

Implementing a Diabetes Prevention Program in a Rural African-American Church

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Objectives: The purpose of this study was to determine the feasibility of implementing a diabetes prevention program (DPP) in a rural African-American church.

Methods: A six-session DPP, modeled after the successful National Institutes of Health (NIH) DPP, was implemented in a rural African-American church. Adult members of the church identified as high risk for diabetes, based on results of a risk questionnaire, were screened with a fasting glucose. Persons with prediabetes, a fasting glucose of 100–125 mg/dL, participated in the six-session, Lifestyle Balance Church DPP. The primary outcomes were attendance rates and changes in fasting glucose, weight and body mass index measured at baseline, six- and 12-month follow-up.

Results: Ninety-nine adult church members were screened for diabetes risk. Eleven had impaired fasting glucose. Ten of 11 participated in the six-session intervention, for an attendance rate of 78%. After the intervention and 12-month follow-up, there was a mean weight loss of 7.9 lbs and 10.6 lbs, respectively.

Conclusions: This pilot project suggests that a modified six-session DPP can be translated to a group format and successfully implemented in a church setting. Further randomized studies are needed to determine the effectiveness of such an intervention.

Key words: diabetes ■ prevention ■ translational research ■ religion

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INTRODUCTION

Type-2 diabetes is a leading cause of early death and disease in the United States. More than 7% of the U.S. adult population has diabetes, with disproportionately higher rates in the elderly and the African-American community.¹ Persons with type-2 diabetes have

a 2–4-fold increased risk for cardiovascular, peripheral vascular disease and stroke. An additional 16 million Americans have prediabetes, including impaired fasting glucose or impaired glucose tolerance.^{2,4}

It has been established that diabetes can be delayed or prevented through lifestyle modification, including dietary change, weight loss and increasing exercise.^{5,6} The Diabetes Prevention Program (DPP) sponsored by the National Institute of Health (NIH) was a highly successful, multicenter controlled, clinical trial that assessed methods to prevent or delay the development of diabetes. This three-arm study compared outcomes using lifestyle intervention, metformin use and placebo. The most successful group, the lifestyle intervention group, had a 58% reduction in the incidence of diabetes.⁷ The lifestyle intervention consisted of an individualized delivery of a 16-session Healthy Lifestyle Program over 24 weeks, followed by quarterly maintenance sessions for 30 months focusing on nutrition, physical activity and weight loss.

Published reports of applications of the DPP or the 16-session lifestyle intervention in clinical or community settings are lacking. Several models have evaluated the cost-effectiveness of a community-based DPP and recommended how some of the tools from the DPP lifestyle intervention could be translated in a practice setting.^{8,9} These models suggest that implementing the DPP in a community may be feasible. The Stockholm DPP describes a stage model for assessing a community-based DPP.¹⁰ The Stockholm DPP study implemented a dietary, physical activity, tobacco cessation and obesity intervention in the adult population of three municipalities of Sweden. Unfortunately, the results of the impact of this study are not presently available. A significant gap exists between what is currently known about diabetes prevention and screening and what is commonly practiced.^{11,12} As a result, nearly half of the people with newly diagnosed diabetes have hemoglobin A1c levels in the range associated with complications, indicating they have had diabetes for a significant time prior to the diagnosis.^{13,14} Therefore, more research demonstrating the application of the DPP in real-world settings is needed.¹⁵

African-American churches have historically been a leader in health screening and disease treatment in the African-American community.¹⁶ Previous successful programs in African-American churches include screening for hypertension, breast and cervical cancer, as well as treatment programs such as smoking cessation and cardiovascular risk reduction.¹⁷⁻²¹ Diabetes was identified as a leading health factor in a study about community concerns regarding chronic diseases in the African-American, faith-based community.²² Nonetheless, there are no reports of translation of the DPP in African-American churches. The purpose of this project was to study the feasibility of implementing a church-based DPP in a rural African-American church.

