

(In Review)

**A Resilience Intervention in African American Adults with Type 2 Diabetes:
A Pilot Study of Efficacy**

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Abstract

Purpose

The purpose of this pilot study was to determine the feasibility of offering our Diabetes Coaching Program (DCP), adapted for African Americans, in a sample of African American adults with type 2 diabetes.

Methods

The study utilized a one-group, pretest-posttest design to test the acceptance and potential effectiveness of the DCP. Subjects were a convenience sample of 16 African Americans (8 females; 8 males) with type 2 diabetes; twelve subjects (6 females; 6 males) completed the program. The DCP included four weekly class sessions devoted to resilience education and diabetes self-management, followed by eight bi-weekly support group meetings. Psychosocial process variables (resilience, coping strategies, diabetes empowerment), and proximal (perceived stress, depressive symptoms, diabetes self-management) and distal outcomes (BMI, fasting blood glucose, HbA1c, lipidemia, blood pressure) were assessed at baseline and six-months post study entry. Qualitative data were collected at eight-months via a focus group conducted to examine the acceptability of the DCP.

Results

Preliminary paired t-tests indicated statistically significant improvements in diabetes empowerment, diabetes self-management, BMI, HbA1c, total cholesterol, LDL-cholesterol, and systolic and diastolic blood pressure. Medium to large effect sizes were reported. Resilience, perceived stress, fasting blood glucose, and HDL-cholesterol improved, but changes were not statistically significant. Focus group data confirmed that participants held positive opinions regarding the DCP and follow-up support group sessions, although they suggested an increase in program length from 4 to 8 weeks.

Conclusions

The pilot study documented the feasibility and potential effectiveness of the DCP to enhance diabetes empowerment, diabetes self-management, and reductions in the progression of obesity, type 2 diabetes, and CVD in the African American community. Randomized experimental designs are needed to confirm these findings.

A Resilience Intervention in African American Adults with Type 2 Diabetes:

A Pilot Study of Efficacy

Type 2 diabetes is becoming the most prevalent health problem in the U.S., affecting more than 20.8 million people at an estimated cost of \$132 billion annually. Minority groups are affected at higher rates, with African Americans 1.8 times as likely to have diabetes as non-Hispanic whites.¹ Type 2 diabetes is almost always preceded by obesity, which has doubled among adults since 1980 with a corresponding increase in type 2 diabetes. Currently, 45% of African Americans are obese and 76% are overweight.² Further, type 2 diabetes results in a two to four times higher rate of cardiovascular disease (CVD), which is the leading cause of death among African Americans with diabetes.¹ The synergistic effects of obesity, type 2 diabetes, and CVD result in complications (e.g., hypertension, stroke, depression, retinopathy, renal failure, neuropathy and nerve damage, foot disorders) that are at an all time high.³ In fact, the common progression of obesity, type 2 diabetes, and CVD is the biggest health threat facing the U.S., in particular African Americans. Moreover, this unremitting accumulation of damage is largely preventable.

Components of a healthy lifestyle are well established in the current literature, yet over 50% of U.S. adults are not engaging in enough physical activity to provide health benefits and only one-fourth eat five or more servings of fruits and vegetables daily.⁴ In the past two decades, increased attention has been given to diabetes self-management programs in an effort to prevent, manage, and/or impede disease progression. Nonetheless, meta-analyses^{5,6} have concluded little change with respect to the effective treatment of type 2 diabetes in the 10-year period following Brown's 1990⁷ meta-analysis. Both short- and long-term studies have focused narrowly on knowledge and glycemic control without sufficiently addressing important process variables and interventions that offer insight into the mechanisms affecting patient empowerment and diabetes self-management, quality of life, and long-term compliance.^{5,8} Further, few studies have evaluated culturally sensitive interventions for African Americans.^{6,9-11}

Because type 2 diabetes is a chronic condition, individuals with the disease typically experience greater stress than non-diseased individuals, have higher levels of depression, and worry about complications from the disease.^{12,13} Chronic stress plays a critical role in the development of unhealthy lifestyle choices, which in turn contributes to the onset of obesity, type 2 diabetes and CVD.¹⁴ Lower

levels of socioeconomic status (SES) prevalent in some African Americans communities manifest in high levels of chronic stressors (e.g., financial insecurity, low education level, lack of health care), and influence disease progression. For African Americans, the stress of type 2 diabetes compounded by higher levels of chronic life stressors make this population particularly vulnerable to complications from the synergistic effects of obesity, type 2 diabetes, and CVD.

