Fidelity of Implementation: Facilitator Experience and Behaviors in the *Getting People in Sync (GPS)* Prediabetes Prevention Program

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Dedication

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Abstract

Fidelity of Implementation: Facilitator Experience and Behaviors in the *Getting People in Sync (GPS) Prediabetes Prevention Program*

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Nicole A. Vaughn, PhD, Advisor

It has been 14 years since the results from the initial Diabetes Prevention Program were published. Since then, this evidence-based program has been adapted by researchers to fit the needs, resources, culture, and language of various communities in diverse settings. Translating an intervention to community settings consists of a myriad of factors leading to program success. The participant outcomes of a program are justifiably the most important aspect of prevention programs. However, there is a dearth of research on the experiences and behaviors of program facilitators. In fulfillment of the three paper model, this dissertation consists of three separate papers that have been prepared for peer-reviewed journals. In Paper 1, the literature on adapted DPP studies in community settings was assessed using the PRISMA Framework to determine program facilitator selection, training and evaluation fidelity of implementation. In Paper 2 a qualitative analysis of the session audio tapes of an adapted DPP study, the *Getting People in Sync (GPS) Prediabetes Prevention Program* was conducted to assess fidelity to the program manual by GPS Facilitator during program implementation. Paper 3 consisted of mixed methods approach to assess facilitator experiences and behaviors with the GPS Program manual, training, and program implementation. A qualitative analysis of individual interviews, short survey, and GPS Participant outcomes were used to explore the best practices and challenges of program implementation.
Introduction

Public health practitioners hold a significant role in addressing health disparities through the dissemination and implementation of evidence-based programs. The Diabetes Prevention Program is an evidence-based program implemented 14 years ago. This initial study was implemented to assess if weight loss through lifestyle change or metformin could prevent or delay the onset of type 2 diabetes in individuals with prediabetes (Diabetes Program Research, 2002). What this study found was that through modest weight loss participants with prediabetes could reduce their risk of type 2 diabetes. Translation of this initial study to community settings includes adaptations to meet the needs and resources of community. However, there is a dearth of research on the adaptation behaviors and experiences of program facilitators during implementation, fidelity of implementation, and how closely the initial protocol in was followed in manner and spirit (Linnan & Steckler, 2002). This dissertation aims to explore and evaluate the various components influencing program adherence by program facilitators.

Translational Research

The impact of research on populations disproportionately affected by health disparities is especially important when considering how to translate research to meet these communities. The medical, health services research, and public health fields utilize translational research to deliver the benefits of evidence-based interventions to communities. Medical researchers are often associated with T1 research and health services researchers and public health researchers are associated with T2 research. It is critically important to understanding these two arms of translational research and how
public health research can best utilize their skills within this field to address health disparities.

**Medical researchers and T1 research**

Understanding the context of how translational research is utilized requires defining the roles, goals, and researchers involved. Within the medical community translational research is the mechanism in which scientific results offer new drugs, devices and treatment options for patients (Woolf, 2008). This distinction is important when considering not only the impact of the research but also the skills needed to belong to this field. This area is often denoted as T1 research and most often associated with clinical scientist in laboratories working with cutting-edge technology who possess skills in molecular biology, genetics, and other basic sciences (Woolf, 2008). The focus of this research is bringing these results to patients. T1 research focuses on how to best facilitate the transfer of knowledge gained on disease mechanisms to diagnosis, therapy, and prevention within a medical setting (Sung et al, 2003). This area of research is beneficial to providing improved health care and medical services.

**Health services research, public health, and T2 research**

Translation research is critically important to health services research and public health. For researchers within these fields translational research is known as T2 research and is the manner in which research is translated into practice (Woolf, 2008). Within T2 research there are a variety of aims to reaching improved health. The aims of T2 research are determining how to best integrate the results of research into clinical practice and health decision making (Sung et al., 2003). T2 research encompasses a diverse set of skills and roles. The personnel needed within T2 research are those individuals with
strengths in implementing and evaluating interventions in real world settings (Woolf, 2008). With such a broad category of roles the necessary skills include “program design, clinical epidemiology, communication theory, behavioral science, public policy, financing, organizational theory, system redesign, informatics, and mixed methods/qualitative research” (Woolf, 2008). These strategies are taken from behavioral and social science disciplines (Office of Behavioral and Social Sciences Research, 2013). The role of these researchers is diverse and they must come together to improve health through implementation and evaluation of interventions.

**Dissemination and Implementation Science**

Dissemination and implementation science offers public health researchers and health services researchers the opportunity to improve the knowledge and skills needed to bring evidence-based programs to communities. Lomas defines dissemination as an active flow of information from the source to the audience in a tailored format (1993). Implementation involves identifying barriers to use of knowledge and utilizing various mediums to communicate the information to a specific audience (Lomas, 1993). The aim of dissemination and implementation research is to ensure evidence-based strategies are used in clinical and public health practice (Office of Behavioral and Social Sciences Research, 2013). As previously stated T2 research often requires a diverse set of knowledge and skillsets to enable this dissemination and implementation process.