METHODS

A 13-step procedure was utilized for implementing the overall project (Table 1).

Setting

The Church. It was estimated that a church with a Sunday attendance of between 100–150 adults would yield 6–12 participants with prediabetes, thus increasing the likelihood of a good group interaction. An African-American church in a rural Georgia town with a population of 8,040 was identified based on a Sunday attendance of approximately 150 adults. The church's roster included 407 members with a 3:1 ratio of women to men.

Additional factors important in this church's selection included: high levels of interest in the project, existence of a health ministry in the church, and an existing relationship with the pastor. The pastor and a member of the research team met to discuss the concept of the project and to determine the interest of implementing a DPP in the church. A timeline for the implementation of this project is shown in Table 2. The pastor recommended including a member of the church on the research team. This team was then responsible for planning and implementing the program in the church. Focus groups with church members conducted prior to implementing this

project yielded findings that determined the number, length and timing of the church DPP sessions.

This study was approved by the Mercer University institutional review board. Participants were not compensated for their participation.

Six-Session Program Development

A six-session program was designed from the 16-session intensive lifestyle arm of the DPP. The full DPP has been previously described.⁷ Briefly, major goals of 7% weight loss and ≥ 150 minutes of physical activity per week were to be achieved through decreasing the fat and caloric intake in the diet and increasing physical activity. The research team selected six of the NIH-DPP's 16 sessions for this pilot study based on information from prior focus groups with church members. The 16-session DPP has three themes: nutrition, physical activity and behavior change. Each theme is the main focus of four sessions. We identified two sessions from each of these three categories to make up the six sessions. The material was modified to be used in a church-based group setting from its original design for individual use with a lifestyle coach. A nurse educator and physician performed the modification, adapting the information to a group setting.

Diabetes Risk Assessment Screening

The seven-question Diabetes Risk Assessment instrument, developed by the Centers for Disease Control and Prevention, was utilized to identify people at risk for developing diabetes.²³ One week prior to starting the program, an announcement detailing the dates of the risk assessment screening and fasting glucose testing was placed in the church bulletin and the pastor announced that the church DPP would be starting. During service on the following Sunday, a research team member explained the project and invited all adults ≥ 18 years old to complete a diabetes risk assessment. The risk assessment was performed during two separate Sunday services to maximize participation. Each service had in attendance an estimated 150 adults and children. There were no duplica-

Table 1. Procedures for implementing a diabetes prevention program in a church

1. Identify the target church.
2. Establish a relationship with church leader.
3. Recruit member of the church for the implementation team.
4. Use focus groups with church members to guide implementation process.
5. Publicize risk assessment in church bulletin.
6. Encourage pastoral support of the project from the pulpit.
7. Perform risk assessment during church services.
8. Contact identified high-risk participants for a fasting blood glucose test.
9. Contact participants with prediabetes to participate in the lifestyle intervention.
10. Measure weight, height, fasting glucose and attendance initially and at the final session.
11. Weight, attendance and review of the dietary activity log should occur at every session.
12. Arrange for health professionals familiar with topics to present information at group session.
13. Support participants with calls, letters and reminders of sessions.

tions in the risk assessments. Participants were told a score of ≥ 10 indicated an increased risk for diabetes and a need to follow up with a fasting finger-sick glucose (FSG).²⁴ The research team collected the risk assessments, scored the results, then contacted all high-risk people and invited them to return to the church for a FSG. Representatives from the research team were available after each church service to answer any questions.