While the relationship between stress and unhealthy lifestyle choices is well documented,¹⁴ the Transactional Model of Stress and Coping proposes that not everyone exposed to potentially stressful situations makes poor health choices.¹⁵ Such findings have led researchers to examine psychosocial process variables, such as resilience, that could potentially contribute to stress and health. Resilient individuals are more likely to perceive change and stressful situations as a challenge as well as an opportunity for personal growth, and their behavior reflects a belief in their ability to take greater responsibility and impact their life circumstances. Conversely, individuals lacking in resilience are more likely to perceive stressful situations as a threat to their sense of security or survival, lack self-confidence and initiative, and their behavior reflects an attitude of powerlessness and victimization.¹⁶

Research suggests that higher levels of resilience (e.g., hardiness) positively influence perceptions of stress and stressful life events. Resilience is related to positive self-ratings of physical health and physical symptoms,^{17,18} and inversely related to depression and anxiety.¹⁹ Bonanna and colleagues²⁰ examined 2,752 residents from the New York City area 6 months following the September 11th terrorist attacks and found that the absence of chronic disease was strongly associated with greater resilience, defined as low levels of depression and substance use and 1 or 0 posttraumatic stress disorder symptoms. Our research has shown that higher levels of resilience and effective coping strategies are associated with less stress and symptoms of illness in corporate employees.²¹ Further, our resilience intervention, adapted for college students, resulted in decreased stress and symptoms of illness in healthy individuals.²²

Taken together, the above studies suggest that resilience interventions hold promise for African American adults with type 2 diabetes, particularly if they are designed to meet their cultural needs, goals, resources, and lifestyle.^{11,23-25} Because type 2 diabetes is a chronic condition that requires effective decisions on a daily basis regarding nutrition, physical activity, medications, and blood glucose

monitoring, resilience programs that enhance the perceived self-efficacy and coping skills of patients to effectively self-manage their diabetes is paramount. Interventions strategies must facilitate collaborative relationships that enable patients to take responsibility for decisions regarding goals, daily self-care behaviors, and treatments options.^{23-24,26-27} As outlined in Figure 1, psychosocial interventions that help African Americans with type 2 diabetes enhance their resilience, coping skills, and feelings of empowerment may improve psychological well-being and diabetes self-management, and thereby prevent or at least delay the progression of obesity, type 2 diabetes, and CVD. Given the economic and personal costs associated with this disease progression, the potential impact of successful diabetes interventions on health outcomes and health care costs is tremendous.²⁵

We found only one study that examined the efficacy of a resiliency-training program for individuals with type 2 diabetes.²⁸ In this study, the experimental group received a 15-hour, five-week resilience intervention containing four intervention components: self-efficacy, locus of control, social support, and purpose in life. Results indicated significantly higher levels of resilient qualities on individual survey items from the Living With Diabetes Subscale (e.g., I know positive ways I cope with diabetes-related stress, I know enough about myself to make diabetes care choices that are right for me) and significantly lower barriers to physical activity post-intervention at 3 months, compared to the control group. At six months, the intervention group reported greater purpose in life, social support, and self-efficacy compared to the control group. HbA1c and waist measurements improved but not significantly. Although the intervention group was Caucasian, it seems feasible that a theory-based and culturally appropriate resilience intervention for African Americans with type 2 diabetes would enhance diabetes empowerment, adherence to healthy lifestyle choices when encountering stressful situations, and ultimately the progression of obesity, type 2 diabetes, and CVD.

Purpose of the Study

The primary purpose of this pilot study was to determine the feasibility of offering our Diabetes Coaching Program (DCP), adapted for African Americans, in a sample of African American adults with type 2 diabetes. A conceptual model of proposed relationships between the DCP intervention and proximal and distal outcomes is displayed in Figure 1. The study examined whether trends in the data suggest the DCP has the potential to be an effective intervention for African Americans with type 2

diabetes as well as an acceptable approach from a cultural perspective. Specifically, the following research questions were addressed:

- 1) What is the feasibility of conducting a DCP intervention in a church setting with a sample of African American adults with type 2 diabetes?
- 2) What were the effects at six months of the DCP intervention on the:
 - a) psychological variables of resilience, percent problem-focused coping, and diabetes empowerment;
 - b) proximal outcomes of perceived stress, depression, and diabetes self-management; and
 - c) distal outcomes of body mass index, fasting blood glucose, HbA1c, lipidemia, and blood pressure?
- 3) What were participants' perceptions of the acceptability and perceived effectiveness of the DCP intervention as assessed using focus group data collected at eight-months post study entry?