**Theoretical Frameworks**

The lack of a theoretical framework within implementation science highlights the need for improving capacity and funding to develop this area of research. Implementation science has moved to integrating and developing theoretical foundations to better
understand strategies for successful implementation (Nilsen, 2015). Currently, implementation science utilizes theories from disciplines such as psychology and sociology (Nilsen, 2015). Such diversity in emerging as well as borrowed theoretical approaches highlights the need for work in this growing field to better equip T2 research. Nilsen highlights the following “three overarching aims of theories, models, and frameworks in implementation science: (1) describing and/or guiding the process of translating research into practice, (2) understanding and/or explaining what influences implementation outcomes and (3) evaluating implementation” (2015). Further, Nilsen discusses the five categories of theoretical approaches as process models, determinant frameworks, classical theories, implementation theories, and evaluation frameworks (2015). Evaluation frameworks that exist and are widely used are the PRECEDE-PROCEED and RE-AIM frameworks. The RE-AIM framework evaluates the reach, effectiveness, adoption, implementation, and maintenance of the intervention (Glasgow, Vogt, and Boles, 1999). The PRECEDE-PROCEED framework stands for Predisposing, Reinforcing, and Enabling Constructs in Educational/Environmental Diagnosis and Evaluation, and Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development (Green and Kreuter, 2005). PRECEDE consists of four stages that include identifying the results, setting priorities, identifying factors that affect the behaviors, attitudes, and environmental factors, and lastly identify administrative and policy factors (Community Tool Box, n.d.). The PROCEED consist of four stages of evaluation; implementation, process, impact, and outcome evaluation. The PRECEDE-PROCEED model best fits this study due to the participatory model and incorporates implementation evaluation (Community Tool Box, n.d.).
Government agencies recognize the importance of translating research to strategies but there is little development of the process through scientific findings, materials and resource for interventions (Brownson, Colditz, & Proctor, 2012). Structures that exist for dissemination and implementation differ in theory and in practice. Green, Ottoson, Garcia, & Hiatt note the gap between science and practice, dissemination research is highly institutionalized and centralized whereas application of this information is highly decentralized (2009). In addition, T2 researchers have not agreed upon a name and scope which is problematic as Woolf claims the role of health service researcher and public health have the opportunity to save many lives (2008). This lack of an established definition has an impact on the role of policy makers and academic researchers who need an established distinction between both T1 and T2 research and within T2 research to develop and implement treatments for guidance and funding (Woolf, 2008). Focus on dissemination and implementation science is not only limited in theory and practice but also in funding. The National Institute of Health spends about $30 billion per year on basic and efficacy research and a very small fraction on dissemination and implementation research (Glasgow, Vinson, Chambers, Khoury, Kaplan, & Hunter, 2012). This lack of funding and support for dissemination and implementation science must be addressed as well. Supporting T2 research must include funding opportunities not only for research but a training academy to equip individuals with the knowledge and skills within implementation science (Woolf, 2008). These skills not only require a diverse set of skills but a set of values to better guide the field and practitioners of dissemination and implementation science.
**Five Core Values**

Within the growing field of dissemination and implementation, Glasgow and colleagues offer a set of values to consider as the field moves forward. Glasgow et.al, recommend the following five core values for dissemination and implementation research: rigor and relevance, efficiency, collaboration, improved capacity, and cumulative knowledge (Glasgow et. al, 2012). Each of these values is in pursuit of strengthening the translation of evidence-based programs to improved health outcomes for communities. Rigor and relevance means researchers should focus on diverse and low resource settings in an attempt to not solely conduct research but to ensure evidence-based programs are benefiting these communities (Glasgow et.al, 2012). For the DPP this would include determining the best ways to train and prepare lay community to implement and sustain an intervention. To facilitate collaboration alternative research designs such as an interdisciplinary approach is needed to combine the efforts of clinical, public health, and community research (Glasgow et al, 2012). This approach is needed to bridge the gap between science and service. Within a clinical setting to address efficiency Electronic Medical Heath Records (EHR) can provide a context and inform implementation strategies (Glasgow et., 2012). In order to improve capacity, researchers should be trained on dissemination and implementation methodologies (Glasgow et. al, 2012). Published cumulative knowledge by various fields will provide a source for dissemination and implementation science (Glasgow, 2012). An example of this training is the National Institutes of Health and Veterans Health Administration five-day Training in Dissemination and Implementation Research in Health (TIDIRH) (Meissner et al., 2013). The core methodology was a train-the-trainer model through large and small group
discussions (Meissner et al., 2013). In addition, tools such as the National Registry of Evidence-Based Programs and Practices, The Research-Tested Interventions Programs, and Research to Reality should be considered in the move to bridge the gap between researchers and practitioners (Glasgow et al., 2012). Lastly, cumulative knowledge through publications to journals such as Implementation Science serves as an important space for researcher to contribute to the field of dissemination and implementation science (Glasgow et al., 2012). These core values must be important not only to the health of populations but also to improving the field and tools of dissemination and implementation science which is a growing field that offers a significant opportunity to addressing how research impacts lives.

