Fostering Healthy Lifestyles in the African American Population

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Abstract
Approximately 8.3% of the U.S. population (25.8 million people) is affected by type 2 diabetes. The burden of diabetes is disproportionately greater in the African American community. Compared with non-Hispanic Caucasian adults, the risk of diagnosed type 2 diabetes was 77% higher among non-Hispanic Blacks, who are 27% more likely to die of diabetes complications than either Caucasians or Hispanics. The purpose of this longitudinal community intervention was to promote healthy lifestyles among African American participants through multiple channels, including individualized point-of-testing counseling, and weekly exercise and nutrition classes led by trained community health mentors. Data collection procedures were guided by the World Health Organization’s STEPS approach, which includes gathering demographic and health information, collecting anthropometric measurements, and analyzing biochemical blood work. Changes in body mass index were assessed from in-person measurements and changes in blood lipids and glucose were examined by biochemical analyses. A total of 157 individuals participated in this study. Results showed that weight gain during the intervention was prevented, glucose levels decreased (−10.88 mg/dL), and low-density lipoprotein cholesterol decreased (−8.8 mg/dL), while high-density lipoprotein increased (+3.2 mg/dL). Lifestyle interventions and point-of-testing counseling can be successful in reducing risk factors for type 2 diabetes among the African American population. The results of this intervention indicate that the use of community health mentors and point-of-testing counseling may be effective in fostering healthy lifestyle changes, which can halt the progression of type 2 diabetes among non-Hispanic Black populations.

Keywords
African American, lifestyle intervention, point-of-testing counseling, type 2 diabetes

Chronic diseases such as heart disease, cancer, and diabetes remain major contributors of death and disability in the United States (Hoyert & Xu, 2012). Diabetes is ranked among the top 10 causes of death in the United States, with an increase of 3.4% in the age-adjusted death rate between 2010 and 2011 (Hoyert & Xu, 2012). It is estimated that 27.8 million people in the United States have diabetes, with approximately 20.8 million people formally diagnosed and an estimated 7.0 million people who remain undiagnosed (Centers for Disease Control and Prevention [CDC], 2011, 2013).

The burden of obesity and diabetes is disproportionately greater in the African American community (Flegal, Carroll, Kit, & Ogden, 2012; Stommel & Schoenborn, 2010). When compared with non-Hispanic Caucasian adults, non-Hispanic African American adults are 77% more likely to be diagnosed with diabetes (CDC, 2011), and it is estimated that 4.9 million non-Hispanic African American adults in the United States have been diagnosed with diabetes. This represents 18.7% of all non-Hispanic African Americans aged 20 years or older (CDC, 2011). Non-Hispanic African Americans with diabetes also suffer from higher rates of complications resulting from diabetes, including vision impairments, kidney disease, and increased mortality (Barr et al., 2010; CDC, 2012).

Evidence has clearly shown diet and lifestyle to be modifiable in both the prevention and treatment of type 2 diabetes. Salas-Salvado et al. (2011) found that following the Mediterranean diet without calorie restriction or physical activity was effective in preventing incidence of type 2 diabetes in participants who were at a high cardiovascular risk. Church et al. (2010) found an intervention program that combined aerobic and resistance exercise training to significantly reduce hemoglobin A1c in patients with type 2 diabetes when compared with those engaging in aerobic exercise or resistance training alone. The Diabetes Prevention Program has also demonstrated that lifestyle modifications,
such as following dietary recommendations, reducing weight, and increasing physical activity, can prevent type 2 diabetes in high-risk individuals (Knowler et al., 2002).

