previous episode of major depression, while another 25 percent have minor depression (Carney and Freeland 2003). Depression has been found to increase incidence and mortality from chronic illness. An epidemiological study found that chronic depression can raise the risk of cancer in older adults by 88 percent (Pennix et al. 1998). Another study found that older adults with depression were four times more likely to die within four months after a heart attack than those without depression (Romanelli, Fauerbach, Bush, and Ziegelstein 2002). While the relationship between depression and illness is probably reciprocal and not well understood, biological and psychological factors play a part (United States Department of Health and Human Services 1999).

<div align="center">**Health Promoting Lifestyle and Depression**</div>

Depression has been found to be adversely related to participation in a health promoting lifestyle. Those with hypertension and depression were significantly less likely to follow a healthy diet, men were less likely to engage in physical activity, and women were more likely to smoke (Bonnet et al. 2005a). In a similar study looking at unhealthy lifestyle in patients with depression and cardiovascular disease, both men and women with depression engaged in more unhealthy behaviors (P<0.001), both genders were more likely to smoke and be physically inactive, while only men had a significant association with poor diet and depression (P = 0.008) (Bonnet et al. 2005b). Often, people with mental illness do not receive comprehensive physical health checks (Golomb et al. 2000). While the exact reasons for this phenomenon are unclear, many theories abound such as an inconsistent pattern of seeking care, lack of health care coverage, and the inability of those with mental illness to adequately communicate and recognize the meaning of their symptoms (Badger et al. 2003; Dixon and Wohlheiter 2003). However,

research looking at those with diabetes and depression found that those with depression had an increased health care expenditure, had higher ambulatory care use (12 vs. 7, P<0.001) and filled more prescriptions (43 vs. 21, P<0.0001) (Egede, Zheng, and Simpson 2002). The United States Surgeon General's Workshop on Health Promotion and Aging highlighted the need for research examining the reasons that only a fraction of older adults engage in a health promoting lifestyle (United States Department of Health and Human Services 1988). While the research supporting poor adherence to a health promoting lifestyle by people with depression seems to be strong, no research was found examining the comparative response of those with depression to their non-depressed peers after a health promoting behavior intervention.

Health Belief Model

The Health Belief Model (HBM) is one of the oldest and most widely recognized theories of health behavior. It was designed to examine factors encouraging and discouraging people from participating in health promoting programs. Over the years, six main constructs have been created to form the HBM: perceived susceptibility (belief in susceptibility to the disease), perceived severity (belief that the condition's consequences are serious), perceived benefits (belief that taking action would decrease disease risk or severity), perceived barriers (belief that the cost of taking action is outweighed by the benefits), cue to action (factors that prompt action), and self-efficacy (belief that they are able to successfully perform an action) (Strecher and Rosenstock 1997). The HBM has proven a successful foundation for previous health, physical activity, and nutrition interventions in Georgia's OAANP participants (Fitzpatrick et al. 2008; Hendrix et al. 2008; Speer et al. 2008; Teems 2008; Bell 2008; Bell et al. 2009).

Previous Successful Interventions

Previous statewide interventions in older adults aimed at increasing participation in various aspects of a health promoting lifestyle have been successful. These interventions were coordinated by the Georgia Division of Aging Services and the Department of Foods and Nutrition at the University of Georgia, and were implemented throughout all 12 of Georgia's Area Agencies on Aging. While these studies have shown increases in certain components of a health promoting lifestyle such as physical activity, consumption of fruits and vegetables, diabetes management, fall and fracture prevention, and stroke and heart attack knowledge and prevention, none have examined the larger totality of the health promoting lifestyle (Fitzpatrick et al. 2008; Hendrix et al. 2008; Speer et al. 2008; Teems 2008; Bell 2008; Bell et al. 2009). It is important to point out that none of these studies differentiated between those with and without a previous diagnosis of depression. By evaluating the response of individuals with a previous diagnosis of depression to an intervention aimed at encouraging health promoting behavior and comparing it to their peers without a previous depression diagnosis, this thesis will provide a fuller understanding of how a previous depression diagnosis affects engagement in health promoting lifestyle and whether an intervention aimed at the general population could be successful for this group, a group that needs it most.

Rational, Specific Aims, and Hypothesis

This study expands on past interventions targeted toward OAANP participants in Georgia, which have shown positive effects on engagement in health promoting behavior (Fitzpatrick et al. 2008; Hendrix et al. 2008; Speer et al. 2008; Teems 2008; Bell et al. 2009). These previous interventions helped to build a foundation upon which the present intervention was founded, by addressing the specific areas of need in the target population. The present study

reinforces and builds on the important health messages presented in past interventions, but takes it a step further by examining the complex relationship between a previous depression diagnosis and engagement in a health promoting lifestyle.

The hypothesis to be tested is that older adults previously diagnosed with a depressive disorder show less change compared to their non-depressed peers after an intervention aimed at increasing health promoting behavior in older adults attending Georgia senior centers. The specific aims are to: 1) conduct a pre-test to determine initial level of engagement in a health promoting lifestyle for both the previously diagnosed with depression and non-depressed groups, and 2) determine the effects of a health promoting behavior intervention on health promoting lifestyle of both groups, and then determine whether or not a previous diagnosis of depression is a predictor of change in engagement in a health promoting lifestyle.

CHAPTER 3

RESPONSE OF OLDER ADULTS WITH A PREVIOUS DEPRESSION DIAGNOSIS TO AN INTERVENTION AIMED AT INCREASING HEALTH PROMOTING BEHAVIOR IN GEORGIA SENIOR CENTERS[1]

Abstract

The purpose of this study was to explore the relationship between a previous diagnosis of depression and engagement in a health promoting lifestyle (HPL) before and after a 12-week health promoting behavior intervention in Georgia senior centers. Participants were a convenience sample from all 12 Georgia Agencies on Aging (AAA). The sample included 811 participants who completed the pre-test (median age 75.0 years, 81.0 percent female, 37.2 percent black, and 22.7 percent depressed) and 546 participants who completed both the pre- and post-test and had consistent depression responses. An interviewer administered questionnaire was used and included demographics, health, and frequency of engagement in many health promoting behaviors. A unique HPL scale was created to measure frequency of meeting nutrition, physical activity, tobacco avoidance, and preventive screening recommendations (12 point scale). At the pre-test, depression was a significant predictor of overall engagement in a HPL. HPL was significantly and negatively associated with meeting physical activity recommendations, but was positively associated with meeting preventive screening recommendations after controlling for demographic variables. Following the intervention, there was a significant increase in median engagement in HPL (pre- vs. post-test: 7.5 (2, 11.5) vs. 8.5 (3, 12), respective HPL scores, $P<0.001$). In a series of regression analyses, depression was not a predictor of change in engagement in HPL or any sub-category of HPL following the intervention. These results provide evidence for the intervention's effectiveness at improving engagement of community dwelling older adults in a HPL. Moreover, the high prevalence of depression in this sample did not measurably impede improvement.

KEYWORDS: Intervention, Older adults, Depression, Health promoting lifestyle, and Health promoting behaviors.

Introduction

The older adult population is growing rapidly. Older adults (65 years or older) comprised 12.4 percent of the United States population in 2006 and 9.6 percent of the Georgia population in 2005 (Administration on Aging 2007a; United States Census Bureau 2005). At least 80 percent of this older adult population has at least one chronic condition, and 50 percent have multiple chronic conditions (Centers for Disease Control and Prevention and The Merck Company Foundation 2007). An estimated 70 percent of mortality can be attributed to chronic disease and, according to Healthy People 2010, at least half of all mortality in the United States is due to an unhealthy lifestyle (Centers for Disease Control and Prevention 2008; United States Department of Health and Human Services 2000). A health promoting lifestyle (HPL) is "a multidimensional pattern of self-initiated actions and perceptions that serve to maintain or enhance the level of wellness, self-actualization, and fulfillment of the individual" (Walker Sechrist and Pender 1987 pg 77). Due to the fact that a person can drastically reduce their risk for chronic disease by eating a healthy diet, getting regular physical activity, abstaining from tobacco, and getting regular health screenings, the American Heart Association, the American Diabetes Association, and the American Cancer Society have agreed that nutrition, physical activity, tobacco avoidance, and preventive screenings are the most important behavioral categories for preventing, detecting, and maintaining many chronic diseases (Blackmon, Kamimoto, and Smith 1999; American Heart Association 2009; American Diabetes Association 2009; American Cancer Society 2009).

An association exists between depression and chronic disease. Chronic diseases are common in those with mental illnesses such as depression, and depression has been found to increase incidence and mortality from chronic illness (Lambert and Pantelis 2003; Pennix et al. 1998; Romanelli, Fauerbach, Bush, and Ziegelstein 2002). While the relationship between depression and chronic disease is still unclear, depression has been found to be adversely related to participation in a health promoting lifestyle (Bonnet et al. 2005a; Bonnet at al. 2005b). The estimated prevalence of depression ranges from 8 to 20 percent in community dwelling older adults, and the prevalence of a lifetime depression diagnosis is 15.7 percent nationally and 18 percent in Georgia (United States Department of Health and Human Services 1999; Centers for Disease Control and Prevention and National Association of Chronic Disease Directors 2006).

Due to the high prevalence of depression and its relationship with chronic disease and engagement in a health promoting lifestyle, a study was conducted to evaluate the impact of a previous depression diagnosis on engagement in a health promoting lifestyle before and after a health promoting behavior intervention conducted in Georgia senior centers. The intervention was based on the Health Belief Model and included the overarching themes of eating healthy, being active, being positive, and getting checked. The intervention was implemented in senior centers throughout Georgia's 12 Area Agencies on Aging (AAA), and included a pre-test, a series of 12 lessons, and a post-test. This intervention was similar to other successful interventions in Georgia senior centers except that its messages were broader than in past years (Fitzpatrick et al. 2008; Hendrix et al. 2008; Speer at al. 2008; Teems 2008; Bell 2008; Bell et al. 2009). The important contribution of this study is that it provides evidence for the benefits of a community-based health promoting behavior intervention on the engagement of older adults

attending Georgia senior centers in a health promoting lifestyle, and provides information on the role of depression on engagement in a health promoting lifestyle in this target population.

Methods

Sample

The Institutional Review Boards on Human Subjects of the University of Georgia and the Georgia Department of Human Resources approved the questionnaires and procedures. Written informed consent and physician's clearance were obtained from participants. Participants were a convenience sample of older adults (all greater than 50 years of age) recruited from 40 senior centers from Georgia's 12 Area Agencies on Aging (AAA) in the fall of 2007. Each AAA was instructed to recruit about 70 individuals to participate. Senior centers were chosen based on the support of the senior center director and the willingness of participants to take part in the health promoting behavior intervention. Most participants received congregate meals at the senior center. Homebound elders were excluded. Other exclusion criteria, as determined by the interviewer, included the participant's inability to understand the informed consent, answer the pre- or post-test questions, or take part in the intervention.

A total of 815 participants were recruited, four were excluded because they did not answer the depression question, leaving 811 participants for analyses of the relationship of a previous depression diagnosis with variables of interest at pre-test. The impact of the intervention on improving health promoting behaviors was assessed in the subset of participants who completed the post-test and had the same answer to the depression question at the pre- and post-test (n = 546); some analyses have fewer participants due to incomplete responses to some questions.

Pre-test

Experts in nutrition and physical activity reviewed and edited both the pre- and post-test questionnaires to ensure content validity and cultural appropriateness (6 professionals, of whom 4 were faculty and 4 were registered dietitians from the Department of Foods and Nutrition, University of Georgia, and the Georgia Division of Aging Services). The questionnaire was interviewer administered, with the interviewer asking the questions and recording the responses. About one hour per participant was needed to explain the study, obtain informed consent, and complete the pre-test questionnaire. Additional follow up was needed to continue to obtain the physician's clearance forms for physical activity.

Questions assessing participant characteristics included demographic information, anthropometrics height and weight (self-reported or measured), general health including current illnesses (self-reported diabetes, high blood pressure, heart disease, and arthritis), self-report of diagnosed high blood cholesterol and osteoporosis, self-reported health, medication use (number of prescription [capped at 20 prescription medications] and over-the-counter [OTC] medications), support group attendance, and self-reported health. Body mass Index (BMI) was calculated (BMI = (weight (pounds)/height (inches)^2) x 703) using the weight and height responses. Total number of chronic conditions was assessed by summing positive responses to arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, and osteoporosis questions. Participants missing one or more chronic condition responses were not used to calculate mean number of chronic conditions. Total number of medications was assessed by summing the number of prescription medications (capped at 20 prescription medications) and OTC medications. Participants missing one or both medication responses were not used to calculate the total number of medications. Support group attendance was assessed with the

question, "Do you attend a support group for health conditions, such as diabetes, heart disease, cancer, grief, and other conditions?" Self-reported health was assessed with a question modified from the Behavioral Risk Factor Surveillance System and National Health and Nutrition Examination Survey, "How would you rate your overall health?" Possible responses included poor, fair, good, very good, and excellent (Behavioral Risk Factor Surveillance System 2006; National Health and Nutrition Examination Survey 2006).

Depression was assessed using the question, "Has a doctor or other health care provider ever told you that you have a depressive disorder?" from the 2006 Behavior Risk Factor Surveillance System questionnaire (2006). An original summary scale was developed to capture the main target areas of the intervention, specifically those categories of behaviors that have been agreed upon as having the greatest impact on chronic disease management and maintenance (American Cancer Society 2009; American Diabetes Association 2009; American Heart Association 2009). This scale weighs each of the four behavioral categories (nutrition, physical activity, tobacco avoidance, and preventative screenings) equally for 3 points in each category, because each category has such an important impact on one's health, resulting in a range of possible scores between 0 and 12 points (Blackmon, Kamimoto, and Smith 1999; American Heart Association 2009; American Diabetes Association 2009; American Cancer Society 2009). Similar to Brown, Muhlenkamp, and Osborn's Personal Lifestyle Questionnaire, this original scale is a 13-item, four-subscale instrument derived from four dimensions of health promoting behavior established in other studies (Brown, Muhlenkamp, and Osborn 1983; Harris and Guten 1979; Walker, Sechrist, and Pender 1987). The items on the scale represent current health promoting behavior recommendations and are based on questions from the Behavior Risk Factor Surveillance System questionnaire (2006) and the National Health and Nutrition Examination

Survey (2006). The scale measures the frequency at which individuals are meeting current

recommendations, providing a total weighted score to measure how many of the

recommendations are being met. The total weighted score was then dichotomized around the

median, indicating high and low engagement in a health promoting lifestyle. Depression and

physical activity have been previously examined in this sample using other measures of physical

activity (Porter et al. 2009).

The nutrition subcategory examined meeting fruit and vegetable, milk products, and

whole grain consumption recommendations. Total fruit and vegetable consumption was

calculated by summing daily reported fruit intake and daily reported vegetable intake. A sample

question is, "How many servings of vegetables do you usually have each day?" (Hendrix et al.

2008). Participants missing responses were excluded, and then results were dichotomized based on

current fruit and vegetable consumption recommendations ($1 = \geq 7$ servings/day and $0 = \leq 7$

servings/day) (United States Department of Health and Human Services and United States

Department of Agriculture 2005). Total milk product consumption was assessed by summing

daily consumption of milk as a beverage and milk on cereal. A sample question is, "How often

do you drink milk as a beverage? Frequency categories were servings per week or day (<1, 1, 2,

3, 4, 5, or 6 times per week or 1, "1 to 2", "2 to 3", or "3 or more" per day) (National Health and

Nutrition Examination Survey 2006). Participants missing responses were excluded, and then

results were dichotomized based on current milk product consumption recommendations ($1 = \geq 3$

servings/day and $0 = \leq 3$ servings/day) (United States Department of Health and Human Services and

United States Department of Agriculture 2005). Whole grain consumption was assessed by summing

daily whole wheat or whole grain bread consumption and whole grain cereal consumption using

questions similar to the milk product questions. Participants missing responses were excluded, and

then results were dichotomized based on current whole grain consumption recommendations ($1 = \geq 3$

servings/day and 0 = ≤3 servings/day) (United States Department of Health and Human Services and United States Department of Agriculture 2005). Median nutrition recommendations met was found by calculating the median of the summation of the dichotomized nutrition responses, participants missing one or more responses were not used to calculate the median. Responses were then dichotomized around the median nutrition recommendations met, indicating high and low nutritional engagement.

The physical activity subcategory examined meeting days, minutes, and minutes/day physical activity recommendations. Number of physically active days was assessed using the question, "How many days of the last week did you participate in any physical activity?" (Fitzpatrick et al. 2008). Results were dichotomized based on current physical activity recommendations (1 = ≥5 days/week and 0 = ≤5 days/week) (United States Department of Health and Human Services and United States Department of Agriculture 2005). Minutes of physical activity was assessed with the question, "How many minutes of physical activity do you do on the days you are physically active?" (Fitzpatrick et al. 2008). Results were dichotomized based on current physical activity recommendations (1 = ≥30 minutes and 0 = ≤30 minutes) (United States Department of Health and Human Services and United States Department of Agriculture 2005). Average minutes of physical activity per day was calculated by multiplying physically active days and minutes of physical activity and dividing by 7. Results were dichotomized based on current physical activity recommendations (1 = ≥30 minutes/day and 0 = ≤30 minutes/day) (United States Department of Health and Human Services and United States Department of Agriculture 2005). Median physical activity recommendations met was found by calculating the median of the summation of the dichotomized physical activity responses, participants missing one or more responses were not used to calculate the median. Responses were then dichotomized around the median physical activity recommendations met, indicating high and low physical activity engagement.

The tobacco avoidance subcategory was assessed with the single question, "Do you use any tobacco products such as cigarettes, cigars, pipe, or chewing tobacco?" Results were recoded (1= no use of tobacco products and 0 = use of tobacco products). Responses were dichotomized around the median tobacco avoidance recommendations met, indicating high and low tobacco avoidance engagement.

The preventive screening subcategory examined meeting bone mineral density, blood cholesterol, blood pressure, vision, hearing, and feet screening recommendations. Bone mineral density was assessed with a question adapted from the National Health and Nutrition Examination Survey, "About how long has it been since you last had a bone mineral density test?" Frequency categories were within the past year, within the past two years, within the past five years, five or more years ago, or never (National Health and Nutrition Examination Survey 2006). Results were dichotomized based on current bone mineral density screening recommendations (1 = ever and 0 = never) (National Osteoporosis Foundation 1999; Schousboe et al. 2007). High blood cholesterol screening was assessed with the question, "About how long has it been since you last had your blood cholesterol checked?" Frequency categories were within the past year, within the past two years, within the past five years, five or more years ago, or never (Behavioral Risk Factor Surveillance System 2006). Results were dichotomized based on current blood cholesterol screening recommendations (1 = within the past five years, within the past two years, and within the past year and 0 = greater than five years and never) (National Cholesterol Education Program 1993). Blood pressure screening was assessed with the question, "About how long has it been since you last had your blood pressure checked?" Frequency categories were within past month, within past year, within past two years, two or more years ago, and never (Behavioral Risk Factor Surveillance System 2000). Results were dichotomized to reflect current blood pressure screening recommendations (1 = within the past two years, within past year, and within past month and 0 = two or more years ago and

never) (American College of Physicians 1991; National High Blood Pressure Education Program 1990). Vision screening was assessed with the question, "When was the last time you visited any eye care professional to have your vision checked." Frequency measures included within the past month, within past year, within past two years, two or more years ago, and never (Behavioral Risk Factor Surveillance System 2006). Results were dichotomized to reflect current vision screening recommendations (1 = within the past month and within the past year for participants with diabetes and within the past month, within the past year, and within past two years for participants without diabetes and 0 = within the past two years, two or more years ago, and never for those with diabetes and two or more years ago and never for those without diabetes) (American Academy of Ophthalmology 1992). Hearing screening was measured with a question adapted from the Behavior Risk Factor Surveillance System, "When was the last time you visited an ear care professional to have your hearing or hearing aides checked." Frequency responses included within the past month, within past year, within past two years, two or more years ago, and never (Behavior Risk Factor Surveillance System 2006). Results were dichotomized to reflect current hearing screening recommendations (1 = ever and 0 = never) (National Academy of Science 1978). Lastly, feet screening was assessed with a question, "When was the last time you had your feet checked by a healthcare professional, such as a doctor or a nurse?" Frequency measures included within the past month, within past year, within past two years, two or more years ago, and never (Behavior Risk Factor Surveillance System 2006). Results were dichotomized to reflect current feet screening recommendations (1 = within the past month and within the past year for participants with diabetes and within the past month, within the past year, and within past two years for participants without diabetes and 0 = within the past two years, two or more years ago, and never for those with diabetes and two or more years ago and never for those without diabetes) (National Guideline Clearinghouse 2009). Median preventive screening recommendations met was found by calculating the median of the summation of the dichotomized preventive screening responses, participants missing one or more

responses were not used to calculate the median. Responses were dichotomized around the median preventive screening recommendations met, indicating high and low preventive screening engagement.