Fasting Glucose Testing

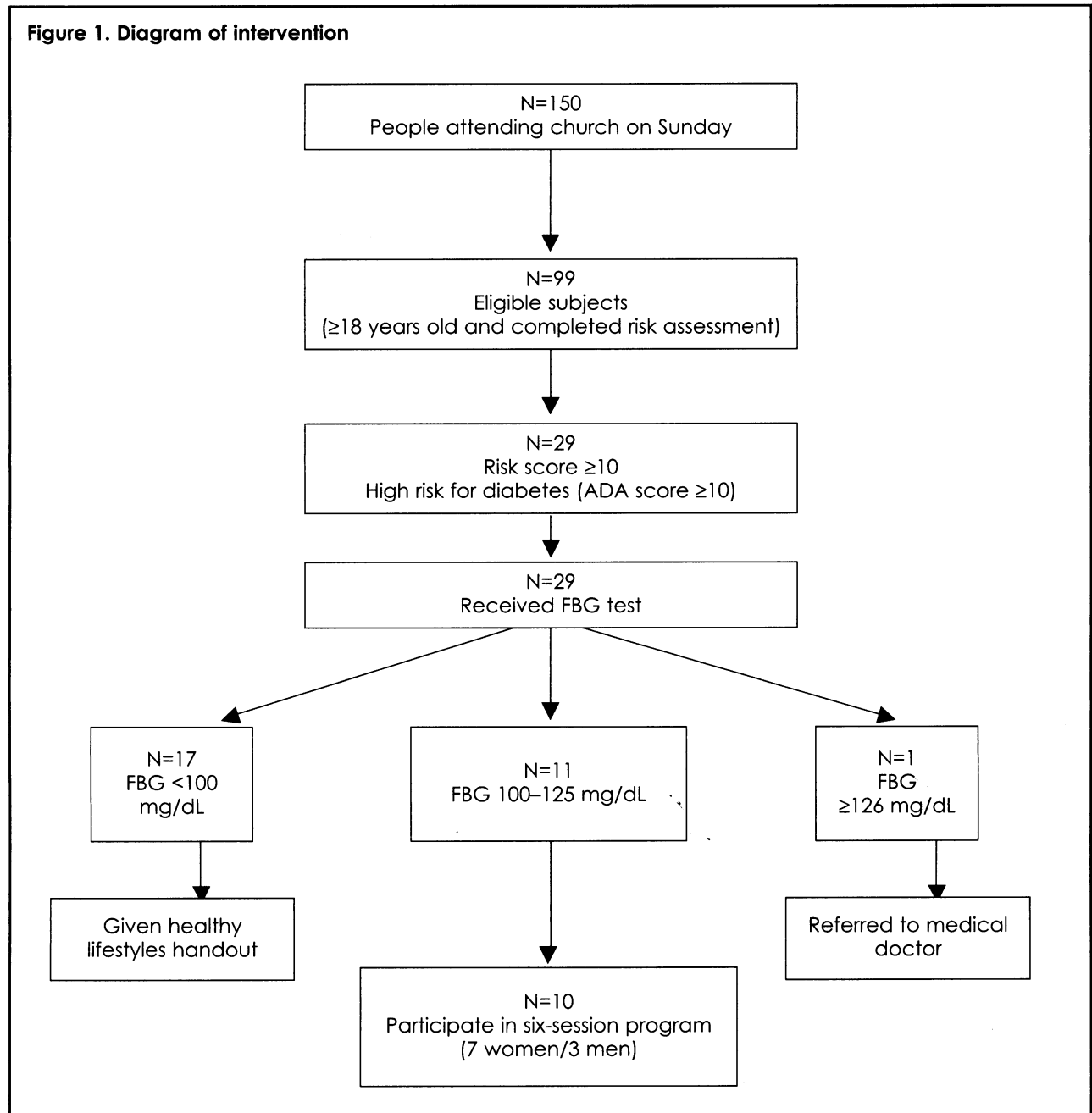
On four days following the Sunday's risk assessment, a FSG was performed at the church. The dates, time, and location of the FSG were listed in the church bulletin. Three FSG testings were in the morning from

8:00–9:00 a.m., and one testing was in the evening prior to bible study, from 5:00–6:00 p.m. Participants with a FSG of < 100 were advised of their risk score results and given information on healthy lifestyle habits. Participants with a FSG in the prediabetes range (FSG 100–125 mg/dL) were invited to participate in the six-session church DPP. Participants with a FSG ≥ 126 mg/dl were advised to follow up with their primary care physician for further evaluation for type-2 diabetes.

