DIABETES SELF-MANAGEMENT EDUCATION FOR OLDER ADULTS

by

Elizabeth M. Speer

(Under the Direction of Mary Ann Johnson)

ABSTRACT

This study examined the effects of a community-based diabetes self-management (DSM) and physical activity intervention on diabetes control in older adults from 33 senior centers in Georgia. Participants were a convenience sample (N = 144, mean age = 74 years, 84% female, 42% Caucasian, 57% African American). The pre- and post-tests included measurements of A1c and self-assessment of 12 DSM behaviors. At the pre-test, participants' mean A1c was 7.0 ± 1.4% and 17% had A1c greater than 8%, which represents poor glucose control. During the 4 month intervention participants attended up to 8 lessons focused on DSM. At the post-test, participants significantly increased their DSM behaviors by an additional 1 or more days in these areas ($P < .0001$): following a healthy eating plan, following an eating plan prescribed by their doctor, eating five or more servings of fruits and vegetables, spacing carbohydrates, and inspecting the insides of their shoes. The mean decrease in A1c for the entire sample was 0.25% (SD = 0.82, N = 144, $P = .0004$) and those with an initial A1c >8% had a clinically and statistically significant decrease of 1.15% (SD = 1.09, n = 24, pre-test: 9.48% vs. 8.33%, $P < .0001$,). In summary, this intervention was found to be a feasible and efficacious approach to significantly improving A1c and DSM behaviors in older adults in community-based senior centers throughout Georgia.

INDEX WORDS: Older Americans Act Nutrition Program, Senior Center, Diabetes Self-Management, Diabetes Self-Management Behaviors, Diabetes Self-Management Education, Diabetes Self-Management Education Intervention.

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by

Elizabeth Speer

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by

ELIZABETH M. SPEER

Major Professor: Mary Ann Johnson, PhD

Committee: Mary Ann Johnson, PhD
Joan G. Fischer, PhD, RD, LD
Connie Crawley, MS, RD, LD

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
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DEDICATION

This project is dedicated to my mother for her unconditional love, endless support, and invaluable guidance.

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CHAPTER 1

INTRODUCTION

The number of adults aged 65 and older in Georgia is increasing and is expected to double in the next 30 years (US Census Bureau, 2005). With this increase in older adults will come an increase in the prevalence of chronic diseases such as type 2 diabetes. Diabetes is a disease in which the body does not produce or properly use insulin. Insulin is the hormone necessary for cellular uptake and utilization of glucose, the body's main energy source. Type 2 diabetes results from insulin resistance, a condition in which the body fails to properly use insulin, combined with relative insulin deficiency. Most people with diabetes have type 2, which is the type that most older adults have (American Diabetes Association, 2006). Type 2 diabetes is increasing partly because of its occurrence in older adults. In Georgia, over 18% of adults 65 and older have diabetes, (Georgia Behavioral Risk Factor Surveillance System Report, 2005) and diabetes was the sixth leading cause of death in 2003 (Jack et al., 2003). Previous research conducted by the University of Georgia's Department of Foods and Nutrition has shown that a large percentage (30%) of Older Americans Act Nutrition Program (OAANP) congregate meal participants from Northeast Georgia senior centers had diabetes (Stephens, 2005). Many chronic conditions, including diabetes, can be prevented or controlled with proper behavioral interventions (Centers for Disease Control and Prevention, 2005). Therefore, a diabetes self-management education (DSME) intervention was conducted in OAANP congregate meal participants throughout Georgia. The intervention included pre- and post-test measurements of hemoglobin A1c concentrations and self-assessment of 12 diabetes self-management (DSM) behaviors.

The purpose of this study was to evaluate the effect of an educational intervention on hemoglobin A1c concentrations and DSM behaviors among older adults participating in the OAANP at 33 senior centers in Georgia (N = 261, mean age = 73 years).

Chapter 2 is a review of literature relative to diabetes self-management education in older adults. The literature review also identifies other research on diabetes self-management, describes other diabetes self-management education interventions conducted in senior centers in north Georgia, and describes their ability to produce changes in behavior.

Chapter 3 is a manuscript that will be submitted to the CDC's online journal, Preventing Chronic Disease: Public Health Research, Practice, and Policy. The manuscript includes the methods, results, and a discussion of the results from the diabetes self-management education intervention. All data tables are included in Chapter 3.

Chapter 4 summarizes the major findings of the diabetes self-management education intervention and states the general conclusion.

CHAPTER 2

LITERATURE REVIEW

Demographics of Older Adults

In 2005, there were over 36 million people aged 65 and older in the US (CDC, 2006) and 870,422 aged 65 and older in Georgia (9.6 % of the state's total population) (US Census Bureau, 2006). The number of older adults 65 and older in the US continues to grow and is expected to reach 86 million by the year 2050 (US Census Bureau, 2006). Of the people reaching age 65, the average life expectancy is an additional 18.5 years, and the prevalence of chronic diseases such as diabetes is high (Federal Interagency Forum on Age-Related Statistics, 2006). Most older people have at least one chronic condition and many have multiple conditions (AoA, 2006).

Older Americans Act Nutrition Program and Georgia Wellness Programs

The Older Americans Act Nutrition Program (OAANP) provides grants to support nutrition services for older adults. One of the primary goals of this program is to improve the dietary intakes of older adults by providing community-based services to those with great economic or social need or who are at risk of losing their independence and being placed in a skilled nursing facility. Federal and state regulations require that meals and nutrition education programs offered at the senior center be based on federal dietary guidelines to meet nutritional needs. Each meal should provide one-third of the Recommended Dietary Allowance or Adequate Intakes for nutrients such as vitamins A, C, D, E, B_6, and B_{12}, folate, calcium, and iron, as well as three servings of fruits and vegetables, one serving of dairy product (preferably low-fat milk), and one serving of whole grain food. Through nutrition service providers, the program facilitates nutrition screening, assessment, education and counseling and seeks to improve the nutritional status of participants. The program also advocates prevention, treatment, and

management of chronic disease. Eligibility is limited to those over 60 (and their spouses of any age), as well as those < 60 years with disabilities, and targets low-income, minority, and rural participants. A national evaluation found that participants in the OAANP were more likely to live alone, live in rural areas, and be below 100% of the Department of Health and Human Services poverty guidelines. Program outcomes have demonstrated effective targeting of a vulnerable population (AoA, 2003a). Of congregate meal participants, 43% were at high nutritional risk, 58% received one half or more of their daily food intake from their congregate meal and 11% were food insecure (report not having enough money to buy the food they need) (AoA, 1994). Based on data from a program evaluation in 1994, 18% of congregate meal recipients had diabetes (AoA, 1994). Reflecting secular trends for the increasing prevalence of diabetes (American Diabetes Association, 2006) and the high prevalence of diabetes in Georgia (Georgia Behavioral Risk Factor Surveillance System Report, 2005), the prevalence of diabetes in a random sample of congregate meal participants in Northeast Georgia in 2004 and 2005 was 30% (Stephens, 2005).

The OAANP Title III D also provides federal funds for health promotion and medications management. Georgia also provides additional state funds through its home and community-based services programs for promotion of exercise and physical fitness, as well as health promotion and wellness programs. For example in Northeast Georgia, The University of Georgia in collaboration with the Northeast Georgia Area Agency on Aging, provides monthly nutrition education and physical activity programs in senior centers in 13 counties. These programs typically involve a nutrition-based lesson, chair exercises and/or walking, and a brief session on medication management. Statewide, these funds are used to deliver similar programs to over 200 senior centers within each of the 12 Area Agencies on Aging in efforts to assist older

adults to remain in the community and keep their independence by maintaining or improving their nutritional status, physical activity, medication management, and general health.

Diabetes and Chronic Disease

Chronic diseases are responsible for almost half of all disabilities among older adults, and four out of five older Americans experience limitations as a result of chronic disease. Seventy percent of older adults have more than one chronic condition (AoA, 2003b). In the US, 10.3 million people aged 60 and older (21% of the total US population in this age group) have diabetes (American Diabetes Association, 2006), and over 18% of adults over 65 in Georgia have diabetes (Georgia Behavioral Risk Factor Surveillance System Report, 2005). In 2004, people aged 65 or older accounted for nearly 40% of the population with diabetes (CDC, 2004). Although the risk for diabetes increases with age, other factors including poor dietary habits, obesity, and lack of physical activity make significant contributions to the growing epidemic. These factors seem to correlate with advanced age. However, many chronic conditions are preventable and can be avoided or managed by behavioral interventions. Results from the Diabetes Prevention Program trial showed that a 7% weight loss and 150 minutes of physical activity per week reduced diabetes risk by 58% in overweight adults. This behavioral intervention was particularly helpful in adults aged 60 and over, reducing their risk for developing diabetes by 71% (Knowler et al., 2002).

Complications of Diabetes

Diabetes is associated with a number of complications that can cause disability and death in older adults. In 2000, 29.5% of Georgia residents hospitalized with cardiovascular disease, 27.4% of those hospitalized with end-stage renal disease, and 49.5% of those with a lower extremity amputation had diabetes (Georgia Department of Public Health, 2003).

Cardiovascular disease (CVD) is the leading cause of premature death in people with diabetes. Adults with diabetes are two to four times more likely to have heart disease or suffer a stroke than those without diabetes (ADA, 2002a). The prevalence of hypertension is 1.5 to 3 times higher in people with diabetes; 20% to 60% of those with diabetes have hypertension. Prevention and treatment of hypertension is important for prevention of CVD in older adults with diabetes due to the fact that people with both diabetes and hypertension have approximately twice the risk of CVD than that of people who have hypertension but not diabetes (ADA, 2002b). People with diabetes also tend to have altered lipoprotein profiles, referred to as diabetic dyslipidemia. Between 70% and 97% of people with diabetes have this condition, which contributes to a CVD risk that can be compared to having an LDL cholesterol concentration of 150 to 220 mg/dL (ADA, 2002c). Among the numerous complications associated with diabetes are increased risks for kidney disease, eye complications such as retinopathy, and neuropathy that can lead to foot complications. Diabetes is the leading cause of new cases of blindness for people aged 20 to 74, with diabetic retinopathy causing 12,000 to 24,000 new cases of blindness each year (ADA, 2006). Diabetes is also the leading cause of kidney failure, causing 44% of new cases in 2002 (ADA, 2006). Amputations resulting from foot complications cause ten times more non-traumatic amputations in diabetic patients than in people without diabetes (ADA, 2006). Quality of life can be negatively affected by the various complications caused by poor glucose control (ADA, 2006). These problems can be prevented and/or delayed by effective glucose control and frequent doctor visits. Results from the United Kingdom Prospective Diabetes Study (UKPDS) provide evidence that hyperglycemia is the major contributor to the complications of diabetes and that for every percentage point decrease in A1c, a measure of

glucose control, there was a 35% reduction in the risk of complications (UKPDS, 1998, ADA, 2003).

Diabetes Self-Management

Diabetes self-management (DSM) behaviors in older adults include following a healthy diet, being physically active, abstaining from smoking, regular glucose monitoring, and taking medications properly. Eating a diet rich in fruits and vegetables, whole grains, low-fat dairy foods and lean sources of protein helps to manage blood glucose. Meal planning, carbohydrate spacing, and portion control can help people with diabetes manage glucose and decrease complications (ADA, 2006). Physical activity is also a factor in diabetes management because exercise increases both insulin-independent muscle glucose uptake and insulin sensitivity (Sigal et al., 2004). Practice guidelines for physical activity in older adults state that incorporating strength, flexibility, and balance training can prevent chronic disease, reduce functional limitations and is beneficial for managing chronic diseases including diabetes (Cress et al., 2004). To reduce the risk of chronic disease in adulthood, it is recommended that individuals engage in at least 30 minutes of physical activity on all or most days of the week (USDHHS and USDA, 2005).

Smoking status is also important to DSM. Smoking increases blood sugar levels, making glucose control more difficult and also constricts blood vessels, which can worsen foot ulcers and other circulatory disorders. People with diabetes who smoke are three times more likely to have CVD than other people with diabetes (Tibbs and Haire-Joshu, 2002).