The nutrition knowledge questions include fruit and vegetable, milk products, and whole grain serving recommendations. Knowledge about the fruit and vegetable serving recommendation was assessed with a question from Hendrix et al., "How many fruits and vegetables should older people have each day?" Frequency responses were 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 servings per day, or "5 a day", "5 or more a day", and "7 to 10 a day" (2008). Results were dichotomized based on the current fruit and vegetable servings recommendation (1 = >7 servings/day or "7 to 10 a day" and 0 = <6 servings/day or "5 a day" or "5 or more a day") (United States Department of Health and Human Services and United States Department of Agriculture 2005). Milk product serving recommendation knowledge was assessed with a question similar to Ellis, Johnson, Fischer, and Hargrove, "How many servings of milk products should most older people eat each day?" Frequency responses were 1, 2, 3, and 4 servings and do not know (2005). Results were dichotomized to reflect current milk product serving recommendations (1 = ≥3 servings and 0 = ≤2 servings and do not know) (United States Department of Health and Human Services and United States Department of Agriculture 2005). Whole grain serving recommendation knowledge was assessed with the question, "How many whole grain servings should most older people eat each day?" Frequency responses were 1, 2, 3, and 4 servings and do not know (Ellis et al. 2005). Results were dichotomized to reflect current whole grain serving recommendations (1 = ≥3 servings and 0 = ≤2 servings and do not know) (United States Department of Health and Human Services and United States Department of Agriculture 2005).

The possible barriers to engagement include food insecurity, joint pain, feeling limited by a fear of falling, and symptoms of lactose intolerance (stomachache, gas, or diarrhea) after

drinking milk. Food insecurity as a barrier to engagement in a health promoting lifestyle was

assessed by asking, "Do you always have enough money to buy the food you need?" from the

Nutrition Screening Initiative (1992). Joint pain was assessed using, "During the past 30 days, have

you had symptoms of pain, aching, or stiffness in or around your joints?" from the Behavioral Risk

Factor Surveillance System (2005). Feeling limited by a fear of falling was assessed with the

question, "Do you feel limited in your daily life by a fear of falling?" assessed by Teems (2008).

Lastly, lactose intolerance was assessed with the question, "Do you get a stomachache, gas, or

diarrhea after drinking milk?" (Elbon, Johnson, and Fischer 1998).

Intervention

    After completion of the pre-test questionnaire, the health promoting behavior

intervention, "Seniors Taking Charge of Your Health!" was initiated at the senior centers

(available at http://nutritionandaging.googlepages.com,

http://www.livewellagewell.info/study/materials.htm, Johnson and Fischer 2008). The

intervention consisted of 12 lessons, each given one time and lasting 45 to 60 minutes. Nutrition

and physical activity experts from The University of Georgia and the Georgia Department of

Aging Services (6 professionals, of whom 4 were faculty and 4 were registered dietitians), who

have experience with the target population, assisted in developing the materials and reviewing

the curriculum for the intervention. Based on years of related experience, the experts ensured

that the curriculum was culturally appropriate and safe for the participants. The curriculum was

developed based on the previously successful educational interventions developed by the

University of Georgia for older adults for specific health promoting behaviors and physical

activity (Fitzpatrick et al. 2008; Hendrix et al. 2008; Speer et al. 2008; Teems 2008; Bell 2008;

Bell et al. 2009). The updated curriculum incorporated recent changes in physical activity and

nutritional recommendations (United States Department of Health and Human Services and

United States Department of Agriculture 2005). Similar to previous interventions, the conceptual framework for the health promoting behavior intervention was based on the health belief model (Stretcher and Rosenstock 1997). Aspects of health promoting lifestyle and physical activity were incorporated into every lesson, and all reviewed and discuss the over arching themes of the intervention (eating healthy, being active, being positive, and getting checked) and included physical activity, activities, and games. The titles of the lessons were, "Be Physically Active Everyday," "Healthy Cooking on a Budget," "Diabetes Prevention and Management," "Heart Health," "Healthy Cooking for Healthy Living," "Friends Helping Friends," "Depression-Getting Help for Those in Need," "Arthritis-Healthy Eating and Keeping Active Can Help," "Prevention-Getting Checked and Medicare Services," "Weight Management-Eat Healthy and Avoid Fads," "Dietary Supplements-Facts and Fiction," and "Bright Ideas for Bone Health."

Post-test

The post-test was administered within one to two months following the last lesson of the intervention to allow participants time to make behavior changes. The post-test was very similar to the pre-test, except that additional questions were added to allow participants to further describe changes in their behavior related to a health promoting lifestyle, as well as their satisfaction with the lessons and overall program.

Statistical Analysis

The questionnaires, consent forms, and physicians' clearance forms were sent to The University of Georgia for analyses. Data were coded and entered into secure files with access restricted to key personnel and was analyzed using the Statistical Analysis System (SAS, Version 9.1, SAS Institute, Cary, NC). Descriptive statistics, including frequencies, medians, and ranges

were calculated.   Differences in engagement in a health promoting lifestyle between people with and without a previous diagnosis of depression were assessed with Mann-Whitney U test for non-normally distributed data, and chi-square analysis for dichotomous variables. Changes in engagement in a health promoting lifestyle were compared using Wilcoxon Signed-Rank test.

A series of exploratory regression analyses were used to identify independent factors that influenced engagement in a health promoting lifestyle at the pre-test and following the intervention. Logistic regression was used to analyze factors affecting engagement in a health promoting lifestyle using the health promoting lifestyle score which was dichotomized around the median (0 = health promoting lifestyle scores from 0 to 7 and 1 = health promoting lifestyle scores ≥ 7.5) (combined regression analysis included 482 participants). Variables included in these models were pre-test demographics, previous diagnosis of depression, self-reported health conditions, self-reported health, medications, nutrition knowledge, and barriers to engagement in a health promoting lifestyle. Participants who did not give responses for each component of the model were excluded. Logistic regression was used to analyze the factors affecting the differences in health promoting lifestyle scores from pre-test to post-test (results were dichotomized to reflect a one behavior improvement) and looked at the variables in the previous models in addition to changes in nutrition knowledge and barriers to engagement in a health promoting lifestyle. The combined model examining factors affect change included 293 participants who met the inclusion criteria for pre-test regression analysis and gave responses for changes in nutrition knowledge, barriers to engagement in a health promoting lifestyle, and the health promoting lifestyle score. $P \leq 0.05$ was considered significant.

Results

Of the 811 participants who completed the pre-test questionnaire and are included in the

pre-test analyses, 76 percent (n = 618) completed the post-test questionnaire. The remaining 193

participants did not complete the post-test for these reasons: working (1.6 percent), death (2.1

percent), homebound (2.1 percent), death of a friend or family member (3.1 percent), refused

(6.2 percent), traveling (6.7 percent), no longer attending the senior center (11.9 percent),

hospitalized/sick (13.0 percent), no reason given (21.8 percent), and no information from the

senior center (25.9 percent). Of the 618 participants who completed the post-test questionnaire,

only 546 participants were included in the post-test analyses. The sample for statistical analyses

of the pre- and post-test changes included only those participants who had consistent responses

for the depression question and answered at least one pre- and post-test question regarding

engagement in health promoting behavior ("included," n = 546, Tables 3, 4, 7, and 8). Some of

the analyses include fewer participants due to incomplete responses to questions. Those who

completed both the pre- and post-test questionnaires and had consistent answers for the

depression question (n = 546) differed significantly from those excluded (n = 265) in regard to

prevalence of depression and diabetes, medication use, and support group attendance. Compared

to those who were excluded, those who were included had a lower prevalence of depression

(28.3 percent vs. 20.0 percent, P<0.01) and diabetes (37.3 percent vs. 30.3 percent, P<0.05), took

fewer medications (prescription and OTC) (7.3 ± 4.1 vs. 6.6 ± 4.1, P<0.01), prescription

medications (5.3 +/- 3.9 vs. 4.7 +/- 3.5, P<0.03), and had higher support group attendance (8.3

percent vs. 13.0 percent, P<0.05). There were no differences in age, gender, race, education,

BMI, arthritis, heart disease, high blood pressure, high blood cholesterol, osteoporosis, mean

number of chronic conditions, self-reported health, total number of OTC medications, or self-reported frequency of social support between those who were excluded and included.

Of the 811 participants who completed the pre-test and answered the depression question, the median age was 75.0 years, 81 percent were female, 37.2 percent were black, median years of education was 11.0 years, median body mass index (BMI) was 28.2 kg/m^2, the median number of chronic conditions (arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, and osteoporosis) was 3.0 chronic conditions, 59.7 percent reported their health to be good or better, median medication use was 6.0 medications per person (a median of 4.0 prescription and 1.0 over the counter medications), 11.5 percent attend a support group for a health condition, 54.4 percent reported always getting the social and emotional support that they needed, and 22.7 percent reported previously being diagnosed with depression (Table 1). Compared to those without a previous diagnosis of depression, those with a previous depression diagnosis were significantly younger, more likely to be white, had higher BMI, had a higher prevalence of chronic disease (heart disease, high blood pressure, high blood cholesterol, and osteoporosis), had lower self-reported health, and took more prescription and OTC medications, but did not differ in gender, education, prevalence of diabetes or arthritis, support group attendance, or self-reported social and emotional support.

Table 2 compares the frequency of engaging in a health promoting lifestyle by meeting current recommendations between those with and without previously diagnosed depression. Compared to those without a previous diagnosis of depression, those with a previous depression diagnosis engaged in significantly less of some of the physical activity behaviors (days participating in any physical activity and average minutes of physical activity per day), but met the bone mineral density screening recommendation with significantly greater frequency. No

significant differences were observed for median nutrition behaviors, or frequency of those meeting the nutritional recommendations for fruit and vegetable, milk product, or whole grain consumption, those engaging in at least 30 minutes of physical activity on the days that they are physically active, tobacco avoidance, preventive screenings, including the frequencies of those meeting the recommendations for blood cholesterol, blood pressure, vision, hearing, and foot screenings/checks, or the overall health promoting lifestyle score found by summing the weighted behavioral categories. However, those with a previous diagnosis of depression were significantly less likely to engage in a health promoting lifestyle when the variable was dichotomized around the median health promoting lifestyle score, reflecting high and low engagement in a health promoting lifestyle.

Tables 3 and 4 examine changes after the health promoting behavior intervention in Georgia senior centers. All behaviors related to a health promoting lifestyle improved significantly with the exception of those meeting the recommendations to engage in 30 minutes of physical activity on physically active days, tobacco avoidance, getting blood cholesterol checked within the past five years, getting blood pressure checked within the last two years, and visiting an eye care professional within the last year for those with diabetes and within the last two years for those without diabetes. The median health promoting lifestyle score improved significantly from 7.5 (2,11.5) to 8.5 (3,12) (P<0.001) and 57.7 percent of participants improved by at least one behavior after the intervention. All of the knowledge questions pertaining to current nutritional recommendations improved significantly. The only barrier to decrease significantly after the intervention was the frequency of those feeling limited in their daily lives by a fear of falling. Following the intervention there were no significant improvements with having enough money to buy food, experiencing joint pain, or having symptoms of lactose

intolerance (stomachache, gas, or diarrhea) after drinking milk. Satisfaction with both the health and nutrition education program and the physical activity program was very good ($3.0 \pm (0.9)$ and $3.0 \pm (0.9)$, respectively, $0 =$ poor to $4 =$ excellent).

A series of exploratory regression analyses were conducted to identify predictors of engagement in a health promoting lifestyle at pre-test (Tables 5 and 6). Models were constructed to assess depression, demographics, health, nutrition knowledge, and barriers to engagement in a health promoting lifestyle. In the depression model examining engagement in a health promoting lifestyle based on the health promoting lifestyle score dichotomized around the median, depression was significant. In the depression and demographics model, not having a previous depression diagnosis and being white were significantly associated with increased engagement in a health promoting lifestyle, but age, education, and gender were not significantly associated with engagement in a health promoting lifestyle. In the depression, demographics, and health model not having a previous depression diagnosis, being white, not having heart disease, not having high blood cholesterol, and having higher self-reported health were significantly associated with increased health promoting lifestyle engagement, but age, education, gender, arthritis, diabetes, high blood pressure, osteoporosis, number of prescription and OTC medications, and BMI were not significantly associated with engagement in a health promoting lifestyle. In the depression, demographics, and nutrition knowledge model not having a previous depression diagnosis and being white were positively associated with a higher health promoting lifestyle score, but age, education, gender, fruit and vegetable recommendation knowledge, milk product recommendation knowledge, and whole grain recommendation knowledge were not significantly associated with engagement in a health promoting lifestyle. In the depression, demographics, and barriers to engagement model not having a previous

depression diagnosis, being white, and not feeling limited by a fear of falling were all positively associated with higher engagement in a health promoting lifestyle, but age, education, gender, having enough money to buy food, joint pain, and symptoms of lactose intolerance were not significant. In the model that combines depression, demographics, health, nutrition knowledge, and barriers to engagement in a health promoting lifestyle the factors significantly associate with high engagement in a health promoting lifestyle included not having a previous depression diagnosis, being white, never having been told that your blood cholesterol is high, having higher self-reported health, being knowledgeable about fruit and vegetable recommendations, and not feeling limited by a fear of falling, but age, education, gender, arthritis, diabetes, heart disease, high blood pressure, osteoporosis, number of prescription and OTC medications, BMI, milk product and whole grain recommendation knowledge, having enough money to buy food, joint pain, and symptoms of lactose intolerance were not significantly associated with engagement in a health promoting lifestyle (Table 5).

The next series of models examine the four subcategories of a health promoting lifestyle (nutrition, physical activity, tobacco avoidance, and preventive screenings) (Table 6). In nutrition's depression model, depression was not a significant predictor for meeting nutritional recommendations. In nutrition's depression and demographics model, meeting more nutritional recommendations was significantly associated with being older, but not with depression, education, gender, and race. In nutrition's depression, demographics, and health model, meeting more nutritional recommendations was significantly associated with not having heart disease, but not with depression, age, education, gender, race, arthritis, diabetes, high blood pressure, high blood cholesterol, osteoporosis, self-reported health, number of prescription and OTC medications, and BMI. In nutrition's depression, demographics, and nutrition knowledge model,

meeting more nutritional recommendations was significantly associated with increased age and greater fruit and vegetable, whole grain, and milk product recommendation knowledge, but not with depression, education, gender, and race. In nutrition's depression, demographics, and barriers model, meeting more nutritional recommendations was significantly associated with increased age, but not with depression, education, gender, race, having enough money to buy food, joint pain, feeling limited by a fear of falling, and having symptoms of lactose intolerance. For nutrition's combined depression, demographics, health, nutrition knowledge, and barriers model, meeting more nutritional recommendations was significantly associated with increased fruit and vegetable, whole grain, and milk product recommendation knowledge, but not with depression, age, education, gender, race, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, osteoporosis, self-reported health, number of prescription and OTC medications, BMI, having enough money to buy food, joint pain, feeling limited by a fear of falling, and having symptoms of lactose intolerance. For the physical activity's depression model, not having depression was associated with meeting more physical activity recommendations. In physical activity's depression and demographics model, meeting more physical activity recommendations was significantly associated with not having depression, being younger, and being white, but not with education and gender. In physical activity's depression, demographics, and health model, meeting more physical activity recommendations was significantly associated being white, having a higher self-reported health, and taking less prescription medications, but not with depression, age, education, gender, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, osteoporosis, number of OTC medications, and BMI were not significant. For physical activity's depression, demographics, and barriers model, meeting more physical activity recommendations was significantly

associated with never being diagnosed with depression, being white, and not feeling limited by a fear of falling, but not with age, education, gender, and joint pain. In physical activity's combined depression, demographics, health, and barriers model, meeting more physical activity recommendations was significantly associated with being white, having a higher self-reported health, taking more prescription medications, and not feeling limited by a fear of falling, but not with depression, age, education, gender, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, osteoporosis, number of OTC medications, BMI, and joint pain. In tobacco avoidance's depression model, depression was not a significant predictor of tobacco avoidance. In tobacco avoidance's depression and demographics model, tobacco avoidance was significantly associated with being older and being white, but not with depression, education, and gender. In tobacco avoidance's depression, demographics, and health model, tobacco avoidance was significantly associated with being older and being white, but not with depression, education, gender, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, osteoporosis, self-reported health, number of prescription and OTC medications, and BMI. Lastly, for preventive screening's depression model, depression was a significant predictor of meeting preventive screening recommendations. In preventive screening's depression and demographics model, meeting more preventive screening recommendations was significantly associated with having depression, being older, and being female, but not with education or race. In preventive screening's depression, demographics, and health model, meeting more preventive screening recommendations was significantly associated with being older and having osteoporosis, but not with depression, education, gender, race, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, self-reported health, number of prescription medications, number of OTC medications, and BMI.

Regression analyses were also conducted to identify predictors of change (meeting at least one more recommendation following the intervention) in a health promoting lifestyle following the health promoting behavior intervention in Georgia senior centers (Tables 7 and 8). Similar models were used as in the previous regression analyses, but also included pre-test engagement, changes in nutrition knowledge, and barriers to engagement in a health promoting lifestyle. In the depression model, a lower pre-test health promoting lifestyle score was a significant predictor of change in engagement in a health promoting lifestyle, but depression was not significant. In the depression and demographics model, a lower pre-test health promoting lifestyle score was significant, but neither depression nor any demographic factor (age, education, gender, or race) was a significant predictor of change in engagement in a health promoting lifestyle. In the depression, demographics, and health model, change in engagement in a health promoting lifestyle was significantly associated with a lower pre-test health promoting lifestyle score, but not with depression, age, education, gender, race, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, osteoporosis, self-reported health, number of prescription or OTC medications, and BMI. In the depression, demographics, and nutrition knowledge model, a lower pre-test health promoting lifestyle score was a significant predictor of change in a health promoting lifestyle, but depression, age, education, gender, race, and fruit and vegetable, milk product, and whole grain recommendation knowledge at post-test were not significant predictors of change in a health promoting lifestyle. In the depression, demographics, and barriers model, change in engagement in a health promoting lifestyle was significantly associated with a lower pre-test health promoting lifestyle score, but not with depression, age, education, gender, race, having enough money to buy food, joint pain, feeling limited by a fear of falling, symptoms of lactose intolerance at both pre-test and post-test.

Lastly, in the combined depression, demographics, health, nutrition knowledge, and barriers model, only a lower pre-test health promoting lifestyle score was a significant predictor of change in engagement in a health promoting lifestyle, but depression, age, education, gender, race, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, osteoporosis, self-reported health, number of prescriptions and OTC medications, BMI, fruit and vegetable, milk product, and whole grain recommendation knowledge at post-test, having enough money to buy food, joint pain, feeling limited by a fear of falling, symptoms of lactose intolerance at pre-test and post-test were not significant predictors of change in a health promoting lifestyle following the health promoting behavior intervention (Table 7).

The last series of models explore change in the four subcategories of a health promoting lifestyle (nutrition, physical activity, tobacco avoidance, and preventive screenings) following the health promoting behavior intervention (Table 8). In the nutrition change depression model, a lower pre-test nutrition score was significant, but depression was not a significant predictor of change in meeting nutritional recommendations. In the nutrition change depression and demographics model, a lower pre-test nutrition score was significant, but neither depression nor demographics (age, education, gender, and race) were significantly associated with change in meeting nutritional recommendations. In the nutrition change depression, demographics, and health model, meeting more nutritional recommendations after the intervention was significantly associated with a lower pre-test nutrition score and having osteoporosis, but not with depression, age, education, gender, race, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, self-reported health, number of prescription and OTC medications, and BMI. In the nutrition change depression, demographics, and nutritional knowledge model, a lower pre-test nutrition score was significant, but neither depression, nor age, education, gender, race, fruit and

vegetable, milk product, and whole grain recommendation knowledge at post-test was significantly associated with change in meeting nutrition recommendations following the intervention. In the nutrition change depression, demographics, and barriers model, meeting more nutritional recommendations after the intervention was significantly associated with a lower pre-test nutrition score and not feeling limited by a fear of falling at pre-test, but not with depression, age, education, gender, race, enough money to buy food, joint pain, lactose intolerance at pre-test, and enough money to buy food, joint pain, lactose intolerance, and feeling limited by a fear of falling at post-test. In the combined nutrition change depression, demographics, health, nutrition knowledge, and barriers model, meeting more nutritional recommendations after the intervention was significantly associated with a lower pre-test nutrition score, having osteoporosis, and not feeling limited by a fear of falling at pre-test, but not with depression, age, education, gender, race, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, self-reported health, number of prescription and OTC medications, BMI, fruit and vegetable, milk product, and whole grain recommendation knowledge at pre-test, enough money to buy food, joint pain, lactose intolerance at pre-test, and enough money to buy food, joint pain, lactose intolerance, and feeling limited by a fear of falling at post-test. In the physical activity change depression model, a lower pre-test physical activity score was a significant predictor of change in meeting physical activity recommendations following the health promoting behavior intervention, but depression was not significant. In the physical activity change depression and demographics model, meeting more physical activity recommendations after the intervention was significantly associated with a lower pre-test physical activity score, but not with depression, age, education, gender, and race.   In the physical activity change depression, demographics, and health model, meeting more physical

activity recommendations after the intervention was significantly associated with a lower pre-test physical activity score, being female, having heart disease, and taking fewer OTC medications, but not with depression, age, education, race, arthritis, diabetes, high blood pressure, high blood cholesterol, osteoporosis, self-reported health, number of prescription medications, and BMI. In the physical activity change depression, demographics, and barriers model, meeting more physical activity recommendations after the intervention was significantly associated with a lower pre-test physical activity score, but not with depression, age, education, gender, race, joint pain and feeling limited by a fear of falling at pre-test, and joint pain and feeling limited by a fear of falling at post-test. In the combined physical activity change depression, demographics, health, and barriers model, meeting more physical activity recommendations after the intervention was significantly associated with a lower pre-test physical activity score, being female, having heart disease, and taking fewer OTC medications, but not with depression, age, education, race, arthritis, diabetes, high blood pressure, high blood cholesterol, osteoporosis, self-reported health, number of prescription medications, BMI, joint pain and feeling limited by a fear of falling at pre-test, and joint pain and feeling limited by a fear of falling at post-test. For the tobacco avoidance change models, there was a quasi-complete separation of the data points, so no maximum likelihood estimate existed. In the preventive screening change depression model, a lower pre-test preventive screening score was significantly associated with meeting more preventive screening recommendations after the intervention, but depression was not. In the preventive screening change depression and demographics model, a lower pre-test preventive screening score and being black were significantly associated with meeting more preventive screening recommendations following the intervention, but depression, age, education, and gender were not significantly associated. In the preventive screening change depression,

demographics, and health model, meeting more preventive screening recommendations after the intervention was significantly associated with a lower pre-test preventive screening score, being black, a lower self-reported health, and taking more OTC medications, but not with depression, age, education, gender, arthritis, diabetes, heart disease, high blood pressure, high blood cholesterol, osteoporosis, number of prescription medications, and BMI.