However, low literacy might be a barrier in modifying behavior if not addressed. Health literacy was defined by Ratzan and Parker (2000) as the “degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.” Low health literacy has been associated with increased hospitalizations, poorer health, and increased mortality (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Additionally, health literacy has been shown to influence patients’ abilities to understand diabetes and their self-efficacy for management of the disease (Inoue, Takahashi, & Kai, 2013). Low-income and rural residents are more likely to have low health literacy, to underutilize preventive health care, to lack affordable health service, to have limited access to health services, to have financial limitations, and consequently, they receive poor quality of care, and suffer from poor communication between provider and patient (Flear, Ettienne-Gittens, & Heffer, 2013; Goins, Williams, Carter, Spencer, & Solovieva, 2005; Pich-Holder, Callahan, & Young, 2012). As a result of this, residents of rural areas are more likely to suffer from higher rates of chronic diseases, such as obesity and diabetes, than their urban counterparts (Bennett, Olatosi, & Probst, 2008), and thus they may need tailored programs specific to their demographics to reduce or prevent these diseases.

To overcome the effect that these health inequalities pose on the risk for type 2 diabetes among African Americans, training community health workers to advocate health promotion may help bridge the gap and create an effective tool for preventive behaviors (Boutin-Foster, George, Samuel, Fraser-White, & Brown, 2008). Community health workers have been found to be effective in minority populations, such as African Americans and Latinos, in achieving significantly improved glycemic control and helping participants to understand the dynamics of diabetes as a disease (Spencer et al., 2011). A recent study by Cenè et al. (2013) found that community health workers perceive themselves to be trusted by research participants because they are native to their communities and can explain health information in a culturally relevant manner, thus providing an important approach for reaching the African American population.

While other studies have focused on a single lifestyle aspect such as diet or exercise (Church et al., 2010; Salas-Salvado et al., 2011) and only a few studies have targeted tailored prevention programs in the rural population, the present study incorporated nutrition education, physical activity, and overall health literacy for disease management using community health mentors (CHMs). The purpose of this diabetes intervention program was to promote healthy lifestyles among the African American population in the rural South in an effort to halt the progression of risk factors for the development of diabetes among African American participants. Point-of-testing counseling, a method of providing participants with immediate feedback regarding individual blood work results, was used in this study. Point-of-testing counseling has the potential to improve compliance and related health outcome as the tests provide hard evidence that a patient may need to change their behavior, especially in the absence of physical symptoms. The immediate feedback enables the health professional to make the appropriate recommendation early in the intervention process and may lead to patients taking more responsibility for the management of their disease (Thaler et al., 1999). This program also used CHMs as a strategy to increase participants’ adherence to healthy lifestyles in the prevention of diabetes and related complications. Targeted outcome variables were weight, body mass index (BMI), glucose, and cholesterol levels.

Method

Participants

The study was approved by the institutional review board of Louisiana Tech University, and all participants were provided with a written informed consent. This longitudinal intervention targeted the African American population residing in northern Louisiana between 2009 and 2012. The target population included all residents of a community chosen based on being persistently poor and having low levels of health literacy and no access to immediate health care. Multibaseline enrollment was conducted and inclusion criteria were being older than 18 years and living in the target community. The intervention components included screening for health outcome measures (BMI, fasting blood glucose, total and low-density lipoprotein [LDL] cholesterol, and caloric intake), followed by point-of-testing counseling on the same visit.

Subjects were recruited before each testing period (every 6 months) using local media, churches, word of mouth, and brochures placed in public places, such as civic offices. Area radio stations and newspapers made announcements and provided dates, locations, and times of screenings, and requested that participants arrive for screenings after fasting. In addition, local churches, schools, and civic organizations also promoted the study, and pamphlets describing the study were bulk-mailed to all residents in the targeted community.

CHMs were recruited based on recommendations from the pastors of community churches. These CHMs were members of a church congregation and were trained by the principal investigator before each assessment point. They were given general handouts related to health and diabetes, and they provided weekly reports to the principal investigator that discussed attendance at weekly group exercise sessions and other issues.