Regular doctor visits and glucose monitoring are essential self-management skills. Both self-monitoring blood glucose (SMBG) and A1c testing are important to managing diabetes. SMBG can be done at home and gives an immediate measure of blood glucose, which can

change according to time of day, diet, activity levels or medication. An A1c test is usually ordered by the physician and gives a measure of plasma glucose averaged over a 3-month period. A1c measures provide an overall picture of glucose control, and a concentration greater than 8% suggests that diabetes is very poorly controlled (ADA, 2006). To reduce risk of complications the American Diabetes Association recommends that A1c be less than 7%, while the American Association of Clinical Endocrinologists suggests a goal of less than 6.5% (ADA, 2006; AACE, 2002).

DSM skills help control the costs of diabetes and improve the quality of life in older adults. Total costs of diabetes reached $132 billion nationally in 2002 (CDC, 2005) and are over $4 billion in Georgia (Diabetes Association of Atlanta, 2005a). It has been estimated that for every $1 spent on diabetes management programs, $4.34 is saved in healthcare costs (Berg and Wadhwa, 2002). Therefore, it has been shown that by effectively managing glucose through diabetes self-management, complications can be prevented and healthcare dollars can be saved.

There are also cost savings associated with preventing diabetes. The costs associated with the prevention of diabetes in the subjects of the Diabetes Prevention Program (DPP) showed the direct medical costs of care outside of the DPP were $432 less per participant in the lifestyle group compared with the placebo group (ADA, 2003). This shows that lifestyle changes made for the prevention and management of diabetes can reduce the direct medical costs to individuals by reducing the need for medical resources. In Georgia, medical care costs for a person with diabetes are approximately $10,000, while the costs for a person without diabetes are only about $2,700 (DAA, 2005). Many of the same lifestyle behaviors that are used to manage diabetes can help prevent diabetes (e.g., diet, physical activity, and medication management).

Diabetes Self-Management Interventions

Recently, the American Association of Clinical Endocrinologists reported that of those surveyed, 69% of adults in Georgia with diabetes were not achieving desirable goals (A1c ≤ 6.5%) (AACE, 2005). Meta-analyses have shown that DSM education about glycemic control improves A1c. One such meta-analysis showed a statistically significant average decrease in A1c of 0.76% immediately following self-management education interventions (see review, Norris, et al., 2002). Research has also shown the success of a self-management intervention delivered in group settings. Results of a five year randomized control trial of continued education delivered to groups versus individuals showed that Alc levels progressively increased over five years among control subjects receiving individual care (+1.7%) but not in group care patients (-0.1%) (Trento et al., 2004). DSM interventions have been shown to increase DSM behaviors and/or decrease A1c in many subgroups of the population including older people. A randomized control trial designed specifically for persons over 60 years of age with type 2 diabetes produced a modest yet statistically significant improvement in A1c (-0.5%) in subjects immediately following a DSME intervention. The intervention was focused primarily on self-care behaviors related to diet, exercise, and glucose testing and was effective in improving behaviors related to dietary intake and glucose testing (Glasgow, 1992). Results from another randomized control trial in adults 65 years and older showed a 0.5% decrease in A1c following an education intervention focusing on nutrition. The mean decrease in A1c (7.2% to 6.7%) for the experimental group brought this group average below the guidelines for good glucose control (A1c < 7.0%) (Miller et al., 2002). The results of these studies show that older people with diabetes can make meaningful behavior changes if they are provided with a program that fits their needs and that these changes can result in better metabolic control of diabetes.

Since this thesis focuses on the behaviors of older adults at senior centers in Georgia it is necessary to highlight the success of previous programs aimed at influencing DSM behaviors in senior center participants. For example, a previous study conducted in OAANP participants in Northeast Georgia was successful in showing that increases in DSM behaviors were associated with lower A1c concentrations (Burnett, 2003, Redmond, 2004). This study showed that in a convenience sample of OAANP participants with diabetes (n = 105), increases in self-management behaviors were correlated with decreases in A1c for participants with initial A1c $\geq$ 7%.

Health Belief Model

Interventions aimed at changing health behaviors (e.g., those related to diabetes self-management) can be based on theoretical models such as the Health Belief Model (HBM). This model states that changes in behavior are based on the idea that people are willing to make changes when they believe that they are at risk for chronic illness. According to this theory, individuals base health decisions on (1) Perceived susceptibility - the likelihood that one will develop a condition, (2) Perceived severity - how serious one views the consequences of the condition, (3) Perceived benefits - one's opinion of how much a certain behavior can reduce their risk, (4) Barriers to change - the costs of taking action, (5) Cues to action - preparation for change, and (6) Self-efficacy - whether or not one believes they are capable of making a change. Once an individual identifies a threat to his or her health and decides that the benefits of taking preventative action outweigh the barriers they are most likely to make positive health changes (Strecher et al. 1997). This DSM education intervention is based on these principles for changing health behaviors.

Rationale, Specific Aims, and Hypotheses

The aging population and the increasing prevalence of diabetes suggest that there is an urgent need for effective DSM programs for older people. There is a particularly acute need for DSM interventions in older adults in OAANP in senior centers in Georgia. Their prevalence of diabetes is estimated to be 30% (Stephens et al., 2005), which is higher than both the national and state averages (21% to 18%, ADA, 2006; Georgia Behavioral Risk Factor Surveillance System Report, 2005). Based on our previously successful DSM program in older adults in north Georgia (Burnett, 2003, Redmond, 2004), the UGA Department of Foods and Nutrition was asked by the Georgia Division of Aging Services to develop a similar program to address the problem of diabetes in OAANP statewide.

There were several differences between this new statewide effort and the previous effort. The educators were employed in numerous agencies across the state rather than just by The University of Georgia. The previous curriculum was designed to be used by dietitians or individuals with degrees in foods and nutrition, while the new curriculum was designed to be used by people with a range of backgrounds (nurses, health promotion and education, and recreation, as well as those with credentials in nutrition or dietetics). Based on our previous experience and requests by stakeholders, the new curriculum included a much more extensive set of handouts, goals, recipes and menus than the previous curriculum. Both studies employed the same key outcome measures, which were A1c and the diabetes self-care activities scale (Toobert et al., 2000).

The following hypotheses were tested in this state-wide DSM intervention in older adults in senior centers: 1) A nutrition, physical activity, and health education intervention will lower A1c levels and increase self-management behaviors (eating healthy, being physically active,

spacing carbohydrates, testing blood sugar, taking medications properly, checking feet), and 2) Improvements in DSM behaviors will predict changes in A1c following the intervention. The specific aims were to: 1) Determine the effects of a nutrition and health education intervention on A1c levels and DSM behaviors, and 2) Identify the predictors of changes in A1c following the intervention, such as improvements in DSM.

CHAPTER 3

DIABETES SELF MANAGEMENT EDUCATION FOR OLDER ADULTS[1]

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[1]Speer, E, J.G. Fischer, S. Reddy, T. Sellers, S. Park, H. Stephens, and M.A. Johnson. To be submitted to Preventing Chronic Disease: Public Health Research, Practice, and Policy.
This study is part of a large statewide effort to prevent and manage chronic disease and promote healthy aging in Georgia's older adults Because of their valuable contributions to the design of the study, recruitment of participants, data collection, and interpretation of the results, the additional authors are Mary Byrd, Jennifer Crosby, Suzanne M. Elbon, Lisa D. Hale, Jami Harper, Monique Hillman, Lisa Howard, Noaleen Ingalsbe, Loreatha Jenkins, Brenda Kirkland, Ilona Preattle, and Lisa Whitley.

ABSTRACT

This study examined the effects of a community-based diabetes self-management (DSM) and physical activity intervention on diabetes control in older adults from 33 senior centers in Georgia. Participants were a convenience sample (N = 144, mean age = 74 years, 84% female, 42% Caucasian, 57% African American). The pre- and post-tests included measurements of A1c and self-assessment of 12 DSM behaviors. At the pre-test, participants' mean A1c was 7.0 ± 1.4% and 17% had A1c greater than 8%, which represents poor glucose control. During the 4 month intervention participants attended up to 8 lessons focused on DSM. At the post-test, participants significantly increased their DSM behaviors by an additional 1 or more days in these areas ($P < .0001$): following a healthy eating plan, following an eating plan prescribed by their doctor, eating five or more servings of fruits and vegetables, spacing carbohydrates, and inspecting the insides of their shoes. The mean decrease in A1c for the entire sample was 0.25% (SD = 0.82, N = 144, $P = .0004$) and those with an initial A1c >8% had a clinically and statistically significant decrease of 1.15% (SD = 1.09, n = 24, pre-test: 9.48% vs. 8.33%, $P < .0001$). In summary, this intervention was found to be a feasible and efficacious approach to significantly improving A1c and DSM behaviors in older adults in community-based senior centers throughout Georgia.

INTRODUCTION

Similar to national trends, Georgia's population aged 65 and older is expected to double within the next 30 years (US Census Bureau, 2005) and more than 18% of these older adults have diabetes (Georgia Behavioral Risk Factor Surveillance System Report, 2005). A much higher prevalence of diabetes – 30% – was reported among older adults receiving congregate meals through Older Americans Act Nutrition Programs (OAANP) in senior centers in northeast Georgia (Stephens, 2005). Thus, there appears to be an urgent need for diabetes self-management (DSM) interventions in this vulnerable subgroup of the older adult population.

In Georgia, medical care costs for a person with diabetes are approximately $10,000, while the costs for a person without diabetes are about $2,700 annually (Diabetes Association of Atlanta, 2005). The total costs of diabetes reached $132 billion nationally in 2002 (CDC, 2005) and are over $4 billion in Georgia (Diabetes Association of Atlanta, 2005a). Diabetes management is cost-effective and it has been estimated that for every $1 spent on diabetes management programs, $4.34 is saved in healthcare costs (Berg and Wadhwa, 2002). The principles of DSM education include: describing the diabetes disease process and treatment options, incorporating nutritional management, incorporating physical activity, taking medications as directed, monitoring blood glucose, preventing and treating complications (both chronic and acute), goal setting and problem solving, and integrating psychosocial adjustment to daily life (Mensing et al., 2005). Meal planning, carbohydrate spacing and portion control can help people with diabetes manage glucose and decrease complications (ADA, 2006). Physical activity is also a factor in diabetes management because exercise increases both insulin-independent muscle glucose uptake and insulin sensitivity (Sigal et al., 2004).

DSM education in a group setting has been shown to be an effective method of controlling glucose levels in adults with diabetes (Mensing, 2003). We have shown that group DSM education in older adults in OAANP programs in senior centers in north Georgia was effective in significantly improving 8 of 11 DSM behaviors and significantly lowering A1c in those with high initial A1c (> 8%, indicative of very poor control) by an average of 1.45% ± 1.90 (Burnett, 2003, Redmond, 2004). Based on this successful group DSM program, the University of Georgia's Department of Foods and Nutrition was asked by the Georgia Division of Aging Services to develop, implement, and evaluate a similar DSM intervention program to address the problem of diabetes in OAANP statewide. The purpose of this report is to provide the evaluation outcomes from this statewide intervention program. The goals of the statewide DSM intervention were to determine the effect of the intervention on improving DSM behaviors and lowering A1c concentrations, particularly in those with initial A1c concentrations > 8%. It was hypothesized that following the intervention, DSM behaviors would improve, A1c concentrations would decrease, and demographic characteristics and changes in DSM behaviors would predict changes in A1c.

METHODS

The overall design of the study was pre-test, intervention, and post-test.

Sample

All procedures were approved by the Institutional Review Boards of The University of Georgia and the Georgia Department of Human Resources. The 12 Wellness Coordinators associated with each of the 12 Area Agencies on Aging (AAA) in Georgia identified between two and five senior centers in their area in which to implement the program. In one AAA

participants were also recruited from an adult day care adjacent to a senior center and a housing and urban development. Factors used to select a senior center were support of the senior center director, interest of the participants, and a relatively high prevalence of diabetes, based on general information provided by the senior center. Recruitment was designed to enroll a total of 70 individuals within each of the 12 AAA, including at least 20 individuals with diabetes. Recruitment of participants was accomplished by Wellness Coordinators, senior center directors, and their staff. The procedures were explained and the consent form was read to participants; written informed consent was obtained from participants. Physicians' clearance for participation in the physical activity portion of the intervention was obtained from participants. Most participants were recipients of congregate meals. Homebound elders were excluded. Other exclusion criteria, as determined by interviewer assessment, were the inability of participants to understand the informed consent, answer pre- and post- test questions, or participate in the educational intervention.