Insert Figure 1 About Here

Methods

Sample and Procedures

Subjects for this pilot study were a convenience sample of African Americans (8 females; 8 males) with type 2 diabetes recruited through radio and church announcements to participate in a six-months DCP intervention. The study utilized a one-group, pretest-posttest design. Quantitative data were collected pre-intervention and again at six months and qualitative evaluation data were collected at eight months. All subjects received \$100 for their participation, dispersed in increments of \$20 throughout the study. An additional \$25 was received for participation in a two-hour focus group to evaluate the acceptance of the DCP intervention.

Diabetes Coaching Program Intervention

The DCP included four weekly two-hour class sessions held on Tuesday evenings, one hour devoted to the resilience intervention, *Transforming Lives Through Resilience Education*, and one hour devoted to nutrition education related to diabetes. Eight bi-weekly hour and a half support group meetings followed these class sessions with the option of attending either Tuesday evening or Saturday morning to

accommodate potential scheduling conflicts and allow for maximum attendance. Support group meetings provided opportunities for participants to receive social support in an informal atmosphere and discuss their problems, ask questions, and review previously learned course content. A modified version of the resilience intervention is described elsewhere²² and available online.²⁹ The intent of the resilience portion of the DCP intervention was to empower participants to manage the stressors in their lives more effectively by taking greater responsibility for them, using effective coping strategies, thinking in more empowering ways, and creating and maintaining meaningful social connections. The general assumption was that individuals who managed stress effectively would have more effective health habits and diabetes self-management and thus better health outcomes.

Our resilience model, based on the work of O'Leary and Ickovics³⁰ and Carver,¹⁶ describes four typical responses to stressful situations including "give up," "put up," "bounce up," and "step up" (see Figure 2). Individuals who "give up" succumb to the stressful situation and feel defeated. Individuals who "put up" struggle with the stressful situation and are better off than those who give up, but their level of well-being is diminished. Individuals who "bounce up" fully recover from the stressful situation and return to their prior level of functioning, which we call resilience. Finally, individuals who "step up" do whatever it takes to meet the challenge and grow to an even higher level of functioning and well-being, which we call thriving. As the DCP intervention progressed, new information and activities were presented within the context of this resilience model. The scope and sequence of curriculum content for the resilience portion of the DCP as well as the nutrition education portion is summarized in Table 1. The author of the resilience curriculum, a health education professor, taught the resilience portion of the DCP. Throughout the intervention, resilience course content was linked to nutrition education during class discussion.

The nutrition education portion of the DCP intervention was designed to provide participants with the knowledge, skills, and support necessary to feel more empowered in managing their diabetes. Participants were taught how to regulate blood glucose levels through blood glucose self-monitoring, as well as reduce fat, sodium, and calorie intake among their favorite foods. The general philosophy for the nutrition education portion of the intervention was that providing realistic and practical suggestions for improving diabetes self-management was preferable to asking participants to make unrealistic changes frequently associated with poor adherence. Glycometers and diabetic strips were provided to all subjects

with the goal of enabling them to assume responsibility for their daily diabetes care. A PhD candidate in nutritional sciences taught the nutrition education portion of the DCP.

Follow-up support group meetings to reinforce core content and provide social support were held bi-weekly until post-data collection at six months. A typical support group session included a brief presentation of an interesting fact or story related to diabetes and/or review of some aspect of the DCP core content. The majority of the session was devoted to problem solving and providing social support for issues raised by group members. A walk in the community followed group discussion. Healthy snacks and water were provided at all four weekly class sessions and eight follow-up support group meetings.

