PERCEIVED BENEFITS AND BARRIERS TO THE DIABETES PREVENTION PROGRAM

ABSTRACT

Objective: Diabetes prevention interventions have a proven positive effect on health outcomes. The goal of this project is to understand the factors that motivate and deter people with prediabetes from utilizing evidence-based education programs, such as the Diabetes Prevention Program (DPP).

Research Design and Methods: Formative research was conducted among program facilitators, health providers who care for diabetes patients, and patients living with prediabetes to generate an in-depth understanding of perceptions of the program. The methodology included a mixed methods approach. A total of 97 interviews and 5 focus groups were conducted with health providers, program facilitators, and patients. An online survey was administered to 50 patients with prediabetes.

Results: All three populations agreed the DPP aided in implementing lifestyle changes and preventing the onset of type 2 diabetes, and the classes provided a positive experience for support, in-depth discussion, and opportunities for learning how to make lifestyle changes. However, while the overall benefits of the program were expressed, there were barriers noted by all populations that affect program utilization and physician referrals. General lack of knowledge, cost of the program, and the significant time commitment necessary to complete the program were barriers discussed.

Conclusions: The Diabetes Prevention Program is successful in helping individuals with prediabetes make positive lifestyle changes. The lack of knowledge about the program, however, is a deterrent for utilization. Creation of a social marketing campaign based on the findings from this research will aim to increase healthcare provider referrals to the DPP.
INTRODUCTION

Prediabetes is indicated by elevated blood glucose levels that are below the clinical range for a diabetes diagnosis, but above 100mg/dl [1]. If left untreated, poorly managed, or undiagnosed, prediabetes can lead to serious health complications [1]. Close to 57 million adults in the U.S. and approximately one in four U.S. adults over 20 years old are categorized as pre-diabetic or at risk for developing type 2 diabetes [2].

Prediabetes and diabetes present a significant challenge for individuals, communities, and healthcare systems. Diabetes can result in debilitating complications like kidney disease, cardiovascular disease, blindness, and amputations [1]. As of 2012, the healthcare costs associated with diabetes are $176 billion annually and diabetes contributes to $69 billion in loss of productivity in the workplace [1]. With the rise of newly diagnosed diabetes cases and an increase of prediabetes, efforts focusing on the prevention of diabetes and diabetes complications have emerged in community-based settings across the nation.

The Diabetes Prevention Program (DPP) is an effort to combat the rising numbers of prediabetes. It began as a multisite research study funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) comparing a dietary and physical activity intervention with oral anti-diabetic medication as a means of preventing the onset of diagnosed diabetes among individuals at high risk for developing diabetes [3]. The results of the study indicated that those participants who experienced modest weight loss through lifestyle intervention lowered their diabetes risk more significantly than participants receiving oral medications (58% versus 31%) [4]. Additionally, the study found that lifestyle intervention was highly effective in all subgroups of age, gender, and ethnicity. This research became the model for the National Diabetes Prevention Program (NDPP) that includes education on diet, physical activity, and behavior modification. The behavioral goals of the program are to eat less fat and fewer calories and exercise for a total of 150 minutes a week in order to lose 7 percent of their body weight and maintain that loss. The year-long program targets individuals at high risk for developing type 2 diabetes. Eligibility for the program is determined using the following metrics: the Centers for Disease Control and Prevention (CDC) Prediabetes Screening Test, BMI measurement over 24, fasting glucose test indicating prediabetes, and over 18 years of age.

The implementation of the NDPP Recognition Program sets program delivery standards of Diabetes Prevention Programs to assure fidelity and quality in programs throughout the United States. Local organizations offering DPP programs can submit applications for recognition including proposed curriculum and available organizational resources. The applications are reviewed and offered “pending status” while initiating programs and collecting participant outcomes data. If programs are able to meet benchmarks, “full recognition status” is awarded. The review process is free of charge for organizations and usually takes 2-3 years. Local recognized programs benefit in reputation from the CDC seal of approval.