**Active and Passive Process**

To better facilitate the translation of benefits from research to communities the science behind T2 research should be a well understood mechanism. There is a push for improving the link between science and service and understanding the role and importance of implementation science (Fixsen, Blase, Naoom, & Wallace, 2009). This link differs not only by T1 and T2 fields but also in the process of achieving this link. Fixsen et al., illustrated the need to move from the passive process to an active process of implementation science (2009). The differences in these processes highlight the need to create the infrastructure around dissemination and implementation science. According to Fixsen et al., the passive process of information reaching practice is common in the U.S. specifically research publications are read by managers and practitioners to help them better serve populations (2009). The active process involves purveyors who are individuals who are knowledgeable and well equipped to attain high fidelity use of
scientific results (Fixsen et al., 2009). This move to a more active role in disseminating evidence-based programs requires not only individuals with the necessary knowledge but there is a need to create structure and learning spaces for these individuals.

**Stages and Core Components**

The knowledge within implementation science is complex and requires an understanding of the important components to implementation. Fixsen et al., makes the case for utilizing both the stages of implementation and core components of implementation. Fixsen et al., identifies the six stages of implementation as exploration, installation, initial implementation, full implementation, innovation, and sustainability (2009). The core implementation components are staff selection, preservice and in-service training, ongoing coaching and consultation, staff evaluation, decision support data systems, facilitative administrative support, and systems interventions (Fixsen et al., 2009). This distinction is necessary because the components and the process of implementing each needs to be effective to implement an effective program well (Fixsen et al., 2009). The core implementation components can be implemented well for an ineffective program and vice versa (Fixsen et al., 2009). To achieve this end there must be careful consideration of how to utilize each of these parts of the implementation process.

A deeper look at the core implementation components reveals a number of complex issues at hand for researchers. When selecting staff the required qualifications should extend past academic credentials or experience. It is necessary to consider an individual’s “knowledge of the field, basic professional skills, common sense, sense of social justice, ethics, willingness to learn, willingness to intervene, good judgement, and empathy” (Fixsen et al., 2009). To fully prepare individuals there needs to be training and
information around the topic, values, reasons for practices, and opportunities to learn new skills (Fixsen et al., 2009). This opportunity to learn new skills requires the researcher to provide support to staff. Coaching and consultation should not occur solely at the implementation stage but as long as the program is in place (Fixsen et al., 2009). This long term commitment to training is a benefit to not only support but to better understanding the needs of the staff and community. Evaluation of staff is beneficial to the staff effectiveness and provides guidance for staff selection, training, and coaching (Fixsen et al., 2009). Fixsen et al., et al., found in their review that high fidelity implementation produced better outcomes (2009). A commitment to evaluation could provide space to improve fidelity of implementation during an intervention and may allow researcher to best understand how adaptation impact participant outcomes. Decision support data systems provide direction with process and outcomes data for policy decision makers and those implementing the program (Fixsen et al., 2009). The outcomes of a study can provide a basis for determining not only the effectiveness of a program but what is needed to achieve these successes. In addition, facilitative administration must provide support and leadership to ensure high levels of program effectiveness (Fixsen et al., 2009). Lastly, systems intervention which is outside support consisting of financial, organizational, and human resources (Fixsen et al., 2009). This step speaks to not only funding but how to best evaluate the success of a program.

Dissemination and implementation science provides programs like the DPP the opportunity for improved guidance on delivering evidence-based programs to populations in various community settings. It is important to consider within this area of research who will take part in the delivery of these evidence-based programs and their role. Program facilitators play an active role in the dissemination and implementation of evidence-based
programs. The avenues to achieving this goal of participant outcomes need to be better understood.

**Adapting the DPP for community settings**

Dissemination and implementation science offers tools for evidence-based programs to reach communities disproportionately affected by health disparities. This is critical for improving the health of communities requiring innovative approaches. Health disparities persist due to complex factors that affect vulnerable populations. Addressing these complex factors requires innovative techniques that take into account these diverse influences on health outcomes in community settings. Reaching high-risk individuals in communities might require the DPP to be delivered through a variety of local venues, such as schools, churches, or a multitude of other organizations, excessive variation in how the program might be delivered imposes a threat to ensuring its fidelity at a national scale (Ackermann, 2013).

**Role of Program Facilitators**

Program facilitators are an important part of the dissemination of evidence based education. A look at their behavior can provide insight into program implementation in practice. Hill, Maucione, and Hood found that among 42 facilitators fifty percent of all changes were due to lack of time, forgetting the material, or disagreeing with the content (2007). Comparing changes in materials in theory and in practice provide an important component to the development of fidelity criteria. “Those who were confident about their abilities as facilitators were more likely to report adding materials as acceptable but less likely to report actually changing materials” (Hill, Maucione, and Hood, 2007). This difference in facilitator perspective and actual behavior as it relates to confidence is
important for program evaluators who develop assessment tools. These facilitator perspectives do not necessarily express their actual behaviors which may not be reflected in assessments limited to reporting behaviors or beliefs. Changes were less likely to be viewed as acceptable by those with more experience as facilitators but those who did make changes often felt guilty (Hill, Maucione, and Hood, 2007).

**Health Disparities and Chronic Conditions**

A key health indicator for prediabetes is obesity which has been on the rise among adults of all income and education levels in the United States (“Adult Obesity Facts”, 2012). According to the 2009 to 2010 National Health and Nutrition Examination Survey 78 million adults or 35.7 percent of the United States adult population were obese (Ogden, Carroll, Kit, and Flegal, 2012). This same data set revealed 12.5 million children and adolescents were obese accounting for 16.9% of the children and adolescent population in the United States (Ogden et al., 2012). These statistics illustrate a serious problem in health status for all citizens in the United States.