These recruitment procedures resulted in a convenience sample of 815 older adults from 39 senior centers (including one adult day care and one housing and urban development). Of the 815 individuals enrolled, 351 reported that they had diabetes, 261 completed interview-administered pre-tests and provided pre-test A1c measures, 237 completed interview-administered pre-test and post-test diabetes questionnaires, and 144 completed interview-administered pre-test and post-test diabetes questionnaires and pre- and post-test A1c measures. Therefore the final sample size included for statistical analyses of participants using only pre-test data was 261 and the sample size used in the analyses including changes in A1c was 144. The participants who did not complete post-test questionnaires and A1c measures (n = 117) did so for any one or more of the following reasons: they were deceased (n = 4), hospitalized or sick

(n = 32), no longer attending the senior center (n = 80), refused (n = 20), had cognitive impairment (n = 1), or no A1c (n = 46). Participants from two sites were also not included due to lack of protocol adherence in data collection (n = 7). Participants who did not give pre-test A1c or post-test A1c were not included in statistical analyses comparing behavior changes and changes in A1c (n = 146, n = 46). Exclusion was determined if participants met one or more of the exclusion criteria.

Pre-tests

The consent form and the pre-test and post-test questionnaires can be found in Appendix C. Experts in nutrition, physical activity, and diabetes (three faculty members and three registered dietitians in the Department of Foods and Nutrition, University of Georgia, and the Georgia Division of Aging Services) reviewed and edited the pre- and post-test questionnaires to ensure content validity and cultural appropriateness based on their collective experience working with the target population. Input from other Division of Aging Services staff and the Wellness Coordinators also was solicited and incorporated into the questionnaires.

Approximately one hour was required to explain the study, obtain informed consent, and complete the pre-tests for each participant. Additional follow up was needed to continue to obtain the physician clearance forms for physical activity. In each AAA, participants from one to five senior centers were recruited and interviewed by Wellness Coordinators and their staff who read the questions to participants and recorded their responses. Assessments included demographic information, general health including current illnesses (yes/no, diabetes, high blood pressure, heart disease, arthritis, joint stiffness), and anthropometrics (height, weight, and waist circumference). Height and weight were both measured and self-reported and waist

circumference was assessed using a tape measure either over or under the participant's clothes. BMI was calculated the formula: BMI = (weight (lb) /height $(in)^2$) x 703.

Participants had their diet and health practices related to diabetes assessed with the Summary of Diabetes Self-Care Activities, a validated self-report tool (Toobert et al., 2000). This questionnaire has 12 core questions that assess the level of self-care in six main areas considered essential for diabetes care. The areas are diet, exercise, self-glucose monitoring, foot care, smoking, and medications. The questions assess physical activity and personal self-care behaviors, but without specifically measuring the participant's compliance to a specific regimen or plan provided by a healthcare provider.

Most participants had A1c measured by a licensed trained phlebotomist or a representative from the Diabetes Association of Atlanta, Inc. or Diabetes Technologies, Inc. (96.5%) (Accubase A1c test kit, Diabetes Technologies, Inc., Thomasville, GA). Some individuals arranged for us to use a recent value (previous three months) for A1c received from their physician (3.5%). Diabetes Technologies, Inc. sent the results to UGA where the data were recorded and forwarded to each Wellness Coordinator for distribution to the participants. Only A1c values obtained from the same source (Diabetes Technologies, Inc. or from the physician) at both the pre- and post-tests were used in the statistical analysis to evaluate the impact of the intervention on diabetes self-management.

Intervention

After completing the pre-test questionnaires, the educational intervention was initiated at the senior centers. During a four month period, each of the eight lessons was given one time and lasted 30 to 60 minutes. Physical activity was incorporated into every lesson. Nutrition, physical activity, and diabetes experts from The University of Georgia (four faculty, including

two registered dietitians) reviewed the curriculum. Based on years of related experience, these experts ensured that the curriculum was culturally appropriate, safe for the participants and could be delivered by individuals who were well-educated, but not necessarily diabetes educators. The curriculum was developed based on the previously successful educational interventions developed by The University of Georgia for older adults diabetes self-management (Burnett, 2003; Redmond, 2004) and physical activity (adapted from the National Institute on Aging, 2005; Administration on Aging, 2004b; American Association of Retired Persons, 2004). The updated curriculum incorporated recent changes in fruit, vegetables and physical activity recommendations (USDHHS and USDA, 2005), as well as diabetes management (American Diabetes Association, 2005).

The conceptual framework for these interventions was based on the Health Belief Model (Strecher and Rosenstock, 1997). The key concepts of this framework that were incorporated were the perceived susceptibility and severity (e.g., emphasizing the health conditions that occur frequently in older adults, including diabetes), perceived benefits (e.g., defining how to take action and emphasizing the positive benefits of improved diabetes self-management), perceived barriers (e.g., providing information and correcting misinformation about diabetes), cues to action (e.g., provide "how-to" information on self-management of diabetes), and self-efficacy (e.g., by demonstrating and reinforcing during the interventions the various ways to manage diabetes).

In the diabetes intervention, the first lesson, "Six Daily Do's for Diabetes," presented general information about type 2 diabetes and how it affects the body. It included six daily suggestions for diabetes management, such as take medications, test blood sugar, eat healthy, be physically active, check feet, and be positive. The second lesson, "Be Physically Active

Everyday," focused on the benefits of being physically active for people with diabetes. The third lesson, "Check Your Feet," stressed daily foot care to prevent diabetes foot problems and injuries, and urged participants to report problems to their doctor and podiatrist. The fourth lesson, "Taking Medications and Testing Blood Sugar," focused on improving medication management, improving blood sugar testing, and talking with the doctor about medications. The fifth lesson, "Eat Healthy - Plan Your Portions and Plates," emphasized portions and accurate serving sizes for people with diabetes. Participants were also shown the plate method of meal planning. The sixth lesson, "Eat Healthy - Meal Timing and Carbohydrate Counting," focused on carbohydrates and carbohydrate counting as well as how to find carbohydrates on the food label. The seventh lesson, "Take Down Fat, Cholesterol and Sodium," showed how to choose foods lower in fat, cholesterol and sodium. The eighth lesson, "Get Checked for Your A,B,C's," focused on complications related to diabetes that can occur in the heart, eyes, kidneys, feet, teeth/gums, and other organs. It also described the checkups and tests that are needed to help delay and prevent these complications.

The physical activity part of each lesson lasted up to 30 minutes and included demonstrations by the educator and participation in selected physical activities by the older adults. Each senior center had the option to choose physical activities that were appropriate for their population (such as Arthritis Foundation Exercise Program), however the primary physical activity interventions were chair exercises for strength, balance, flexibility, and endurance adapted from the National Institute on Aging Exercise Guide (NIA, 2001) and encouragement of walking. The physical activity intervention materials were developed based on the principles of the Administration on Aging's "You Can" program (2004b), American Association of Retired

Person's Step Up to Better Health" (2004), and the National Institute on Aging's Exercise Guide (2003).

In addition to attending up to eight lessons on diabetes self-management, most participants also attended up to an additional eight lessons on the importance and benefits of incorporating fruits and vegetables into their diet. The two sets of lessons were given on alternate weeks. The fruit and vegetable intervention focused on the health benefits, recommended daily servings, and serving sizes of fruits and vegetables and setting goals for eating more fruits and vegetables. Each lesson had a lesson plan and handouts including recipes, menus and tips on how to include more fruits and vegetables as part of an overall healthy diet. The methods and results of this fruit and vegetable intervention are discussed elsewhere (Hendrix, 2007).

Post-tests

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 (May and June, 2006). 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 behaviors related to diabetes self-management and physical activity, as well as their satisfaction with the lessons and overall program.

Power Analysis

Our previous senior center based nutrition, physical activity and health intervention studies had completion rates between the pre-tests and post-tests ranging between 72% and 88% (Burnett, 2003, Ellis et al., 2005, McCamey et al., 2003, and Redmond, 2004). The previous DSM intervention is most related to the present study (Burnett, 2003, Redmond, 2004). In this previous study, participants completed the following: pre-test questionnaires (n = 105), pre-test

questionnaires and A1c (n = 100), pre-test and post-test questionnaires (n = 91), pre-test and post-test questionnaires and A1c measures (n = 77). Also, 21 of these 77 participants (27%) had high initial A1c (> 8%, indicating poor diabetes control) and the intervention was associated with a 1.46 percentage point decrease (SD = 1.90%) in A1c in those with high initial A1c.

Compared to the previous DSM intervention (Burnett, 2003, Redmond, 2004), the current study was conducted over a larger geographical area (the whole state), had a larger number of personnel and senior centers, and a smaller number of times that the phlebotomist could visit each senior center for A1c measures (only once at the pre-test and once at the post-test). Therefore, we assumed there would be a lower completion rate among individuals completing all pre-test and post-test questionnaires and A1c measures (70%), a lower prevalence of high A1c among those completing all measures (20% vs. 27%), and a smaller decrease in A1c (1% vs. 1.46% in those with A1c > 8%).

Using these assumptions, our goal was to recruit 240 people with diabetes (20 from each of the 12 AAA), have 168 with complete measures (70%), and have 34 with A1c > 8% at pre-test (20%). Using online power and sample size programs (http://www.dssresearch.com/toolkit/default.asp, http://home.clara.net/sisa/samsize.htm) and these assumptions, it was determined that the targeted sample size of 34 would have adequate power (> 80%, alpha = 0.05) to detect a 1% (SD = 1.90%) decrease in A1c among those with initial A1c > 8%. For pairwise comparisons, 24 participants are needed for 80% power and alpha = 0.05. It was also determined that a sample size of 136 is needed to show that a 15 percentage point change in following a recommended behavior is statistically significant (e.g., from 40% at pre-test to 55% at post-test, 80% power, alpha = 0.05). Additional information about the power analyses can be found in the Appendix B.

Statistical Analysis

The pre- and post-test questionnaires, consent forms, and physician clearance forms were sent by the Wellness Coordinators to The University of Georgia for analyses. Data were coded and entered into secure files with access restricted to key personnel and were analyzed using the Statistical Analysis System (SAS, Version 8, SAS Institute, Cary, NC). For the purpose of data analyses, participants were divided into four groups based on completion of pre- and post-test questionnaires and pre- and post-test A1c measures. The groups were: 1) participants who provided a pre-test questionnaire, and pre-test A1c (n = 261); 2) participants who completed a pre- and post-test questionnaire (n = 237); 3) participants who provided pre- and post-test questionnaires and pre- and post-test A1c (n = 144); and 4) participants who provided a pre- and post-test A1c (n = 169). The primary focus of this paper is on the subgroup that provided pre- and post-test questionnaires and pre- and post-test A1c (n = 144). Descriptive statistics, including frequencies, means, standard deviations, and Spearman correlation coefficients were calculated. Categorical data from the pre-test and post-test was compared using chi-square analyses. All comparisons of mean changes from the pre-test and the post-test were evaluated with the Signed Rank Test for non-normally distributed data, unless otherwise indicated (paired t-test for normally distributed data). Regression analyses were used to identify DSM behaviors associated with changes in A1c. $P \leq .05$ were considered statistically significant relationships.

RESULTS

A total of 261 older adults completed the pre-test questionnaire and provided blood samples for A1c and 144 completed both the post-test questionnaire and provided blood samples for A1c. There were significant differences ($P < .05$) between the completers (n = 144) and non-completers (n = 116) in their race (completers were more likely to be white, 42% vs. 29%, $P = .04$), but not in their age, education, BMI, or sex. Demographic characteristics of the participants at the pre-test are shown in Table 3.1. These 144 participants had a mean age of 74 years, and most participants were female (84%). Most participants were black (57%) and had a mean education of 11 years. Table 3.1 also shows that the mean A1c was 7%, just within the recommended level for good glucose control, however 23% had an A1c level between 7% and 8% and 18% had an A1c level greater than 8%, which represents poor glucose control. Mean BMI was also high at 30.8, which is within the range considered obese.