The CDC sponsors trainings for “lifestyle coaches.” Lifestyle coaches are encouraged to attend CDC sponsored trainings by the Diabetes Training and Technical Assistance Center (DTTAC) and partner organizations that deliver approved curriculum. Additionally, the standardized program provides technical assistance and support to assure fidelity, capacity, and sustainability.

The NDPP partners with non-profit organizations and private insurance companies to provide and expand offerings of the DPP across the United States. It has recognized several grantees/rx programs that provide the program through their memberships and local programs: American Association of Diabetes Educators, American Health Insurance Plans, Black Women’s Health Exchange, National Association of Chronic Disease Directors, Optum Healthcare Solutions/Diabetes Prevention and Control Alliance, and the YMCA of the USA. The American Medical Association (AMA) is collaborating with the NDPP in an attempt to prevent the progression of prediabetes by addressing risk factors and developing new approaches to reduce diabetes [5]. This aligns with the AMA’s goal of improving health outcomes in cardiovascular disease and type 2 diabetes due to the detrimental impact on patients nationally and the increased costs on the healthcare system. The YMCA of the USA has been an active partner in this effort by providing the program in YMCA locations. The ultimate goal of these partnerships is to increase the number of referrals of adults who have prediabetes to this evidence-based program.

Formative Research Objectives

Despite evidence that lifestyle intervention can reduce the incidence of diabetes, and despite evidence that this reduction is applicable to the diverse population of the U.S., participation in the DPP is less than desired. The
The goal of this formative research is to understand the factors that motivate and deter people with prediabetes from utilizing evidence-based education programs. The population of interest is isolated to the state of Florida, since the research was partially funded through a grant from the Florida Department of Health. Results from this research will be used to create a multi-faceted intervention to increase health provider referral to these programs and develop other materials needed to increase DPP program utilization.

RESEARCH DESIGN AND METHODS

A mixed methods approach was utilized combining qualitative and quantitative data collection and analysis. Specifically, an exploratory design was used, where findings from the qualitative analysis guided the survey design for the quantitative analysis.

Participant Recruitment

Participants were recruited for this research in multiple ways. Health Professional and Program Facilitator recruitment occurred through email and phone calls for interviews and focus groups. Researchers began with a database of professional contacts and used snowball sampling to increase recruitment efforts. Patient recruitment was the final phase of the research and research team members had already established relationships with the program facilitators to receive permission to recruit patient participants from active programs.

Qualitative Methodology

A semi-structured interview guide was developed to aid researchers in developing an understanding of how DPP programs are implemented and to explore the perceptions of program benefits and barriers. A total of 97 interviews and 5 focus groups were conducted. Sixty-nine interviews with healthcare professionals and program facilitators were carried out, and 28 patient interviews were conducted. Informed consent was signed or verbally agreed upon by the interviewees prior to each interview. Information about the minimal risks associated with their involvement with this research study was discussed as per the Institutional Review Board (IRB) guidelines. All study procedures were reviewed and approved by the University of South Florida IRB.

Survey Participant Recruitment

Survey participants were recruited through the research team’s professional contact database, as well as from panels purchased from Survey Monkey. The panels were specifically designed to match the research objectives for each group: Healthcare Providers and DPP Patients. DPP Patients were provided surveys by DPP Program Facilitators with whom the research team had received permission.

Quantitative Methodology

Survey data was gathered through the use of survey panels from Survey Monkey. Survey participants were all over the age of 18, could read English language, and were either people with diabetes in the state of Florida, or healthcare providers in the state of Florida. All survey participants had access to a computer and were able to respond to a Survey Monkey link. The surveys were created with language
that was specific to each population: healthcare providers and patient groups. Healthcare professionals were queried about their perceptions of DPP utility, benefits and risks of referral to DPP; and the perceived benefit of DPP when considering patient outcomes and experiences. Patients were queried about their overall impression of DPP, as well as their specific experiences.