Individuals with specific risk factors should be tested for prediabetes. Individuals who are at risk for prediabetes are those who are overweight and age 45 years or older (“Prediabetes FAQs”, 2012). Risk factors such as being overweight are important but consultation with a doctor is important to determine the pertinence of testing. Individuals over the age of 45 and with normal weight should ask about the appropriateness of testing (“Prediabetes FAQs, 2012). Those younger than age 45 who are overweight may have to be tested if they have any of the following risk factors; high blood pressure, low HDL cholesterol and high triglycerides, family history of diabetes, history of gestational diabetes, giving birth to a baby more than 9 pounds, or if they belong to an ethnic or
minority group at high risk for diabetes (“Prediabetes FAQs”, 2012). Racial and ethnic
groups at high risk for diabetes are African Americans, Mexican Americans, American
Indians, Native Hawaiians, Pacific Islanders, and Asian Americans (“Prediabetes FAQs”,
2012). Prediabetes and the associated risk factors require assessment by a health
professional. Blood glucose testing for prediabetes is important but knowledge of overall
health status can better facilitate recognizing personal risk for prediabetes and diabetes.
Those who have normal blood glucose levels should be tested every three years or as
often as their doctor recommends (“Prediabetes FAQs”, 2012). Individuals who are
diagnosed with prediabetes should be tested for type 2 diabetes every one or two years
(“Prediabetes FAQs”, 2012).

**Weight Status as a Risk Factor for Prediabetes**

An important risk factor for prediabetes and type 2 diabetes is whether an
individual is overweight or obese. Disparities for this risk factor exist among African
Americans compared to their white counterparts in every age group among men and
women. Adults with a Body Mass Index of 25 to 29.9 are diagnosed as overweight (The
Office of Minority Health, 2012). According to the 2010 Health Interview Survey Non-
Hispanic Black women were 1.1 times more likely to be overweight than Non-Hispanic
White women (The Office of Minority Health, 2012). A look at the data for obesity rates
further illustrates a disparity in health status for African American women compared to
White women. Individuals with a BMI of 30 or greater are considered obese (The Office
of Minority Health, 2012). In 2010, Non- Hispanic Black women were 1.4 times more
likely to be obese than Non-Hispanic White women (The Office of Minority Health,
2012). Higher rates of being overweight and obese remain consistent among African
American girls and women. Non-Hispanic Black men were 1.1 times more likely to be obese than Non-Hispanic White men (The Office of Minority Health, 2012).

The prevalence of overweight and obesity status in the African American population persists across gender and age groups (Centers for Disease Control and Prevention, 2012; The Office of Minority Health, 2012). Those who are obese are at an increased risk of developing prediabetes or type 2 diabetes. Overall, in 2010 Non-Hispanic Blacks were 40 percent times more likely to be obese than Non-Hispanic Whites (The Office of Minority Health, 2012).

**Socioeconomic Status, Weight Status, and Increased Risk for Prediabetes**

Socioeconomic status is measured by an individual’s education, income and occupation (American Psychological Association, n.d.). The influence of racism and discrimination on the health of racial and ethnic minorities must be considered when discussing the risk of obesity within the African American community. Addressing health disparities with regards to diabetes involves nutrition and physical activity. These two factors alone are influenced heavily by neighborhood safety, access to healthy foods, and affordability of healthy foods.

Education is an important component to health as it influences the ability to fully engage in society and access resources for a healthy lifestyle. Data from 2011 indicated that individuals without a high school diploma experienced the highest rates of obesity at 32.8 percent (Levi, Segal, St. Laurent, Lang, & Rayburn, 2011). Those who graduated from a college or technical school had obesity rates of 21.5 (Levi et al., 2011). Difference in obesity rates along the educational gradient is an important factor as there is an
increase in education attainment the percentage in obesity rates decreases (Levi et al., 2011). Future prospect on quality of life are influenced by educational attainment. With low educational attainment there are limits on employment opportunities and household income. Among those who earned less than $15,000 was the highest rate of obesity at 33.8 percent (Levi et al., 2011). This gradient was persistent as one moved up the household income gradient the rates were lower, the lowest rate being 24.6 percent among income levels above $50,000 (Levi et al., 2011).

**Poverty as a Risk Factor for Obesity and Prediabetes**

African Americans are disproportionately affected by poverty. Data from the National Poverty Center reported in 2010 the poverty rate for African Americans was 27.4 percent compared to 12.1 percent of Non-Hispanic Whites (2010). African Americans are affected by poverty at a rate twice that of Non-Hispanic Whites, limiting their financial stability and quality of life. These limited options and purchasing power can negatively influence diet and access to healthy foods. That same year the rate of poverty for African American children, those under the age of 18, was 38.2 percent compared to 12.4 percent for Non-Hispanic White children (National Poverty Center, 2010). Data from the United States Census Bureau showed among those states in the top 10 for obesity there were six states with the highest poverty rates (Levi et al., 2011). These states were Mississippi, Louisiana, Kentucky, Arkansas, West Virginia and Tennessee (Levi et al., 2011). Among those states with the highest poverty rates seven were Southern states (Levi et al., 2011). Southern states made up the top eight states with the highest rates of adults diabetes and these same states made up the top eight states with the highest rates of obesity (Levi et al., 2011).
**Prediabetes**