Table 3.2 shows that those in good control (A1c < 7%) were older than those in poor control (> 8%), with mean ages of 74 vs. 71 years, respectively ($P = .04$). There were no significant associations of the stage of A1c control with sex, race, education, BMI or A1c knowledge.

Table 3.3 shows that the decrease in mean A1c levels was significant for the total sample (n = 144, -0.25%, $P = .0004$). Among those with an A1c > 8%, the A1c was decreased by 1.15% following the intervention (n = 24, $P < .0001$).

Table 3.4 shows the relationships between the mean number of days participants followed each of the DSM behaviors and their A1c levels. Participants in excellent control ate five or more servings of fruits and vegetables more frequently and tested their blood sugar less frequently than those in moderate or poor control ($P = .04$ and $P = .02$, respectively).

As shown in Table 3.5, of the 12 DSM behaviors assessed, nine significantly improved, one showed a trend for improvement, and two did not improve significantly. The DSM behaviors that improved significantly by at least one or more times per week were: following a healthy eating plan, following an eating plan prescribed by the doctor, eating five or more servings of fruits and vegetables, spacing carbohydrates, and inspecting the insides of shoes. Compliance (practicing the DSM behaviors ≥ five times per week) increased significantly by 10% or more for eight of the 12 behaviors ($P < .05$). Those participants with low compliance (< 5 days/week) at the pre-test significantly improved both their mean and percentage compliance for all of the self-management behaviors except eating high fat foods.

Following the intervention, most participants noted that they were able to make improvements in several DSM areas. Figure 3.1 shows the percentages of participants who answered yes to improvements in these areas: following a diet plan, maintaining portion control, spacing carbohydrates evenly, increasing fruit and vegetable intake, taking better care of feet, maintaining blood sugar levels, increasing physical activity, taking medications as recommended by the doctor, and decreasing A1c level. For most of these DSM behaviors over 80% of participants answered yes to making improvements following the intervention.

Associations of changes in DSM behaviors with change in A1c concentrations

In a series univariate correlation analyses in the total sample and the subgroups with pre-test A1c > 7 % and with pre-test A1c > 8%, there were no consistent associations of changes in any of the DSM behaviors with changes in A1c following the intervention. The associations of changes in A1c with 9 out of 12 of the DSM behaviors were assessed in a regression model. The variables included in the model were those with the highest number of participants responding; variables with an n < 139 were not included. The variable describing participants' knowledge of

what their A1c should be was not included due to a low number of responses. In this regression model, age, physical activity at the pre-test and improvements in physical activity at post-test were associated with improvements in A1c control following the intervention ($P = .04$, $P = .001$ and $P = .02$) as shown in Table 3.6. A second model was also developed to assess the changes in self-reported behaviors and change in A1c as shown in Table 3.7. Similar to the first model, increases in physical activity were associated with improvements in A1c ($P = .05$).

DISCUSSION

Primary findings of this study were that following the intervention there was a significant decrease in A1c for the total sample with the largest decrease in those participants who had an A1c > 8% at the pre-test; participants made significant improvements in DSM behaviors; and the most significant improvements were made in those participants complying < 5 days per week with self-management behaviors at pre-test.

Hyperglycemia is the major contributor to the complications of diabetes and by reducing A1c, the risk for complications can also be lowered (UKPDS, 1998, ADA, 2003). To reduce the risk of complications, the American Diabetes Association recommends having A1c less than 7% (ADA, 2006). The mean decrease in A1c for the total sample was from 7.00% to 6.76% ($P <$ .0001), bringing the participants within the guidelines for good glucose control. This intervention was effective in achieving even greater reductions in A1c among participants with poorer control (initial A1c >8.0%). Those in poorest glucose control were able to decrease their A1c by an average of over 1%, which is clinically significant (n = 24, -1.15%, P <.0001) (ADA, 2006). According to the U.K. Prospective Diabetes Study, each 1% reduction in A1c over 10

years is associated with reductions in risk for any end point related to diabetes, death related to diabetes, myocardial infarctions, and microvascular complications (Stratton et al., 2000). Thus, it is likely that the intervention will lead to reductions in the risk of complications in the participants.

This study focused on increasing DSM behaviors with the purpose of better diabetes management in a target population of lower income older adults with diabetes. The effectiveness of group education programs aimed at the management of chronic diseases has been documented and positive effects of interventions focusing on diet and physical activity have been shown (Mensing, 2003). In the total sample, the greatest mean improvements were made in spacing carbohydrates (an increase of 1.4 ± 3.2 days per week, $P < .0001$) and inspecting the insides of shoes (1.8 ± 3.7, $P < .0001$). Of the 12 DSM behaviors assessed, nine significant mean improvements were made and one showed a trend for improvement. Among increases in self-care behaviors of those with low compliance (< 5 days/week), all changes except for one (eating high fat foods) significantly improved. This shows that older adults with diabetes are capable of making changes in behavior that can help them to better manage their condition and prevent complications. The results of this study show the ability of older adults with diabetes to improve the management of their condition through increases in self-management behaviors following a nutrition and physical activity education program. Therefore, in terms of the primary goal of increasing DSM behaviors and decreasing A1c for the prevention of complications in people with diabetes, this educational intervention was successful.

A possible explanation for the success of this program was the intensity of the intervention. Previous research has shown positive metabolic outcomes in participants receiving a DSM education intervention of similar duration (Miller, et al., 2002). Correlations have also

been shown between increased contact time and decreased A1c in a meta-analysis of DSM education interventions (Norris, 2002). The present DSM intervention involved contact with the participants at least every two weeks and lasted for approximately four months, giving participants ample time to learn new behaviors and incorporate them into their management program. By highlighting six key behaviors, the "Six Daily Do's," and dedicating at least one lesson to each of these behaviors, this intervention was able to stress the importance and feasibility of DSM behaviors through repeated contact and reiteration of DSM behaviors.

This evaluation was also able to show the effectiveness of using trained educators who were not necessarily diabetes educators. According to the National Standards for DSM education, DSM education has been shown to be most effective when delivered by a multidisciplinary team (Mensing, 2005). Educators in this study included some registered dietitians, registered nurses, certified diabetes educators, extension agents and certified recreational therapists, which demonstrated the benefits of having educators from various disciplines. Also, at least some of the educators at each site already knew the participants and the culture of the senior center, which may have enhanced the interactions between the educator and the participants and increased the support from the senior center for the program.

This study builds on a previous study conducted in Northeast Georgia OAANP participants (Burnett, 2003, Redmond, 2004). The success of both studies shows the feasibility of using senior centers as sites for DSM education interventions in a group setting. The study by Glasgow et al. (1992) demonstrated the effectiveness of a group education intervention in older adults and suggested that a similar intervention package could be delivered in a variety of settings, including senior centers (Glasgow et al., 1992). By using senior centers as the site for delivery, this intervention was able to bring the program to its participants, which is something

that can be very valuable for older adults. For example, many of the older adults attending senior centers have transportation problems and rely on the senior center to bring them to the center and to other activities in their communities. Another highlight of this intervention was its effectiveness in an older and ethnically diverse population. As stated earlier, congregate meal participants in Georgia tend to be older and minority and the average age of subjects in this study was 74 years and most were black (57%). By effectively targeting its intended population, this intervention was able to deliver a program tailored to the specific needs of this unique population of older people. The guiding principles for group-based DSM education programs are that they be patient centered, problem-based, culturally relevant, inclusive of psychosocial, behavioral and clinical issues, and evidence-based (Tang, et al., 2006). This intervention was successful at addressing each of those guidelines. The curriculum and lessons were designed such that participants were able to take an active role in each session and identify self-management behaviors that they could improve. The program was problem-based, because it supplied participants with knowledge and skills needed to help manage diabetes such as knowing what their A1c should be and how to check their feet and insides of shoes. The community setting of this program also contributed to the cultural relevance, because participants were able to learn in a comfortable and familiar environment that they frequent several times each week. By including self-management behaviors, social interaction, and clinical issues related to diabetes in each lesson this program was able to meet the inclusive criteria for DSM education programs.

Limitations

By successfully conducting this intervention with a larger sample and an expanded and improved curriculum from the previous study, it has been shown that statewide efforts to improve DSM behaviors and lower A1c are effective. However, there are some limitations to

this study. One possible limitation is the differences in the approaches to data collection and education in Wellness Coordinators and educators at different sites. This was addressed through extensive training of Wellness coordinators and educators, site visits and telephone support by UGA staff to provide additional information about the intervention and data collection, and site visits by the project coordinator to ensure proper testing and delivery of the lessons. As noted earlier, there was a range of credentials among the educators, but the curriculum materials were detailed and used at all education sites. Another limitation is adherence to protocols, such as interviewer-administered questionnaires. This limitation was addressed by elimination of data from two intervention sites that did not comply with data collection protocol (participants were allowed to fill out their own questionnaire). Self-reporting of pre- and post-test responses by participants is a concern, but the primary outcome variables of the DSM behaviors were adapted from a validated questionnaire and interviewers were trained in how to administer the questionnaire. We did not have a parallel control group. However, other studies of older adults that had a control group showed that the controls did not have significant decreases in A1c during the intervention period (Miller et al., 2002). Lastly, the relatively small sample size of participants with high A1c was a limitation possibly affecting the ability to see statistically significant relationships between A1c and self-management behaviors. Also, generalizations of the findings of this study may be applicable only to congregate meal participants of OAANP programs in Georgia. However, the participants in this program share many of the same characteristics as the general older adult population who are also still living in the community and trying to manage chronic disease.

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Table 3.1. Characteristics of Participants at Pre-test in the Older Americans Act Nutrition Program, Georgia, 2005-2006

Variable	Pre-test Questionnaire and Pre-test A1c		Pre- and Post-test Questionnaire Pre- and Post-test A1c[a]	
	No.	Mean or %	No.	Mean or %
No.	261		144	
Age, y, mean (SD)	260	73 (8)	143	74 (7)
≤ 69, %		32		29
70-79, %		48		51
≥ 80, %		20		20
Sex, %	261		144	
Male		16		16
Female		84		84
Race, %	260		144	
White		36		42
Black		62		57
Asian		1		1
Other		1		0
Education, y, mean (SD)	258	11 (3)	139	11 (3)
A1c, %, mean (SD)	261	7.0 (1.3)	144	7.0 (1.4)
< 7, %		59		60
7-8, %		23		23
≥ 8, %		18		17
Body mass index, mean (SD)	253	31.5 (7.2)	137	30.8 (7.1)
Tobacco use, % yes	259	12	141	11
Attendance, number of DSM lessons, mean (SD)	193	6 (2)	139	6 (2)

[a] Completed pre- and post-test questionnaire and pre- and post-test A1c. Two intervention sites were deleted due to invalid data.

Table 3.2. Relationship of Demographic and Diabetes Characteristics to Stage of A1c Control in Participants in the Older Americans Act Nutrition Program, Georgia, 2005-2006

Variable	N	Stage of A1c Control			*P* value
		Excellent (< 7%)	Moderate (7 - 8%)	Poor (> 8%)	
Age, y, mean (SD)	260	74 (7.9)	73 (6.5)	71 (8.0)	.01
≤ 69, %	84	29	33	43	.13
70-79, %	124	46	53	45	
≥ 80, %	52	25	13	13	
Sex, %	261				.10
Male	42	14	25	13	
Female	219	86	75	88	
Race, %	256				.18
White	94	41	29	32	
Black	162	59	71	68	
Education, y, mean (SD)	258	11 (4)	10 (3)	11 (3)	.83
0-8, %	49	19	23	13	.42
9-11, %	89	31	37	44	
12, %	80	31	30	31	
13-22, %	40	19	10	13	
Body mass index, mean (SD)	253	30.8 (7.2)	33.2 (7.5)	31.4 (6.9)	.30
< 25, %	46	21	10	18	.31
25-29.9, %	74	30	27	29	
≥ 30, %	133	48	63	53	
A1c knowledge, % correct	52	44	25	25	.42

Table 3.3. Changes in A1c from Pre-test to Post-test by Stage of A1c Control in Participants in the Older Americans Act Nutrition Program, Georgia, 2005-2006

Stage of A1c control	N	Pre-test A1c	Post-test A1c	Change in A1c (%)[b]	*P* value[a]
Total sample, %, mean (SD)	144	7.00 (1.39)	6.76 (1.17)	-0.25 (0.82)	< .0001
A1c < 8% %, mean (SD)	120	6.51 (0.71)	6.44 (0.87)	-0.07 (0.62)	.05
A1c < 7%, %, mean (SD)	87	6.19 (0.54)	6.12 (0.71)	-0.06 (0.61)	.07
A1c 7 - 8%, % mean (SD)	33	7.36 (0.30)	7.27 (0.71)	-0.09 (0.64)	.40
A1c > 8%, %, mean (SD)	24	9.48 (1.31)	8.33 (1.20)	-1.15 (1.09)	< .0001

[a] Non-parametric t-test was used to determine differences between pre- and post-test A1c levels.
[b] Change in A1c may not equal pre-test minus post-test A1c due to rounding.