Discussion

The purpose of this study was to examine the relationship between a previous diagnosis of depression and engagement in a health promoting lifestyle before and after a 12-week health promoting behavior intervention in Georgia senior centers. To our knowledge, no research exists exploring the effects of depression on older adult's engagement in a health promoting lifestyle after a health promoting behavior intervention. A major finding was that the prevalence of depression, based on a previous diagnosis of depression, in this sample was higher than expected based on reported state and national prevalence. Also, a previous diagnosis of depression was a significant predictor of overall engagement in a health promoting lifestyle at pre-test. However, after the intervention, a previous diagnosis of depression was not associated with change in a health promoting lifestyle or change in any subcategory of a health promoting lifestyle. Lastly, despite the relationship between depression and engagement in some aspects of a health promoting lifestyle, significant improvements in engagement in a health promoting lifestyle were seen after the health promoting behavior intervention.

Depression was assessed using a question from the Behavioral Risk Factor Surveillance System (BRFSS) 2006, "Has a doctor or other health care provider ever told you that you have a depressive disorder?" At pre-test a higher proportion of our sample, 22.7 percent, reported a previous diagnosis of depression (Table 1) compared to 18 percent of older adults in Georgia and

15 percent of older adults nationally (Centers for Disease Control and Prevention and National Association of Chronic Disease Directors 2006). The high prevalence of those with a previous depression diagnosis in this sample may be due in part to the Older American's Act Nutrition Program's purposeful targeting of those with the greatest economic and social need, especially low-income minorities and rural older adults (Older Americans Act 2006; Administration on Aging 2008). Serious consequences of depression in older adults include increased illness and suicide mortality, with the mortality rates of depressed older adults being four times higher than that seen in their peers who are not depressed (United States Department of Health and Human Services 1999; American Psychological Association 2004). One reason for the increased mortality seen in those with depression may be related to the higher rates of chronic disease and lower rates of engagement in a health promoting lifestyle associated with depression (Lambert and Pantelis 2003; Bonnet et al. 2005a; Bonnet et al. 2005b). In our study, those with a previous diagnosis of depression had significantly more chronic health conditions than those without (4 health conditions vs. 3 health conditions, P<0.001). Thus, given the possible adverse relationship among depression, chronic disease, and engagement in a health promoting lifestyle, the present study was conducted to determine the relationship between a previous diagnosis of depression and engagement in a health promoting lifestyle.

Before the initiation of the intervention, a pre-test was conducted, while there was no significant univariate relationship between depression and engagement in a health promoting lifestyle, when engagement in a health promoting lifestyle was dichotomized around the median, depression was significantly associated with less engagement in a health promoting lifestyle. Likewise, depression was found to be a significant predictor of overall engagement in a health promoting lifestyle when controlling for variables such as demographics, health, nutrition

knowledge, and barriers to engagement in a health promoting lifestyle. A previous diagnosis of depression was associated with less compliance to current physical activity recommendations of 30 minutes of moderate physical activity most days of the week (as previously reported in this sample by Porter, 2009), but was associated with increased compliance with bone density screening recommendations (United States Department of Health and Human Services and United States Department of Agriculture 2005; National Osteoporosis Foundation 1999). In a series of multivariate regression analyses, it was found that a previous depression diagnosis was a factor predicting engagement in a health promoting lifestyle, as defined by our health promoting lifestyle score, even when controlling for demographics, health, nutrition knowledge, and barriers known to influence engagement in a health promoting lifestyle (Gillis 1993; Felton, Parsons, and Bartoces 1997; Pullen Walker, and Fiandt 2001). A previous diagnosis of depression was a significant predictor of less physical activity in all of the individual models except the depression, demographics, and health model and the combined model (similar to the findings previously reported in this sample by Porter, 2009). Our results are similar to others studies that have found depression negatively influences engagement in physical activity, even when controlling for other factors (Goodwin 2003; Paluska and Schwenk 2000). A previous diagnosis of depression was found to be a significant positive predictor of engaging in preventive screenings as recommended, when controlling for demographic factors, which is contrary to what other studies have found (Golomb et al. 2000). One possible explanation is that a lack of health care coverage in the mentally ill population is typically a barrier to getting the recommended preventive screenings, but since many older adults have Medicare that pays for many preventive services, this barrier may no longer exist (Badger et al. 2003; United States Department of Health and Human Services, Centers for Medicare and Medicaid Services 2007).

In addition, studies have shown that those with depression have higher ambulatory care use and fill more prescriptions, so the combination of increased healthcare use and increased health care coverage could explain this unexpected finding (Egede, Zheng, and Simpson 2002). Another possible explanation is that those who more often engage in preventive screenings for other chronic conditions are more likely to get screened for depression. This phenomenon is probably complex and involves several factors.

A previous diagnosis of depression did not appear to significantly interfere with the ability of participants to improve their health promoting lifestyle score following the intervention when controlling for demographics, health, nutrition knowledge, or barriers to engagement in a health promoting lifestyle independently of combined (Table 7). The only factor significantly predicting change in the health promoting lifestyle score after the intervention is a lower pre-test health promoting lifestyle score, depression was not significant. Also, a previous depression diagnosis did not appear to be a barrier for participants' improvement in any subcategory of a health promoting lifestyle (nutrition, physical activity, tobacco avoidance, and preventive screenings) in any of the regression models. Regression analyses of the four subcategories highlight the uniqueness of each category comprising a health promoting lifestyle and reiterate the complexity of studying a health promoting lifestyle.

Overall, the health promoting behavior intervention resulted in significant improvements in engagement in a health promoting lifestyle. Following the intervention, significantly more participants were meeting current health promoting behavior recommendations (United States Department of Health and Human Services and United States Department of Agriculture 2005; National Osteoporosis Foundation 1999; National Cholesterol Education Program 1993; American College of Physicians 1991; National High Blood Pressure Education Program 1990;

American Academy of Ophthalmology 1992; National Academy of Sciences 1978; National

Guideline Clearinghouse 2009). The overall health promoting lifestyle score increased from 7.4

(1.7) to 8.0 (1.8), P<0.001, after the intervention. Likewise, all subcategory totals comprising the

scale, except tobacco avoidance (nutrition, physical activity, and preventive screenings)

increased significantly following the health promoting behavior intervention. The behaviors

where recommendation compliance did not significantly increase (minutes of physical activity

on physically active days, tobacco avoidance, cholesterol screening, blood pressure screenings,

and eye examinations) all had high compliance at pre-test (ranging from 71.9 percent to 99.4

percent meeting recommendations at pre-test). Poor improvement in minutes of physical activity

on physically active days has also been documented in past interventions in this population

(Fitzpatrick et al. 2008). While no previous studies in this population have examined all of these

behaviors compared to current recommendations, an intervention promoting fruit and vegetable

consumption, with similar methodology, has been reported (Hendrix et al. 2008). Pre-test fruit

and vegetable intake in this previous intervention (58 percent meeting the fruit and vegetable

consumption recommendation) was higher than the current study (19.7 percent meeting the fruit

and vegetable consumption recommendation) at pre-test. The previous intervention also showed

greater percentage change (21 percent) compared to the current intervention (12.4 percent)

following the interventions. The smaller change seen in participants meeting fruit and vegetable

recommendations in the current study compared to the previous study may be attributed to the

broad focus of the current intervention instead of the primary focus on fruit and vegetable intake

in the previous intervention by Hendrix et al. (2008).

There are a few limitations to this study. Depression was evaluated with only one

question from the Behavioral Risk Factor Surveillance System (BRFSS) that assessed a previous

depression diagnosis (Behavioral Risk Factor Surveillance System 2006). Evidence suggests that depression is a recurrent problem, plaguing individuals throughout life, but becoming more chronic in later life, and that an estimated 90 percent of older adults with a previous depression diagnosis will have a depression recurrence within three years (Cole and Bellavance 1997; American Psychological Association 2003; Reynolds, Frank, Perel, and Imber 1999). Ergo, the BRFSS question may provide useful and meaningful information about depression in older adults. In the future, studies could also explore the effect of depression symptoms in older adults by using a tool such as the Geriatric Depression Scale (Yesavage et al. 1982; Herrmann et al. 1996; Almeida and Almeida 1999). Other ways to explore depression may include assessing current psychological treatment, including current medication use to treat depression, and the type of diagnosed depressive disorder. In this study, concerns about implementation variability across the various sites was addressed by having Wellness Coordinators and educators take part in a statewide training, along with printed and online training and educational materials, and technical assistance from The University of Georgia by phone, email, and site visits. Due to the nature of self-reported data, information may be inaccurate due to memory lapses and social acceptability bias, but this was minimized because Wellness Coordinators and their staff administered the questionnaires to participants and recorded their responses. The interviewer-administered questionnaires also minimized concerns about impaired vision and/or hearing. Lastly, the intervention contains a lesson on depression and another on social support, which may have provided the depressed group with information and resources that may have helped to offset the effects of depression and cause the depressed group's engagement in a health promoting lifestyle to be more favorable. Since both the depressed and non-depressed groups received this education, the overall result (e.g. degree of change between the groups) should not

have been affected. Although no maintenance data regarding the intervention has been collected, the materials are available online, printed in large fonts, and can be utilized by a variety of settings to encourage engagement in a health promoting lifestyle.

In summary, the health promoting behavior intervention improved engagement in health promoting lifestyle of older adults attending Georgia senior centers and the high prevalence of depression, based on a previous depression diagnosis, in this sample was not a barrier to improvement. Future studies are needed to further assess depression and the complexity of a health promoting lifestyle in community dwelling older adults.

Acknowledgements

TABLE 3.1. Characteristics of Participants in Georgia Senior Centers, 2007-2008

		Pre-test		Depressed		Non-depressed		
		N	Median (range) or %	N	Median (range) or %	N	Median (range) or %	P-value[a]
Depression		811	22.7	184	100.0	627	0.0	-
Age (years)		811	75.0 (51-97)	184	73.0 (54-97)	627	76.0 (51-97)	<0.001
Gender	Male	811	19.0	184	14.1	627	20.4	0.06
	Female		81.0		85.9		79.6	
Race/ethnicity	White	811	61.6	183	72.1	619	59.4	0.01
	Black		37.2		27.9		40.6	
	Other		1.1		-		-	
Education (years)		796	11.0 (0-20)	182	11.0 (0-20)	614	11.0 (0-20)	0.95
Body mass index (kg/m^2)		771	28.2 (14.0-64.0)	176	29.5 (15.8-64.0)	595	28.0 (14.0-53.5)	0.01
Arthritis		809	69.7	184	75.5	625	68.0	0.06
Diabetes		807	32.6	183	37.7	624	31.1	0.09
Heart disease		806	31.1	184	41.3	622	28.1	<0.001
High blood pressure		809	73.0	184	78.8	625	71.4	0.04
High blood cholesterol		783	57.5	178	69.1	605	54.0	<0.001
Osteoporosis		799	27.2	184	38.6	615	23.7	<0.001
Median number of health-conditions[b]		762	3.0 (0-6)	177	4.0 (0-6)	585	3.0 (0-6)	<0.001
Self-reported health	Excellent	811	3.6	184	1.6	627	4.2	<0.001
	Very Good		13.4		10.3		14.4	
	Good		42.7		39.1		43.7	
	Fair		34.0		37.0		33.2	
	Poor		6.3		12.0		4.6	
Number of prescription medications		794	4.0 (0-20)	182	5.0 (0-20)	612	4.0 (0-20)	<0.001
Number of OTC medications		785	1.0 (0-20)	178	2.0 (0-10)	607	1.0 (0-20)	0.03
Total number of medications[c]		772	6.0 (0-24)	177	7.0 (1-24)	595	6.0 (0-23)	<0.001
Attend a support group for health conditions		809	11.5	184	14.7	625	10.6	0.12

			Pre-test		Depressed		Non-depressed		
		N	Median (range) or %	N	Median (range) or %	N	Median (range) or %	P-value[a]
Self-reported frequency of social support	**Always**	788	54.4	181	48.6	607	56.2	0.13
	Usually		22.3		26.5		21.1	
	Sometimes		12.4		13.3		12.2	
	Rarely		4.3		5.0		4.1	
	Never		6.5		6.6		6.4	

[a]P-value of depressed compared to non-depressed participants.

[b]Participants who were missing one or more responses were not used to calculate the average.

[c]Total number of medications is the sum of prescription and OTC medications. Participants who were missing one or both responses were not used to calculate total number of medications.

TABLE 3.2. Engagement in a Health Promoting Lifestyle and Depression in Georgia Senior Centers, 2007-2008

		N	Depressed median (range) or %[a]	N	Non-depressed median (range) or %[a]	P-value
Nutrition	**Servings of fruits and vegetables consumed each day ($\geq$ 7 servings)**	181	14.9	610	20.2	0.11
	Servings of milk products consumed each day ($\geq$ 3 servings)	176	9.1	600	8.0	0.64
	Servings of whole grains consumed each day ($\geq$ 3 servings)	178	12.4	590	10.7	0.53
	Nutrition score of 0	169	72.8	559	66.9	0.22
	Nutrition score of 1		20.1		27.6	
	Nutrition score of 2		5.9		4.6	
	Nutrition score of 3		1.2		0.9	
Physical activity (See also Porter, 2009)	**How many days of the last week did you participate in any physical activity? ($\geq$ 5 days)**	183	53.6	619	61.7	0.05
	How many minutes of physical activity do you do on the days that you are physically active? ($\geq$ 30 minutes)	176	65.3	596	70.3	0.21
	Average minutes of physical activity per day ($\geq$ 30 minutes)	175	33.7	591	42.3	0.04
	Physical activity score of 0	175	20.0	591	16.6	0.02
	Physical activity score of 1		38.3		31.6	
	Physical activity score of 2		10.9		11.2	
	Physical activity score of 3		30.9		40.6	
Tobacco avoidance	**Do you use tobacco products such as cigarettes, cigars, pipe, or chewing tobacco? (no)**	184	91.3	620	91.9	0.78
	Tobacco avoidance score of 0	184	8.7	620	8.1	0.78
	Tobacco avoidance score of 3		91.3		91.9	

		N	Depressed median (range) or %[a]	N	Non-depressed median (range) or %[a]	P-value
Preventive screenings	**About how long has it been since you last had a bone mineral density test? (ever)**	168	78.0	582	68.0	0.01
	About how long has it been since you last had your blood cholesterol checked? (within the past 5 years)	170	97.7	597	97.3	0.81
	About how long has it been since you last had your blood pressure checked? (within the past 2 years)	184	99.5	625	99.2	0.72
	When was the last time you visited any eye care professional? (to have your eyes and vision checked) (within the past year for those with diabetes and within the past 2 years for those without diabetes)	180	84.4	613	83.5	0.77
	When was the last time you visited any ear care professional? (to have your hearing or hearing aides checked) (ever)	173	68.8	593	64.2	0.27
	When was the last time you had your feet checked by a healthcare professional, such as a doctor or a nurse? (within the past year for those with diabetes and within the past 2 years for those without diabetes)	177	68.4	604	66.2	0.60
	Preventive screenings score of 0	145	0.0	536	0.0	0.14
	Preventive screenings score of 0.5		0.0		0.6	
	Preventive screenings score of 1.0		1.4		1.3	
	Preventive screenings score of 1.5		7.6		11.8	

		N	Depressed median (range) or %[a]	N	Non-depressed median (range) or %[a]	P-value
Preventive screenings	**Preventive screenings score of 2**	145	18.6	536	23.1	0.14
	Preventive screenings score of 2.5		40.7		32.8	
	Preventive screenings score of 3		31.7		30.4	
Health promoting lifestyle score[b]		129	7.0 (3.0-11.5)	457	7.5 (1.5-11)	0.18
Higher health promoting lifestyle score[c]		129	42.6	457	54.7	0.02

[a]Percentage of those with and without previously diagnosed depression meeting the recommendations.

[b]Score calculated by summing all 4 weighted behavioral categories for a maximum of 12 points. Each of the 4 categories is worth a total of 3 points.

[c]Health promoting lifestyle score $\leq 7 = 0$ and $\geq 7.5 = 1$, reflecting the median health promoting lifestyle score.

TABLE 3.3. Changes in Engagement in a Health Promoting Lifestyle Following the Health Promoting Behavior Intervention in Georgia Senior Centers, 2007-2008

		N	Pre-test median (range) or % [a]	N	Pre-test median (range) or % [a]	Post-test median (range) or % [a]	Change	P-value
Nutrition	**Servings of fruits and vegetables consumed each day (≥ 7 servings)**	791	19.0	524	19.7	32.1	12.4	<0.001
	Servings of milk products consumed each day (≥ 3 servings)	776	8.2	481	9.4	17.3	7.9	<0.001
	Servings of whole grains consumed each day (≥ 3 servings)	768	11.1	483	10.6	22.0	11.4	<0.001
	Median nutrition behaviors	728	0.0 (0.0-3.0)	429	0.0 (0.0-3.0)	0.0 (0.0-3.0)	0.0 (-3.0-3.0)	<0.001
	Percent who improved by at least 1 nutrition behavior	-	-	429	35.7		-	-
Physical activity (See also Porter, 2009)	**How many days of the last week did you participate in any physical activity? (≥ 5 days)**	802	59.8	543	61.0	67.4	6.4	0.01
	How many minutes of physical activity do you do on the days that you are physically active? (≥ 30 minutes)	772	69.2	498	71.9	75.7	3.8	0.11

		N	Pre-test median (range) or % [a]	N	Pre-test median (range) or % [a]	Post-test median (range) or % [a]	Change	P-value
Physical activity (See also Porter, 2009)	**Average minutes of physical activity per day (≥ 30 minutes)**	766	40.3	496	42.7	48.8	6.1	0.02
	Median physical activity behaviors	766	1.0 (0.0-3.0)	496	2.0 (0.0-3.0)	2.0 (0.0-3.0)	0.0 (-3.0-3.0)	0.01
	Percent who improved by at least 1 physical activity behavior	-	-	496	32.3		-	-
Tobacco avoidance	**Do you use tobacco products such as cigarettes, cigars, pipe, or chewing tobacco? (no)**	804	91.8	533	91.6	92.5	0.9	0.33
	Median tobacco avoidance behavior	804	3.0 (0.0-3.0)	533	3.0 (0.0-3.0)	3.0 (0.0-3.0)	0.0 (-3.0-3.0)	0.33
	Percent who improved by at least 1 tobacco avoidance behavior	-	-	533	2.1		-	-
Preventive screenings	**About how long has it been since you last had a bone mineral density test? (ever)**	750	70.3	485	71.6	75.7	4.1	0.01
	About how long has it been since you last had your blood cholesterol checked? (within the past 5 years)	767	97.4	510	97.2	98.4	1.2	0.21

		N	Pre-test median (range) or % [a]	N	Pre-test median (range) or % [a]	Post-test median (range) or % [a]	Change	P-value
Preventive screenings	**About how long has it been since you last had your blood pressure checked? (within the past 2 years)**	809	99.3	541	99.4	100.0	0.6	0.25
	When was the last time you visited any eye care professional? (to have your eyes and vision checked) (within the past year for those with diabetes and within the past 2 years for those without diabetes)	793	83.7	529	83.7	86.0	2.3	0.13
	When was the last time you visited any ear care professional? (to have your hearing or hearing aides checked) (ever)	766	65.3	503	66.4	71.0	4.6	0.04

		N	Pre-test median (range) or % [a]	N	Pre-test median (range) or % [a]	Post-test median (range) or % [a]	Change	P-value
Preventive screenings	**When was the last time you had your feet checked by a healthcare professional, such as a doctor or a nurse? (within the past year for those with diabetes and within the past 2 years for those without diabetes)**	781	66.7	520	63.5	74.4	10.9	<0.001
	Median preventive screening behaviors	681	2.5 (0.5-3.0)	425	2.5 (0.5-3.0)	2.5 (0.5-3.0)	0.0 (-1.5-2.0)	<0.001
	Percent who improved by at least 1 preventive screening behavior	-	-	425	35.3		-	-
Health promoting lifestyle score	**Median health promoting lifestyle score[b]**	586	7.5 (1.5-11.5)	298	7.5 (2.0-11.5)	8.5 (3.0-12.0)	1.0 (-4.0-5.5)	<0.001
	Percent who improved by at least 1 behavior	-	-	298	57.7		-	-

[a]Percent of population meeting the health promoting behavior recommendations.