Participants

Healthcare Providers

In total, 251 healthcare providers (65% males) were surveyed on their experiences with diabetes prevention education programs. Of those healthcare providers, 46% were primary care physicians, 19% were in internal medicine, and the remainder held various job titles including endocrinologist, OB-GYN, registered nurse, dietician, pharmacist, psychologist, and physician’s assistant. Of these healthcare providers, 23% were certified diabetes educators, but all who participated treated patients with either diabetes or prediabetes. Forty-four percent of providers had been practicing for over 20 years, 31% between 11-20 years, 20% between 5-10 years, and 5% practicing less than five years.

DPP Patients

Patients (n=50) who participated in a Diabetes Prevention Program in Florida completed a survey describing the experiences in their program. Respondents’ ages ranged from 34-80 years with the mean age being 58.7 years (SD=11.30). Participants (35% males) had a racial background of 83% white and 6% African American. Regarding educational background, 56% had completed or at least attended some college, and 28% had completed or at least attended graduate school. All participants had some form of health insurance; 58% of respondents had health insurance through either their employer’s plan or their spouse’s employer’s plan. Other forms of health insurance included Medicare (38%), Medicaid (4%), the Health Insurance Marketplace Plan, military/veteran benefits, were self-insured, or were covered under their parent’s plan.

Quantitative Data Analysis

Survey responses were collected electronically from Survey Monkey and analyzed using Excel and SPSS (v. 22). In order to investigate possible sub-population characteristics in each target audience, several key demographic variables were examined for interactions with evaluation and opinion questions on the surveys using Pearson Chi-Squared Tests for Independence ($\chi^2$). Chi-square estimates the probability that the association between variables is a result of random chance or sampling error by comparing the actual distribution of responses with the expected distribution of responses [6]. When relevant, data were segmented and compared using Analysis of Variance techniques (ANOVA F-tests). This analytical technique aims to determine whether variables are related to each other by comparing the differences between three or more subgroups and the variance on the same variable within each of the subgroups [6].
INTERVIEW AND FOCUS GROUP RESULTS

Benefits of DPP: Program Facilitator Perspectives

According to program facilitators of DPP programs, the benefits for participants are tremendous. When the program is adopted into daily life, the DPP can significantly improve health, well-being, and prevent the onset of diabetes. Many program facilitators have witnessed the benefits the program can offer. For example, one program facilitator stated:

*It’s the most beautiful transformation to witness, and to be a part of, and to say that you contributed to someone regaining their mobility. You contributed to someone getting their blood pressure management reduced. You contributed to them giving up the unhealthy choices and substituting those for now-healthy choices… that has been such a gift I have witnessed and experienced in this program.*

Incremental Lifestyle Change

According to program facilitators, the evidence-based curriculum is a primary strength of the program. The goal of the program is systematic behavior change that is targeted incrementally. The incremental steps taken in the program were perceived as beneficial for participants who may be overwhelmed by major lifestyle changes happening quickly. Another program facilitator stated:

*From a lifestyle change, I think for a lot of these folks one at a time was plenty. ‘Let’s start here; let’s just look at what you’re eating. Start documenting. It doesn’t matter what you eat, just put it on a pad of paper. Then start looking at your fat grams. Now we’ve got two things.’ Then we slowly added more. It was so easy. It wasn’t too much for them.*

Peer Support

The community-based format allows for group education that results in powerful peer support. All of the facilitators in the study described how the dynamics of the group format created a sense of accountability and encouragement for participants. The development of peer support was made possible by the long-term format of the program.

Long-term Format

Meeting regularly for a year allowed for relationships to develop and for behavior change to be reinforced. For facilitators, this is a hallmark of the DPP. Ironically, the long-term format of the program was perceived by some new participants as a barrier, but once participants began the program they valued the extended time frame, even asking for the program to continue past the original year commitment.

Flexible Program

A final significant benefit is the flexibility of administering the program. The program requirements are flexible enough to allow for programs to operate in a variety of community settings including YMCA facilities, health department locations, community centers, libraries, churches, and workplaces. The use of trained lay facilitators was reported as a strength of the program and would allow for easier expansion of programs.