Table 3.4. Relationship of Diabetes Self Management Questions to Level of A1c Control in Participants in the Older Americans Act Nutrition Program, Georgia, 2005-2006

DSM Behaviors	N	Stage of A1c Control: Excellent < 7%	Moderate 7-8%	Poor > 8%	*P* value
1. How many of the last seven days have you followed a healthy eating plan?	258	4.4 (2.4)	4.5 (2.5)	4.4 (2.6)	.68
0-4 days/week (%)	109	41	40	49	.58
≥ 5 days/week (%)	149	59	60	51	
2. On average, over the past month, how many days per week have you followed an eating plan prescribed by your doctor?	245	3.0 (2.9)	3.3 (2.7)	3.2 (3.0)	.58
0-4 days/week (%)	153	62	63	63	1.00
≥ 5 days/week (%)	92	38	37	37	
3. On how many of the last seven days did you eat five or more servings of fruits and vegetables?	258	4.3 (2.5)	3.6 (2.7)	3.6 (2.6)	.04
0-4 days/week (%)	135	47	58	61	.16
≥ 5 days/week (%)	123	53	42	39	
4. On how many of the last seven days did you eat high fat foods such as high fat red meats or full-fat dairy foods?	260	2.1 (2.0)	1.4 (1.6)	1.7 (1.6)	.09
0-4 days/week (%)	234	88	95	92	.24
≥ 5 days/week (%)	26	12	5	8	
5. Thinking about your diet, on how many of the last seven days did you space carbohydrates evenly?	254	3.3 (2.9)	3.6 (3.0)	2.8 (2.9)	.46
0-4 days/week (%)	153	60	56	67	.59
≥ 5 days/week (%)	101	40	44	34	
6. On how many of the last seven days did you participate in at least 30 minutes of moderate physical activity?	260	4.2 (2.7)	3.6 (2.6)	3.5 (2.6)	.06
0-4 days/week (%)	139	49	58	63	.17
≥ 5 days/week (%)	121	51	42	37	
7. On how many of the last seven days did you participate in a specific exercise session other than what you do around the house or as part of your daily behaviors?	260	2.4 (2.4)	2.6 (2.4)	2.1 (2.3)	.66
0-4 days/week (%)	198	77	71	79	.57
≥ 5 days/week (%)	62	23	29	21	

DSM Behaviors	N	Excellent < 7% (%)	Moderate 7-8% (%)	Poor > 8% (%)	*P* value
8. On how many of the last seven days did you test your blood sugar?	259	4.6 (2.9)	5.7 (2.4)	5.4 (2.6)	.02
0-4 days/week (%)	94	43	25	28	.02
≥ 5 days/week (%)	165	57	75	72	
9. On how many of the last seven days did you test your blood sugar as recommended by your doctor?	245	4.2 (3.0)	5.4 (2.7)	4.1 (3.1)	.59
0-4 days/week (%)	108	49	28	50	.02
≥ 5 days/week (%)	137	51	72	50	
10. On how many of the last seven days did you check your feet?	258	5.1 (2.8)	5.8 (2.4)	5.3 (2.8)	.42
0-4 days/week (%)	74	31	22	30	.43
≥ 5 days/week (%)	184	69	78	70	
11. On how many of the last seven days did you inspect the inside of your shoes?	259	3.4 (3.3)	3.6 (3.4)	3.9 (3.4)	.29
0-4 days/week (%)	136	56	50	47	.48
≥ 5 days/week (%)	122	44	50	53	
12. On how many of the last seven days did you take your diabetes medications as prescribed by your doctor?	254	6.3 (2.0)	6.9 (0.9)	6.4 (1.9)	.39
0-4 days/week (%)	21	11	2	9	.11
≥ 5 days/week (%)	233	89	98	91	

Table 3.5. Means and Percents of DSM Behaviors for all Participants and Those with Low Compliance in Participants in the Older Americans Act Nutrition Program, Georgia, 2005-2006.[a,b]

DSM Behaviors	N	Pre-test	Post-test	Change[c]	*P* value
1. How many of the last seven days have you followed a healthy eating plan?					
All participants (mean ± SD)	143	4.6 (2.3)	5.7 (2.0)	1.1 (2.7)	< .0001
≥ 5/week (%)		62	78	16	.005
Low compliance at pre-test (mean ± SD)	55	2.2 (1.7)	5.3 (2.2)	3.1 (2.5)	< .0001
≥ 5/week (%)		0	71		
2. On average, over the past month, how many days per week have you followed an eating plan prescribed by your doctor?					
All participants (mean ± SD)	128	3.0 (3.0)	4.2 (3.0)	1.1 (3.5)	< .0001
≥ 5/week (%)		40	58	18	.0006
Low compliance at pre-test (mean ± SD)	77	0.8 (1.5)	3.5 (2.9)	2.7 (2.9)	< .0001
≥ 5/week (%)		0	35		
3. On how many of the last seven days did you eat five or more servings of fruits and vegetables?					
All participants (mean ± SD)	142	4.3 (2.5)	5.6 (1.9)	1.1 (2.7)	< .0001
≥ 5/week (%)		55	75	20	.0005
Low compliance at pre-test (mean ± SD)	64	1.9 (1.6)	5.2 (2.2)	3.3 (2.5)	< .0001
≥ 5/week (%)		0	69		
4. On how many of the last seven days did you eat high fat foods such as high fat red meats or full-fat dairy foods?					
All participants (mean ± SD)	140	2.0 (1.9)	1.7 (1.8)	-0.3 (2.4)	.13
≥ 5/week (%)		11	9	-2	.84
Low compliance at pre-test (mean ± SD)	125	1.5 (1.4)	1.7 (1.8)	0.2 (1.9)	.38
≥ 5/week (%)		0	10		
5. Thinking about your diet, on how many of the last seven days did you space carbohydrates evenly?					
All participants (mean ± SD)	140	3.2 (2.9)	4.7 (2.6)	1.1 (3.2)	< .0001
≥ 5/week (%)		37	59	22	.002
Low compliance at pre-test (mean ± SD	88	1.2 (1.6)	4.1 (2.8)	2.9 (2.8)	< .0001
≥ 5/week (%)		0	50		
6. On how many of the last seven days did you participate in at least 30 minutes of moderate physical activity?					
All participants (mean ± SD)	142	4.1 (2.7)	4.8 (2.6)	0.7 (2.8)	.004
≥ 5/week (%)		51	62	11	.07
Low compliance at pre-test (mean ± SD)	70	1.7 (1.6)	4.0 (2.7)	2.2 (2.5)	< .0001
≥ 5/week (%)		0	46		

DSM Behaviors	N	Pre-test	Post-test	Change[c]	*P* value
7. On how many of the last seven days did you participate In a specific exercise session other than what you do Around the house or as part of your daily behaviors?					
All participants (mean ± SD)	142	2.4 (2.4)	2.9 (2.6)	0.5 (3.1)	.06
≥ 5/week (%)		25	30	6	.35
Low compliance at pre-test (mean ± SD)	107	1.2 (1.3)	2.7 (2.5)	1.5 (2.5)	< .0001
≥ 5/week (%)		0	26		
8. On how many of the last seven days did you test your blood sugar?					
All participants (mean ± SD)	141	4.8 (2.8)	5.3 (2.6)	0.5 (2.1)	.007
≥ 5/week (%)		60	68	9	.17
Low compliance at pre-test (mean ± SD)	57	1.6 (1.5)	3.4 (2.8)	1.8 (2.5)	< .0001
≥ 5/week (%)		0	35		
9. On how many of the last seven days did you test your blood sugar as recommended by your doctor?					
All participants (mean ± SD)	132	4.3 (3.0)	5.1 (2.7)	0.9 (3.1)	.001
≥ 5/week (%)		53	66	13	.04
Low compliance at pre-test (mean ± SD)	62	1.2 (1.3)	4.0 (3.0)	2.9 (2.9)	<.0001
≥ 5/week (%)		0	48		
10. On how many of the last seven days did you check your feet?					
All participants (mean ± SD)	140	5.4 (2.7)	6.3 (1.6)	0.8 (2.7)	.0003
≥ 5/week (%)		74	86	12	.02
Low compliance at pre-test (mean ± SD)	36	1.0 (1.4)	5.4 (2.1)	4.4 (2.7)	< .0001
≥ 5/week (%)		0	69		
11. On how many of the last seven days did you inspect The inside of your shoes?					
All participants (mean ± SD)	140	3.2 (3.3)	5.0 (2.9)	1.8 (3.7)	<.0001
≥ 5/week (%)		43	66	24	<.0001
Low compliance at pre-test (mean ± SD)	80	0.4 (1.0)	4.3 (3.1)	3.8 (3.3)	< .0001
≥ 5/week (%)		0	55		
12. On how many of the last seven days did you take your Diabetes medications as prescribed by your doctor?					
All participants (mean ± SD)	138	6.5 (1.8)	6.4 (1.9)	-0.1 (1.8)	.64
≥ 5/week (%)		92	91	-1	1.00
Low compliance at pre-test (mean ± SD)	11	0.5 (1.0)	3.2 (3.7)	2.7 (3.3)	.06
≥ 5/week (%)		0	45		

[a] Low compliance refers to participants who undertook the activity < 5 days/week at pre-test.
[b] Non-parametric t-test was used to evaluate means. Fisher exact test was used to compare percents.
[C] Change in percent compliance may not equal pre-test minus post-test value due to rounding.

Table 3.6. Regression Model for Exploring Relationships of DSM Behaviors with Changes in A1c in Participants in the Older Americans Act Nutrition Program, Georgia, 2005-2006 (*P* values ≤ 0.20)

	Change in A1c Total Sample	
	Parameter Estimate (± SEM)	*P* value
N	142	
Intercept	3.60 ± 1.01	.0006
A1c	-0.38 ± 0.05	< .0001
Age	-0.02 ± 0.01	.04
Race	-0.10 ± 0.12	.41
Sex	-0.09 ± 0.17	.61
Healthy diet (pre-test)	0.03 ± 0.05	.58
Change in healthy diet	0.04 ± 0.04	.27
Eat ≥5 servings of fruit and vegetables (pre-test)	0.02 ± 0.04	.60
Change in eating ≥5 servings of fruits and vegetables	0.02 ± 0.04	.54
Eating high fat foods (pre-test)	0.04 ± 0.05	.38
Change in eating high fat foods	0.05 ± 0.04	.17
Spacing carbohydrates (pre-test)	0.02 ± 0.03	.53
Change in spacing carbohydrates	0.02 ± 0.03	.35
Exercise (pre-test)	-0.11 ± 0.03	.001
Change in exercise	-0.06 ± 0.02	.02
Testing blood sugar (pre-test)	0.03 ± 0.03	.30
Change in testing blood sugar	0.03 ± 0.04	.35
Checking feet (pre-test)	0.03 ± 0.05	.60
Change in checking feet	-0.04 ± 0.05	.41
Checking insides of shoes (pre-test)	-0.01 ± 0.03	.84
Change in checking insides of shoes	0.06 ± 0.05	.02

Table 3.7. Regression Model for Exploring Relationships of DSM Behaviors with Changes in A1c in Participants in the Older Americans Act Nutrition Program, Georgia, 2005-2006 (*P* values ≤ .20)