[b]Score calculated by summing all 4 weighted behavioral categories for a maximum of 12 points. Each of the 4 categories is worth a total of 3 points.

TABLE 3.4. Changes in Knowledge and Barriers Following the Health Promoting Behavior Intervention in Georgia Senior Centers, 2007-2008

	N	Pre-test %	N	Pre-test[a] %	Post-test %	Change	P-value
How many fruits and vegetables should older people eat each day? (≥ 7 servings)[b, c]	782	11.8	523	13.4	48.0	34.6	<0.001
How many servings of milk products should older people eat each day? (≥ 3 servings)[b]	810	31.9	536	32.3	60.6	28.3	<0.001
How many whole grain servings should older people eat each day? (≥ 3 servings)[b, c]	805	32.2	536	34.5	57.6	23.1	<0.001
Do you always have enough money to buy the food you need? (no)[c]	792	18.8	528	18.2	16.9	-1.3	0.48
During the past 30 days, have you had symptoms of pain, aching, or stiffness in or around a joint? (yes)	810	69.1	544	67.5	69.1	1.6	0.44
Do you feel limited in your daily life by a fear of falling? (yes)	799	34.8	532	33.6	28.2	-5.4	0.02
Do you get a stomachache, gas, or diarrhea after drinking milk? (yes)	798	23.7	537	22.4	25.0	2.6	0.14

[a]Completed both the pre-test and the post-test.

[b]Correct responses according to the USDA 2005 Dietary Guidelines for Americans.

[c]For additional analyses see Catlett, 2009.

TABLE 3.5. Regression Models Exploring Predictors of Engagement in a Health Promoting Lifestyle at Pre-test

	Predictors of engaging in a health promoting lifestyle at pre-test[a]		
	B	**OR (95% CI)**	**P-value**
Depression model (n = 586)			
Intercept	0.19		0.04
Depression (0 = no, 1 = yes)	-0.48	0.62 (0.42-0.91)	0.02
Depression and demographics model (n = 577)			
Intercept	1.13		0.01
Depressed (0 = no, 1 = yes)	-0.60	0.55 (0.36-0.83)	0.01
Age (0 = <75 years, 1 = ≥75 years)[b]	0.09	1.09 (0.78-1.54)	0.62
Education (0 = <11 years, 1 = ≥11 years)[b]	0.23	1.26 (0.88-1.80)	0.20
Gender (0 = male, 1 = female)	0.01	1.01 (0.65-1.56)	0.96
Race (1 = white, 2 = black)	-0.85	0.43 (0.30-0.62)	<0.001
Depression, demographics, and health model (n = 518)			
Intercept	0.54		0.29
Depressed (0 = no, 1 = yes)	-0.58	0.56 (0.35-0.88)	0.01
Age (0 = <75 years, 1 = ≥75 years)[b]	0.10	1.10 (0.74-1.64)	0.64
Education (0 = <11 years, 1 = ≥11 years)[b]	0.21	1.23 (0.82-1.83)	0.30
Gender (0 = male, 1 = female)	-0.22	0.80 (0.49-1.32)	0.39
Race (1 = white, 2 = black)	-0.75	0.47 (0.31-0.73)	<0.001
Arthritis (0 = no, 1 = yes)	0.18	1.20 (0.78-1.84)	0.40
Diabetes (0 = no, 1 = yes)	0.25	1.28 (0.82-2.00)	0.27
Heart Disease (0 = no, 1 = yes)	-0.49	0.62 (0.40-0.95)	0.03
High blood pressure (0 = no, 1 = yes)	0.23	1.26 (0.80-1.97)	0.32
High blood cholesterol (0 = no, 1 = yes)	-0.41	0.66 (0.45-0.98)	0.04
Osteoporosis (0 = no, 1 = yes)	0.39	1.48 (0.96-2.30)	0.08
Self-reported health (0 = poor or fair, 1 = good, very good, and excellent)	0.72	2.06 (1.38-3.08)	<0.001
Number of prescription medications (0 = <3 medications, 1 = ≥4 medications)[b]	-0.36	0.69 (0.44-1.10)	0.12
Number of OTC medications (0 = 0 medications, 1 = ≥1 medication)[b]	0.37	1.45 (0.86-2.43)	0.16
BMI (0 = < 28.2 kg/m^2, 1 = ≥28.2 kg/m^2)[b]	-0.01	0.99 (0.67-1.48)	0.97
Depression, demographics, and knowledge model (n = 558)			
Intercept	0.90		0.01
Depressed (0 = no, 1 = yes)	-0.57	0.57 (0.37-0.86)	0.01
Age (0 = <75 years, 1 = ≥75 years)[b]	0.14	1.15 (0.81-1.63)	0.44

	Predictors of engaging in a health promoting lifestyle at pre-test[a]		
	B	**OR (95% CI)**	**P-value**
Education (0 = <11 years, 1 = >11 years) [b]	0.18	1.19 (0.83-1.72)	0.34
Gender (0 = male, 1 = female)	-0.04	0.96 (0.61-1.50)	0.85
Race (1 = white, 2 = black)	-0.80	0.45 (0.31-0.65)	<0.001
Fruit and vegetable knowledge (0 = no, 1 = yes)	0.37	1.44 (0.85-2.44)	0.17
Milk knowledge (0 = no, 1 = yes)	0.13	1.14 (0.78-1.67)	0.50
Whole grain knowledge (0 = no, 1 = yes)	0.34	1.41 (0.95-2.08)	0.09
Depression, demographics, and barriers model (n = 553)			
Intercept	0.86		0.07
Depressed (0 = no, 1 = yes)	-0.58	0.56 (0.36-0.87)	0.01
Age (0 = <75 years, 1 = >75 years) [b]	0.17	1.18 (0.82-1.69)	0.37
Education (0 = <11 years, 1 = >11 years) [b]	0.23	1.26 (0.87-1.82)	0.22
Gender (0 = male, 1 = female)	0.20	1.22 (0.78-1.93)	0.38
Race (1 = white, 2 = black)	-0.76	0.47 (0.31-0.69)	<0.001
Enough money to buy food (0 = no, 1 = yes)	0.26	1.30 (0.80-2.09)	0.29
Joint pain (0 = no, 1 = yes)	0.03	1.03 (0.70-1.52)	0.87
Limited by fear of falling (0 = no, 1 = yes)	-0.58	0.56 (0.38-0.83)	0.01
Symptoms of lactose intolerance (0 = no, 1 = yes)	-0.43	0.65 (0.42-1.00)	0.06
Depression, demographic, health, knowledge, and barriers model (n = 482)			
Intercept	0.34		0.59
Depressed (0 = no, 1 = yes)	-0.56	0.57 (0.35-0.94)	0.03
Age (0 = <75 years, 1 = >75 years) [b]	0.21	1.23 (0.79-1.91)	0.35
Education (0 = <11 years, 1 = >11 years) [b]	0.10	1.10 (0.72-1.69)	0.66
Gender (0 = male, 1 = female)	-0.06	0.94 (0.55-1.62)	0.83
Race (1 = white, 2 = black)	-0.68	0.50 (0.31-0.82)	0.01
Arthritis (0 = no, 1 = yes)	0.24	1.27 (0.74-2.18)	0.39
Diabetes (0 = no, 1 = yes)	0.35	1.43 (0.88-2.30)	0.15
Heart Disease (0 = no, 1 = yes)	-0.46	0.63 (0.39-1.01)	0.06
High blood pressure (0 = no, 1 = yes)	0.23	1.26 (0.78-2.04)	0.34
High blood cholesterol (0 = no, 1 = yes)	-0.52	0.60 (0.39-0.91)	0.02
Osteoporosis (0 = no, 1 = yes)	0.37	1.44 (0.90-2.32)	0.13
Self-reported health (0 = poor or fair, 1 = good, very good, and excellent)	0.72	2.05 (1.33-3.17)	0.01
Number of prescription medications (0 = <3 medications, 1 = >4 medications) [b]	-0.35	0.70 (0.43-1.15)	0.16
Number of OTC medications (0 = 0 medications, 1 = >1 medication) [b]	0.34	1.41 (0.81-2.45)	0.22

	Predictors of engaging in a health promoting lifestyle at pre-test[a]		
	B	**OR (95% CI)**	**P-value**
BMI (0 = < 28.2 kg/m^2, 1 = $\geq$28.2 kg/m^2) [b]	0.02	1.03 (0.66-1.58)	0.91
Fruit and vegetable knowledge (0 = no, 1 = yes)	0.63	1.88 (1.04-3.41)	0.04
Milk knowledge (0 = no, 1 = yes)	0.04	1.04 (0.66-1.62)	0.88
Whole grain knowledge (0 = no, 1 = yes)	0.29	1.33 (0.84-2.12)	0.22
Enough money to buy food (0 = no, 1 = yes)	0.04	1.04 (0.60-1.79)	0.90
Joint pain (0 = no, 1 = yes)	0.04	1.04 (0.61-1.77)	0.90
Limited by fear of falling (0 = no, 1 = yes)	-0.59	0.55 (0.36-0.87)	0.01
Symptoms of lactose intolerance (0 = no, 1 = yes)	-0.40	0.67 (0.41-1.10)	0.11

[a]Health promoting lifestyle score $\leq$7 = 0 and $\geq$7.5 = 1, reflecting the median health promoting lifestyle score.

[b]Response dichotomized to reflect the median.

TABLE 3.6. Regression Models Exploring Predictors of Engagement in the Four Categories of a Health Promoting Lifestyle at Pre-test, 2007–2008

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Depression model												
N	728			766			804			681		
Intercept	-0.70		<0.001	0.07		0.39	2.43		<0.001	0.54		<0.001
Depression (0 = no, 1 = yes)	-0.28	0.76 (0.52-1.11)	0.15	-0.40	0.67 (0.47-0.94)	0.02	-0.08	0.92 (0.51-1.66)	0.78	0.42	1.52 (1.01-2.28)	0.04
Depression and demographics model												
N	713			747			782			667		
Intercept	-0.96		0.01	1.17		<0.001	3.05		<0.001	-0.47		0.16
Depressed (0 = no, 1 = yes)	-0.22	0.80 (0.54-1.18)	0.27	-0.55	0.58 (0.40-0.82)	0.01	-0.12	0.89 (0.47-1.66)	0.71	0.58	1.78 (1.16-2.72)	0.01
Age (0 = <75 years, 1 = ≥75 years)	0.33	1.39 (1.00-1.93)	0.05	-0.32	0.72 (0.53-0.97)	0.03	0.67	1.95 (1.12-3.40)	0.02	0.61	1.84 (1.31-2.58)	<0.001
Education (0 = <11 years, 1 = ≥11 years)	0.30	1.35 (0.96-1.89)	0.08	0.11	1.12 (0.82-1.52)	0.47	0.23	1.26 (0.73-2.18)	0.41	0.16	1.18 (0.83-1.66)	0.35

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Gender (0 = male, 1 = female)	0.07	1.08 (0.71-1.63)	0.74	-0.12	0.89 (0.61-1.30)	0.54	0.55	1.73 (0.93-3.24)	0.08	0.54	1.71 (1.14-2.56)	0.01
Race (1 = white, 2 = black)	-0.14	0.87 (0.61-1.22)	0.41	-0.64	0.53 (0.39-0.72)	<0.001	-1.00	0.37 (0.21-0.63)	<0.001	0.10	1.11 (0.78-1.57)	0.56

Depression, demographic and health model

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
N		616			647			669			591	
Intercept	-1.11		0.03	1.04		0.02	3.38		<0.001	-1.55		0.01
Depressed (0 = no, 1 = yes)	-0.25	0.78 (0.50-1.21)	0.26	-0.38	0.68 (0.46-1.02)	0.06	-0.19	0.83 (0.41-1.67)	0.60	0.35	1.43 (0.90-2.25)	0.13
Age (0 = <75 years, 1 = ≥75 years)	0.36	1.44 (0.98-2.10)	0.06	-0.32	0.72 (0.51-1.03)	0.07	0.76	2.13 (1.10-4.13)	0.03	0.77	2.15 (1.46-3.18)	<0.001
Education (0 = <11 years, 1 = ≥11 years)	0.30	1.35 (0.93-1.97)	0.12	0.05	1.05 (0.75-1.49)	0.76	0.08	1.08 (0.58-2.04)	0.80	0.21	1.23 (0.85-1.81)	0.27
Gender (0 = male, 1 = female)	-0.03	0.97 (0.60-1.56)	0.89	-0.25	0.78 (0.50-1.20)	0.26	0.65	1.92 (0.92-3.98)	0.08	0.28	1.32 (0.85-2.07)	0.22
Race (1 = white, 2 = black)	0.04	1.04 (0.69-1.57)	0.85	-0.57	0.56 (0.39-0.82)	0.01	-1.04	0.35 (0.19-0.67)	0.01	0.21	1.23 (0.82-1.85)	0.31

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Arthritis (0 = no, 1 = yes)	0.00	1.00 (0.67-1.50)	0.99	0.01	1.01 (0.69-1.47)	0.97	0.00	1.00 (0.51-1.97)	1.00	0.14	1.14 (0.77-1.70)	0.51
Diabetes (0 = no, 1 = yes)	-0.15	0.86 (0.56-1.31)	0.48	0.36	1.44 (0.97-2.11)	0.07	0.42	1.52 (0.74-3.13)	0.25	0.19	1.21 (0.79-1.86)	0.37
Heart Disease (0 = no, 1 = yes)	-0.44	0.64 (0.42-0.97)	0.03	-0.16	0.85 (0.59-1.23)	0.39	-0.06	0.94 (0.48-1.84)	0.86	-0.21	0.81 (0.54-1.21)	0.30
High blood pressure (0 = no, 1 = yes)	-0.31	0.73 (0.49-1.11)	0.14	0.05	1.05 (0.72-1.56)	0.80	-0.03	0.97 (0.47-2.02)	0.94	0.20	1.22 (0.80-1.86)	0.36
High blood cholesterol (0 = no, 1 = yes)	-0.23	0.79 (0.55-1.14)	0.21	-0.09	0.91 (0.64-1.29)	0.60	-0.20	0.82 (0.44-1.53)	0.53	0.15	1.16 (0.80-1.69)	0.44
Osteoporosis (0 = no, 1 = yes)	0.22	1.24 (0.82-1.88)	0.30	0.19	1.22 (0.82-1.79)	0.33	-0.13	0.88 (0.42-1.82)	0.72	0.68	1.98 (1.27-3.09)	0.01
Self-reported health (0 = poor or fair, 1 = good, very good, and excellent)	0.32	1.38 (0.94-2.03)	0.10	0.71	2.03 (1.42-2.88)	<0.001	-0.36	0.70 (0.36-1.35)	0.28	0.10	1.11 (0.75-1.64)	0.60

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Number of prescription medications (0 = ≤3 medications, 1 = ≥4 medications)	0.18	1.20 (0.79-1.83)	0.39	-0.43	0.65 (0.44-0.96)	0.03	0.16	1.18 (0.59-2.35)	0.64	0.08	1.08 (0.71-1.66)	0.71
Number of OTC medications (0 = 0 medications, 1 = ≥1 medication)	0.24	1.27 (0.78-2.06)	0.34	-0.04	0.96 (0.62-1.50)	0.87	-0.27	0.76 (0.34-1.72)	0.52	0.36	1.43 (0.89-2.28)	0.14
BMI (0 = <28.2 kg/m², 1 = ≥28.2 kg/m²)	-0.10	0.90 (0.62-1.31)	0.59	-0.22	0.80 (0.56-1.14)	0.22	0.31	1.37 (0.73-2.58)	0.33	0.31	1.37 (0.94-2.00)	0.10
Depression, demographics and knowledge model												
N		690										
Intercept	-1.41		<0.001									
Depressed (0 = no, 1 = yes)	-0.19	0.83 (0.55-1.25)	0.36									
Age (0 = <75 years, 1 = ≥75 years)	0.39	1.48 (1.05-2.10)	0.03									
Education (0 = <11 years, 1 = ≥11 years)	0.25	1.28 (0.90-1.84)	0.17									

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Gender (0 = male, 1 = female)	-0.18	0.83 (0.53-1.30)	0.41									
Race (1 = white, 2 = black)	-0.04	0.96 (0.66-1.38)	0.82									
Fruit and vegetable knowledge (0 = no, 1 = yes)	0.96	2.62 (1.61-4.27)	<0.001									
Milk knowledge (0 = no, 1 = yes)	0.53	1.71 (1.18-2.45)	0.01									
Whole grain knowledge (0 = no, 1 = yes)	0.57	1.78 (1.22-2.58)	0.01									
Depression, demographics and barriers model												
N		683			738							
Intercept	-1.29		0.01	1.36		<0.001						
Depressed (0 = no, 1 = yes)	-0.23	0.79 (0.52-1.20)	0.28	-0.44	0.64 (0.45-0.93)	0.02						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Age (0 = <75 years, 1 = ≥75 years)	0.37	1.45 (1.03-2.04)	0.03	-0.29	0.75 (0.55-1.02)	0.06						
Education (0 = <11 years, 1 = ≥11 years)	0.33	1.39 (0.98-1.98)	0.07	0.09	1.10 (0.80-1.50)	0.55						
Gender (0 = male, 1 = female)	0.12	1.13 (0.74-1.74)	0.57	-0.04	0.96 (0.65-1.42)	0.84						
Race (1 = white, 2 = black)	-0.06	0.94 (0.65-1.37)	0.76	-0.61	0.54 (0.39-0.74)	<0.001						
Enough money to buy food (0 = no, 1 = yes)	0.26	1.30 (0.81-2.08)	0.28	-	-	-						
Joint pain (0 = no, 1 = yes)	0.07	1.07 (0.74-1.55)	0.71	-0.25	0.78 (0.56-1.08)	0.14						
Limited by fear of falling (0 = no, 1 = yes)	-0.23	0.79 (0.55-1.14)	0.21	-0.46	0.63 (0.46-0.88)	0.01						
Symptoms of lactose intolerance (0 = no, 1 = yes)	-0.29	0.75 (0.50-1.14)	0.18	-	-	-						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Depression, demographic, health, knowledge, and barriers model												
N		573			642							
Intercept	-1.68		0.01	1.09		0.02						
Depressed (0 = no, 1 = yes)	-0.30	0.74 (0.46-1.19)	0.22	-0.32	0.72 (0.48-1.09)	0.12						
Age (0 = <75 years, 1 = ≥75 years)	0.41	1.51 (0.99-2.30)	0.06	-0.30	0.74 (0.52-1.06)	0.10						
Education (0 = <11 years, 1 = ≥11 years)	0.23	1.26 (0.83-1.90)	0.28	0.09	1.09 (0.77-1.55)	0.62						
Gender (0 = male, 1 = female)	-0.23	0.80 (0.47-1.34)	0.39	-0.19	0.83 (0.53-1.29)	0.40						
Race (1 = white, 2 = black)	0.14	1.15 (0.72-1.82)	0.56	-0.56	0.57 (0.39-0.83)	0.01						
Arthritis (0 = no, 1 = yes)	-0.12	0.88 (0.53-1.48)	0.63	0.15	1.17 (0.75-1.82)	0.50						
Diabetes (0 = no, 1 = yes)	-0.06	0.94 (0.59-1.49)	0.80	0.35	1.41 (0.96-2.09)	0.08						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Heart Disease (0 = no, 1 = yes)	-0.43	0.65 (0.42-1.02)	0.06	-0.14	0.86 (0.60-1.25)	0.44						
High blood pressure (0 = no, 1 = yes)	-0.21	0.81 (0.52-1.26)	0.35	0.06	1.06 (0.71-1.57)	0.78						
High blood cholesterol (0 = no, 1 = yes)	-0.29	0.74 (0.50-1.11)	0.15	-0.11	0.90 (0.63-1.27)	0.53						
Osteoporosis (0 = no, 1 = yes)	0.18	1.19 (0.76-1.87)	0.44	0.20	1.22 (0.82-1.81)	0.32						
Self-reported health (0 = poor or fair, 1 = good, very good, and excellent)	0.27	1.31 (0.86-1.99)	0.21	0.62	1.87 (1.30-2.68)	<0.001						
Number of prescription medications (0 = ≤3 medications, 1 = ≥4 medications)	0.20	1.22 (0.77-1.93)	0.40	-0.45	0.64 (0.43-0.94)	0.02						
Number of OTC medications (0 = 0 medications, 1 = ≥1 medication)	0.16	1.17 (0.69-1.97)	0.56	-0.00	1.00 (0.64-1.56)	0.98						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c]			Preventive screenings[d]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
BMI (0 = < 28.2 kg/m², 1 = >28.2 kg/m²)	-0.16	0.85 (0.56-1.28)	0.43	-0.18	0.83 (0.58-1.18)	0.30						
Fruit and vegetable knowledge (0 = no, 1 = yes)	1.14	3.13 (1.83-5.34)	<0.001	-	-	-						
Milk knowledge	0.43	1.53 (1.01-2.32)	0.04	-	-	-						
Whole grain knowledge (0 = no, 1 = yes)	0.60	1.82 (1.18-2.80)	0.01	-	-	-						
Enough money to buy food (0 = no, 1 = yes)	0.11	1.11 (0.65-1.90)	0.70	-	-	-						
Joint pain (0 = no, 1 = yes)	0.39	1.48 (0.88-2.50)	0.14	-0.19	0.83 (0.54-1.28)	0.39						
Limited by fear of falling (0 = no, 1 = yes)	-0.16	0.85 (0.56-1.30)	0.46	-0.39	0.68 (0.47-0.97)	0.04						
Symptoms of lactose intolerance (0 = no, 1 = yes)	-0.19	0.83 (0.51-1.33)	0.43	-	-	-						

[a]Nutrition score 0 = 0 and 1-3 = 1, reflecting the nutrition score.