Benefits of DPP: Healthcare Professional Perspectives

Providers reported several benefits of DPP including communal support, ease of information, and the convenient location of the educational venue. Some providers acknowledged the healthy lifestyle component of the program to be a viable success and motivating component in reaching diabetes prevention goals. For example, a family medicine physician said, “What I like the most about the DPP is that they talk about nutrition but also have a holistic approach. It focuses on obesity and healthy weight with the help of a healthy diet.” Additionally, an internal medicine physician stated:

*I like the activity component…the idea of physical activity encouragement…I think a really important thing is knowing how activity affects your blood sugar levels, and how certain foods affect them, and how following the healthy diet and being active actually prevents long-term problems.*

Benefits of DPP: Patient Perspectives

Patients participating in DPP programs indicated communal support and an encouraging environment are beneficial and assist in their efforts toward diabetes prevention. A female participant provided the comment, “It’s a feeling of
everybody having something in common. I feel comfortable here talking, because I know everybody understands, probably, what I’m going through. I understand what you’re going through.”

The comfort and ease of the program was also highlighted as a benefit of the curriculum. For example, one participant said, “I like the simplicity of just dealing with one thing. If I worry about fat grams, and I worry about it good enough, I will come in and will have lost some weight. That works for me.”

**Barriers to the DPP: Program Facilitator Perspectives**

**Cost**
The implementation costs for organizations to offer DPP classes is an important consideration for future policy decisions. Program facilitators discussed cost barriers in two contexts. They described the investment costs necessary to run the program and the need for insurance coverage to relieve patient financial burden. For programs, there are several operational costs including staff salaries, data tracking software, cost of materials, incentives, and purchasing supplemental materials like nutrition books.

Program facilitators also reported that participant costs impede recruitment and success in the DPP. While some programs offer reduced rate or free access to the DPP due to grants or special coverage, these offers are not long-term solutions. Without insurance coverage many participants are unable to afford the program. One program facilitator said, “The biggest problem is seeing that population that has no insurance, or their insurance doesn’t cover for them to come to class.”

**Content**
The content of the DPP curriculum is described as outdated. For example, a program facilitator stated, “Because you can’t change the curriculum, one of the barriers we see from our coordinators is that the curriculum is not up to date. They haven’t changed it since whenever they wrote it in the ‘90s.” There is also a reported lack of cultural competency. For example, the curriculum is offered in English and Spanish, but there were no ethnic dishes used as examples in the curriculum. This can make it challenging to engage diverse groups.

**Time**
Program facilitators perceived the length of the program, scheduling conflicts, and the time commitment required in the program as barriers when attempting to recruit new participants. Potential participants are dissuaded by the long-term format of the program and report having difficulty fitting classes into their schedule. However, facilitators report that once participants become engaged in the sessions, many appreciate the long-term support and education afforded by the DPP. The time commitment becomes an asset.

**Barriers to DPP: Healthcare Professional Perspectives**

**Lack of Knowledge**
Many of the providers indicated the lack of knowledge about the existence of the program was a barrier to referring to the program.

**Credibility**
The credibility of the program was noted by a few providers questioning if group facilitators may not be as informed as medical professionals about issues with pre-diabetic patients. Physicians explained that if they did not know what was taught or felt it was a credible program they would not make referrals to DPP programs. For example, an internal medicine physician stated:

*It’s so complex…Because a lot of people, especially with the non-compliant people, they have a lot of other issues, life issues, financial issues that really prevent them from getting control of their diabetes and their health. Probably adding on some sort of mental health counseling.*

**Cost**
Insurance coverage or cost issues and time commitment restraints were also noted as barriers. Another internal medicine physician stated:

*Expense is probably the number one thing, if their insurance doesn’t pay for it. As a whole, patients don’t really like to pay for anything. Number two is the time commitment that they have to put into the comprehensive programs. Those are probably the major barriers.*
Barriers to DPP: Patient Perspectives

Time
There are numerous barriers for participating in the DPP programs. Some patients vocalized how the time commitment or limited time for the program was a hindrance to participation at times. Transportation and timing of classes were barriers for existing participants. For example, a male participant provided the following comment:

*I mean the education classes, it’s not that you don’t know where they are. You know where they are. It’s the motivation to go and the desire, the interest, and the environment. And available on weekends, or evenings, or something around a work schedule and not in the middle of the day.*

Content
Patients felt that the program curriculum was a bit “too basic” at times and more techniques or education were needed.