Data Collection and Measures

The study protocol was based on the World Health Organization’s STEPS approach that uses three steps for
risk-factor assessment (World Health Organization, n.d.). Step 1 gathers information on risk factors that can be obtained using questionnaires, Step 2 involves taking anthropometric measurements, and Step 3 includes taking blood samples for biochemical assessment. The questionnaire included demographic data such as age, race, gender, marital status, education level, income, and general medical history information. Food frequency and caloric intake were assessed by a 24-hour recall interview that was conducted by trained senior dietetics students. The recall was conducted in a five-step multiple pass approach that included: a quick list of foods and beverages consumed the previous day, probing for forgotten foods eaten the previous day, collecting the eating occasion for each food, a detailed description for each food eaten, and a final probe for anything else consumed. Caloric intake and the percentage of calories from fat were analyzed using Nutritionist plus. This analysis yields individual nutrient intakes and measures of energy, total fat, and percentage of energy from total fat. In addition, the International Physical Activity Questionnaire was administered to collect physical activity data, and contraindications for exercise were assessed using the Physical Activity Readiness Questionnaire.

Anthropometric measures obtained during the study included height and weight. A standard stadiometer (Medical Resources, Columbus, OH) was used to assess height. A calibrated Tanita digital scale (TBF-300A, Tanita, Arlington Heights, IL) was used to assess weight and, after entering height, also assessed BMI. Waist circumference was measured at the umbilicus and recorded to the nearest 0.1 cm, using a Gulick 11 tape measure with a constant 4 oz. tension device. Participants were requested to remove any outer clothing that would restrict easy access or interfere with placement of the measuring tape. A registered nurse took all measurements. Blood samples were collected from each participant using a standardized handout that summarized recommendations for change were based on guidelines of the U.S. Department of Agriculture MyPlate, American Heart Association, and American Diabetes Association. The counseling sessions addressed diet, physical activity, and other lifestyle factors. During each session, subjects received nutrition counseling based on their clinical findings, such as abnormal lipid values, high BMI, or high blood glucose. For example, a subject with high LDL cholesterol was encouraged to decrease fat intake, incorporate fish intake, and increase whole grain, fruit, and vegetable intake. The individual messages were modified based on observed changes on the risk factors over time and the participants’ motivational levels. All subjects were encouraged to engage in at least 30 minutes of physical activity most days of the week, if they were physically and medically able. The individualized point-of-testing counseling sessions lasted approximately 20 to 40 minutes and were interactive with the participants setting their own goals for a plan of action. All participants were given a standardized handout that summarized the recommendations for increased fruit and vegetable intake, physical activity, increasing whole grain consumption, and reducing consumption of fat, added sugar, salt, and processed foods.

**Results**

**Baseline Characteristics**

A total of 157 participants were screened and provided with one-on-one, point-of-testing counseling based on their screening results. The majority (86.2%) were African American and female (75%), with an average age of 51 (±14.9) years. Baseline weight assessment showed that the majority (86.0%) were overweight or obese. Almost half (47.1%) of the participants had fasting blood glucose levels ≥100 mg/dL. Approximately one third (33.5%) of the participants had total cholesterol >200 mg/dL, and 28% had elevated LDL cholesterol ≥130 mg/dL, while 65.6% had high-density lipoprotein (HDL) cholesterol levels ≥40 mg/dL. Other baseline characteristics can be found in Table 1.
A total of 67 people attended at least two sessions, 49 people attended at least three sessions, 34 people attended at least four sessions, 24 people attended at least five sessions, while only 11 participants attended all six sessions. Although physical activity was implemented and an integral part of the intervention, and participants exercised for an hour weekly as a group, these data were not analyzed. The purpose of this article was to describe the overall effects of a lifestyle intervention and not just one component.

**Weight, Waist Circumference, BMI**

The results of this study showed that the intervention halted weight gain for participants that attended screening more than two times (Figure 1), while the overall trend revealed group weight maintenance over the study period. Mean waist circumference decreased 2.0 inches from baseline, while mean BMI decreased from 33.3 kg/m² at baseline to 31.2 kg/m² (−2.0 kg/m²), and weight decreased from 203.5 lbs at baseline to 189.0 lbs (−14.5 lbs.), for those who attended six sessions. Participants lost an average of 0.34% of their baseline body weight, an indication of weight maintenance over three 3-year period.