Insert Figure 2 and Table 1 About Here

Measures

Quantitative and qualitative data were collected to evaluate the effectiveness and acceptability of the DCP intervention. Psychosocial process variables (resilience, coping strategies, diabetes empowerment), proximal outcomes (perceived stress, depressive symptoms, diabetes self-management) and distal outcomes (body mass index, fasting blood glucose, HbA1c, lipidemia, blood pressure) were assessed at baseline and at six-months follow-up. Qualitative data were assessed at eight-months follow-up via a focus group.

Psychosocial Process Variables

Resilience. The 25-item Connor-Davidson Resilience Scale (CD-RISC) was developed as a clinical measure to assess the positive effects of treatment for stress reactions, anxiety, and depression.³¹ This scale was chosen because it includes items that represent a variety of resilient characteristics such as goal setting, patience, faith, humor, and tolerance of negative affect, as well as the ability to perceive stressors as a challenge, make a commitment, and take control. The Cronbach's alpha of the CD-RISC was 0.92 for the pre-test and 0.90 for the post-test.

Coping Strategies. The 28-item brief version of the Coping Orientations to Problems Experienced Scale (Brief COPE) measured a broad range of cognitive and behavioral coping strategies.³² Items were grouped together into the most-commonly used supersets, problem-focused or approach coping and emotion-focused or avoidant coping.³³⁻³⁵ Problem-focused coping (PFC) strategies were those that

directly addressed the stressful situation or whose value exceeded merely reducing distress, and included active coping, planning, positive reframing, acceptance, emotional support, instrumental support, and religion. The PFC alpha was 0.87 at pre-test and 0.78 at post-test. Emotion-focused coping (EFC) strategies were used to reduce or manage one's emotional reaction and feelings of distress, and included self-distraction, denial, venting, substance use, behavioral disengagement, self-blame, and humor. The EFC alpha was 0.89 at pre-test and 0.73 at post-test. Given the conceptual and predictive advantages of relative versus absolute coping scores, this study focused on percentage of PFC, computed by dividing PFC by the sum of PFC and EFC.³⁶

Diabetes Empowerment. The 28-item Diabetes Empowerment Scale (DES) assessed participants' self-efficacy in managing their diabetes.²⁷ The DES contains three subscales: managing the psychological aspects of diabetes (9 items; pre-test $\alpha = 0.52$; post-test $\alpha = 0.91$); assessing dissatisfaction and readiness to change (9 items; pre-test $\alpha = 0.74$; post-test $\alpha = 0.82$); and setting and achieving diabetes goals (10 items; pre-test $\alpha = 0.87$; post-test $\alpha = 0.91$). Across all items, DES reliability was $\alpha = 0.89$ at pre-test and $\alpha = 0.95$ at post-test.

Proximal Outcomes

Perceived Stress. The ten-item version of the Perceived Stress Scale³⁷ assessed the degree to which situations in one's life were perceived as stressful (pre-test $\alpha = 0.72$; post-test $\alpha = 0.83$).

Depressive Symptoms. Depressive symptoms were measured using the 20-item Center for Epidemiologic Studies Depression Index,³⁸ with pre-test $\alpha = 0.80$ and post-test $\alpha = 0.85$.

Diabetes Self-Management. Physical activity, nutrition, and monitoring of blood glucose were assessed using the DCP participant journal developed by the authors. The journal contained several months of daily pages, each providing an inspirational quote, and a quick and convenient checklist to monitor a variety of health behaviors for effective diabetes self-management. The checklist had 10 items that provided realistic and practical suggestions for improving diabetes self-management, such as *eat five fruits and vegetables in a variety of colors, choose fat-free or reduced fat foods most often, use sodium and refined sugars sparingly, and monitor blood glucose*. Scores for the daily journal ranged from 0 to 100. Subjects were asked to recall the previous three days, and scores were averaged across days (pre-test $\alpha = 0.58$; post-test $\alpha = 0.85$).

Distal Outcomes

Body Mass Index (BMI). BMI was determined using the following equation: $BMI = (\text{weight in kg}) / (\text{height in m}^2)$. The body weight of each of the subjects was assessed using a portable digital scale; subjects wore street clothes and no shoes. Height was determined using a wall-mounted stadiometer.

Fasting blood glucose. A BD Logic Blood Glucose Monitor (BD Biosciences, Franklin Lakes, NJ) was used to test fasting blood glucose (minimum of eight hours of fasting). This portable blood glucose monitor uses test strips and a very small amount of blood (0.3 μL) to return accurate results from the fingertip.