Cost
Additionally, the cost of the program and insurance coverage could possibly cause patients to reconsider participating in the program. For example, a female participant said, “This sounds fantastic, but is it going to cost me because my insurance is not going to cover it?”

SURVEY DATA RESULTS

Healthcare Provider Perceptions of DPP Programs
A key finding from the survey data is that only 51% (128/250) reported referring patients with prediabetes to DPP programs. A little over half of the respondents (55%; 138/250) felt that DPP programs are helpful to their patients with 53% (132/249) stating that they were “very satisfied” or “satisfied” with DPP programs.

When asked to rank what aspects of the DPP they like best, HCPs reported the highest ranking factor as “dietary education” (30%; 78/257), followed by “peer support” (25%; 64/257), “group setting” (18%; 46/257), and “lifestyle coach/non-professional leader” (15%; 39/257).

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Two barriers were equally reported as being primary barriers to referring prediabetes patients to DPP programs, “patients’ lack of interest” and “cost for patients due to lack of insurance coverage” (28%; 68/244 for each).

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When reporting barriers for patients to attend DPP, healthcare providers reported “motivation to attend” (41%; 99/243), time/schedule of classes (25%; 60/250), followed by cost to patient (21%; 52/243), transportation (8%; 19/250), and child care needs (5%; 13/243).

While 53% (132/248) believed that the information taught in DPP was “about right,” a proportion of healthcare providers (29%; 72/248) were unaware of what is taught in DPP. Suggestions for changing DPP programs were dominated by the “referral process” (38%; 94/246), “location of classes” (21%; 51/246); “content of classes” (15%; 38/246), “time of classes” (14%; 34/246), and “quality of instructors” (15%; 38/246).

For HCPs who stated that they were or were not certified diabetes educators, and for those who were identified as male or female, the data were segregated and compared via Analysis of Variance techniques (ANOVA F-tests) to see what significant results, if any, ensued. Those who are certified HCPs are more likely to be “very satisfied” with the DPP programs, while also suggesting that changes should be made to DPP “content.” Those who are not certified are significantly more likely to say that they are “not sure where to refer my patient” and also more likely to say they are “not sure what is taught in the DPP programs.” Those who are not certified are also significantly more likely to mention “time” as something that needs to be changed with DPP.
Patient Perceptions of DPP Programs

Data received by participants in the Diabetes Prevention Program reports that the program was well received. Respondents (n = 50) generally reported a positive impression of the DPP, with the majority (90%; 45/50) either “very satisfied” (74%; 37/50) or “satisfied” (16%; 8/50) with their experience in the program. Most participants also felt the “length of the program” (92%; 45/50) and “content” presented (86%; 42/50) were appropriate for meeting their expectations. Only 30% (15/50) of participants reported difficulty attending the classes, citing “inconvenient times/schedules” and “lack of motivation” as the greatest challenges. It should be noted that several participants were able to attend classes offered at their workplace, making attendance easier and more convenient.

Patients responded to what would help make their lives with prediabetes easier. The responses are consistent with the DPP program design, further supporting the patient satisfaction findings.

Audience Segmentation: DPP Patient Interactions

Several of the key demographic variables were examined for interactions with evaluation and opinion questions on the survey using Independent Samples t-test and Pearson Correlation Coefficients. None of the demographic variables (gender, age, race/ethnicity, level of education, type of health insurance coverage) were found to have a statistically significant relationship with any of the evaluation or opinion questions. These findings suggest there are no relations between demographic variables and patient responses for this sample. An explanation for the lack of interaction may be inherent homogeneity in the DPP sample.