[b]Physical activity score 0-1 = 0 and 2-3 = 1, reflecting the median physical activity score.

[c]Tobacco avoidance score 0 = 0 and 1-3 = 1, reflecting the median tobacco avoidance score.

[d]Preventive screening score 0-2 = 0 and 2.5-3 = 1, reflecting the median preventive screening score.

TABLE 3.7. Regression Models Exploring Predictors of Differences in Engagement in a Health Promoting Lifestyle from Pre-test to Post-test Following the Health Promoting Behavior Intervention in Georgia Senior Centers, 2007-2008

	Predictors of change in engagement in a health promoting lifestyle following the health promoting behavior intervention[a]		
	B	**OR (95% CI)**	**P-value**
Depression model (n = 337)			
Intercept	1.14		<0.001
Pre-test HPL	-1.43	0.24 (0.15-0.38)	<0.001
Depression (0 = no, 1 = yes)	-0.19	0.83 (0.47-1.45)	0.51
Depression and demographics model (n = 334)			
Intercept	1.14		0.04
Pre-test HPL	-1.42	0.24 (0.15-0.39)	<0.001
Depressed (0 = no, 1 = yes)	-0.10	0.91 (0.51-1.60)	0.74
Age (0 = <75 years, 1 = ≥75 years)	0.08	1.08 (0.68-1.73)	0.74
Education (0 = <11 years, 1 = ≥11 years)	-0.09	0.91 (0.56-1.49)	0.72
Gender (0 = male, 1 = female)	-0.28	0.76 (0.41-1.41)	0.38
Race (1 = white, 2 = black)	0.16	1.17 (0.69-1.99)	0.56
Depression, demographic and health model (n = 310)			
Intercept	1.35		0.07
Pre-test HPL	-1.36		<0.001
Depressed (0 = no, 1 = yes)	-0.29	0.56 (0.35-0.88)	0.36
Age (0 = <75 years, 1 = ≥75 years)	-0.05	1.10 (0.74-1.64)	0.84
Education (0 = <11 years, 1 = ≥11 years)	-0.19	1.23 (0.82-1.83)	0.47
Gender (0 = male, 1 = female)	-0.21	0.80 (0.49-1.32)	0.55
Race (1 = white, 2 = black)	0.22	0.47 (0.31-0.73)	0.46
Arthritis (0 = no, 1 = yes)	-0.40	1.20 (0.78-1.84)	0.17
Diabetes (0 = no, 1 = yes)	-0.41	1.28 (0.82-2.00)	0.19
Heart Disease (0 = no, 1 = yes)	0.18	0.62 (0.40-0.95)	0.55
High blood pressure (0 = no, 1 = yes)	0.16	1.26 (0.80-1.97)	0.58
High blood cholesterol (0 = no, 1 = yes)	-0.06	0.66 (0.45-0.98)	0.82
Osteoporosis (0 = no, 1 = yes)	0.35	1.48 (0.96-2.30)	0.24
Self-reported health (0 = poor or fair, 1 = good, very good, and excellent)	-0.01	2.06 (1.38-3.08)	0.98

	Predictors of change in engagement in a health promoting lifestyle following the health promoting behavior intervention[a]		
	B	OR (95% CI)	P-value
Number of prescription medications (0 = <u><</u>3 medications, 1 = <u>></u>4 medications)	0.06	0.69 (0.44-1.10)	0.84
Number of OTC medications (0 = 0 medications, 1 = <u>></u>1 medication)	-0.07	1.45 (0.86-2.43)	0.84
BMI (0 = < 28.2 kg/m², 1 = <u>></u>28.2 kg/m²)	-0.12	0.99 (0.67-1.48)	0.64
Depression, demographics and knowledge model (n = 332)			
Intercept	0.77		0.18
Pre-test HPL	-1.47		<0.001
Depressed (0 = no, 1 = yes)	-0.08	0.57 (0.37-0.86)	0.78
Age (0 = <75 years, 1 = <u>></u>75 years)	0.14	1.15 (0.81-1.63)	0.56
Education (0 = <11 years, 1 = <u>></u>11 years)	-0.19	1.19 (0.83-1.72)	0.46
Gender (0 = male, 1 = female)	-0.47	0.96 (0.61-1.50)	0.15
Race (1 = white, 2 = black)	0.21	0.45 (0.31-0.65)	0.45
Fruit and vegetable knowledge (0 = no, 1 = yes)	0.21	1.44 (0.85-2.44)	0.41
Milk knowledge (0 = no, 1 = yes)	0.46	1.14 (0.78-1.67)	0.11
Whole grain knowledge (0 = no, 1 = yes)	0.24	1.41 (0.95-2.08)	0.38
Depression, demographics and barriers model (n = 318)			
Intercept	1.72		0.02
Pre-test HPL	-1.48	0.23 (0.14-0.38)	<0.001
Depressed (0 = no, 1 = yes)	0.10	1.10 (0.59-2.06)	0.76
Age (0 = <75 years, 1 = <u>></u>75 years)	0.13	1.13 (0.69-1.86)	0.62
Education (0 = <11 years, 1 = <u>></u>11 years)	-0.23	0.79 (0.47-1.34)	0.38
Gender (0 = male, 1 = female)	-0.12	0.89 (0.46-1.73)	0.73
Race (1 = white, 2 = black)	0.12	1.13 (0.63-2.01)	0.68
Enough money to buy food at pre-test (0 = no, 1 = yes)	-0.01	0.98 (0.46-2.13)	0.97
Enough money to buy food at post-test (0 = no, 1 = yes)	-0.05	0.96 (0.43-2.14)	0.91

	Predictors of change in engagement in a health promoting lifestyle following the health promoting behavior intervention[a]		
	B	**OR (95% CI)**	**P-value**
Joint pain at pre-test(0 = no, 1 = yes)	-0.04	0.96 (0.51-1.78)	0.89
Joint pain at post-test(0 = no, 1 = yes)	-0.48	0.62 (0.33-1.16)	0.13
Limited by fear of falling at pre-test (0 = no, 1 = yes)	-0.32	0.72 (0.40-1.30)	0.28
Limited by fear of falling at post-test (0 = no, 1 = yes)	-0.16	0.85 (0.46-1.55)	0.60
Symptoms of lactose intolerance at pre-test (0 = no, 1 = yes)	0.19	1.21 (0.58-2.54)	0.61
Symptoms of lactose intolerance at post-test (0 = no, 1 = yes)	-0.22	0.81 (0.40-1.61)	0.54
Depression, demographic, health, knowledge, and barriers model (n = 293)			
Intercept	1.24		0.17
Pre-test HPL	-1.45	0.24 (0.13-0.41)	<0.001
Depressed (0 = no, 1 = yes)	-0.15	0.86 (0.43-1.72)	0.68
Age (0 = <75 years, 1 = $\geq$75 years)	0.10	1.10 (0.63-1.92)	0.74
Education (0 = <11 years, 1 = $\geq$11 years)	-0.30	0.74 (0.42-1.32)	0.31
Gender (0 = male, 1 = female)	-0.29	0.75 (0.34-1.62)	0.46
Race (1 = white, 2 = black)	0.24	1.23 (0.66-2.44)	0.48
Arthritis (0 = no, 1 = yes)	0.08	1.08 (0.54-2.18)	0.82
Diabetes (0 = no, 1 = yes)	-0.28	0.76 (0.39-1.47)	0.42
Heart Disease (0 = no, 1 = yes)	0.18	1.20 (0.64-2.25)	0.57
High blood pressure (0 = no, 1 = yes)	0.32	1.38 (0.75-2.56)	0.30
High blood cholesterol (0 = no, 1 = yes)	-0.13	0.88 (0.50-1.53)	0.64
Osteoporosis (0 = no, 1 = yes)	0.42	1.52 (0.81-2.85)	0.19
Self-reported health (0 = poor or fair, 1 = good, very good, and excellent)	-0.14	0.86 (0.48-1.56)	0.63
Number of prescription medications (0 = $\leq$3 medications, 1 = $\geq$4 medications)	0.06	1.06 (0.56-2.03)	0.85
Number of OTC medications (0 = 0 medications, 1 = $\geq$1 medication)	0.01	1.01 (0.48-2.13)	0.99

	Predictors of change in engagement in a health promoting lifestyle following the health promoting behavior intervention[a]		
	B	**OR (95% CI)**	**P-value**
BMI (0 = < 28.2 kg/m^2, 1 = $\geq$28.2 kg/m^2)	-0.00	1.00 (0.56-1.76)	0.99
Fruit and vegetable knowledge (0 = no, 1 = yes)	0.32	1.38 (0.81-2.36)	0.24
Milk knowledge	0.64	1.90 (1.00-3.61)	0.06
Whole grain knowledge (0 = no, 1 = yes)	-0.10	0.91 (0.49-1.66)	0.75
Enough money to buy food (0 = no, 1 = yes)	0.06	1.06 (0.46-2.43)	0.88
Enough money to buy food (0 = no, 1 = yes)	0.22	0.82 (0.34-1.94)	0.65
Joint pain (0 = no, 1 = yes)	-0.05	0.95 (0.47-1.94)	0.89
Joint pain (0 = no, 1 = yes)	-0.66	0.52 (0.26-1.06)	0.07
Limited by fear of falling (0 = no, 1 = yes)	-0.34	0.71 (0.37-1.36)	0.30
Limited by fear of falling (0 = no, 1 = yes)	-0.15	0.86 (0.45-1.67)	0.66
Symptoms of lactose intolerance (0 = no, 1 = yes)	0.22	1.25 (0.54-2.86)	0.60
Symptoms of lactose intolerance (0 = no, 1 = yes)	-0.37	0.69 (0.32-1.49)	0.34

[a]A one behavior change in engagement in a health promoting lifestyle, <0.5 point behavior change = 0 and $\geq$ 0.5 point behavior change = 1.

TABLE 3.8. Regression Models Exploring Predictors of Differences in Engagement in the Four Categories of a Health Promoting Lifestyle from Pre-test to Post-test Following the Health Promoting Behavior Intervention in Georgia Senior Centers, 2007-2008

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Depression model												
N		429			496						425	
Intercept	-0.39		0.01	0.39		0.01				0.53		0.01
Pre-test score[e]	-0.79	0.45 (0.29-0.72)	<0.001	-2.84	0.06 (0.03-0.10)	<0.001				-1.80	0.16 (0.11-0.26)	<0.001
Depression (0 = no, 1 = yes)	0.17	1.18 (0.73-1.92)	0.50	-0.14	0.87 (0.50-1.51)	0.62				-0.56	0.57 (0.31-1.03)	0.06
Depression and demographics model												
N		418			481						416	
Intercept	-0.23		0.62	0.44		0.41				-0.56		0.23
Pre-test score[f]	-0.82	0.44 (0.28-0.70)	<0.001	-2.98	0.05 (0.03-0.09)	<0.001				-1.88	0.15 (0.10-0.24)	<0.001
Depressed (0 = no, 1 = yes)	0.11	1.11 (0.67-1.85)	0.68	-0.24	0.79 (0.44-1.40)	0.42				-0.48	0.62 (0.33-1.15)	0.13

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Age (0 = <75 years, 1 = ≥75 years)	0.06	1.06 (0.70-1.62)	0.78	-0.42	0.66 (0.40-1.08)	0.10				0.18	1.19 (0.75-1.91)	0.46
Education (0 = <11 years, 1 = ≥11 years)	-0.06	0.94 (0.61-1.44)	0.78	-0.23	0.79 (0.49-1.30)	0.36				0.14	1.14 (0.70-1.86)	0.58
Gender (0 = male, 1 = female)	0.43	1.54 (0.87-2.71)	0.14	0.48	1.61 (0.82-3.16)	0.16				0.17	1.18 (0.66-2.10)	0.57
Race (1 = white, 2 = black)	-0.37	0.69 (0.44-1.08)	0.10	-0.01	0.99 (0.60-1.61)	0.95				0.61	1.84 (1.14-2.97)	0.01
Depression, demographic and health model												
N	378			432						377		
Intercept	-0.41		0.52	0.58		0.45				-0.13		0.85
Pre-test score[f]	-0.92	0.41 (0.25-0.66)	<0.001	-3.08	0.05 (0.02-0.09)	<0.001				-1.98	0.14 (0.08-0.23)	<0.001
Depressed (0 = no, 1 = yes)	-0.10	0.96 (0.57-1.63)	0.73	-0.61	0.54 (0.28-1.06)	0.07				-0.36	0.69 (0.35-1.38)	0.30
Age (0 = <75 years, 1 = ≥75 years)	0.06	1.08 (0.69-1.70)	0.81	-0.47	0.63 (0.35-1.11)	0.11				-0.05	0.95 (0.55-1.65)	0.85

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Education (0 = <11 years, 1 = ≥11 years)	-0.19	0.84 (0.54-1.32)	0.42	-0.20	0.82 (0.47-1.41)	0.47				0.08	1.09 (0.62-1.89)	0.77
Gender (0 = male, 1 = female)	0.35	1.51 (0.81-2.80)	0.30	0.82	2.27 (1.04-4.95)	0.04				-0.09	0.91 (0.47-1.77)	0.78
Race (1 = white, 2 = black)	-0.29	0.67 (0.40-1.11)	0.28	-0.00	1.00 (0.56-1.80)	1.00				0.82	2.27 (1.27-4.05)	0.01
Arthritis (0 = no, 1 = yes)	-0.09	0.99 (0.60-1.64)	0.74	-0.49	0.61 (0.33-1.12)	0.11				0.00	1.00 (0.56-1.77)	1.00
Diabetes (0 = no, 1 = yes)	0.36	1.62 (0.97-2.73)	0.20	-0.18	0.84 (0.45-1.55)	0.57				-0.20	0.82 (0.44-1.52)	0.53
Heart Disease (0 = no, 1 = yes)	0.33	1.35 (0.84-2.18)	0.19	0.63	1.87 (1.04-3.36)	0.04				-0.22	0.80 (0.45-1.41)	0.44
High blood pressure (0 = no, 1 = yes)	-0.05	0.92 (0.55-1.53)	0.86	0.03	1.03 (0.55-1.95)	0.92				0.16	1.18 (0.64-2.16)	0.60
High blood cholesterol (0 = no, 1 = yes)	0.14	1.23 (0.79-1.92)	0.56	-0.02	0.99 (0.56-1.72)	0.96				-0.27	0.76 (0.45-1.29)	0.32
Osteoporosis (0 = no, 1 = yes)	0.62	1.88 (1.15-3.08)	0.02	0.08	1.08 (0.60-1.98)	0.80				-0.08	0.92 (0.50-1.70)	0.80

89

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Self-reported health (0 = poor or fair, 1 = good, very good, and excellent)	0.12	1.28 (0.81-2.02)	0.62	0.31	1.37 (0.79-2.37)	0.27				-1.12	0.32 (0.19-0.57)	<0.001
Number of prescription medications (0 = ≤3 medications, 1 = >4 medications)	-0.43	0.67 (0.40-1.12)	0.12	0.26	1.30 (0.69-2.48)	0.42				-0.34	0.71 (0.39-1.29)	0.26
Number of OTC medications (0 = 0 medications, 1 = >1 medication)	-0.08	0.76 (0.43-1.33)	0.79	-0.84	0.43 (0.22-084)	0.01				1.10	3.00 (1.48-6.08)	0.01
BMI (0 = <28.2 kg/m², 1 = >28.2 kg/m²)	0.05	1.04 (0.66-1.64)	0.83	0.28	1.38 (0.79-2.39)	0.26				-0.38	0.69 (0.40-1.18)	0.17

Depression, demographics and knowledge model

	B	OR (95% CI)	P-value
N		411	
Intercept	-0.57		0.25
Pre-test score[f]	-0.94	0.39 (0.24-0.63)	<0.001

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Depressed (0 = no, 1 = yes)	0.17	1.18 (0.70-1.99)	0.53									
Age (0 = <75 years, 1 = ≥75 years)	0.12	1.13 (0.73-1.75)	0.57									
Education (0 = <11 years, 1 = ≥11 years)	-0.12	0.89 (0.57-1.39)	0.60									
Gender (0 = male, 1 = female)	0.27	1.31 (0.73-2.36)	0.36									
Race (1 = white, 2 = black)	-0.38	0.68 (0.43-1.09)	0.11									
Fruit and vegetable knowledge (0 = no, 1 = yes)	0.30	1.35 (0.87-2.09)	0.18									
Milk knowledge (0 = no, 1 = yes)	0.28	1.33 (0.80-2.20)	0.27									
Whole grain knowledge (0 = no, 1 = yes)	0.30	1.36 (0.83-2.21)	0.22									

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
						Depression, demographics and barriers model						
N		396			469							
Intercept	-0.25		0.69	0.54		0.36						
Pre-test score[f]	-0.91	0.40 (0.25-0.66)	>0.001	-3.05	0.05 (0.03-0.08)	<0.001						
Depressed (0 = no, 1 = yes)	0.27	1.31 (0.74-2.33)	0.36	-0.28	0.76 (0.41-1.39)	0.37						
Age (0 = <75 years, 1 = ≥75 years)	0.21	1.23 (0.78-1.94)	0.37	-0.38	0.68 (0.41-1.12)	0.13						
Education (0 = <11 years, 1 = ≥11 years)	-0.14	0.87 (0.55-1.37)	0.54	-0.22	0.80 (0.48-1.33)	0.40						
Gender (0 = male, 1 = female)	0.56	1.75 (0.94-3.25)	0.08	0.55	1.73 (0.86-3.50)	0.12						
Race (1 = white, 2 = black)	-0.34	0.71 (0.43-1.17)	0.18	-0.04	0.96 (0.58-1.60)	0.87						
Enough money to buy food at pre-test (0 = no, 1 = yes)	0.07	1.07 (0.53-2.19)	0.84	-	-	-						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Enough money to buy food at post-test (0 = no, 1 = yes)	0.12	1.13 (0.55-2.36)	0.74	-	-	-						
Joint pain at pre-test(0 = no, 1 = yes)	-0.07	0.93 (0.53-1.64)	0.80	0.20	1.22 (0.67-2.12)	0.51						
Joint pain at post-test(0 = no, 1 = yes)	0.09	1.09 (0.62-1.92)	0.75	-0.36	0.70 (0.38-1.28)	0.25						
Limited by fear of falling at pre-test (0 = no, 1 = yes)	-0.73	0.48 (0.28-0.81)	0.01	0.06	1.07 (0.62-1.84)	0.82						
Limited by fear of falling at post-test (0 = no, 1 = yes)	-0.01	0.99 (0.58-1.70)	0.96	-0.13	0.88 (0.49-1.59)	0.67						
Symptoms of lactose intolerance at pre-test (0 = no, 1 = yes)	-0.05	0.95 (0.49-1.85)	0.89	-	-	-						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Symptoms of lactose intolerance at post-test (0 = no, 1 = yes)	-0.33	0.72 (0.37-1.38)	0.32	-	-	-						
Depression, demographic, health, knowledge, and barriers model												
N	355			422								
Intercept	-0.88		0.28	0.47		0.56						
Pre-test score[f]	-1.12	0.33 (0.19-0.56)	<0.001	-3.10	0.04 (0.02-0.09)	<0.001						
Depressed (0 = no, 1 = yes)	0.02	1.02 (0.52-1.98)	0.96	-0.63	0.54 (0.26-1.08)	0.08						
Age (0 = <75 years, 1 = ≥75 years)	0.14	1.16 (0.68-1.96)	0.59	-0.47	0.62 (0.35-1.12)	0.11						
Education (0 = <11 years, 1 = ≥11 years)	-0.23	0.80 (0.47-1.33)	0.38	-0.16	0.86 (0.49-1.50)	0.59						
Gender (0 = male, 1 = female)	0.32	1.38 (0.66-2.86)	0.39	0.87	2.39 (1.07-5.37)	0.03						
Race (1 = white, 2 = black)	-0.31	0.73 (0.40-1.35)	0.32	-0.06	0.95 (0.52-1.74)	0.86						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Arthritis (0 = no, 1 = yes)	0.56	1.76 (0.86-3.56)	0.12	-0.57	0.56 (0.26-1.21)	0.14						
Diabetes (0 = no, 1 = yes)	0.40	1.49 (0.81-2.74)	0.20	-0.18	0.84 (0.45-1.57)	0.58						
Heart Disease (0 = no, 1 = yes)	0.42	1.52 (0.88-2.63)	0.14	0.63	1.88 (1.04-3.39)	0.04						
High blood pressure (0 = no, 1 = yes)	0.15	1.17 (0.66-2.07)	0.60	0.10	1.11 (0.58-2.10)	0.75						
High blood cholesterol (0 = no, 1 = yes)	0.08	1.09 (0.66-1.81)	0.74	-0.09	0.91 (0.52-1.62)	0.76						
Osteoporosis (0 = no, 1 = yes)	0.67	1.96 (1.13-3.40)	0.02	0.15	1.16 (0.63-2.13)	0.63						
Self-reported health (0 = poor or fair, 1 = good, very good, and excellent)	-0.03	0.97 (0.56-1.67)	0.91	0.40	1.50 (0.85-2.65)	0.17						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Number of prescription medications (0 = ≤3 medications, 1 = >4 medications)	-0.59	0.55 (0.31-1.00)	0.06	0.23	1.25 (0.65-2.41)	0.50						
Number of OTC medications (0 = 0 medications, 1 = >1 medication)	-0.14	0.87 (0.46-1.64)	0.66	-0.87	0.42 (0.21-0.83)	0.01						
BMI (0 = <28.2 kg/m², 1 = ≥28.2 kg/m²)	0.16	1.17 (0.69-1.99)	0.55	0.34	1.41 (0.80-2.48)	0.24						
Fruit and vegetable knowledge (0 = no, 1 = yes)	0.38	1.46 (0.89-2.41)	0.14	-	-	-						
Milk knowledge	0.52	1.68 (0.93-3.01)	0.08	-	-	-						
Whole grain knowledge (0 = no, 1 = yes)	-0.05	0.95 (0.54-1.66)	0.86	-	-	-						
Enough money to buy food (0 = no, 1 = yes)	0.20	1.23 (0.56-2.67)	0.61	-	-	-						

	Nutrition[a]			Physical activity[b]			Tobacco avoidance[c,d]			Preventive screening[e]		
	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value	B	OR (95% CI)	P-value
Enough money to buy food (0 = no, 1 = yes)	0.14	1.15 (0.51-2.56)	0.74	-	-	-						
Joint pain (0 = no, 1 = yes)	-0.16	0.85 (0.43-1.68)	0.64	0.49	1.64 (0.78-3.42)	0.19						
Joint pain (0 = no, 1 = yes)	-0.21	0.81 (0.40-1.62)	0.55	-0.22	0.80 (0.39-1.67)	0.56						
Limited by fear of falling (0 = no, 1 = yes)	-0.65	0.52 (0.29-0.94)	0.03	-0.15	0.86 (0.46-1.61)	0.64						
Limited by fear of falling (0 = no, 1 = yes)	0.14	1.15 (0.62-2.13)	0.65	0.00	1.00 (0.52-1.94)	0.99						
Symptoms of lactose intolerance (0 = no, 1 = yes)	0.33	1.39 (0.63-3.07)	0.42	-	-	-						
Symptoms of lactose intolerance (0 = no, 1 = yes)	-0.84	0.43 (0.20-0.94)	0.04	-	-	-						

[a] A one behavior change in meeting nutrition recommendations, <1 point change = 0 and $\geq$ 1 point change = 1.