According to the Centers for Disease Control and Prevention an estimated 79 million Americans in the United States over the age of 20 have prediabetes (2011). This statistic is especially important considering racial and ethnic minorities are disproportionately affected by diabetes. Among African Americans 4.9 million have diabetes of which 12.6 percent have been diagnosed with diabetes (National Diabetes Education Program, 2011). Prediabetes serves as an important clinical diagnosis for prevention of diabetes and associated health complications. An individual is diagnosed with prediabetes when their A1C level is between 5.7 percent and 6.5 percent (American Diabetes Association, 2016). A clinical diagnosis of prediabetes is significant because it provides the opportunity to prevent the onset of type 2 diabetes. Those who are diagnosed with prediabetes can reduce their risk of developing type 2 diabetes by 50 percent if the individual loses 7 percent of their body weight in combination with 30 minutes of moderate exercise five days a week (American Diabetes Association, 2016). With a diagnosis of prediabetes there is an opportunity for lifestyle changes and the potential to return to a normal blood glucose level (American Diabetes Association, 2016). An individual is at an increased risk for other chronic disease when they live with prediabetes. Individuals with prediabetes are at a 50 percent increased risk for heart disease or stroke (American Diabetes Association, 2016). Those who go on to develop type 2 diabetes are at risk for complications such as skin infections, eye problems that could lead to blindness, neuropathy, peripheral arterial disease, ketoacidosis, stroke, hypertension, heart disease, or gastroparesis (American Diabetes Association, 2016).
African Americans in Philadelphia are disproportionately affected by diabetes. Over a ten-year timeframe the rate of diabetes among adults in Philadelphia increased from 9.4 percent in 2000 to 13.3 percent in 2010 (Mallya, 2011). In 2010, diabetes affected 17.20 percent of African Americans compared to 11.10 percent Whites and 10.30 percent Hispanics in Philadelphia (Mallya, 2011). Higher rates in status of obesity and overweight are seen among African American compared to Whites and Hispanics (Mallya, 2011).

Preventing the onset of type 2 diabetes can be achieved through management of prediabetes. This is important for individual health and population health. A goal for Healthy People 2020 is to reduce the annual number of new cases of diagnosed diabetes in the population from 8 new cases per 1,000 population aged 18 to 84 years to 7.2 new cases (HealthyPeople.gov, 2012). Prediabetes prevention and intervention programs are an important component to achieving this national goal for improved health status.

The Faith Community and Prevention Programs

To achieve these improved health goals researchers must utilize a variety of innovative techniques to reach communities disproportionately impacted by health disparities. The faith community provides one setting for reaching communities. The three distinct relationships researchers can establish in a faith community are faith placed, faith based, and collaboration (Campbell, Hudson, Resnicow, Blakeney, Paxton, and Baskin, 2007). These relationships vary based on the development of the program and the roles of each partner. In faith based programs individuals who are part of the congregation take an active role in the development of the program but often not report outcome data (Campbell et al, 2007). Programs originating outside of the church and involving various
professionals who are not part of the congregation are faith placed programs (Campbell et al., 2007). Congregation members and the health professionals outside the church working together to design and deliver a program are in a collaborative relationship (Campbell et al., 2007).

**Faith Placed Prevention Programs**

Reaching communities through faith settings offer a number of benefits to strengthening the collaborative relationship with researchers. Forming trust with participants can be facilitated with the inclusion of the church in the research process. Established institutions such as the church are highly visible, respected and credible for many community members (Campbell et al., 2007). This distinct role of the church can build and strengthen the relationship between church members and the research team (Dodani and Field, 2010). Programs placed in a church allow for researchers and participants to maintain contact. Churches provide the benefit of continued contact and support with program participants (Dodani and Fields, 2010). These components are beneficial not only to program development and outcomes but the collaborative relationship.

The Diabetes Prevention Program curriculum has previously been adapted for church placed and church based health promotion program to reach communities disproportionately affected by diabetes (Dodani and Fields, 2010; Boltri et al, 2008,). As a community based participatory research program the Getting People In Sync Pre-Diabetic Program is a faith placed program established through a collaborative relationship involving local African American Churches in Philadelphia and Drexel University School of Public Health.
Project Not Me

The GPS Program utilizes a faith placed approach and videos to reach communities disproportionately affected by diabetes. This prediabetes prevention program utilized the 16-episode series Project NOT ME to aid in disseminating the Diabetes Prevention Program (DPP) curriculum. The videos were developed by UnitedHealth Group and made accessible by Comcast on Demand (United Health Group, n.d.). In the video series, six adults complete the 16 weekly sessions in an effort to lose 5 to 7 percent of their body weight to reduce their risk for type 2 diabetes by 58% (United Health Group, n.d.).

The GPS Program collaborated with Comcast and United Health Group with the purpose of reaching minority populations at risk for type 2 diabetes. These videos were utilized in the GPS Program in combination with group facilitation to dissemination the Diabetes Prevention Program materials.