DISCUSSION

This research study examined the factors that motivate and deter people at risk for developing type 2 diabetes from utilizing the evidence-based Diabetes Prevention Program. Physician referrals are viewed as powerful encouragements for patient behavior change; therefore, understanding physician perceptions is critical to addressing their concerns about the program. Results from the survey data demonstrate that only about half of healthcare providers refer patients to the DPP, which may be in part due to the lack of awareness and knowledge about the program. Additionally, providers reported during interviews that they question the credibility of the program since classes are not led by medical professionals, and 29% of survey respondents reported being unaware of what is actually taught in the DPP classes.

Program length, scheduling conflicts, and time commitment were repeatedly noted as barriers to participation by HCPs, program facilitators, and participants during interviews and focus groups. This sentiment was also relayed through survey data by many participants who desired classes at their workplace (e.g. during lunch) to make scheduling, transportation, and arranging childcare less difficult. Likewise, cost to participate in the program was stated as a deterrent for engaging in the DPP. Program facilitators, HCPs, and patients all conveyed that the out-of-pocket costs to participate in the program may be too expensive for those without insurance, or whose insurance will not cover the costs of the program; this was reflected in both the qualitative and quantitative data.

Interestingly, length of the program was regarded as both a barrier and a benefit by program facilitators and DPP participants. The year-long format was initially perceived as a barrier due to the extensive time commitment, but once participants engaged in the program they valued the extended time frame as it provided the opportunity to develop supportive relationships and reinforce behavior change. This hesitance for patients to participate in the DPP was also reflected in the survey data by providers and patients who both reported...
lack of “motivation to attend” as the greatest barrier for engagement. Participants, program facilitators, and HCPs all expressed during interviews the benefits of the long-term format in that it allows for incremental lifestyle change. The nutritional and physical components praised by HCPs are presented in a slow, progressive format that allows for ease of information comprehension which is appreciated by participants who fear being overwhelmed. Additionally, the extended length of the program allows participants to build relationships and provide communal, peer support. Participants disclosed during interviews their joy of being able to openly share their feelings and the struggles they experience making lifestyle changes with others who truly understand. Program facilitators also reflected on the power of peer support for fostering accountability and encouragement among participants.

Finally, the flexibility built into the DPP was recognized by program facilitators, HCPs, and participants as one of the program’s strengths. The program enables classes to be taught in a variety of community settings, allowing for the creation of convenient times and locations.

Given the benefits of the program, 90% of survey respondents reported an overall positive impression of their experience participating in the DPP. Unfortunately, the lack of knowledge about the DPP is a barrier that must be overcome to increase utilization of this evidence-based program.

**CONCLUSION**

Findings in this formative research study provide evidence that the Diabetes Prevention Program is successful in helping individuals with prediabetes make positive lifestyle changes and attain better health management. Healthcare providers, program facilitators, and patients/participants all believe the DPP provides individuals with support and the opportunity to learn essential skills for healthy living. However, while the overall benefits of the program were expressed, there were barriers to program utilization noted by all populations. Cost of the program and the significant time commitment necessary to complete the programs were two barriers that were discussed on numerous occasions. While those barriers are at a macro-level, the large barrier present, the lack of knowledge about the programs, is something that can be addressed and would create significant impact.

**FUTURE DIRECTIONS**

Results of this study highlight two significant findings. First, there is a general lack of awareness of the Diabetes Prevention Program among patients and healthcare providers. Those who heard of the program had limited knowledge of what the DPP entails and how to find a local program. Second, participation in the DPP aids in better health management, lifestyle change, and diabetes prevention. These findings emphasize the need to increase knowledge and awareness of the programs offered in local communities.

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**CONFLICT OF INTEREST DISCLOSURES**

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. The authors report no potential conflict of interests relevant to this article.

**REFERENCES**