[b]A one behavior change in meeting physical activity recommendations, <1 point change = 0 and $\geq$1 point change = 1.

[c]A one behavior change in meeting tobacco avoidance recommendations, <1 point change = 0 and $\geq$1 point change = 1.

[d]For the tobacco avoidance change models, there was a quasi-complete separation of the data points, so no maximum likelihood estimate existed.

[e]A one behavior change in meeting preventive screening recommendations, <1 point change = 0 and $\geq$1 point change = 1.

[f]Nutrition score 0 = 0 and 1-3 = 1, reflecting the nutrition score; Physical activity score 0-1 = 0 and 2-3 = 1, reflecting the median physical activity score; Tobacco avoidance score 0 = 0 and 1-3 = 1, reflecting the median tobacco avoidance score; Preventive screening score 0-2 = 0 and 2.5-3 = 1, reflecting the median preventive screening score.

CHAPTER 4

CONCLUSION

The goal of this study was to examine the relationship between a previous diagnosis of depression and engagement in a health promoting lifestyle before and after a 12-week health promoting behavior intervention in Georgia's OAANP participants. The study's first specific aim was to conduct a pre-test to determine initial level of engagement in a health promoting lifestyle for both those with a previous diagnosis of depression and those without a previous diagnosis of depression. The second specific aim was to determine the effects of a health promoting behavior intervention on health promoting lifestyle of both groups, and then determine whether or not a previous diagnosis of depression was a predictor of change in engagement in a health promoting lifestyle. The hypothesis was that older adults previously diagnosed with a depressive disorder would show less change compared to their non-depressed peers after an intervention aimed at increasing health promoting behavior in older adults attending Georgia senior centers.

At pre-test, depression was found to be significantly and negatively associated with overall engagement in a health promoting lifestyle when engagement was dichotomized around the median. This finding is what was expected. There was an association between a previous depression diagnosis and less compliance with current physical activity recommendations (as previously reported in this sample by Porter, 2009), but increased compliance with bone mineral screening recommendations (United States Department of Health and Human Services and the United States Department of Agriculture 2005; National Osteoporosis Foundation 1999). After a

series of multivariate regression analyses, it was found that a previous diagnosis of depression was a predictor of engagement in an overall health promoting lifestyle, as defined by this health promoting lifestyle score dichotomized around the median, even after controlling for demographics, health, nutrition knowledge, and barriers to engagement in a health promoting lifestyle (Gillis 1993, Felton, Parsons, and Bartoces 1997; Pullen, Walker, and Fiandt 2001). A previous diagnosis of depression was a significant predictor of less physical activity compliance in all of the individual models (depression, depression and demographics, and depression, demographics, and barriers to engagement in physical activity), but not the depression, demographics, and health model or the combined model (depression, demographics, health, and barriers to physical activity) (similar to the findings previously reported in this sample by Porter, 2009). A previous diagnosis of depression was found to be a positive predictor of compliance with preventive screening recommendations in the depression and depression and demographics models, which was contrary to what was expected based on previous research (Golomb et al. 2000). One possible explanation is that the lack of healthcare coverage in the mentally ill is often a barrier to getting many recommended preventive services, but since most older adults have Medicare, which pays for some preventive services, this barrier may no longer be an obstacle (Badger et al. 2003; United States Department of Health and Human Services, Centers for Medicare and Medicaid Services 2007). Also, studies have shown a relationship between depression and higher ambulatory care and prescription medication use, so the combination of increased healthcare use with increased healthcare coverage could explain this unexpected outcome (Egede, Zheng, and Simpson 2002). This relationship is complex, and further research is needed.

Following the health promoting behavior intervention, participants significantly improved compliance with most current health promoting behavior recommendations, as expected (United States Department of Health and Human Services and United States Department of Agriculture 2005; National Osteoporosis Foundation 1999; American Academy of Ophthamology 1992; National Academy of Science 1978; National Guideline Clearinghouse 2009). The overall health promoting lifestyle score increased from 7.5 (2, 11.5) to 8.5 (3, 12), $P<0.001$, after the intervention. Likewise, the nutrition, physical activity, and preventive screening subcategories all improved significantly following the intervention. The behaviors where compliance did not improve significantly (tobacco avoidance, minutes of physical activity on physically active days, cholesterol screening, blood pressure screening, and eye examinations) all had greater compliance at pre-test (ranging from 71.9 percent to 99.4 percent meeting recommendations at pre-test). Poor improvement in minutes of physical activity on physically active days was also documented in a previous intervention in this population (Fitzpatrick et al. 2008).

Contrary to what was hypothesized, a previous diagnosis of depression did not appear to significantly interfere with participants ability to improve their health promoting lifestyle score following the intervention, even when controlling for demographics, health, nutrition knowledge, changes in nutrition knowledge, barriers, and changes in barriers to engagement in a health promoting lifestyle (Table 8). Also, a previous depression diagnosis did not appear to be a barrier of change for any subcategory of a health promoting lifestyle (nutrition, physical activity, tobacco avoidance, and preventive screenings) in any of the regression models.

Overall, this study demonstrated the complex relationship between depression and engagement in a health promoting lifestyle and further research is needed to continue to examine

this interaction. While the intervention showed significant improvements in engagement in a health promoting lifestyle and most health promoting behaviors, many participants still failed to meet the health promoting behavior recommendations. Following the intervention, fewer than half of the participants were meeting the recommendations for fruit and vegetable, milk product, and whole grain intake and average minutes of physical activity per day. In the future, researchers should explore depression symptoms using a validated tool such as the Geriatric Depression Scale, and treatment in addition to a previous diagnosis of depression in order to more accurately understand the complex relationship between depression and engagement in a health promoting lifestyle (Yesavage et al. 1982; Hermann et al. 1996; Almeida and Almeida 1994). It would also be beneficial to use a validated tool to measure engagement in a health promoting lifestyle such as the Health Promoting Lifestyle Profile II or the Personal Lifestyle Questionnaire (Walker and Pender 1987; Brown, Muhlenkamp, Fox, and Osborn 1983). Using a validated and widely used tool would enable more accurate comparisons with previous studies examining engagement in a health promoting lifestyle. There are also other possible subcategories of engagement in a health promoting lifestyle (home-food-safety, medication use, and supplement use) emphasized in this intervention, but not analyzed as part of this study.

In conclusion, the results provide evidence for the effectiveness of the intervention to improve engagement in a health promoting lifestyle of older adults attending Georgia senior centers and that the high prevalence of previously diagnosed depression was not a barrier to improvement. It also emphasized the complexities of researching depression and engagement in a health promoting lifestyle. Future studies are warranted to further address the complex relationship between depression and health promoting lifestyle engagement in community dwelling older adults.

REFRENCES

Administration on Aging. 2004. Highlights from the pilot study: second national survey of Older Americans Act Title III service recipients. http://www.gpra.net/nationalsurvey/files/2ndhighlights.pdf.

Administration on Aging. 2008a. Elderly Nutrition Program. http://www.aoa.gov/press/prodsmats/fact/pdf/fs_nutrition.pdf

Administration on Aging. 2008b. FY2006 U.S. profile of OAA programs. http://www.aoa.gov/PROF/agingnet/NAPIS/SPR/2006/Profiles/us.pdf

Administration on Aging. 2008c. FY 2008 annual performance report. http://www.aoa.gov/about/results/2008_AoA_Annual_PerformanceRepoprt-011509.pdf.

Administration on Aging. 2007a. A profile of older Americans: 2007. http://www.aoa.gov/prof/Statistics/profile/profiles.asp.

Administration on Aging. 2007b. Modernizing Older Americans Act Programs. http://aoa.gov/about/annual_report/2007Annual Report.pdf.

Alexopoulos, G.S. 2005. Depression in the elderly. *Lancet* 365:1961-1970.

Almeida, O. P., and S.A. Almeida. 1999. Short version of the Geriatric Depression Scale: a study of their validity for the diagnosis of a major depressive episode according to ICD-10 and DSM-IV. *International Journal of Geriatric Psychiatry* 14(10): 858-865.

American Academy of Ophthalmology, Quality of Care Committee. 1992. Comprehensive adult eye examinations. San Francisco, Ca: American Academy of Ophthalmology.

American Cancer Society. 2009. Everyday choices for a healthier life. http://www.cancer.org/docroot/PED/PED_12_Everyday_Choices.asp.

American College of Physicians. 1991. Guidelines. In: Eddy D.M., ed, Common Screening Tests. Philidelphia, PA: American College of Physicians.

American Diabetes Association. 2009. Everyday choices for a healthier life. http://www.diabetes.org/everydaychoices/default.jsp.

American Heart Association. 2009. Everyday choices for a healthier life. http://www.americanheart.org/presenter.jhtml?identifier=3022144

American Lung Association. 2006. Smokeless tobacco fact sheet.
http://www.lungusa.org/site/c.dvLUK9O0E/b.1694879/k.CFC8/Smokeless_Tobacco_Fact_Sheet.htm.

American Lung Association. 2008a. Smoking 101 fact sheet.
http://www.lungusa.org/site/c.dvLUK9O0E/b.39853/k.5D05/Smoking_101_Fact_Sheet.htm.

American Lung Association. 2008b. Smoking among older adults fact sheet.
http://www.lungusa.org/site/c.dvLUK9O0E/b.39862/k.5E9D/Smoking_Among_Older_Adults_Fact_Sheet.htm.

American Podiatric Medical Association. 2009. Aging. http://www.apma.org/MainMenu/Foot-Health/FootHealthBrochures/GeneralFootHealthBrochures/Aging.aspx.

American Psychological Association. 2003. Facts about depression in older adults.
http://www.apa.org/ppo/issues/olderdepressfact.html.

American Psychological Association. 2004. Aging and depression.
http://www.apahelpcenter.org/articles/pdf.php?id=121.

Anderson, W.J., B.M. Smith, and N.J. Gustafson. 1994. Health benefits and practical aspects of high-fiber diets. *American Journal of Clinical Nutrition* 59(5 Suppl): 1242S-1247S.

Appel, L.J., T.J. Moore, E. Obarzanek, W.M. Vollmer, L.P. Svetkey, F.M. Sacks, G.A. Bray, T.M. Vogt, J.A. Cutler, M.M. Windhauser, P.H. Lin, and N. Karanja. 1997. A clinical trial of the effects of dietary patterns on blood pressure: DASH Collaborative Research Group. *American Journal of Clinical Nutrition* 336:1117-1124.

Badger, T., C. McNiece, E. Bonham, J. Jacobson, and A. Gelenberg. 2003. Health outcomes for people with serious mental illness: a case study. *Perspectives in Psychiatric Care* 39(1):23-32.

Bazzano. L.A. 2006. The high cost of not consuming fruits and vegetables. *Journal of the American Dietetics Association* 106.9:1364-1368.

Bazzano, L.A, H. Jiang, L.G. Ogden, C.M. Lorla, S. Vupputuri, L. Myers, and P.K. Whelton. 2002. Fruit and vegetable intake and risk of cardiovascular disease in US adults: the First National Health and Nutrition Examination Survey epidemiological follow-up study. *American Journal of Clinical Nutrition* 76:93-99.

Bell, M. 2008. A community intervention improves lifestyle habits to support diabetes and heart disease prevention and management among older adults. Master's Thesis, The University of Georgia, Athens, GA.

Bell, M., T. Lommel, J.G. Fischer, J.S. Lee, S. Reddy, and M.A. Johnson. 2009. Recognition of heart attack and stroke warning signs improved following a community-based intervention in older adults in Georgia senior centers. *Preventing Chronic Disease* in press.

Bess, F.H., M.J. Lichtenstein, S.A. Logan, M.C. Burger, and E. Nelson. 1989. Hearing impairment as a determinant of function in the elderly. *Journal of the American Geriatric Society* 37:123-128.

Beydoun, M.A., T.L. Gary, B.H. Caballero, R.S. Lawrence, L.J. Cheskin, and Y. Wang. 2008. Ethnic differences in dairy and related nutrient consumption among US adults and their association with obesity, central obesity, and the metabolic syndrome. *American Journal of Clinical Nutrition* 87(6):1914-1925.

Blackman, D.K., L.A. Kamimoto, and S.M. Smith. 1999. Overview: surveillance for selected public health indicators affecting older adults-United States. *Morbidity and Mortality Weekly Report Surveillance Summaries* 48(No. SS-8):1-6.

Bonnet, F., K. Irving, J.L. Terra, P. Nony, F. Berthezene, and P. Moulin. 2005a. Depressive symptoms are associated with unhealthy lifestyles in hypertensive patients with the metabolic syndrome. *Journal of Hypertension* 23(3):611-617.

Bonnet, F., K. Irving, J.L. Terra, P. Nony, F. Berthezene, and P. Moulin. 2005b. Anxiety and depression are associated with unhealthy lifestyle in patients at risk of cardiovascular disease. *Atherosclerosis* 178:339-344.

Brown, N., A. Muhlenkamp, L. Fox, and M. Osborn. 1983. The relationship among health beliefs, health values, and health promotion activity. *Western Journal of Nursing Research* 5:155-163.

Callahan, C.M., S.L. Hui, N.A. Nienaber, B.S. Musick, and W.M. Tierney. 1994. Longitudinal study of depression and health services use among elderly primary care patients. *Journals of the American Geriatric Society* 42:833-838.

Callahan C.M., and F.D. Wolinsky. 1995. Hospitalization for major depression among older Americans. *Journals of Gerontology Series A: Biological Sciences and Medical Sciences* 50(4):M196-M202.

Catlett, C. 2009. Dietary and health characteristics among food insecure senior center congregate meal participants in Georgia. Master's Thesis, The University of Georgia, Athens, GA.

Carney, R. M., and K.E. Freedland. 2003. Depression, mortality, and medical morbidity in patients with coronary heart disease. *Biology of Psychiatry* 54(3):241-247.

Centers for Disease Control and Prevention. 2002. State-specific trends in self-reported blood pressure screening and high blood pressure-United States, 1991-1999. *Morbidity and Mortality Weekly Report* 51(21):456-460.

Centers for Disease Control and Prevention. 2003. Public health and aging: trends in aging-United States and worldwide. *Morbidity and Mortality Weekly Report* 52(06):101-106.

Centers for Disease Control and Prevention. 2006. Visual impairment and eye care among older adults-five states, 2005. *Morbidity and Mortality Weekly Report* 55(49):1321-1325.

Centers for Disease Control and Prevention. 2007a. Health information for older adults. http://www.cdc.gov/aging/info.htm.

Centers for Disease Control and Prevention. 2007b. Fact sheet: adult cigarette smoking in the United States: current estimates. http://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/adult_cig_smoking.htm.

Centers for Disease Control and Prevention. 2007c. Fact sheet: smokeless tobacco. http://www.cdc.gov/tobacco/data_statistics/fact_sheets/smokeless/smokeless_tobacco.htm.

Centers for Disease Control and Prevention. 2008. Chronic disease overview. http://www.cdc.gov/NCCdphp/overview.htm.

Centers for Disease Control and Prevention. 2009. National vital statistics reports: deaths: final data for 2006. http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_14.pdf.

Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. 2006. Fact sheets and at-a-glance reports: high blood pressure fact sheet. http://www.cdc.gov/dhdsp/library/fs_bloodpressure.htm.

Centers for Disease Control and Prevention, Division for Heart Disease and Stroke Prevention. 2007. Cholesterol: facts and statistics. http://www.cdc.gov/cholesterol/facts.htm.

Centers for Disease Control and Prevention and The Merck Company Foundation. 2007. The state of aging and health in America 2007. http://www.cdc.gov/aging and http://www.merck.com/cr.

Centers for Disease Control and Prevention and National Association of Chronic Disease Directors. 2008. *The State of Mental Health and Aging in America Issue Brief 1: What Do the Data Tell Us?* http://www.cdc.gov/aging/pdf/mental_health.pdf.

Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. 2007. Chronic disease indicators: state profile-United States compared with Georgia. http://apps.nccd.cdc.gov/cdi/SearchResults.aspx?IndicatorIds=12,61,34,31,24,19,38&StateIds=46,11&StateNames=United%20States,Georgia&FromPage=HomePage.

Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey. 2006. National Health and Nutrition

Examination Survey, 2005-2006.
http://www.cdc.gov/nchs/about/major/nhanes/nhanes2005-2006/nhanes05_06.htm.

Centers for Disease Control and Prevention and United States Department of Health and Human Services. 2003. Preventing chronic disease: investing wisely in health- preventing obesity and chronic diseases through good nutrition and physical activity.
http://www.muni.org/iceimages/healthchp/Preventing%20chronic%20disease.pdf

Cole, M.G., and F. Bellavance. 1997. The prognosis of depression in old age. *American Journal of Geriatric Psychiatry* 5:4-14.

Cooper-Patrick L., R.M. Crum, and D.E. Ford. 1994. Characteristics of patients with major depression who receive care in general medical and specialty mental health settings. *Medical Care* 32:15-24.

Dixon, L., and K. Wohlheiter. 2003. Diabetes and mental illness: factors to keep in mind. *Consultant* 43(3):337-344.

DSS Research Inc. 2006. Fort Worth, TX.
http://www.dssresearch.com/toolkit/sscalc/size_a2.asp.

Egede, L.E., D. Zheng, and K. Simpson. 2002. Comorbid depression is associated with increased health care use and expenditures in individuals with diabetes. *Diabetes Care* 25:464-470.

Elbon, S.M., M.A. Johnson, and J.G. Fisher. 1998. Milk consumption in older Americans. *American Journal of Public Health* 88(8):1221-1224.

Ellis, J., M.A. Johnson, J.G. Fischer, and J.L. Hargrove. 2005. Nutrition and health education intervention for whole grain foods in the Georgia older Americans nutrition program. *Journal of Nutrition for the Elderly* 24(3):67-83.

Felton, G.M., M.A. Parsons, and M.G. Bartoces. 1997. Demographic factors: interaction effects on health-promoting behavior and health related factors. *Public Health Nursing* 14(6):361-367.

Fitzpatrick, S.E., S. Reddy, T.S. Lommel, J.G. Fischer, E.M. Speer, H. Stephens, S. Park, and M.A. Johnson. 2008. Physical activity and physical function improved following a community-based intervention in older adults in Georgia senior centers. *Journal of Nutrition for the Elderly* 27(1-2):135-154.

Ford, E., and A. Mokdad. 2001. Fruit and vegetables consumption and diabetes mellitus incidence among US adults. *Preventive Medicine* 32:33-39.

Gillis, A.J. 1993. Determinants of a health-promoting lifestyle: an integrative review. *Journal of Advanced Nursing* 18:345-353.

Glass, A.P. 2005. Public health and older Georgians: a road map for research, training, and outreach. Institute of Gerontology, College of Public Health, The University of Georgia. Technical Report # UGAIG-05-001. http://www.geron.uga.edu.