Lifestyle Balance Intervention and Implementation

Based on prior focus group findings, it was determined that the best times for the first and last sessions

Figure 1. Diagram of intervention



as well as the six- and 12-month follow-up were Saturday mornings. Measurements included fasting glucose (mg/dL), blood pressure (mmHg), height (inches) and weight (pounds). Blood pressure was measured by a licensed nurse or physician using a standard Trimline-certified blood pressure cuff and a standard Welch Allen stethoscope. During the other four sessions held just prior to bible study, only weight was recorded. The six sessions were presented over a seven-week period following a schedule determined by the participants.

Each session was led by volunteer healthcare professionals. The session leaders attended a 60-minute training session led by the research team on how to present the lifestyle balance curriculum to the church community. A paid research assistant brought snacks and handouts and recorded the participants' weight.

Handouts for each session were distributed at the beginning of the session. Advance letters were mailed to remind the participants of each upcoming session and to encourage them to meet the goals of the previous session. Each session started with a prayer by one of the church participants. The diet and physical activity logs were reviewed by the group and the leader. Using the handouts, the leader guided the discussion, emphasizing participation by all participants. After the presentation and discussion, individuals set goals for diet, exercise and behavior change for the subsequent week. A prayer concluded the session.

Following the six-session intervention, there was no additional support provided by the research team except for the six- and 12-month follow-up sessions. During these follow-up sessions, participants' weight, height, blood pressure and fasting glucose were measured. A session leader and research assistant evaluated how much information participants retained from the six sessions. Possible roles for the church to fulfill in diabetes prevention and next steps for the participants in maintaining the lifestyle intervention were discussed by the group. Again, the participants established individual and group goals to maintain changes made and to provide motivational support to each other, and concluded with prayer.

Cost and Time for Implementation

A record of costs was maintained throughout the study.

Data Analysis

All data were entered into SPSS® version 15.0. A pre-to-post comparison was made for each subject using an intention-to-treat analysis. Differences between preintervention and postintervention data for the continuous variables, including weight, body mass index (BMI), blood pressure and fasting glucose, were assessed using independent t tests.

RESULTS

Diabetes Risk Assessment Screening

The diabetes risk assessment was completed by 99 church attendees (66%) aged ≥ 18 years. Seventy-four subjects completed a risk assessment on the first Sunday of the risk screening, and an additional 25 subjects completed a risk assessment on the second Sunday. Twenty-nine (28.3%) participants were identified as high risk for diabetes with a risk assessment score of ≥ 10 .

Fasting Glucose Testing

All 29 high-risk participants (100%) returned for a FSG, with 3–4 attending each of the eight FSG screenings. Of the 29 participants identified as high risk for diabetes, 11 (37.9%) were found to have prediabetes. One participant had a FSG ≥ 126 mg/dl and was referred to a primary care physician. The remaining 17 (58.6%) had FSG < 100 mg/dL (Figure 1).

Lifestyle Balance Implementation

Of the 11 participants identified with prediabetes, 10 agreed to participate in the program; one was a visitor from out of town; this person was excluded from the analysis. The attendance rate for the six-session program was 47/60 (78%). Data were collected on nine (90%) of the participants at the six- and 12-month follow-up. One participant could not be located to obtain six-month data, and another participant moved out of state prior to the 12-month follow-up. The initial mean group FSG was 108 mg/dL. At the conclusion of the intervention (final session), six- and 12-month follow-ups, the mean FSG levels were 102-, 99- and 100 mg/dL, respectively (Table 3). For individual participants, weight loss ranged from 0.5–27.2 lbs after the six-week intervention. Overall mean weight loss for the combined group when compared to the initial weight was 8.8-, 6.5- and 10.6 lbs immediately after the inter-

Table 2. Timeline for implementation

Week	Task
0	Identify church
1	Meet with pastor
2	Research team meets (church member on team)
3	Select sessions
7	Focus group
9	Schedule sessions
11	Risk screening/fasting glucose
13	First session
19	Last session
6 months after last session	Follow-up
12 months after last session	Follow-up

vention, and the six- and 12-month follow-up, respectively. The average decrease in BMI from the initial session to the 12-month follow-up was 1.9 kg/m².