	Change in A1c Total Sample	
	Parameter Estimate (± SEM)	*P* value
N	142	
Intercept	3.22 0.94	.0008
A1c	-0.33± 0.05	< .0001
Age	-0.01± 0.009	.19
Race	-0.12 ± 0.13	.36
Sex	-0.11 ± .17	.54
Follow diet plan	-0.11 ± 0.26	.66
Maintain portion control	0.09± 0.27	.73
Space carbohydrates evenly	-0.13 ± 0.19	.50
Increased fruit and vegetable intake	-0.12 ± 0.19	.53
Take better care of feet	0.16 ± 0.19	.41
Maintain blood sugar levels	-0.01 ± .25	.98
Increased physical activity	-0.33 ± 0.17	.05
Take medications as recommended	-0.05 ± 0.17	.77

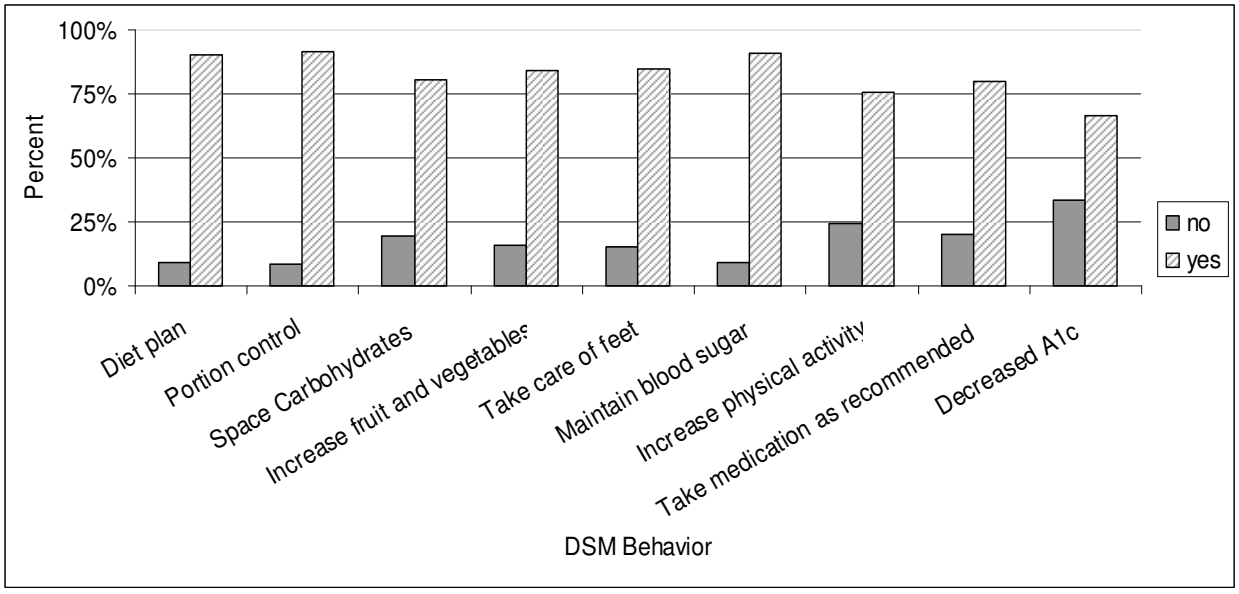

Figure 3.1. Self-reported improvements in DSM

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CHAPTER 4

CONCLUSIONS

The goals of this study were to:1) Determine the effects of a DSM education intervention on A1c levels and DSM behaviors, 2) Identify the predictors of changes in A1c following the intervention, such as improvements in DSM. It was hypothesized that: 1) A DSM education intervention would lower A1c levels and increase DSM behaviors (eating healthy, being physically active, spacing carbohydrates, testing blood sugar, taking medications properly, and checking feet), and 2) Improvements in self-management behaviors would predict changes in A1c following the intervention. Following the intervention, DSM behaviors increased significantly in nine out of 12 areas and the mean A1c for the total sample decreased by 0.25% ($P < .0001$) and 1.15% for those who had an initial A1c > 8.0% ($P < .0001$). Therefore, in terms of the primary goals of increasing DSM behaviors and decreasing A1c this educational intervention was successful. Correlation analyses in the total sample and the subgroup with pre-test A1c > 8% revealed no consistent associations of changes in any of the DSM behaviors with changes in A1c following the intervention. A regression model assessing DSM behaviors with the most respondents showed that physical activity at the pre-test and improvements in physical activity at post-test were associated with improvements in A1c control following the intervention. The results indicate that there is still more room for improvement in DSM among older adults. Although DSM is important for all older adults with diabetes, the results of this study show that the most change is seen in those with initial high A1c concentrations. Therefore future studies may need to focus recruitment efforts toward those with the most room for improvement. Future interventions should continue to strongly emphasize the importance of DSM for the prevention and treatment of complications.

Since it has been shown that health care costs for people with diabetes are greater than the costs for people without diabetes, it is important to evaluate the potential savings associated with improved glycemic control. In a study of people with diabetes who improved their A1c by 1% or more over a 4-year period, the average costs savings per person per year were $685 to $950 less each year as compared to those who did not improve their A1c (Wagner et al., 2007). In the current study 17% of participants were able to decrease A1c by 1.15%. By taking the average savings converted to current dollar values it can be determined that this intervention saved approximately $24,000 in healthcare costs. It was determined that the intervention reached over 3000 people who attended lessons but were not actually enrolled in the study, and of these people about 30% would have diabetes (Stephens et al., 2005). Therefore the potential for cost savings is approximately $168,600 per 1000 people with diabetes reached, $337,300 per 2000, and $506,000 per 3000 people reached, 17% of whom improve glycemic control through participation in an educational intervention and compliance with DSM behaviors. This dramatic decrease in healthcare costs further highlights the need for continued research and more interventions aimed at improving glycemic control.

There were significant differences in the mean A1c concentrations of white participants and black participants at the pre-test; black participants had higher A1c concentrations. Also, black participants made greater decreases in A1c following the intervention ($P < .05$). This finding reflects the overall trend in this study that those in poorer control seem to make the greatest improvements. Research supports the fact that disparities in glycemic control exist among blacks vs. whites which can explain why these participants had higher pre-test A1c concentrations (DeRekeniere et al., 2003; Adams et al., 2005). Conclusions as to whether these differences are due to inadequate access to healthcare or genetic and environmental factors are

varied. Nonetheless, it is important to ensure that interventions aimed at improving glycemic control in all races and ethnic groups be appropriate to serve the needs of the ethnically diverse older adult population.

Since the complications of diabetes such as cardiovascular disease, hypertension and altered lipoprotein profile are so common it may be beneficial to include these as focus areas in future studies. In addition, by using more accurate weight and waist circumference as outcome variables, as well as biochemical markers such as LDL cholesterol, researchers may gain a more objective idea of behavioral changes as indicated by metabolic and anthropometric changes. Expansion of the curriculum to include prevention of diabetes would also make the topic relevant to more people which may increase participants' perceptions of their susceptibility, making behavioral changes more likely. Future studies should also include a larger sample size and additional emphasis on nutrition and physical activity. The findings of this study support the value of DSM education for glucose control while highlighting the need for continued research in the area to better understand and address barriers to self-management.

APPENDICES

APPENDIX A

ADDITIONAL TABLE

Table A.1. Correlations of changes in A1c for participants with pre-test A1c > 8% with a change in DSM Behaviors in participants in the Older Americans Act Nutrition Program, Georgia, 2005-2006[a]

DSM Behaviors	Change in Diabetes Self Management Behaviors[b]					
	Total Sample			A1c >8%		
	n	r	*P*	n	r	*P*
1. On how many of the last seven days have you followed a healthful eating plan?	141	0.23	.01	23	0.09	.67
2. On average, over the past month, how many days per week have you followed an eating plan prescribed by you healthcare provider?	126	0.06	.51	19	-0.12	.62
3. On how many of the last seven days did you eat five or more servings of fruit and vegetables?	140	0.12	.15	23	- 0.14	.50
4. On how many of the last seven days did you eat high fat foods such as high fat red meats or full-fat dairy foods?	138	-0.9	.30	23	0.25	.25
5. Thinking about your diet, on how many of the last seven days did you space carbohydrates evenly?	138	0.09	.28	22	0.23	.30
6. On how many of the last seven days did you participate in at least 30 minutes of moderate physical activity?	140	0.05	.59	23	0.06	.78
7. On how many of the last seven days did you participate in a specific exercise session other than what you do around the house as part of your daily behaviors?	140	-0.02	.85	23	-0.16	.46
8. On how many of the last seven days did you test your blood sugar?	139	0.01	.90	22	0.04	.86
9. On how many of the last seven days did you test your blood sugar as recommended by your doctor?	130	-0.08	.35	21	0.11	.62
10. On how many of the last seven days did you check your feet?	138	-0.06	.51	22	0.11	.62
11. On how many of the last seven days did you inspect the inside of your shoes?	138	0.04	.62	22	0.25	.26
12. On how many of the last seven days did you take your diabetes medication as recommended by your doctor?	136	-0.03	.77	22	0.31	.16

[a]Correlations are Spearman rho.
[b]Change from pre-test to post-test.

APPENDIX B

EXPANDED POWER ANALYSES

This detailed description of the power analyses for previous studies and the current study is designed to aid in the design of future studies. Our previous senior center based nutrition, physical activity and health intervention studies had completion rates between the pre-tests and post-tests ranging between 72% and 88% (Burnett, 2003, Ellis et al., 2005, McCamey et al., 2003, and Redmond, 2004). Of these studies, the previous diabetes self-management intervention conducted in north Georgia is the one most related to the present study (Burnett, 2003, Redmond, 2004, Redmond et al., 2007). In this previous study, participants completed the following: pre-test questionnaires (n = 105), pre-test questionnaires and A1c (n = 100), pre-test and post-test questionnaires (n = 91), pre-test and post-test questionnaires and A1c measures (n = 77). Also, 21 of these 77 participants (27%) had high initial A1c > 8% (indicating poor diabetes control) and the intervention was associated with a 1.46 percentage point decrease (SD = 1.90%) in A1c in those with high initial A1c.

Compared to this previous study, the current study was conducted over a larger geographical area (the whole state), had a larger number of personnel and senior centers, and a smaller number of times that the phlebotomist could visit each senior center for A1c measures (only once at the pre-test and once at the post-test). Therefore, we assumed there would be a lower completion rate among individuals completing all pre-test and post-test questionnaires and A1c measures (70%), a lower prevalence of high A1c among those completing all measures (20% vs. 27%), and a smaller decrease in A1c (1% vs. 1.46% in those with A1c > 8%).

Using these assumptions, our goal was to recruit 240 people with diabetes (20 from each of the 12 AAA), have 168 with complete measures (70%), and have 34 with A1c > 8% at

baseline (20%). Using online power and sample size programs (http://www.dssresearch.com/toolkit/default.asp, http://home.clara.net/sisa/samsize.htm) and these assumptions, it was determined that the targeted sample size of 34 would have adequate power (> 80%, alpha = 0.05) to detect a 1% (SD = 1.90) decrease in A1c among those with initial A1c > 8%. For pairwise comparisons, 24 participants are needed for 80% power and alpha = 0.05. It was also determined that a sample size of 136 is needed to show that a 15 percentage point change in following a recommended behavior is statistically significant (e.g., from 40% at pre-test to 55% at post-test, power = 0.08, alpha = 0.05).

Our actual recruitment and completion information for this study was: 351 with diabetes enrolled and completed questionnaires, 237 completed pre-test and post-test questionnaires, 144 completed pre-test and post-test questionnaires and A1c, and 24 of these had high initial A1c and had a decrease in A1c of of 1.15% ± 1.09% following the intervention. In future studies assuming 80% power and alpha = 0.05, the necessary samples sizes for those with high initial A1c are n = 16 if the decrease is 1% ± 1.5% or n = 27 if the decrease is 1% ± 2%.

APPENDIX C

PRE-TEST/ POST-TEST (2005-2006 version)

WITH DIABETES PRE-TEST

LIVE HEALTHY GEORGIA – SENIORS TAKING CHARGE!
CONSENT FORM (WITH DIABETES)

I, _____, agree to participate in the research study titled "Live Healthy Georgia – Seniors Taking Charge" 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 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. 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. 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 approval to participate in a physical activity program.

3) Attend two sessions for collecting information about my health, fitness, food, and nutrition habits. The first session will last about 60 minutes and the second session will last about 30 minutes.