Golomb, B.A., J.M. Pyne, B. Wright, B. Jaworski, J.B. Lohr, and S.A. Bozzette. 2000. The role of psychiatrists in primary care of patients with severe mental illness. *Psychiatric Services* 51:766-773.

Goodwin, R.D. 2003. Association between physical activity and mental disorders among adults in the United States. *Preventative Medicine* 36(6):698-703. Doi:10.1016/S0091-7435(03)00042-2.

Harris, D.M., and S. Guten. 1979. Health protective behavior: an exploratory study. *Journal of Health and Social Behavior* 20:17-29.

Heaney, R.P. 2000. Calcium, dairy products and osteoporosis. *Journal of the American College of Nutrition* 19(90002):83S-99S.

Hendrix, S.J., J.G. Fischer, R.D. Reddy, T.S. Lommel, E.M. Speer, H. Stephens, S. Park, and M.A. Johnson. 2008. Fruit and vegetable intake increased following a community-based intervention in older adults in Georgia senior centers. *Journal of Nutrition for the Elderly* 27(1-2):155-178.

Herrmann, N., N. Mittmann, I.L. Silver, K.I. Shulman, U.A. Busto, N.H. Shear, and C.A. Naranjo. 1996. A validation study of The Geriatric Depression Scale short form. *International Journal of Geriatric Psychiatry* 11(5):457-460 Doi:10.1002/(SICI)1099-1166(199605)11:5<457.

Hirschfeld R.M., M.B. Keller, S. Panico, B.S. Arons, D. Barlow, and F. Davidoff. 1997. The national depressive and manic-depressive association consensus statement on the under treatment of depression. *Journal of the American Medical Association* 277:333-340.

Hoffman, C., D. Rice, and H.Y. Sung. 1996. Persons with chronic conditions: their prevalence and costs. *Journal of the American Medical Association* 276(18):1473-1479.

Johnson, M.A., and J. Fischer, Editors. 2008. Seniors Taking Charge of Your Health! Department of Foods and Nutrition, The University of Georgia, Athens, GA. http://www.livewellagewell.info/study materials.htm.

Kasl, S.V. and S. Cobb. 1966. Health behavior, illness behavior and sick-role behavior: I. health and illness behavior. *Achieves of Environment Health* 12:246-266.

Katon, W.J. 2003. Clinical and health services relationships between major depression, depressive symptoms, and general medical illness. *Biological Psychiatry* 54:216-226.

Kruger, J., S.A. Carlson, and D. Buchner. 2007. How active are older Americans? *Preventing Chronic Disease* 4:1-12.

Kulbok, P.A., J.H. Baldwin, C.L. Cox, and R. Duffy. 1997. Advancing discourse on health promotion: beyond mainstream thinking. *Advances in Nursing Science* 20(1):12-20.

Lambert V.T., and C. Pantelis C. 2003. Medical comorbidities in schizophrenia. *Medical Journal of Australia* 178:S67-S70.

Leavell, H.R., and E.G. Clark. 1965. *Preventive Medicine for the Doctor in His Community: An Epidemiological Approach*. 3rd ed. New York, NY: McGraw-Hill.

Lorant, V., D. Deliege, W. Eaton, A. Robert, P. Philippot, and M. Ansseau. 2003. Socioeconomic inequalities in depression: a meta-analysis. *American Journal of Epidemiology* 157: 98-112.

Luber M.P., B.S. Meyers, P.G. Williams-Russo, J.P. Hollenberg, T.N. DiDomenico, M.E. Charlson, and G.S. Alexopoulos. 2001. Depression and service utilization in elderly primary care patients. *American Journal of Geriatric Psychiatry* 9:169-176.

Maciosek, M.V., A.B. Coffield, N.M. Edwards, T.J. Flottemesch, M.J. Goodman, L.I. Solberg. 2006. Priorities among affective clinical preventive services: results of a systematic review and analysis. *American Journal of Preventive Medicine* 31(1):52-61.

Maryland Department of Health and Mental Hygiene, Family Health Administration, and Center for Preventive Health Services. 2007. Maryland BRFSS state of the state report: 2005 survey results on Maryland Health Behaviors and Lifestyles. http://www.marylandbrfss.org/pdf/brfss2005report.pdf.

Maylahn, C. and T.A. Melnik. 2008. Vision impairment and access to eye care. *Behavioral Risk Factor Surveillance System* 14(1)1-8.

Mulrow, C.D., C. Aguilar, J.E. Endicott, M.R. Tuley, R. Velez, W.S. Charlip, M.C. Rhodes, J.A. Hill, and L.A. DeNiro. 1990. Quality of life changes and hearing impairment: results of a randomized trial. *Annuals of Internal Medicine* 113:188-194.

Mulrow, C.D. and M.J. Lichtenstein. 1991. Screening for hearing impairments in the elderly: rational and strategy. *Journal of General Internal Medicine* 6:249-258.

National Academy of Sciences, Institute of Medicine, Ad Hoc Advisory Group on Preventive Services. 1978. Preventive services for the well population. Washington DC: National Academy of Sciences.

National Center for Chronic Disease Prevention and Health Promotion, Behavioral Risk Factor Surveillance System. 2006. Prevalence data. http://apps.nccd.cdc.gov/brfss/display.asp?cat=PA&yr=2005&key=4418&stateGA.

National Cholesterol Education Program. 1993. Second report of the National Cholesterol Education Program expert panel on the detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel II). Bethesda, MD: National Heart, Lung, and Blood Institute.

National Eye Institute. 2008. Statistics and data: prevalence of blindness data. http://www.nei.nih.gov/eyedata/pbd_tables.asp.

National Guideline Clearinghouse. 2009. Guideline for the care of older adults with diabetes. http://www.guideline.gov/summary/summary.aspx?doc_id=11373&nbr=005910&string=older+AND+adults+AND+diabetes.

National High Blood Pressure Education Program Working Group. 1990. Report on Ambulatory blood pressure monitoring. *Archives of Internal Medicine* 150:2270-2280.

National Institutes of Mental Health. 2007. Depression. http://www.nimh.nih.gov/health/publications/depression/nimhdepression.pdf.

National Osteoporosis Foundation. 1999. Physician's guide to prevention and treatment of osteoporosis. Washington, DC: National Osteoporosis Foundation.

National Osteoporosis Foundation. 2008. Fact sheets on osteoporosis. http://www.nof.org/osteoporosis/diseasefacts.htm.

Nelson, M.E., W.J. Rejeski, S.N. Blair, P.W. Duncan, J.O. Judge, A.C. King, et al. 1997. Physical activity and public health in older adults: recommendations from the American College of Sports Medicine and the American Heart Association. *Circulation* 116:1094-1105.

Nutrition Screening Initiative. 1992. Nutrition Interventions Manual for Professionals Caring for Older Americans. Washington, DC: Nutrition Screening Initiative.

Older Americans Act Amendments of 2006. Public Law 109-365. Congress, October 17, 2006. http://www.aoa.gov/oaa2006/Main_Site/oaa/oaa_full.asp.

Outshoorn, J. 2002. Gendering the "graying of society: a discourse analysis of the care gap. *Public Administration Review* 62:185-196.

Paluska, S. A., and T.L. Schwenk. 2000. Physical activity and mental health current concepts. *Sports Medicine* 29(3):167-180.

Parsons, T. 1951. The Social System. New York, NY: Free Press.

Pennix B.W., J.M. Guralnik, M. Pahor, L. Ferrucci, J.R. Cerhan, R.B. Wallace, and R.J. Havlik. 1998. Chronically depressed mood and cancer risk in older persons. *Journal of the National Cancer Institute* 90:1888-1893.

Plummer, E.S. and S.G. Albert. 1996. Focused assessment of foot care in older adults. *Journal of the American Geriatric Society* 44(3):310-313.

Porter, K.N. 2009. Improved physical activity and physical function in depressed and non-depressed older adults following a community-based intervention. Master's Thesis, The University of Georgia, Athens, GA.

Pratt, L.A., and D.J. Brody. 2008. Depression in the United States household population, 2005-2006. United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. NCHS Data Brief No. 7, September 2008. http://www.cdc.gov/nchs/data/databriefs/db07.htm.

Pullen, C., S.N. Walker, and K. Fiandt. 2001. Determinants of health-promoting lifestyle behaviors in rural older women. *Family and Community Health* 24(2):49-72.

Reynolds, C. F., E. Frank, J.M. Perel, and S.D. Imber. 1999. Nortriptyline and interpersonal psychotherapy as maintenance therapies for recurrent major depression: a randomized controlled trial in patients older than 59 years. *Journal of American Medical Association* 281(1):39-45.

Romanelli J., J.A. Fauerbach, D.E. Bush, and R.C. Ziegelstein. 2002. The significance of depression in older patients after myocardial infarction. *Journal of the American Geriatrics Society* 50:817-822.

SAS Institute, Inc. (2001). Version 9, Cary, North Carolina.

Schousboe, J.T., B.C. Taylor, H.A. Fink, R.L. Kane, S.R. Cummings, E.S. Orwoll, L.J. Melton III, D.C. Bauer, and K.E. Ensrud. 2007. Cost-effectiveness of bone densitrometry followed by treatment of osteoporosis in older men. *Journal of the American Medical Association* 298(6):629-637.

Speer, E.M., S. Reddy, T.S. Lommel, J.G. Fischer, H. Stephens, S. Park, and M.A. Johnson. 2008. Diabetes self-management behaviors and A1c improved following a community-based intervention in older adults in Georgia senior centers. *Journal of Nutrition for the Elderly* 27(1-2):179-200.

Strecher, V.J., and I.M. Rosenstock. 1997. The Health Belief Model.   In Health Behavior and Health Education: Theory, Research and Practice, 2nd Ed., Glanz K., F.M. Lewis, and B.K. Rimer (editors). Jossey-Bass Publishers, San Francisco CA. 41-59.

Teems, J.E. 2008. Fall and fracture preventive behaviors increased following a community-based intervention in older adults in Georgia senior centers. Master's Thesis, The University of Georgia, Athens, GA.

University of Illinois Chicago Department of Psychology. 2005. Clinical depression disorders. http://www.psych.uic.edu/clinical/depression.htm.

United States Census Bureau. 2005. U.S. population projections for selected age groups by state: 2005-2030. http://www.aoa.gov/prof/Statistics/future_growth/State-5-yr-projections-2005-2030.pdf.

United States Department of Agriculture, Centers for Nutrition Policy and Promotion. 2005. Grain consumption by Americans: nutrition insight 32. http://www.cnpp.usda.gov/Publications/NutritionInsights/Insight32.pdf.

United States Department of Agriculture, Centers for Nutrition Policy and Promotion. 2007. Fruit and vegetable consumption by older Americans: nutrition insight 34. http://www.cnpp.usda.gov/Publications/NutritionInsights/Insight34.pdf.

United States Department of Health and Human Services. 2000. Healthy People 2010 understanding and improving health. http://www.healthypeople.gov/Document/pdf/uih/2010uih.pdf.

United States Department of Health and Human Services. 2008. 2008 Physical activity guidelines for Americans: be active, healthy, and happy! http://www.health.gov/paguidelines/pdf/paguide.pdf.

United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adult and Community Health. 2000. 2000 Behavioral Risk Factor Surveillance Systems BRFSS questionnaire. http://www.cdc.gov/BRFSS/questionnaires/pdf-ques/2000brfss.pdf.

United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adult and Community Health. 2005. 2005 Behavioral Risk Factor Surveillance Systems BRFSS questionnaire. http://www.cdc.gov/BRFSS/questionnaires/pdf-ques/2005brfss.pdf.

United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adult and Community Health. 2006. 2006 Behavioral Risk Factor Surveillance Systems BRFSS questionnaire. http://www.health.state.nd.us/brfss/publications/ND_2006_BRFSS_QSTNR_7_10_06.pdf.

United States Department of Health and Human Services, Centers for Medicare and Medicaid Services. 2007. Your guide to Medicare's preventive services. http://www.medicare.gov/Publications/Pubs/pdf/10110.pdf.

United States Department of Health and Human Services, Substance Abuse and Mental Health Services, National Institutes of Health, National Institutes of Medicine. 1988. Surgeon General's workshop on health promotion and aging. http://profiles.nlm.nih.gov/NN/B/C/S/M/.

United States Department of Health and Human Services, Substance Abuse and Mental Health Services, National Institutes of Health, National Institutes of Medicine. 1999. Surgeon General's workshop on health promotion and aging. http://profiles.nlm.nih.gov/NN/B/C/S/M/.

United States Department of Health and Human Services and United States Department of Agriculture. 2005. Dietary Guidelines for Americans 2005. http://www.health.gov/dietaryguidlines/dga2005/document/.

Unutzer J., D.L. Patrick, G. Simon, D. Grembowski, E. Walker, C. Rutter, and W. Kanton. 1997. Depressive symptoms and the cost of health services in HMO patients aged 65 years and older: a 4-year prospective study. *Journal of the American Medical Association* 277:1618-1623.

Walker, S.N., K.R. Sechrist, and N.J. Pender. 1987. The Health Promoting Lifestyle Profile: development and psychometric characteristics. *Nursing Research* 36:76-81.

Walker S., and N. Pender. 1987. The Health-Promoting Lifestyle Profile: development and psychometric characteristics. *Nursing Research* 36:76-81.

Yesavage, J.A., T.L. Brink, T.L. Rose, O. Lum, V. Huang, M.B. Adey, and V.O. Leirer. 1983. Development and validation of a geriatric depression screening scale: a preliminary report. *Journal of Psychiatric Research* 17(1):37-49.

APPENDICES

APPENDIX A

POWER ANALYSIS

The target number of enrolled participants was 3,000 (about 250 per AAA) and 811 participants in the pre-test (about 70 per AAA). A drop out rate of 30 percent will be assumed based on previously interventions (Fitzpatrick et al. 2008; Hendrix et al. 2008; Speer et al. 2008). A 22 percent prevalence of depression in this sample was determined by pre-test analysis. Assuming a 30 percent drop out rate, the anticipated sample completing the post-test include 125 with a previous diagnosis of depression and 443 without a previous depression diagnosis, for a total of 568 participants.

The proposed sample has adequate power (DSS Research Inc. 2009). A difference of at least one behavior between the group with a previous diagnosis of depression and the group without (e.g. in a summary score with mean (+/-SD), a total score of 7.0 +/-1.5 for the group with a previous depression diagnosis compared to 7.5+/-1.5 for the group without a previous depression diagnosis assuming the previously estimated sample sizes) will have a power of 95 percent and an alpha set at 0.05. Due to the nature of the health promoting lifestyle score, a 0.5 difference is the smallest increment representing a behavioral difference. Only 111 participants are needed at post-test to show a difference of at least one behavior (e.g. in a summary score with mean (+/-SD), a total score of 7.0 +/-1.5 at pre-test compared to 7.5+/-1.5 at post-test, power = 0.8, $\alpha = 0.05$).

APPENDIX B

PHYSICAIAN'S CLEARANCE

Physician's Clearance to Participate in Physical Activity and Walking

Your patient, _____, has indicated an interest in participating in a nutrition, physical activity, and walking program offered at their local senior center. The program is designed to help older adults eat better and walk more, and was developed by the Georgia Division of Aging Services and the University of Georgia. Participants will wear step counters to monitor the number of steps they take each day. About every two weeks each participant will be given a daily step goal based on the average daily steps from the previous week. The new step goal will be about a 10% increase. Also, about every one or two weeks, there will be lessons on nutrition, physical activity, and walking at the senior centers. Along with the lessons, about five to thirty minutes of group physical activity, including chair exercises for improving flexibility, balance, and strength will be offered. When and where possible, a group walking activity will also be included.

RELEASE TO REQUEST PERMISSION FROM PHYSICIAN

I give permission to _____to ask my physician if I may participate in the physical activity and walking program at my senior center.

I give my physician my approval to sign the form.

Participant signature: _____ Date: _____

Participant printed name: _____

PHYSICIAN SIGNATURE

My patient,_____ has medical approval to participate in the physical activity and walking program at their senior center.

___ The patient has no known contraindications to moderate physical activity.

___ The patient has conditions in which moderate physical activity is contraindicated.

Physician Signature: _____ Date: _____

Physician printed name: _____

Physician address: _____

Physician phone: _____

Physician FAX: _____

Form adapted from: Eat Better & Move Better, A Guide Book for Community Programs, National Resource Center on Nutrition, Physical Activity and Aging, Florida International University, funded by grants from the Administration on Aging, US Department of Health and Human Services.

APPENDIX C

INTEVERNTION PRE-TEST/POST-TEST

LIVE HEALTHY GEORGIA! CONSENT FORM

I, _____, agree to participate in the research study titled "Live Healthy Georgia!" conducted by Dr. Mary Ann Johnson in the Department of Foods and Nutrition at the University of Georgia and at my local Senior Center. I understand that participation is voluntary and I do not have to take part if I do not want to. I can refuse to participate and stop taking part anytime without giving any reason and without penalty. I can ask to have all information concerning me removed from the research records, returned to me, or destroyed. My decision to participate will not affect the services that I receive at the Senior Center.

By participating in this study, I may improve my nutrition and physical activity habits and self-management of diabetes and other chronic conditions. This study will also help the investigators learn more about good ways to help older adults improve their nutrition and physical activity habits and self-management of diabetes and other chronic conditions. This study will be conducted at my local Senior Center. If I volunteer to take part in this study, I will be asked to do the following things:

1) Answer questions about my health, nutrition and physical activity.

2) Obtain physician clearance to participate in a physical activity program.

3) Provide information about my health, nutrition, and physical activity and complete a physical measurement of weight and waist circumference in a pre-test and post-test. The pre-test will last up to 60 minutes that may be divided into two sessions. The post-test will last up to 30 minutes that also may be divided into two sessions.

4) Attend up to 12 health, nutrition and physical activity programs that will last about 30 to 60 minutes each over a four-month period. I will learn how to use a step counter and record my daily number of steps and minutes of physical activity.

5) Take part in a physical activity program of chair exercises and walking to improve my strength, balance, endurance, and flexibility.

6) **<u>If I have diabetes</u>**, then I may be asked if I would like to provide blood samples for hemoglobin A1c. A licensed nurse, medical technologist, or phlebotomist will obtain 2-3 drops (about 35 microliters) of whole blood via finger stick and/or up to 3 ml of whole blood via venipuncture on two occasions about four to six months apart. Or, I can provide a hemoglobin A1c value from my physician, health department, clinical laboratory, or hospital. This test will help determine if 12 lessons at my senior center are helping me manage my diabetes. The risks of drawing blood from my finger or arm include the unlikely possibilities of a small bruise or localized infection, bleeding and fainting. These risks will be reduced in the following ways: my blood will be drawn only by a qualified and experienced person who will follow standard sterile techniques, who will observe me after the blood draw, and who will apply pressure and a Band-Aid to the blood draw site. My blood will not be tested for HIV-AIDS. Any unused portion of my blood sample will be discarded. I understand that these questions and blood tests are not for diagnostic purposes. I should see a physician if I have questions about my test results. In the event that I have any health problems associated with the blood draw or my blood sample, my insurance or I will be responsible for any related medical expenses.

7) Someone from the study may contact me to clarify my information throughout the study.

The instructor may provide food to taste. Mild to no risk is expected by tasting food. However, I will not taste foods that I should not eat because of swallowing difficulties, allergic reactions, dietary restrictions, or other food-related problems.

There is minimal risk to participation in this study. I may experience some discomfort or stress when the researchers ask me questions about my nutrition, health, and physical activity habits. There is a possibility that I could temporarily injure a muscle or be sore from physical exertion. This risk is minimized by ability to rest at any time. The leaders will advise me to stop exercising if I experience any discomfort or chest pains. If additional care is needed, then my insurance company or myself will be responsible for any expense that may be incurred. As a participant, I assume certain risks of physical injury. The researchers will exercise all reasonable care to protect me from harm as a result of my participation. However, I do not give up or waive any of my rights to file a claim with the University of Georgia's insurer (Department of Administrative Services) or pursue legal action by signing this form.

In case of a research-related injury, please contact Dr. Mary Ann Johnson at 706-542-2292.

No information concerning myself or provided by myself during this study will be shared with others without my written permission, unless law requires it. I may choose not to answer any question or questions that may make me uncomfortable. I will be assigned an identifying number and this number will be used on all of the questionnaires I fill out. Data will be stored in locked file cabinets under the supervision of Dr. Mary Ann Johnson at the University of Georgia; only the staff involved in the study will have access to these data and only for the purpose of data analyses and interpretation of results. My identity will not be revealed in any reports or published materials that might result from this study. The data will be destroyed by January 1, 2015.

If I have any further questions about the study, now or during the course of the study I can call Ms. Tiffany Sellers Lommel (706-542-4838) or Dr. Mary Ann Johnson (706-542-2292). I will sign two copies of this form. I understand that I am agreeing by my signature on this form to take part in this study. I will receive a signed copy of this consent form for my records.

_____   _____
_____
Signature of Participant   Participant's Printed Name   Date

_____
___
Participant Address and Phone

_____   _____Mary Ann Johnson____   Oct 19,
2007
Signature of Investigator   Printed Name of Investigator   Date
Email: mjohnson@fcs.uga.edu

_____   _____
_____

Signature of Staff who Reads   **Printed Name of Staff**   **Date**
Consent Form to Participant

For questions or problems about your rights as a research participant please call or write: The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu.

Project # 070702
Consent Form Approval Period
From: 9-11-07 to 9-1-08
Authorization: m.p.