Cost and Time for Implementation

The cost for materials for this project was \$1,075.09. This included all paper for handouts, food, scales, supplies, items distributed to participants, postage, etc. This value does not include the salary for the research assistant. The session leaders for this project volunteered their time and the space was donated by the church.

Identified Barriers and Resources to Implementation

Performing all activities at the church was deemed to be a critical factor in participation and attendance rates. Including a church member on the research team was helpful in building support for the program with other church members. The concepts of disease prevention and risk assessment were unfamiliar to some members in the congregation and were addressed in focus groups held prior to the initiation of this project. Finding dates for the program on the church calendar presented obstacles because of competing demands and limited space in the church. Involving the church leadership in planning and implementation as an equal partner assisted in securing time and space at the church for the program. Research staff mailed weekly session reminders to the participants, which may have helped with attendance. Following the study, all of the material for the sessions, including the leader's guide, was donated to the church's health ministry for future use.

Unexpected Outcomes

There were a number of unplanned developments as a result of the church DPP. The pastor was pleased because attendance at bible study increased following the church DPP sessions. There were also three proactive changes that occurred following this intervention. First, the church initiated a "well report" during Sunday service to identify members of the congregation who were healthy and promoting healthy lifestyle changes and to pray for their continued success. This report complemented the longstanding sick report that existed in this church to identify and pray for the members of the

church that are ill. Second, a weekly Saturday morning exercise group was developed at the church. This involved walking and gospel aerobics. Finally, the church cooking ministry incorporated healthier food choices on their menu. Currently, weekly gatherings include healthy food choices which are well received by the congregation.

DISCUSSION

This pilot church DPP demonstrated that implementation of a group-based DPP is feasible and well accepted by a rural African-American church. Additionally, this study showed that an abbreviated adaptation of the NIH-sponsored DPP can be translated into a rural church setting. This study was different from the NIH-DPP in that it used only six of the original 16 sessions, and the sessions were group based instead of individualized. The DPP lifestyle intervention spanned 2.8 years, completing the 16-session individual curriculum over a six-month period. In contrast, this pilot church DPP spanned 12 months, completing the six-session group curriculum in seven weeks. Additionally, the 16 NIH-DPP sessions were followed with individual support for 24 months, and participants in the NIH-DPP had to be overweight and have a fasting glucose of 95–125 mg/dL. In the church DPP no additional support was provided, and participants' fasting glucose levels ranged from 100–125 mg/dL.

Conducting this study in the African-American church population addresses two important preventive medicine strategies: 1) population screening and 2) intervention with high-risk individuals.²⁵ The church DPP involved screening the entire adult church membership for diabetes risk and intervening in those identified as high risk—in this case, those with prediabetes. The institution of the "Black Church" has been utilized by many organizations to implement health promotion and disease prevention programs.¹⁶ The population studied in this setting targeted individuals who are members of high-risk groups for diabetes, including African Americans, women and older adults. The prevalence of prediabetes (11%) and undiagnosed diabetes (1%) in this church was similar to the reported U.S. African-American population prevalence for these disorders (9.5% and 3% respectively).^{1,13} Participation rates were