**Caloric Intake**

Reported total caloric intake was maintained at around 1,500 calories for the duration of the study (Figure 2). Mean total caloric intake increased from 1,564.94 kcal at baseline to 1,854.30 kcal for those attending three sessions, followed by a consistent decrease to 1,552.11 kcal for those attending six sessions for an overall difference of 12.83 kcal between baseline and the final screening visit. However it was noted that calories from fat continued to increase despite the control for the total calories, from 33.48% at baseline to 37.30% for those attending six sessions.

**Glucose and Cholesterol**

Glucose levels dropped consistently throughout the intervention period with a mean baseline fasting glucose of 106.52 mg/dL to a mean fasting level of 95.64 mg/dL for those who attended six sessions (Figure 2). Total cholesterol had a slight increase over the study period from 188.4 mg/dL at baseline to 190.3 mg/dL for those who attended six sessions; however, the values stayed below the recommended levels of 200 mg/dL and the overall trend of the cholesterol profile was positive. LDL levels showed a decrease of 8.8 mg/dL from 115.8 mg/dL at baseline to 107.0 mg/dL for those attending six sessions; whereas, HDL levels showed a slight increase...
of 3.2 mg/dL from 48.6 mg/dL at baseline to 51.8 mg/dL for those attending six sessions (Figure 3).

### Discussion

This study used a multifactor approach to reduce risk factors for type 2 diabetes in rural African Americans in the South. Findings indicate that the use of CHMs and point-of-testing counseling may be effective in fostering healthy lifestyle changes to prevent the onset of type 2 diabetes by halting the progression of risk factors.

Results of this study showed that weight loss occurred over the duration of the intervention. Although this weight loss was not statistically significant, the mean decrease of 14.5 lbs may have clinical significance and is comparable to the findings from Katula et al. (2011), who found that a lifestyle intervention for overweight individuals with indications of prediabetes resulted in a weight loss of 15.6 lbs. The American Diabetes Association (2008) recommends weight loss for individuals who have or are at risk for diabetes and moderate weight loss of only 5% of a person’s body weight may decrease insulin resistance, improve glycemia, and lower blood pressure (Klein et al., 2004). Additionally, data has shown that adults gain an average of 0.84 pounds per year (3.35 pounds over 4 years; Mozaffarian, Hao, Rimm, Willett, & Hu, 2011), and the findings of this study showed that this weight gain was prevented.

Based on the food frequency results, caloric intake increased, and then decreased during the study period (Figure 2). Reported calories were low (1,500 kcal) despite high levels of overweight measured in the participants. This can potentially be explained by evidence showing that overweight and rural adults are more likely to underreport their caloric intake (Bailey, Mitchell, Miller, & Smiciklas-Wright, 2007; Ferrari et al., 2002). Reported fat intake increased, which may have implications for the preferred cultural use of fried foods in this population.

Glucose levels dropped by 9 mg/dL during the study, demonstrating that modest caloric intake and related weight halting could prevent the onset of risk factors for type 2 diabetes or halt its progression. The improvements in blood
glucose by the lifestyle intervention implemented in this study is supported by the findings of Li et al. (2008) who determined adults with impaired glucose tolerance that participated in a diet and exercise lifestyle intervention had a 51% lower incidence of diabetes during the 6-year intervention period, as well as a 43% lower incidence over a 20-year follow-up period.

While cholesterol levels were consistent throughout the study period, there were positive findings, including a decrease in LDL (−8 mg/dL) and slight increase in HDL (+3 mg/dL), although changes in blood cholesterol in this present study were smaller than what others have found. Rahilly-Tierney, Lawler, Scranton, and Michael Gaziano (2009) found that each 10 mg/dL decrease in LDL was associated with a 10% reduction in cardiovascular risk. Also Grover, Kaouache, Joseph, Barter, and Davignon (2009) found that each 5 mg/dL increase in HDL was associated with a hazard ratio of 0.79 (0.67-0.93). The smaller findings here could potentially be explained by the increase in calories from fat observed in the participants.