University of Georgia
Institutional Review Board
Approved: 9-10-07
Expires 6-4-08

UGA project number: #2006-10842   DHR project number: #070702

POST-TEST

To be completed in April and May, 2008

LIVE HEALTHY GEORGIA

	Line 1
Name of Interviewer:	1
ID of Participant:	1-4
Phone number to use to clarify information and get step counts:	
1. County/Senior Center	10-12
2. Date (M/D/Y): ___/___/___	13-18
3. Age of Participant: ___ ___ ___	19-21
4. Gender: Male (0) Female (1)	22
5. Ethnicity: White (1) Black (2) Hispanic/Latino (3) Asian (4) Other (5)	23
6. How many years did you complete in school: _____ years	24-25

		Line
7. How would you rate your overall health? Circle one: Poor (0) Fair (1) Good (2) Very good (3) Excellent (4)		26
8. Do you use any tobacco products such as cigarettes, cigars, pipe, or chewing tobacco?	No (0) Yes (1)	27
9. Do you have diabetes?	No (0) Yes (1)	28
10. Do you have high blood pressure?	No (0) Yes (1)	29
11. Do you have heart disease such as angina, congestive heart failure, heart attack or other heart problems?	No (0) Yes (1)	30
12. Do you have arthritis?	No (0) Yes (1)	31
13. During the past 30 days, have you had symptoms of pain, aching, or stiffness in or around a joint?	No (0) Yes (1)	32
MEDICATION MANAGEMENT		X
14. How many prescription medications, including insulin, do you take?		34-35
15. How many over the counter medications do you take? *(such as a daily multivitamin, supplements, Aspirin®, etc.)*		36-37
16. Do you go to one pharmacy for **all** of your medications?	No (0) Yes (1)	38
17. Do you have a written list of **all** of your prescription medications, non-prescription medications, and dietary supplements?	No (0) Yes (1)	39
18. Do you carry this written list with you in your purse or wallet?	No (0) Yes (1)	40
19. Have you had a physician, pharmacist, or other health professional look at all of your medications in the past 6 months?	No (0) Yes (1)	41
20. Do you **always** throw out your medications when they are expired (past their "use by" date)?	No (0) Yes (1)	42
21. Do you use a pillbox or other system to help you take your medications?	No (0) Yes (1)	43
22. Do you know the name of **each** of your medications?	No (0) Yes (1)	44
23. Do you know what **each** of your medications is for?	No (0) Yes (1)	45
24. Do you know the possible side effects of **each** of your medications?	No (0) Yes (1)	46
Emotional Support, Life Satisfaction, and Depression		
25. Do you attend a support group for health conditions, such as diabetes, heart disease, cancer, grief, or other conditions?	No (0) Yes (1)	47
26. How often do you get the social and emotional support that	1) Always 4)	7 Don't

you need?	Rarely 2) Usually 5) Never 3) Sometimes	know/ not sure 9 Refused 48
27. Has a doctor or other health care provider EVER told you that you have a depressive disorder?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 49

Read Questions to Participants and Circle their Answers			
DIET AND PHYSICAL ACTIVITY			Line 1
28. How many fruits and vegetables should older people eat each day? (Circle the participant's response) 0 1 2 3 4 5 6 7 8 9 10 "5 a day" "5 or more a day" "7 to 10 a day" DK Missing			50-52
29. How many servings of fruits and 100% fruit juices do you usually have each day?	0 1 2 3 4 5 6 7		53
30. How many servings of vegetables do you usually eat each day?	0 1 2 3 4 5 6 7		54
31. On how many DAYS of the last WEEK (seven days) did you eat five or more servings of fruits and vegetables?	0 1 2 3 4 5 6 7		55
32. How many DAYS of the last WEEK (seven days) have you followed a healthful eating plan?	0 1 2 3 4 5 6 7		56
33. How many DAYS of the last WEEK (seven days) did you participate in at least **30 minutes** of **moderate** physical activity? Examples of **moderate** activities are regular walking, housework, yard work, lawn mowing, painting, repairing, light carpentry, ballroom dancing, light sports, golf, or bicycling on level ground.	0 1 2 3 4 5 6 7		57
34. How many days of the week do you participate in any physical activity (light or moderate)?	0 1 2 3 4 5 6 7		58
35. About how many minutes of physical activity do you do on the days you are physically active?	_____ minutes		59-61
36. How many DAYS of the last WEEK (seven days) did you participate in a specific **exercise session** other than what you do around the house or as a part of your daily activities *(e.g., chair exercises, yoga, aerobics, organized walking programs, using workout machines, etc.)*?	0 1 2 3 4 5 6 7		62
HOME FOOD SAFETY			
37. In the past month, did you **always** wash your hands with **warm water** and **soap** for **20 seconds** before eating food?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused	63
38. In the past month, did you **always** rinse fresh fruits and vegetables with cold running water before eating them??	No (0) Yes (1)	7 Don't know/ not sure 9 Refused	64
39. In the past month, have you checked the temperature of your refrigerator?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused	65
40. Do you cook, reheat or prepare meals in your home?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused	66
41. Do you own a meat thermometer?	No (0) Yes (1)	7 Don't know/ not sure	

Read Questions to Participants and Circle their Answers			
		9 Refused 67	
FALLS AND FRACTURES			
42. Have you had a fracture or broken bone after age 50?		No (0) Yes (1)	68
43. Have you fallen in the past year?		No (0) Yes (1)	69
44. Do you feel limited in your daily life by a fear of falling?		No (0) Yes (1)	70
45. Have you ever been told by a doctor or other health professional that you have osteoporosis?		No (0) Yes (1)	71
FOODS AND SUPPLEMENTS			Line 1
46. Do you get a stomachache, gas, or diarrhea after drinking milk?		No (0) Yes (1)	72
47. How many servings of milk products should most older people eat daily?		0 1 2 3 4 DK	73
48. How many whole grain servings should people eat each day?		0 1 2 3 4 DK	74

How often do you eat or drink or take these items? (*includes 3 or more per day)	Line 2
49. Whole wheat or whole grain bread (such as 100% whole wheat bread)? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	1-2
50. Whole grain cereals (such as oatmeal, Cheerios®, bran flakes or bran cereal)? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	3-4
51. Milk as a beverage (including soy milk)? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	5-6
52. Milk on cereal (including soy milk)? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	7-8
53. Calcium-fortified orange juice? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	9-10
54. Calcium supplement? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	11-12
55. Calcium supplement with vitamin D? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	13-14
56. Multivitamin with vitamin D? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	15-16
57. Vitamin D-only supplement? <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK	17-18

For the data coder: <1/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 1/day 1-2/day 2/day 2-3/day 3/day* DK/Miss

          00   01   02   03   04   05   06   07   10   14   17   21

99   19-20

FOOD SECURITY

58. Do you always have enough money to buy the food you need?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 21
59. In the past month, have you received food from a food pantry or food bank?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 22
60. Do you currently receive food stamps?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused

		23
Think about the past 30 days. I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for you since last (name of current month).		
61. The food that you bought just didn't last, and you didn't have money to buy more.	1) Often 2) Sometimes 3) Never	7 Don't know/ not sure 9 Refused 24
62. You couldn't choose the right food and meals for your health because you couldn't afford them.	1) Often 2) Sometimes 3) Never	7 Don't know/ not sure 9 Refused 25
63. Did you ever cut the size of your meals or skip meals because there wasn't enough money for food?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 26
63a. If yes, in the last 30 days, how many days did this happen? *(interviewer-please write in participant's response)*	_____days	7 Don't know/ not sure 9 Refused 27-28
64. Did you ever eat less than you felt you should because there wasn't enough money to buy food?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 29
65. Were you ever hungry but didn't eat because you couldn't afford enough food?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 30

Get Checked Questions
(Adapted from **BRFSS,** http://www.cdc.gov/brfss/questionnaires/pdf-ques/2005brfss.pdf)

Question	Write or Circle Answer	Code
		Line 2
66. About how long has it been since you last had a bone mineral density test?	1) Within the past year 2) Within the past 2 yr 3) Within the past 5 yr 4) 5 or more yrs ago 5) Never	7 Don't know/not sure 9 Refused 31
67. About how long has it been since you last had your blood cholesterol checked?	1) Within the past year 2) Within the past 2 yr 3) Within the past 5 yr 4) 5 or more yrs ago 5) Never	7 Don't know/not sure 9 Refused 32
68. Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?	1) Yes 2) No	7 Don't know/not sure 9 Refused 33
69. Are you cutting down on saturated fat in your diet (to help manage or lower your risks of developing heart disease)?	1) Yes 2) No	7 Don't know/not sure 8 Refused 34
70. About how long has it been since you last had your blood pressure checked?	1) Within past month 2) Within past year 3) Within past 2 yrs 4) 2 or more years ago 5) Never	7 Don't know/not sure 9 Refused 35
71. Are you cutting down on sodium or salt (to help lower or control your blood pressure)?	1) Yes 2) No 3) Do not use salt	7 Don't know/not sure 9 Refused 36
72. When was the last time you visited ANY eye care professional? (To have your eyes and vision checked?)	1) Within past month 2) Within past year 3) Within past 2 yrs 4) 2 or more years ago 5) Never	7 Don't know/not sure 9 Refused 37
73. When was the last time you visited ANY ear care professional? (To have your hearing or hearing aids checked?)	1) Within past month 2) Within past year 3) Within past 2 yrs 4) 2 or more years ago 5) Never	7 Don't know/not sure 9 Refused 38
74. When was the last time you had your feet checked by a health care	1) Within past month 2) Within past year	7 Don't know/not sure

professional, such as a doctor or nurse?	3) Within past 2 yrs 4) 2 or more years ago 5) Never	9 Refused 39
75. If you thought someone was having a heart attack or a stroke, what is the first thing you would do? *Read list to participant and circle their answer.*	1-Take them to the hospital 2-Tell them to call their doctor 3-Call 911 4-Call their spouse or a family member 5-Do something else	7 Don't know/not sure 9 Refused 40

WEIGHT QUESTIONS		
76. Do you consider yourself to be:	1) Underweight? 2) Overweight? 3) About the right weight?	7 Don't know/ not sure 9 Refused 41
77. Would you like to weigh:	1) More 2) Less 3) Stay about the same	7 Don't know/ not sure 9 Refused 42
78. Your primary concern about your current weight is:	1) My health 2) My appearance 3) My weight is about right, no concerns	7 Don't know/ not sure 9 Refused 43
79. Does your current weight affect your ability to do daily activities such as walk, do housework, shop, etc?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 44
80. In the past year, have you been told by a doctor or health care professional to reduce your weight?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 45
81. What do you think is the best way to lose weight? *(interviewer-please write in participant's response)*		7 Don't know/ not sure 9 Refused 46
82. In the past year, have you lost weight?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 47
year, 82a. If you have lost weight in the past how much? *(interviewer-please write in participant's response)*		7 Don't know/ not sure 9 Refused 48
is, 82b. Was the weight loss intentional? That were you trying to lose weight?	No (0) Yes, trying to change it (1) No loss (2)	7 Don't know/ not sure 9 Refused 49
82c. What method(s) did you use to lose weight? *(interviewer-please write in participant's response)*		50-51
83. In the past year, have you gained weight?	No (0) Yes (1)	7 Don't know/ not sure 9 Refused 52
year, 83a. If you have gained weight in the past how much? *(interviewer-please write in*		53-54

	participant's response)		
is,	83b.Was the weight gain intentional? That were you trying to gain weight?	No (0) Yes, trying to change it (1) No gain (2)	7 Don't know/ not sure 9 Refused 55
	83c. What method(s) did you use to gain weight? *(interviewer-please write in participant's response)*		7 Don't know/ not sure 9 Refused 56-57

7 = Don't know/not sure, 9 = Refused

FOR THOSE WITH DIABETES		Line 2
1. What kind of effect does diabetes have on your daily activities? No effect (1)　　　Little effect (2)　　　Large effect (3)	1　2　3	58
2. Thinking about your diet, on how many DAYS of the last WEEK (seven days) did you space carbohydrates evenly?	0 1 2 3 4 5 6 7	59
3. On how many DAYS of the last WEEK (seven days) did you test your blood sugar?	0 1 2 3 4 5 6 7	60
4. What medications do you take for your diabetes? 0-None　　1-pills only　2-insulin only　3-pills and insulin		61
5. On how many DAYS of the last WEEK (seven days), did you take your diabetes medication as prescribed by your doctor?	0 1 2 3 4 5 6 7	62
6. On how many DAYS of the last WEEK (seven days) did you check your feet?	0 1 2 3 4 5 6 7	63
7. On how many DAYS of the last WEEK (seven days) did you inspect the inside of your shoes?	0 1 2 3 4 5 6 7	64
8. What should your hemoglobin A1c level be? ___% *(interviewer-please write in participant's response)*	77 Don't know/ not sure 99 Refused 65-66	
9. What things are the hardest for you to do when managing your diabetes? *(interviewer-please write in participant's response)*		67-68

After attending the health, nutrition, and physical activity education programs at your center these past few months, have you done any of the following? *Read the list and circle the answers.*	Line 3
1. Increased your physical activity?	No (0) Yes (1) 1
2. Tried to follow a healthier diet?	No (0) Yes (1) 2
3. Increased your intake of fruit?	No (0) Yes (1) 3
4. Increased your intake of vegetables?	No (0) Yes (1) 4
5. Learned about healthy foods that are inexpensive?	No (0) Yes (1) 5
6. Started washing your hands more often to prevent illness?	No (0) Yes (1) 6
7. Started taking a supplement with calcium and vitamin D?	No (0) Yes (1) 7
8. Eaten more calcium-rich foods?	No (0) Yes (1) 8
9. Learned the warning signs of a heart attack?	No (0) Yes (1) 9
10. Learned the warnings signs of a stroke?	No (0) Yes (1) 10
11. Taken better care of your feet?	No (0) Yes (1) 11
12. Talked with your doctor about bone health and osteoporosis?	No (0) Yes (1) 12
13. Talked with your doctor about arthritis?	No (0) Yes (1) 13
14. Talked with your doctor about your body weight?	No (0) Yes (1) 14
15. Had your medications reviewed?	No (0) Yes (1) 15
16. Taken your medications as recommended by your doctor?	No (0) Yes (1) 16
17. Made your home a safer place to prevent falls?	No (0) Yes (1) 17
18. Made a recipe from one of the lessons?	No (0) Yes (1) 18
19. Modified a recipe to make it healthier?	No (0) Yes (1) 19
20. If you have diabetes, did these programs help you space carbohydrates over the day?	No (0) Yes (1) No diabetes (8) 20
21. If you have diabetes, did these programs help you maintain your blood sugar levels?	No (0) Yes (1) No diabetes (8) 21
22. If you have diabetes, did these programs help you control portion sizes of foods?	No (0) Yes (1) No diabetes (8)

	22
23. What was your overall level of satisfaction with these health and nutrition education programs? Circle one: Poor (0) Fair (1) Good (2) Very good (3) Excellent (4)	0 1 2 3 4 23
24. What was your overall level of satisfaction with this physical activity program? Circle one: Poor (0) Fair (1) Good (2) Very good (3) Excellent (4)	0 1 2 3 4 24
25. How many sessions of the **health, nutrition, and physical activity education programs** did the participant attend? *Staff should document with attendance records. Maximum is 12 sessions.*	25-26

Please ask the participant for any additional comments about the education programs, physical activity programs, menus, recipes, games, etc.:

WAIST CIRCUMFERENCE:
Instructions for Measuring Waist Circumference

The measurement should be made under the clothes.

To measure waist circumference, locate the upper hipbone and the top of the right iliac crest. Place a measuring tape in a horizontal plane around the abdomen at the level of the iliac crest. Before reading the tape measure, ensure that the tape is snug, but does not compress the skin, and is parallel to the floor. The measurement is made at the end of a normal expiration.

A high waist circumference is associated with an increased risk for type 2 diabetes, dyslipidemia, hypertension, and CVD in patients with a BMI between 25 and 34.9 kg/m2.

High-Risk Waist Circumference
Men: > 40 in (> 102 cm)
Women: > 35 in (> 88 cm)

http://www.nhlbi.nih.gov/guidelines/obesity/prctgd_c.pdf
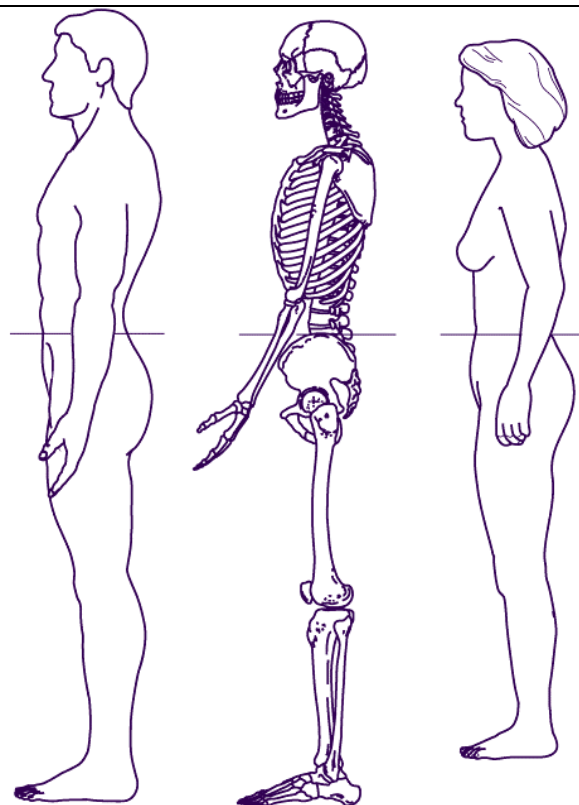
84. Waist Circumference = _____ INCHES		Line 4 1-3
85. How was measurement made? (1) Under clothes OR (2) Over clothes	1 2	4
86. What is your current height without shoes? _____ feet and ____ inches		5-7
87. How was the measurement made? (1) With a tape measure OR (2) Self-report	1 2	8
88. What is your current weight without clothes? _____ pounds		9-11
89. How was weight measurement made? PREFERRED: With a scale and without shoes (1) With a scale and with shoes (2)		

Self-report (3)		12
90. Chair Sit-and-Reach: sit in stable chair, knees straight, bend over, reach with arms straight to toes, then measure with a ruler: Number of inches person is short of reaching the toes: ___ ___ . ___ (-) *or* Number of inches person reaches beyond toes: ___ ___ . ___ (+) *Measure to the nearest ½ inch*		13-16 17-20

ID: _____ DATE (M/D/Year): _____ STAFF NAME: _____ PHYSICAL PERFORMANCE

	Physical Performance Test-Task Descriptions Equipment: <u>Stopwatch</u>, 8-Ft Tape Measure, Ruler, Folding Chair	RECORD TIME IN SECONDS	LINE 4 UGA Staff can score with open coding
ASB	**STANDING BALANCE:** **Time each item until >10.0 sec. OR** **until participant moves feet or reaches for support.** **1a) SEMI-TANDEM** (heel of one foot placed at mid-position of the other) *If can hold for 10 seconds, move to **1b)** *If can NOT hold for 10 seconds, move to **1c)** **1b) TANDEM** (heel to toe, one foot directly in front of the other) **1c) SIDE-BY-SIDE (**toes lined up evenly and feet touching)	**Time to the nearest 10th second:** **a)** ___ ___ . ___ > 10.0 sec. Go to **b)** < 10.0 sec. Go to **c)** **b)** ___ ___ . ___ **c)** ___ ___ . ___	1-4 5-8 9-12

ASB D	DOMAIN SCORE:
	If A= <10 & C= 0-9, score= 0 A= <10 & C= 10, score= 1
	        A= ≥10 & B= 0-2, score= 2 A= ≥10 & B= 3-9, score= 3
	        A= ≥10 & B= ≥10, score= 4
		SCORE: _____	13

AFW	**8 FOOT WALK:** **Participant begins at standing position and will walk a straight distance of 8-feet, measured with tape on the floor.** **Instruct the participant to walk at normal gait using any assistive devices. If possible, have them begin walking a few feet before starting mark, and continue walking a few feet past the 8-foot mark. Tester will start and stop watch at the distance marks.** **Complete the walk twice.**	**Time to the nearest 10th second:** **1)** ___ ___ . ___ **2)** ___ ___ . ___ Use best (lowest) time **Assistive device used?** NO (0) YES (1) Describe _____	14-17 18
AFW D	DOMAIN SCORE: 1= ≥5.7 2= 4.1-5.6 3= 3.2-4.0 4= ≤3.1	SCORE: _____	19
ACS	**CHAIR STANDS:** **Participant is asked to stand one time from a seated**	**Time to the nearest 10th second:**	

position in an armless, straight-backed chair (such as a folding metal chair) with their arms folded across their chest. If able, participant is asked to stand-up and sit-down 5 times as quickly as possible while being timed. If not able to perform, then the test is complete.	1) ___ ___ . ___	20-23
ACSD DOMAIN SCORE: 1= ≥16.7 2= 13.7-16.6 3= 11.2-13.6 4= ≤11.1	SCORE: _____	24
TDS TOTAL SCORE: Add all 3 domain scores (1-12)	TOTAL SCORE:__ __	25-26
Coding: 8 = physically unable, 9=refused, 7=not applicable. Good function (score of 10 to 12); moderate function (score of 6 to 9); poor function (score of 0 to 5).		

THE END