Table 3. Mean change in variables over time

	Initial	End of Intervention	6-Month Follow-Up	12-Month Follow-Up
Weight (lbs)	231 ^a (±55.7)	222.2 ^b (±50.7)	224.5 ^b (±60)	220.4 ^b (±34.7)
BMI (kg/m ²)	35.7 ^a	34 ^b	34.9 ^b	33.8 ^b
Finger-stick glucose (mg/dL)	109 ^a (± 8.3)	102 ^b (±7.5)	99 ^c (±9.8)	100 ^c (±5.8)
Systole (mmHg)	141 ^a (±12)	138 ^b (±10)	130 ^c (±10)	128 ^d (±8)
Diastole (mmHg)	85 ^a (± 10)	80 ^b (± 12)	74 ^c (± 9)	66 ^d (± 9)

Values with different superscripts differ from each other at $p < 0.05$ in pairwise comparison.

high and the program was successful as demonstrated by weight loss and decrease in fasting glucose. Weight loss achieved in the program also appeared to be sustainable on average; the participants maintained a significant amount of weight loss up to 12 months after the program was completed. The challenges for translating a program known to be effective includes both identifying the population at risk and implementing an intervention in which the population is willing to participate.²⁶ The study results demonstrate the ability to identify an at-risk population and implement a program that results in a high level of participation, along with a tangible change in weight and fasting glucose.

This pilot study translating the DPP in a rural African-American church shows promise for replication on a wider scale. The project was economically feasible with time volunteered by the medical professionals and the space provided at no cost by the church. The church members decided on the timing and place of the sessions and the implementation was coordinated by the health professionals. The project was feasible from an organizational standpoint due to the commitment from the leadership and the church and the research team. The DPP that was instituted in the church occurred with mutual acceptance in scheduled group sessions, thus allowing time for absorption of the information and flexibility in implementation. Further studies are needed to evaluate the effectiveness and feasibility of translating the 16-session lifestyle intervention of the DPP within churches on a wider scale.

LIMITATIONS

This pilot study was implemented in one church with a small number of participants and may not be representative of other African-American churches. Nonetheless, screening results in this study found levels of prediabetes and undiagnosed diabetes similar to those found in the overall U.S. African-American population. There was no control group in this study; therefore, there may have been confounding factors that resulted in the positive outcomes of weight loss and lowered fasting glucose. Fingertstick glucose values were obtained in lieu of plasma blood glucose because of cost and feasibility of obtaining a plasma glucose in a church setting.

CONCLUSIONS

The results of this study show that the clinical research community and faith-based community can collaborate to identify people at risk for developing diabetes and successfully implement a group lifestyle intervention. At six- and 12-month follow-up, a translational program from the DPP had reductions in weight and fasting glucose levels that were maintained over 12 months. Further controlled studies are needed to test the effectiveness of a DPP in multiple churches.

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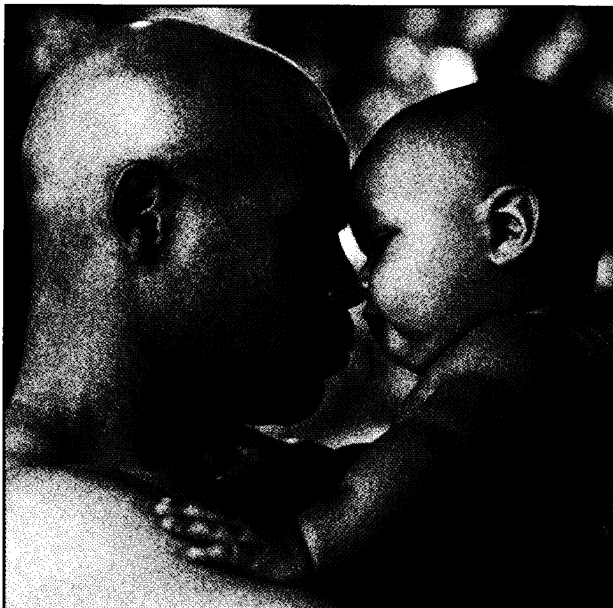
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