4) Attend up to 16 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 number of daily steps.

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

6) 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 obtain a hemoglobin A1c value from my local physician, health department, clinical laboratory, or hospital. This test will help determine if the diabetes self-management program is improving my management of 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. If additional care is needed, then my insurance company or myself will be responsible for any expense that may be incurred. The Senior Center where the programs are conducted and the University of Georgia and their employees shall not incur any liability for incidents that may occur during or as a result of my participation in this study.

The leaders will advise me to stop exercising if I experience any discomfort or chest pains. 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, 2012.

If I have any further questions about the study, now or during the course of the study I can call Ms. Tiffany Sellers (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

_____

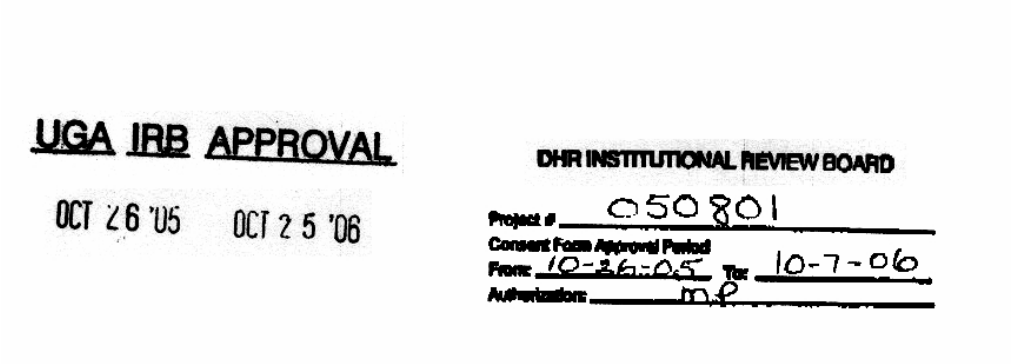
Participant Address and Phone

_____	Mary Ann Johnson	_____
Signature of Investigator	Printed Name of Investigator	Date

Email: mjohnson@fcs.uga.edu

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

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.



LIVE HEALTHY GEORGIA – SENIORS TAKING CHARGE!

		Line 1
ID of Participant:		1-4
Phone number to use to clarify information and get step counts:		
1. County:		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
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
14. Do you always have enough money to buy the food you need?	No (0) Yes (1)	33
15. How many over the counter medications do you take?		34-35
16. How many prescription medications, including insulin, do you take?		36-37
Think about the fruits and vegetables you usually eat each day, such as 100% juices; fresh, frozen or canned fruits; fruits for dessert, as well as potatoes, salads, slaws, and other fresh, frozen or canned vegetables. A serving is a piece of fruit or about ½ cup of most fruits and vegetables; ¼ cup of dried fruits (such as raisins); or 1 cup of raw leafy greens used in salads. The next questions are about your usual intake of fruits and vegetables at each meal and for snacks <u>each day.</u>		
17. How many servings of fruit do you usually have with breakfast?	0 1 2 3 4 5	38
18. How many servings of vegetables do you usually have with breakfast?	0 1 2 3 4 5	39
19. How many servings of fruit do you usually have with lunch?	0 1 2 3 4 5	40
20. How many servings of vegetables do you usually have with lunch?	0 1 2 3 4 5	41
21. How many servings of fruit do you usually have with your evening meal?	0 1 2 3 4 5	42
22. How many servings of vegetables do you usually have with your evening meal?	0 1 2 3 4 5	43
23. How many servings of fruit do you usually have as snacks each day?	0 1 2 3 4 5	44
24. How many servings of vegetables do you usually have as snacks each day?	0 1 2 3 4 5	45
25. 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		46-47
26. On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	0 1 2 3 4 5 6 7	48

What keeps you from eating more fruits and vegetables? *Circle all that apply.*		
27. Chewing or dental problems	No (0) Yes (1)	49
28. Cooking problems	No (0) Yes (1)	50
29. Cost	No (0) Yes (1)	51
30. Difficulties with digestion	No (0) Yes (1)	52
31. Don't like taste	No (0) Yes (1)	53
32. Grocery store does not have what I like	No (0) Yes (1)	54
33. Lack of storage space	No (0) Yes (1)	55
34. Not in season	No (0) Yes (1)	56
35. Spouse doesn't like them	No (0) Yes (1)	57
36. Takes too much time	No (0) Yes (1)	58
37. Too heavy to carry home from the store	No (0) Yes (1)	59
38. Too many are recommended	No (0) Yes (1)	60
39. Too much trouble	No (0) Yes (1)	61
40. Transportation problems	No (0) Yes (1)	62
41. Doctor told me not to eat some fruits and vegetables. If yes, please list:	No (0) Yes (1)	63
42. Other reasons that keep you from eating more fruits and vegetables. If yes, please list:	No (0) Yes (1)	64
43. How many of the last SEVEN DAYS have you followed a healthful eating plan?	0 1 2 3 4 5 6 7	65
44. On average, over the past month, how many DAYS PER WEEK have you followed an eating plan prescribed by your health care provider?	0 1 2 3 4 5 6 7	66
45. On how many of the last SEVEN DAYS did you eat high fat foods such as high fat red meats or full-fat dairy foods?	0 1 2 3 4 5 6 7	67
46. On how many of the last 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.	0 1 2 3 4 5 6 7	68
47. On how many of the last 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?	0 1 2 3 4 5 6 7	69
48. On how many of the last SEVEN DAYS, did you participate in specific exercises for your arthritis?	0 1 2 3 4 5 6 7	70
49. How many days of the week do you participate in physical activity?	0 1 2 3 4 5 6 7	71
50. About how many minutes of physical activity do you do on the days you are physically active?	____ minutes	72-74
What keeps you from being physically active for at least 30 minutes on all or most days of the week? *Circle all that apply.*		
51. I already am this physically active on all or most days of the week	No (0) Yes (1)	75
52. I have a health condition that keeps me from being active	No (0) Yes (1)	76
53. It costs too much	No (0) Yes (1)	77
54. I don't have time	No (0) Yes (1)	78
55. I don't like to	No (0) Yes (1)	79
56. It's not safe	No (0) Yes (1)	80
57. It's too late to improve my health	No (0) Yes (1)	81
58. 30 minutes daily is too much for me	No (0) Yes (1)	82

List of FV barriers selected from John and Ziebland, 2004 (http://her.oxfordjournals.org/cgi/reprint/19/2/165). 5

		Line 2
1. What is the current effect of diabetes on your daily activities? No effect (1) Little effect (2) Large effect (3)	1 2 3	10
2. Thinking about your diet, on how many of the last SEVEN DAYS did you space carbohydrates evenly?	0 1 2 3 4 5 6 7	11
3. On how many of the last SEVEN DAYS did you test your blood sugar?	0 1 2 3 4 5 6 7	12
4. How many times per day has your doctor told you to test your blood sugar?	0 1 2 3 4 5 6 7	13
5. On how many of the last SEVEN DAYS did you test your blood sugar as recommended by your doctor?	0 1 2 3 4 5 6 7	14
6. Are you taking medications for your diabetes? If yes, which ones do you take?	No (0) Yes (1)	15
7. An insulin shot 1 or 2 times a day	No (0) Yes (1)	16
8. An insulin shot 3 or more times a day	No (0) Yes (1)	17
9. Diabetes pills to control my blood sugar	No (0) Yes (1)	18
10. Other medication for diabetes? If yes, write name of medication here:	No (0) Yes (1)	19
11. On how many of the last SEVEN DAYS, did you take your diabetes medication as prescribed by your doctor?	0 1 2 3 4 5 6 7	20
12. On how many of the last SEVEN DAYS did you check your feet?	0 1 2 3 4 5 6 7	21
13. On how many of the last SEVEN DAYS did you inspect the inside of your shoes?	0 1 2 3 4 5 6 7	22
14. Have you heard of (hemoglobin) A1c?	No (0) Yes (1)	23
15. If yes, what should your level be? _____%		24-26 9=DK
16. INTERVIEWER: Encourage and/or arrange to have the participant's A1c measured by their local physician, health department, clinical laboratory, or hospital or at the Senior Center. Record the value here. A1c: _____%		27-29 9=missing
17. Date A1c performed (M/D/Y): _____/_____/_____		30-35
18. Where was value obtained from? Local physician (1) Health department (2) Clinical laboratory (3) Hospital (4) Senior Center (5)		36
19. <u>Post-test only</u>: Was the A1c value obtained from the same laboratory or facility at both the pre- and post-test?	No (0) Yes (1)	37

WAIST CIRCUMFERENCE:

Instructions for Measuring Waist Circumference

<u>The measurement should be made under the clothes</u>.

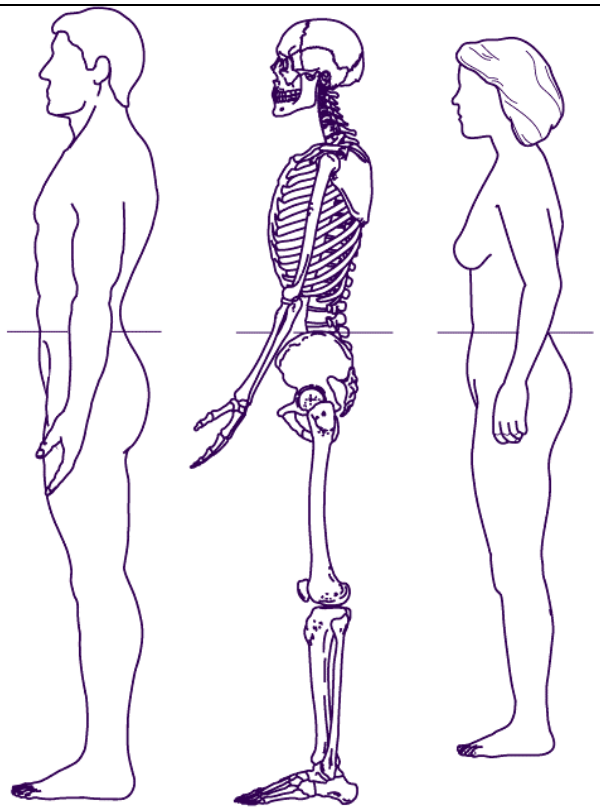
To measure waist circumference, locate the upper hipbone and the top of the right iliac crest. Place a measuring tape in a horizontal plane around the abdomen at the level of the iliac crest. Before reading the tape measure, ensure that the tape is snug, but does not compress the skin, and is parallel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



59. Waist Circumference = _____ INCHES		Line 3 10-13
60. How was measurement made? (1) Under clothes OR (2) Over clothes	1 2	14
61. 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*		15-18 19-22
62. What is your current height without shoes? _____ feet and ____ inches		23-25
63. What is your current weight without clothes? _____ pounds		26-28
64. How was weight measurement made? PREFERRED: With a scale and without shoes (1) With a scale and with shoes (2) Self-report (3)		29

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

	Physical Performance Test-Task Descriptions Equipment: Stopwatch, 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)** ___ ___ . ___	10-13 14-17 18-21
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:** _____	22
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 _____	23-26 27
AFW D	**DOMAIN SCORE:** 1= ≥5.7 2= 4.1-5.6 3= 3.2-4.0 4= ≤3.1	**SCORE:** _____	28
ACS	**CHAIR STANDS:** **Participant is asked to stand one time from a seated 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.**	**Time to the nearest 10th second:** **1)** ___ ___ . ___	29-32
ACS D	**DOMAIN SCORE:** 1= ≥16.7 2= 13.7-16.6 3= 11.2-13.6 4= ≤11.1	**SCORE:** _____	33
TDS	**TOTAL SCORE: Add all 3 domain scores (1-12)**	**TOTAL SCORE:__ __**	34-35
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).			

WITH DIABETES POST-TEST
LIVE HEALTHY GEORGIA – SENIORS TAKING CHARGE!