The DPP has been adapted in a number of setting to reach communities disproportionately affected by diabetes. The YMCA has been a setting to provide communities with this evidence based program but limited to those with access to a YMCA (Ackermann, 2013; Ackermann & Marrero, 2007). In addition, the DPP has been adapted to by the University of Pittsburgh with outcomes focused on weight loss, waist circumference, and body mass index (Kramer et al., 2009). These programs report successful outcomes but limited assessment on the experiences of program facilitators.

History of Lay Health Educators

Lay health educators provide an opportunity to develop interventions that fit the needs of the local community. Often lay health educators are included in the definition
for community health workers lay health workers. The definition of a Community Health Worker includes a myriad of titles including lay health advocate, community health advocates, community health representatives, peer health promoters, community health outreach workers, and promotores de salud (Wiggins & Borbon, 1998). The roles and titles of lay health advisors changes according to the intervention or program being implemented. These liaisons provide a link between health care professionals and community members with the goals of improving appropriate health care use and reducing health risks (Nemcek and Sabatier, 2003). With a strong understanding of the local language and cultural beliefs the lay health educator provides insight on development of health materials (Dodani and Fields, 2010; Nemcek and Sabatier, 2003). The level of allegiance to their communities must be respected and sustained by programs in order to build capacity at the individual and system level (Nemcek and Sabatier, 2003). Lay health advisors are important to promoting community ownership (Dodani and Fields, 2010). Successful integration of lay health educators provides for a culturally and linguistically competent manner of meeting the needs of diverse populations (Dodani and Fields, 2010; Nemcek and Sabatier, 2003).

**Community Health Workers and the Role of GPS Facilitators**

The role of a Getting People in Sync (GPS) Program facilitator falls into the category of a Community Health Worker (CHW). Community health workers are lay members of communities who work either for pay or as volunteers in association with the local health care system in both urban and rural environments and usually share ethnicity, language, socioeconomic status and life experiences with the community members they
serve. This distinction is necessary because the GPS Program aims to implement a program meeting the needs of the community in a culturally appropriate manner.

Distinct differences exist between the specific roles of CHWs and the GPS facilitators. The Community Health Advisor Study of 1998 identified seven core roles of CHWs: cultural mediator, counseling and support, culturally appropriate health educator, advocate, assure services access, capacity building, and provide services (Wiggins and Borbon, 1998). The GPS facilitators adopt two of the seven core roles during program intervention specifically health education and support. CHW provide culturally appropriate health education using concepts of health promotion, disease prevention, and chronic disease management (Wiggins & Borbon, 1998). An eligibility criterion for GPS is participants do not have diabetes so there is no discussion of diabetes management and the focus is on health promotion and diabetes prevention. CHWs provide informal individual counseling and lead social support groups (Wiggins & Borbon, 1998). Similar to CHW the GPS facilitators provided social support. However, GPS facilitators lead discussion to cultivate social support in a group setting not at the individual level. Also, the aim of this social support was not to counsel but to ensure dissemination of program materials while at the same time address barriers and facilitators to behaviors change. CHWs should have skills in the areas of communication, interpersonal, knowledge base, service coordination, capacity-building, advocacy, teaching, and organizational (Wiggin & Borbon, 1998). GPS facilitators need to master communication, interpersonal, teaching, and organizational skills.
**Training of Program Facilitators**

Community based participatory research offers the opportunity to engage members of the community in dissemination and implementation of evidence-based programs. Lay health educators or program facilitators offer a wealth of experience and skills to community prevention programs (Quinn and McNabb, 2001). However, this diversity in experience and skillsets are important and many times training may not be adequate for program implementation. It is critical to the field of dissemination and implementation science to understand how to develop training modules or components to ensure program facilitators are equipped to lead each session.

Facilitator trainings vary across programs due to the diversity of program content. However, a few core components should be considered when training program facilitators. Recognizing the complexity of the health behavior along with the knowledge and skills needed to implement the program should be considered (Quinn and McNabb, 2001). In addition, the program facilitator’s educational background, experience and their level of independence will influence the training criteria (Quinn and McNabb, 2001). Training can build upon existing knowledge and strengthen specific skillsets. These specific characteristics should be considered in both recruitment and training to ensure training is effective for all facilitators. Another important steps to establish the roles of the facilitator and the researchers (Frank, Coviak, Haley, Belza, & Casado, 2008; Tang, Nwankwo, Whiten, & Oney, 2012) with an emphasis on the supporting role of the university (Quinn and McNabb, 2001). This aspect of training provides the community with not only a role but a responsibility in the implementation of the program. It is important to limit the amount of time between training and when the facilitators actually implement the
program (Tang et al, 2012). In an effort to limit changes to the program there should be enough time to cover the content, facilitators (Hill, Maucione, & Hood, 2007).

The frequency and duration of facilitator training is dependent on the facilitators’ and researchers’ resources and schedules. However, specific training techniques have been employed in a number of chronic disease prevention programs. Training techniques include role playing which provides the opportunity for team building, self-evaluation, and constructive feedback among facilitators (Frank, Covik, Healy, Belza, & Casado, 2008). Listening and asking open-ended questions offer the facilitator an opportunity to master these skills (Tang et al., 2012). Facilitator support during the intervention consists of program materials and field support. Each facilitator should be provided with a manual that includes learning objectives, scripts, and participant materials (Frank, Covik, Healy, Belza, & Casado, 2008; Quinn and McNabb, 2001; Tang et al., 2012). Two person facilitating teams per session offer the benefits of facilitator support and a partner to practice facilitating skills (Tang et al, 2012). Over the course of program implementation training can be provided to address issue with implementing the program. Booster sessions and ongoing coaching are employed to maintain the necessary skillsets to disseminate program materials (Frank, Covik, Healy, Belza, & Casado, 2008; Tang et al., 2012).