Similar to the Diabetes Prevention Project, this study showed that combining multiple health behaviors can reduce type 2 diabetes risk factors. Both interventions emphasized a healthy diet following U.S. Department of Agriculture and other federal recommendations and both studies included regular exercise classes. However, this study emphasized cultural sensitivity by using CHMs to lead health and exercise classes. Lifestyle modifications, including following a healthy diet and increasing physical activity, may be less costly than medications for participants, which could provide better adherence to behavior changes (Knowler et al., 2002).

CHMs have been used in a variety of settings because they can be trained to provide culturally relevant guidance and make a connection to the local health care system. The CHMs were used in the current study to encourage participants in adhering to nutritional and physical activity recommendations. The results of this study support research that has found community health workers to improve outcomes of chronic diseases, such as type 2 diabetes. Babamoto et al. (2009) found that Hispanic patients with newly diagnosed type 2 diabetes who were assigned to a CHM achieved greater improvements on measures such as health status, dietary habits, and physical activity when compared with those who used another service such as a standard care clinic.

Point of testing has been shown to be effective in reducing obesity and chronic disease risk factors in older adults (Walker et al., 2012). Results of the present study showed an overall improvement in similar risk factors that Walker et al. (2012) found, namely, weight, BMI, waist circumference, glucose, LDL cholesterol, and HDL cholesterol. The weight/BMI/waist circumference findings here were all positive.

However, attrition was high in this study despite the use of multiple recruitment channels throughout the intervention period, which limits the external validity of the findings. This indicates that the African American population is difficult to retain for research studies, and more work should be done to examine the best ways to reduce attrition in this population. A community-based, randomized controlled intervention among Korean Americans in New York City at risk for diabetes resulted in similar attrition rates to this study, with only 27% of initially eligible participants completing data collection at 6 months (Islam et al., 2013). Potential methods to reduce attrition could be to provide culturally relevant incentives at each measurement and counseling session.

Finally, there are several cultural, structural, and demographic limitations in rural areas that may hamper having a healthy diet and engaging in regular exercise, such as a lack of health and nutrition education, and less access to health care and exercise facilities (Tai-Seale & Chandler, 2003). This intervention addressed some of those barriers to a healthy lifestyle by providing free health assessments in an accessible community location and training mentors to facilitate the exercise sessions and teach culturally appropriate nutrition education; other studies should examine if this intervention is effective in other rural areas.

**Limitations**

Generalizability of results is limited to the particular sample and study design. The sample consisted of predominantly older African American, female adults. In addition, the attrition rate was fairly high for this sample; of the 157 participants who attended at least one session, only 11 (7.0%) attended all six sessions. Thus, analysis of the dosage effect of attending all six sessions was limited for the current study. Cenè et al. (2013) also reported difficulty in retaining participants during a 6-month diabetes intervention in rural African Americans. There was no control group; therefore, it is possible that outside factors may have influenced results. The small change in calorie intake (−13 kcal) does not lend itself to a weight loss of 14.5 lbs, and thus there was likely measurement error (self-report bias) or the data are influenced by highly motivated participants who attended all six screening and counseling sessions. Finally, because of the multiple components of the intervention program, it is not possible to determine which strategies were most effective at producing the positive health outcomes.

**Implications for Practice**

When reaching residents in rural settings, public health initiatives need to be sensitive to the culture of rural residents and the possibility of low health literacy. This study found that using a combination of strategies, including health screening followed by point-of-testing counseling with individualized messages, enabled community members to participate regardless of their literacy level or other rural barriers. Additionally, the use of CHMs builds trust and comfort among the participants (Cenè et al., 2013). Evidence from this study shows that
the combination of these strategies can yield maintenance of caloric intake over time, as well as positive trends in weight/ BMI, glucose and lipid levels in at-risk individuals, while remaining culturally relevant.

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