		Line 1
ID of Participant:		1-4
Phone number to use to clarify information and get step counts:		
59. County:		10-12
60. Date (M/D/Y): ___/___/___		13-18
61. Age of Participant: ___ ___ ___		19-21
62. Gender: Male (0) Female (1)		22
63. Ethnicity: White (1) Black (2) Hispanic/Latino (3) Asian (4) Other (5)		23
64. How many years did you complete in school: ____ years		24-25
65. How would you rate your overall health? Circle one: Poor (0) Fair (1) Good (2) Very good (3) Excellent (4)		26
66. Do you use any tobacco products such as cigarettes, cigars, pipe, or chewing tobacco?	No (0) Yes (1)	27
67. Do you have diabetes?	No (0) Yes (1)	28
68. Do you have high blood pressure?	No (0) Yes (1)	29
69. Do you have heart disease such as angina, congestive heart failure, heart attack or other heart problems?	No (0) Yes (1)	30
70. Do you have arthritis?	No (0) Yes (1)	31
71. During the past 30 days, have you had symptoms of pain, aching, or stiffness in or around a joint?	No (0) Yes (1)	32
72. Do you always have enough money to buy the food you need?	No (0) Yes (1)	33
73. How many over the counter medications do you take?		34-35
74. How many prescription medications, including insulin, do you take?		36-37
Think about the fruits and vegetables you usually eat each day, such as 100% juices; fresh, frozen or canned fruits; fruits for dessert, as well as potatoes, salads, slaws, and other fresh, frozen or canned vegetables. A serving is a piece of fruit or about ½ cup of most fruits and vegetables; ¼ cup of dried fruits (such as raisins); or 1 cup of raw leafy greens used in salads. The next questions are about your usual intake of fruits and vegetables at each meal and for snacks <u>each day.</u>		
75. How many servings of fruit do you usually have with breakfast?	0 1 2 3 4 5	38
76. How many servings of vegetables do you usually have with breakfast?	0 1 2 3 4 5	39
77. How many servings of fruit do you usually have with lunch?	0 1 2 3 4 5	40
78. How many servings of vegetables do you usually have with lunch?	0 1 2 3 4 5	41
79. How many servings of fruit do you usually have with your evening meal?	0 1 2 3 4 5	42
80. How many servings of vegetables do you usually have with your evening meal?	0 1 2 3 4 5	43
81. How many servings of fruit do you usually have as snacks each day?	0 1 2 3 4 5	44
82. How many servings of vegetables do you usually have as snacks each day?	0 1 2 3 4 5	45
83. 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		46-47
84. On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?	0 1 2 3 4 5 6 7	48

What keeps you from eating more fruits and vegetables? *Circle all that apply.*		
85. Chewing or dental problems	No (0) Yes (1)	49
86. Cooking problems	No (0) Yes (1)	50
87. Cost	No (0) Yes (1)	51
88. Difficulties with digestion	No (0) Yes (1)	52
89. Don't like taste	No (0) Yes (1)	53
90. Grocery store does not have what I like	No (0) Yes (1)	54
91. Lack of storage space	No (0) Yes (1)	55
92. Not in season	No (0) Yes (1)	56
93. Spouse doesn't like them	No (0) Yes (1)	57
94. Takes too much time	No (0) Yes (1)	58
95. Too heavy to carry home from the store	No (0) Yes (1)	59
96. Too many are recommended	No (0) Yes (1)	60
97. Too much trouble	No (0) Yes (1)	61
98. Transportation problems	No (0) Yes (1)	62
99. Doctor told me not to eat some fruits and vegetables. If yes, please list:	No (0) Yes (1)	63
100. Other reasons that keep you from eating more fruits and vegetables. If yes, please list:	No (0) Yes (1)	64
101. How many of the last SEVEN DAYS have you followed a healthful eating plan?	0 1 2 3 4 5 6 7	65
102. On average, over the past month, how many DAYS PER WEEK have you followed an eating plan prescribed by your health care provider?	0 1 2 3 4 5 6 7	66
103. On how many of the last SEVEN DAYS did you eat high fat foods such as high fat red meats or full-fat dairy foods?	0 1 2 3 4 5 6 7	67
104. On how many of the last 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.	0 1 2 3 4 5 6 7	68
105. On how many of the last 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?	0 1 2 3 4 5 6 7	69
106. On how many of the last SEVEN DAYS, did you participate in specific exercises for your arthritis?	0 1 2 3 4 5 6 7	70
107. How many days of the week do you participate in physical activity?	0 1 2 3 4 5 6 7	71
108. About how many minutes of physical activity do you do on the days you are physically active?	____ minutes	72-74
What keeps you from being physically active for at least 30 minutes on all or most days of the week? *Circle all that apply.*		
109. I already am this physically active on all or most days of the week	No (0) Yes (1)	75
110. I have a health condition that keeps me from being active	No (0) Yes (1)	76
111. It costs too much	No (0) Yes (1)	77
112. I don't have time	No (0) Yes (1)	78
113. I don't like to	No (0) Yes (1)	79
114. It's not safe	No (0) Yes (1)	80
115. It's too late to improve my health	No (0) Yes (1)	81
116. 30 minutes daily is too much for me	No (0) Yes (1)	82

List of FV barriers selected from John and Ziebland, 2004 (http://her.oxfordjournals.org/cgi/reprint/19/2/165).

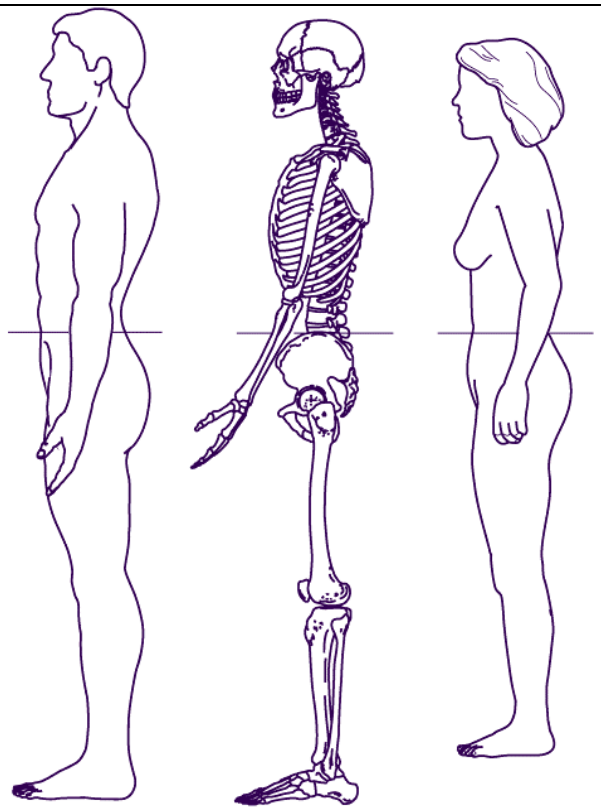
		Line 2
20. What is the current effect of diabetes on your daily activities? No effect (1) Little effect (2) Large effect (3)	1 2 3	10
21. Thinking about your diet, on how many of the last SEVEN DAYS did you space carbohydrates evenly?	0 1 2 3 4 5 6 7	11
22. On how many of the last SEVEN DAYS did you test your blood sugar?	0 1 2 3 4 5 6 7	12
23. How many times per day has your doctor told you to test your blood sugar?	0 1 2 3 4 5 6 7	13
24. On how many of the last SEVEN DAYS did you test your blood sugar as recommended by your doctor?	0 1 2 3 4 5 6 7	14
25. Are you taking medications for your diabetes? If yes, which ones do you take?	No (0) Yes (1)	15
26. An insulin shot 1 or 2 times a day	No (0) Yes (1)	16
27. An insulin shot 3 or more times a day	No (0) Yes (1)	17
28. Diabetes pills to control my blood sugar	No (0) Yes (1)	18
29. Other medication for diabetes? If yes, write name of medication here:	No (0) Yes (1)	19
30. On how many of the last SEVEN DAYS, did you take your diabetes medication as prescribed by your doctor?	0 1 2 3 4 5 6 7	20
31. On how many of the last SEVEN DAYS did you check your feet?	0 1 2 3 4 5 6 7	21
32. On how many of the last SEVEN DAYS did you inspect the inside of your shoes?	0 1 2 3 4 5 6 7	22
33. Have you heard of (hemoglobin) A1c?	No (0) Yes (1)	23
34. If yes, what should your level be? _____%		24-26 9=DK
35. INTERVIEWER: Encourage and/or arrange to have the participant's A1c measured by their local physician, health department, clinical laboratory, or hospital or at the Senior Center. Record the value here. A1c: _____%		27-29 9=missing
36. Date A1c performed (M/D/Y): _____/_____/_____		30-35
37. Where was value obtained from? Local physician (1) Health department (2) Clinical laboratory (3) Hospital (4) Senior Center (5)		36
38. <u>Post-test only</u>: Was the A1c value obtained from the same laboratory or facility at both the pre- and post-test?	No (0) Yes (1)	37

After attending the fruit, vegetable, and physical activity programs, have you done any of the following? (*Circle all the apply.)*		Line 3
1. Increased your physical activity?	No (0) Yes (1)	10
2. Tried to follow a healthier diet?	No (0) Yes (1)	11
3. Increased your intake of fruit?	No (0) Yes (1)	12
4. Increased your intake of vegetables?	No (0) Yes (1)	13
5. Ate more fruits and vegetables for snacks?	No (0) Yes (1)	14
6. Ate more fruits and vegetables with breakfast?	No (0) Yes (1)	15
7. Ate more fruits and vegetables with lunch?	No (0) Yes (1)	16
8. Ate more fruits and vegetables with your evening meal?	No (0) Yes (1)	17
9. Made a recipe from one of the lessons?	No (0) Yes (1)	18
10. What was your overall level of satisfaction with this fruit and vegetable nutrition education program? Circle one: Poor (0) Fair (1) Good (2) Very good (3) Excellent (4)	0 1 2 3 4 5	19
11. 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 5	20
12. How many sessions of the fruit and vegetable nutrition education program did the participant attend? *Staff should document with attendance records.*		21

Has this diabetes education program helped you improve your ability to do any of the following?		Line 4
1. Follow your diet plan	No (0) Yes (1)	10
2. Maintain portion control	No (0) Yes (1)	11
3. Space carbohydrates over the day	No (0) Yes (1)	12
4. Increase your fruit and vegetable intake	No (0) Yes (1)	13
5. Take better care of your feet	No (0) Yes (1)	14
6. Maintain your blood sugar levels	No (0) Yes (1)	15
7. Increase your physical activity	No (0) Yes (1)	16
8. Take medications as recommended by your doctor	No (0) Yes (1)	17
9. Decrease your A1c level	No (0) Yes (1)	18
10. Any other improvements with managing your diabetes? Please list:	No (0) Yes (1)	19
11. Total number of improvements (summary of above)		20-21
12. What was your overall level of satisfaction with this diabetes management program? Circle one: Poor (0) Fair (1) Good (2) Very good (3) Excellent (4)		22
13. How many sessions of the diabetes education program did the participant attend? Staff should document with attendance records.		23

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

59. Waist Circumference = _____ INCHES		Line 5 10-13
60. How was measurement made? (1) Under clothes OR (2) Over clothes	1 2	14
61. 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*		15-18 19-22
62. What is your current height without shoes? _____ feet and ____ inches		23-25
63. What is your current weight without clothes? _____ pounds		26-28
64. How was weight measurement made? PREFERRED: With a scale and without shoes (1) With a scale and with shoes (2) Self-report (3)		29

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

	Physical Performance Test-Task Descriptions **Equipment: Stopwatch, 8-Ft Tape Measure, Ruler, Folding Chair**	**RECORD TIME IN SECONDS**	**LINE 6 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)** **c)** ___ ___ . ___ **c)** ___ ___ . ___	10-13 14-17 18-21
ASBD	**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:** _____	22
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 _____	23-26 27
AFWD	**DOMAIN SCORE:** 1= ≥5.7 2= 4.1-5.6 3= 3.2-4.0 4= ≤3.1	**SCORE:** _____	28
ACS	**CHAIR STANDS:** **Participant is asked to stand one time from a seated 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.**	**Time to the nearest 10th second:** **1)** ___ ___ . ___	29-32
ACSD	**DOMAIN SCORE:** 1= ≥16.7 2= 13.7-16.6 3= 11.2-13.6 4= ≤11.1	**SCORE:** _____	33
TDS	**TOTAL SCORE: Add all 3 domain scores (1-12)**	**TOTAL SCORE:**__ __	34-35
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