Lipidemia and HbA1c. Fasting plasma concentrations of total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglycerides were determined by enzymatic methods with a semi-automated chemistry analyzer (Vitros DT60 II, Johnson&Johnson, Rochester, NY). An aliquot of whole blood from the fasting blood sample was also used to determine glycated hemoglobin (HbA1c) concentration measured on a Micromat II HbA1c (Bio-Rad, Hercules, CA).

Blood pressure. An Omnicron model HEM-712C Automatic Inflation Blood Pressure Monitor (Omnicron, Philadelphia, PA) was used to assess systolic and diastolic blood pressures. Following a five-minute rest period, three measurements were taken using the subject's right arm. The first measurement was omitted, and the remaining two measures were averaged.

Qualitative Data

As part of the evaluation, a two-hour focus group was conducted eight months following baseline data collection to examine subjects' opinions of the acceptability and perceived effectiveness of the DCP intervention. A trained facilitator moderated the session, with the goal of providing insight into DCP strategies that were successful and worth replicating, as well as those that needed to be modified or discontinued.

Results

The first research question examined the feasibility of providing the DCP intervention in an African-American community church setting. Of the sixteen subjects that began the program, twelve subjects (6 females; 6 males) completed the intervention and post-data collection, ranging in age from 43 to 66 with a mean of 54.83 years. Subjects had some high school ($n=1$), a high school diploma or GED equivalent

(n=1), some college (n=4), a bachelors degree (n=5), or a masters degree (n=1), and reported a yearly family income before taxes of \$19,000 or less (n=4), \$20,000 to \$39,000 (n=2), \$40,000 to \$59,000 (n=2), \$60,000 to \$79,000 (n=1), and over \$100,000 (n=1).

Both attendance and attrition were monitored during the intervention and follow-up support group sessions. Three subjects completed the four educational sessions, but did not attend any support group sessions or show up for post data collection. One subject moved out of town. The remaining twelve subjects completed all four of the educational sessions, and on average attended five of the eight support group sessions. Throughout the DCP, three participants required transportation; however, this was non-problematic, as the church was on the city bus route, and spouses and group members provided rides on several occasions. Individual class sessions were provided on two occasions, once in the home of a wheelchair bound subject and once at a local hospital for a subject whose husband was hospitalized.

The second research question examined the effects of the DCP intervention on the psychological process variables, as well as proximal and distal outcome variables (see Figure 1). Means and standard deviations for all study variables at baseline and post-intervention at six months are shown in Table 2. Effect sizes were calculated as the averaged individual difference between post-test and pre-test, divided by the standard deviation of the difference, and are thus expressed in standard deviation units.³⁹ An effect size of 0.20 may be considered small, 0.50 medium, and greater than .80 as large. Preliminary paired t-tests indicated significant improvements from pre- to post-intervention for the psychosocial variable diabetes empowerment, the proximal outcome of diabetes self-management, and the distal outcomes of BMI, HbA1c, total cholesterol, LDL-cholesterol, and systolic and diastolic blood pressure. Although the baseline HbA1c group mean was not unusually high (6.94), improvements occurred in 11 of the 12 participants, resulting in a significant post-intervention improvement (5.57), reflecting a change score of -1.37 percentage points. Resilience, perceived stress, fasting blood glucose, and HDL-cholesterol improved, but results were not statistically significant.

The third and final research question examined participants' perceptions of the effectiveness of the DCP intervention. Qualitative information was gathered via a two-hour focus group at eight-months led by a trained facilitator. Eleven of the twelve subjects participated and indicated that the DCP was effective. The central location of the meetings was convenient, the size of the group was appropriate and allowed

for maximum participation, and participants enjoyed meeting in a church setting. Several subjects expressed an appreciation of the conversational style of the instructors and the flexibility to attend support group sessions on either a Tuesday evening or Saturday morning. They especially liked the class handouts, food models illustrating healthy portion sizes, discussions of ways to prepare their favorite foods more healthfully, computer printouts of their blood glucose self-monitoring, and the DCP daily journal. For example, one participant commented, "I loved it when they brought the portions that you are really allowed to eat and some of the men looked at it, and said, 'oh my, that's all I'm really supposed to have'! But that really helped." With respect to favorite foods, one participant remarked, "My favorite food is fried chicken... I find out I can still have my fried chicken if I cook it in canola oil... or I can do the shake and bake." Finally, with regard to the glucose self-monitoring computer print-outs, a participant remarked, "The thing that I found most interesting was when the instructor would read meters and she could pinpoint it down to the day... they would show me, hey what did you do on this day, you know, and think about it, and I couldn't deny that I knew that there was something I did."