Program facilitators offer the potential to include those with indigenous knowledge from the community. The inclusion of specific techniques offers the opportunity to build upon the knowledge, experiences, and skills of program facilitators. These techniques provide the researcher with a tool in ensuring the program implemented as intended.
Social Justice and Health Policy

The impact of fidelity of implementation has important implications for social justice within community health education and prevention and large scale dissemination of evidence-based programs particularly for populations at risk, such as African Americans, who are disproportionately affected by prediabetes and diabetes. From a social justice perspective creating health education and prevention programs with vulnerable population to reduce risk and onset of chronic disease provides a window of opportunity to reduce health disparities. This is only achieved if programs are implemented as intended. This can be difficult considering communities may not have the financial and personnel resources to closely follow program protocol.

In relation to the DPP trial the cost of implementing the program was $1,399 per participant (Ali, Echouffo-Tcheugui, & Williamson, 2012). Changes made within a program may be unavoidable and necessary to meet financial constraints. Any impact on program outcomes should be noted, however previous research indicates these consequences have not been reported or evaluated (Elliot and Mihalic, 2004; Mowbray, Holter, Teague, and Bybee, 2003). Evaluation of these programs has the potential to draw false or inadequate conclusions. For example, participants may be viewed as simply non-compliant with the program requirements, while the real barriers to adequate implementation are overlooked. There is also the potential negative impact on program participants and future lack of enrollment in health education or prevention programs.

Three Qualitative Research Methodological Approaches

The three major methodologies in qualitative research are post-positivist, interpretive, and critical (Ulin, Robinson and Tolley, 2004). Each of these methodologies
operates under differing assumptions which shape the data collection and analysis. The post-positivism methodology operates under the belief in a pattern and causal relationships in the social world that can be tested (Ulin, Robinson and Tolley, 2004). The interpretive methodology suggests the social world is constructed by group interactions so they are best understood by the individuals constructing those interactions (Ulin, Robinson and Tolley, 2004). The critical perspective assumes the social world is continuously constructed but the shift in power shapes reality and the study of it (Ulin, Robinson and Tolley, 2004). Determining which of these methodologies is employed allows the researcher to determine how they will utilize the hypotheses they are generating. The deductive approach of post-positivism assesses a hypothesis against data generated (Ulin, Robinson and Tolley, 2004). A hypothesis emerges from the data under the inductive approach in the interpretive and critical methodologies (Ulin, Robinson and Tolley, 2004).

Often the aim of qualitative research is to determine the range of responses to a particular question (Baker and Edwards, 2012). This is achieved by analyzing the data to the point of saturation, as long as different answers are emerging from the data (Baker and Edwards, 2012). I aim to assess whether the experience of program facilitators is more complex than assumed (Baker and Edwards, 2012). My research focuses on facilitator experiences through an assessment of their experiences with similar program materials across one program (Baker and Edwards, 2012).

**Framework for Evaluating Program Fidelity**

The framework for measuring fidelity of program implementation is especially important with community based participatory research. Programs may be adapted or
altered to fit the needs of the community. Elliot and Mihalic note how important it is to ensure the core elements of a program are implemented (2004).

Century, Rudnick and Freeman discuss three distinct frameworks for program evaluation (2010). The first is a framework from Dane and Schneider which assesses program integrity based on adherence, exposure, the quality of delivery, participant responsiveness, and program differentiation (Century, Rudnick, and Freeman, 2010). There is no standard definition for each of these dimensions (Century, Rudnick, and Freeman, 2010). With varying developments of definitions and measurement tools this can limit comparison of programs. However, this diversity in approaches is advantageous and critical for programs developed to meet the needs of the target population. The second framework focuses on determining whether a program implemented the core components of a program but a challenge to this framework is the lack of consensus on selecting and defining core components (Century, Rudnik, and Freeman, 2010). The third framework requires an evaluation of the structure and process, specifically, how the program was delivered, the roles and behaviors of program coordinators (2010). Currently, there is very little literature discussing adaptations to program components (Hill, Maucione, & Hood, 2007), training process, and training effectiveness (Quinn & McNabb, 2001).

Elliott and Mihalic note the importance of site selection, specifically, if there are well connected and respected local champions, strong administrative support, formal organizational commitment and staff, commitment of resources, program credibility within the community and existing operational budget to ensure sustainability (2004).
Determining the core content is an important feature Elliott and Mihalic recommended in the event that components are removed from the program (2004).

**Gap in the Field**

**Lack of program implementation evaluation for DPP programs in community settings**

Labor and resource intense programs like the DPP may be adapted and scaled down when implemented in local communities. These adaptations may lead to a significant difference in program structure compared to the original protocol not only in implementation but also in program outcomes. Inquiring about these differences is not rooted in a perspective that these changes are necessarily negative or positive but it is important to understand the process of translating evidence-based programs to a local setting. Implementation consists of the activities taken during the program and the outputs demonstrate the program is being implemented (Harris, 2010). Program outcomes are what occurred as a result of the program activities (Harris, 2010). In this study the activities for the GPS facilitators and co-facilitators include facilitator training.