Social support was reported as the single most important benefit subjects got from the class. For example, one female group member said, "If we felt like we were not doing right and we weren't feeling good at other times we had someone to call, like a call buddy. And they would pick you up and say, 'Hey, you're ok. You messed up this time but that's ok, you can do better tomorrow'. And I enjoyed that." Participants also reported that they discussed their disease with family members and gained their support in addition to enhancing their knowledge of diabetes. For example, one participant commented, "I come from a family of diabetics... one of the greatest things that I found is going back relaying [the information] to my relatives... I try to keep them abreast, you know, giving them the information... and they are doing better with their own diabetes." For many group members, the social support received provided the courage and inspiration to take responsibility for their diabetes rather than be in denial, blame others, make excuses, or shame themselves. For example, one participant said, "I was in denial, you know, they send you to classes but they don't give you what you really need." Another commented, "It was satisfying to hear some of the challenges that they were going through, you know, sometimes when their numbers were off... it was almost like they were doing what you were doing, and so it helped to talk." Finally, the importance of feeling supported from within one's community was reflected by the following comment,

“And I’ve lived in Austin all my life and I know that a lot of us have structured times when you went to see a doctor, you know, when you were diagnosed with diabetes, they say, ‘you go see the nutritionist’, and ‘you talk to someone about exercise’, but to have support within your community, that was support!”

The group especially liked the DCP journal and linking a passing score (70) more days than not as an indicator of their overall glycemic control. One participant remarked, “You just can’t lie and say you did this and that, because when they did the A1 hemoglobin it told the truth.” The sharing of struggles experienced in trying to get a daily passing score normalized the struggle and provided encouragement. For example, one participant commented, “Since I’ve been a part of this, it’s so much useful information, it clarifies a lot of myths about being a diabetic and little things like [a participant] being a nurse and being afraid to prick her own finger. We experience little things like that that really encouraged us on an individual level.” Another shared his paradigm shift with respect to monitoring blood glucose, “I used to always kind of live, or see, the pricking part as being the event, but what I learned was actually it’s the reverse... it’s all the stuff in between that really is important and that really helped me. I really kind of reversed my thinking on that whole process.”

The main suggestion to improve the program related to time. For example, “We just didn’t have enough time... this was just the beginning. We were just getting started.” Another commented, “If there were more sessions we could go a little slower and break it down more.” Most participants thought eight sessions with the follow-up support groups would be sufficient. When subjects were asked if they might be willing to help teach the material to members of their community in the future if provided with participant manuals and facilitator manuals, several expressed an interest as long as they could “get some instructions and some training.” Another commented, “As long as you had the manuals.”

Discussion

This pilot study demonstrated the feasibility of providing the DCP and support-group sessions, the strong interest of subjects in participating in the DCP, the potential efficacy of the DCP to impact health outcomes of adults with type 2 diabetes, and the acceptability of our intervention in a church setting in this African-American community. Statistically significant improvements were observed in diabetes empowerment, diabetes self-management, BMI, HbA1c, total cholesterol, LDL-cholesterol, and systolic and diastolic blood pressure. However, due to the small sample size and other study limitations, these

data must be interpreted cautiously. A next logical step is to incorporate the lessons learned during this pilot study, including suggestions from the focus group, and conduct a larger experimental study.

During the beginning stages of this research, we were reminded of the value and necessity of having the support of a key opinion leader in the community. Although several churches expressed an interest in the DCP, follow-up and subject recruitment proved to be challenging. After several months, a breakfast meeting with members of the Women's Health Ministry from a local Baptist Church was a key turning point. A church nurse with type 2 diabetes was very interested in the DCP and became our program champion. Her efforts in communicating with churches in the surrounding area and her willingness to be interviewed on local radio to enhance subject recruitment proved most effective. This same nurse also secured the church group room for our class sessions and the support of the church pastor.

Although the psychosocial variables of resilience and coping skills did not significantly increase as expected, they may have played a role in enhancing diabetes empowerment and self-management. The foundational component of the resilience intervention is taking responsibility for one's life circumstances. Participants practiced taking greater responsibility by reflecting on the relationship between the choices they made on a daily basis and the consequences of those choices. They also identified the most important values in their lives and set goals and priorities based on these values. Further, they practiced thinking about stressful life situations in ways that brought power to them, as opposed to interpreting situations in ways that gave their power away and left them feeling threatened and/or defeated. It is likely that taking greater responsibility for their stressful situations, accompanied by empowering, yet realistic interpretations of these situations, resulted in the significant increases we found in diabetes empowerment and self-management. This interpretation is consistent with Bradshaw and colleagues' study²⁸ in that higher levels of resiliency were reflected by such things as knowing positive ways to cope with diabetes, staying motivated to care for diabetes, eating healthier, and increasing physical activity.

Complications from the synergistic effects of obesity, type 2 diabetes, and CVD results in an enormous burden for the African-American community. Identifying possible causal mechanisms among the psychosocial process variables and proximal and distal outcomes outlined in Figure 1 is essential.

This pilot study suggests that diabetes empowerment results in enhanced diabetes self-management, which in turn positively affects the distal outcomes associated with the progression of obesity, type 2 diabetes, and CVD (e.g., body mass index, fasting blood glucose, HbA1c, lipidemia, and blood pressure). We were surprised that these beneficial changes occurred without a corresponding significant increase in resilience and effective coping strategies or decreases in perceived stress and depressive symptoms. Qualitative data from participants suggested that the program needed to be longer (8 weeks rather than 4 weeks) and that they were “just getting started.” Increasing program length will bring the DCP more in line with the “dosage effect”⁴⁰ suggested in the literature for successful diabetes self-management. Future interventions are planned to examine the effects of a longer intervention using an experimental design on these psychosocial process and outcome variables.

The findings of this pilot study should be considered in light of several limitations. First, participants were not randomly selected from the population, a process that is often not feasible in social science research. Thus, the sample may not be representative of the population from which it was drawn, which has implications for generalizability of the results. Second, the use of self-report survey data has inherent limitations such as the potential for untruthful or inaccurate responses due to lack of self-awareness. Third, while comparable to some pilot studies, the sample size was relatively small and may have contributed to the lack of significant findings in some instances. Nonetheless, our pilot study documented the feasibility and potential effectiveness of the DCP to enhance diabetes empowerment, diabetes self-management, and reductions in the disease progression of obesity, type 2 diabetes, and CVD in the African American community. Randomized experimental designs are needed to confirm the potential benefits found in our pilot study.

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Figure 1. Conceptual Model of the Diabetes Coaching Program (DCP) Intervention and Proposed Outcomes



Figure 2. The Resilience Model Taught in the Diabetes Coaching Program Intervention, based on the work of O'Leary and Ickovics³⁰ and Carver¹⁶

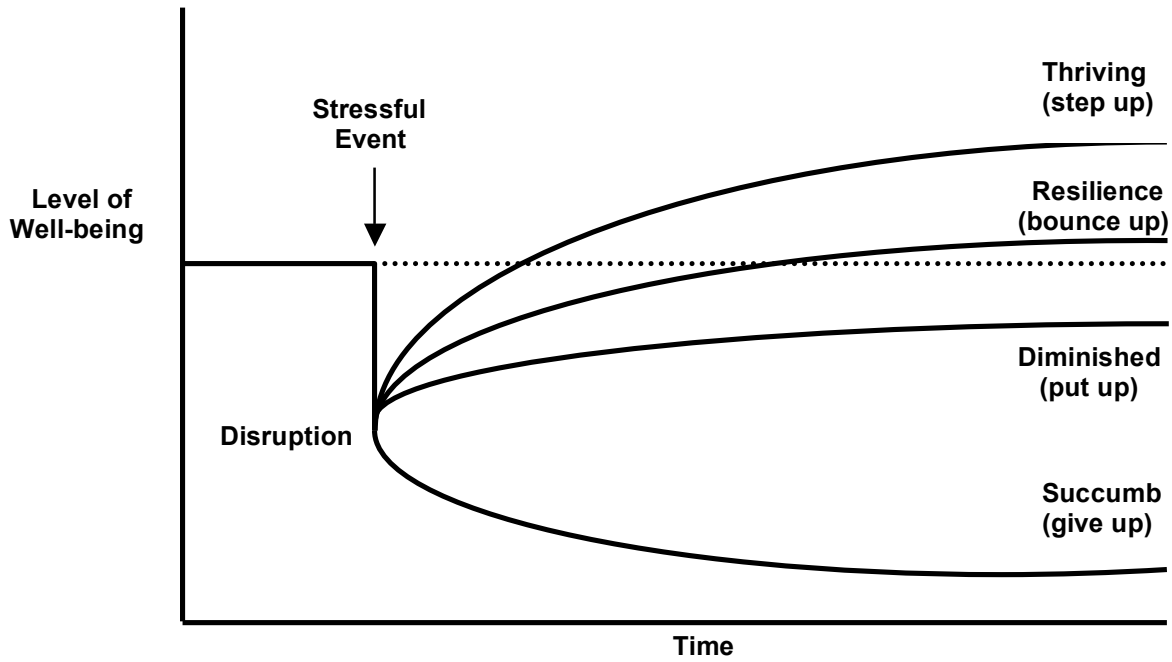


Table 1. Curriculum Content for the Resilience Education and Nutrition Education

Components of the DCP Intervention

Resilience Education Component

Week One

The resilience model
 The stress response
 Problem-focused coping strategies
 Emotion-focused coping strategies

Week Two

The responsibility model
 Above the line/below the line behavior
 Circle of influence/circle of concern
 Five-step process to move above the line

Week Three

Focusing on empowering interpretations
 How our thinking affects our health
 ABCDE thinking model
 The origin of beliefs

Week Four

Creating meaningful connections
 The healing power of love and intimacy
 Self-leadership and the circle of influence
 Features of psychological thriving

Nutrition Education Component

General facts about diabetes
 Causes of diabetes
 Blood glucose self monitoring

Meal planning
 Reading food labels
 Carbohydrate counting

Strategies for dining out
 Diabetes and alcohol
 Sick day management
 Reasons to see the doctor

Diabetes complications
 General hygiene
 Exercise

Table 2. Pre and Post Means, Standard Deviations, and Effect Size for Psychosocial Variables, Proximal Outcomes, and Distal Outcomes

	<u>Pre Mean (SD)</u>	<u>Post Mean (SD)</u>	<u>ES</u>	<u>t</u>
<u>Psychosocial Variables</u>				
Resilience	83.18 (8.48)	84.08 (8.38)	0.10	0.35
% Problem-Focused Coping	0.65 (.06)	0.64 (.06)	-0.18	-0.64
Diabetes Empowerment	3.75 (.39)	4.37 (.41)	1.23	4.25**
Psychological Aspects	3.63 (.36)	4.36 (.40)	1.51	5.23***
Readiness to Change	3.79 (.41)	4.28 (.46)	1.08	3.73**
Setting and Achieving Goal:	3.83 (.54)	4.41 (.42)	0.76	2.65*
<u>Proximal Outcomes</u>				
Perceived Stress	16.50 (4.03)	15.58 (5.00)	-0.26	-0.91
Depressive Symptoms	11.57 (7.08)	11.75 (7.79)	0.03	0.10
Diabetes Self-Management	49.55 (24.72)	63.06 (16.84)	0.74	2.46*
<u>Distal Outcomes</u>				
BMI	32.83 (5.36)	32.08 (4.94)	-0.99	-3.45**
Fasting Blood Glucose	140.92 (53.48)	131.42 (42.15)	-0.18	-0.62
HbA1c	6.94 (1.70)	5.57 (.81)	-1.04	-3.61**
Total Cholesterol	178.00 (30.82)	163.45 (37.79)	-0.70	-2.31*
LDL-Cholesterol	107.50 (33.56)	91.64 (30.95)	-1.08	-3.58**
HDL-Cholesterol	39.42 (9.27)	40.36 (8.29)	0.09	0.31
Systolic Blood Pressure	134.58 (16.66)	124.50 (17.61)	-0.80	-2.78*
Diastolic Blood Pressure	82.00 (11.24)	76.00 (10.12)	-0.71	-2.47*

* $p < .05$ ** $p < .01$ *** $p < .001$