**Important factors for implementation**

Adaptations of the DPP to community settings offer the opportunity to make evidence-based programs available to populations disproportionately suffering from diabetes. A meta-analysis was conducted by Ali, Echouffo-Tcheugui, and Williamson of twenty-eight studies applying the DPP in various settings (2012). The outcomes of their study provided insight to participant outcomes and program implementation factors.

Programs like the DPP consist of health education and the bridging of science and service. These interventions focus on a number of outcomes but the main outcome is
participant decreased risk of diabetes through weight loss. Ali et al., found that every additional session on top of the first 3 to 6 months were associated with additional weight change, intervention staffed by lay community were associated with better weight loss compared to the outcomes of medical, and allied health professional staffed interventions (2012). These findings are critically important for program participant and program developers. The additional sessions for program participants are important because these additional sessions could lead to improved participant outcomes. Better weight loss associated with lay community staff is especially important to this study because CBPR was the framework utilized to implement this program. Assessing not only the benefits of engaging lay educators is important but understanding the mechanism to reaching the benefits is critical to reproducing these participant experiences and outcomes.

What is the role of researcher in strengthening and supporting the engagement of lay community in staffing? The authors found important aspects of training included basic knowledge, organizational skills, and empathy (Ali et al., 2012). There was no discussion of how to best select staff that possesses these skills. However, standardized training, program structure, and defined roles can avoid reduced effectiveness (Ali et al., 2012). Program planners can determine through process evaluation how lay educators are impacted by training, the program structure, and what they see their role being in program implementation. No evidence exist that trained lifestyle professionals are any more effective than lay educators in achieving lifestyle intervention goals (Ali et al., 2012). This outcome is especially important when scaling down programs and trying to translate these successful outcomes to local level. Understanding the mechanism of lay staff effectiveness on outcomes would be beneficial to scaling program to local settings (Ali et
al., 2012). A better understanding of how to reach intended outcomes, like weight loss, are critical to improving programs and determining the best route to sustaining these changes in behavior.

**Evaluation measurement**

To my knowledge, standardized measures beyond biometric outcomes have not been published or established for the DPP. A lack of research around translation to local settings further limits the possibility to create standards whether they are a core set of program components or facilitator training. With various settings for implementation of the DPP there is no universal standard protocol for measuring fidelity of implementation of an adapted DPP program. Without a standard measurement for evaluating fidelity of the DPP there can be no systematic evaluation of studies adapting the DPP. Implementation stages and components should be developed to guide policy makers, funders, and program implementers (Fixsen et al., 2009). This interdependent cycle around a lack of research and standardized measures is indicative of the need to explore how evidence-based programs are reaching communities.

**Participant outcomes**

The DPP aims to prevent the onset of diabetes which means success is often focused on the participant’s outcomes. Program measurements of success are often focused on the participant’s experience or physical changes. Outcomes are often biometric, psychosocial, or behavioral. These are usually collected qualitatively or quantitatively. It is necessary to focus on the participant outcomes since they are the intended beneficiaries of research. Research focusing on the outcomes of an intervention
risk is a “black box” evaluation (Stame, 2004). The outcomes are assessed but there is not a clear understanding of the pathway to the outcomes. This pathway is critical to future programs, evaluations, and best practices. It is important to consider whether putting program inputs in place will allow participants to achieve the expected participant outcomes through program activities. In addition, adjusting one core implementation component requires adjustment to the other core implementation components (Fixsen et al., 2009). The ripple effects of changing one component need to be better understood whether the changes result in a negative, neutral, or positive outcome. This pathway to expected outcomes is important to not only the program in place but to future research questions.

However, understanding the mechanisms which these outcomes are achieved is important to informing program development and implementation. Without evaluations of fidelity of implementation there is no foundation for future program evaluations on fidelity. These outcomes are important to various settings especially those that make adaptations to fit the needs of the local community. Determining whether there is a need for fidelity is as important as the various mechanisms which fidelity is achieved when changes are made to the initial program protocol.

**Theoretical Framework**

In this study the conceptual model guiding this research was developed by Carroll, Patterson, Wood, Booth, Rick, and Balain (2007) to through a review of existing research on implementation fidelity. Figure 1 in Appendix A shows the figure developed to measure implementation fidelity. Adherence, which consists of details of the content,
frequency, and duration, in this model refers to those who are implementing the intervention (Carroll et al, 2007). In this case the GPS Program Facilitators are implementing the study. Potential moderators for adherence of an intervention include comprehensiveness of policy, strategies to facilitate implementation, quality of delivery, and participant responsiveness (Carroll et al, 2007). Comprehensiveness of policy refers to the complexity of the intervention, adherence may be impacted by the detail and comprehensiveness of an intervention (Carroll et al, 2007). The initial GPS study provided significant support and guidance to program implementation. Participant responsiveness relates to the responsiveness of to the intervention, this includes those implementing the intervention (Carroll et al, 2007). Previous research on the DPP often focus on participant responsiveness to the intervention, weight loss (Ackermann et al., 2014; Boltri et al., 2008; Florez et al., 2012; Katula et al., 2011; Tang, Nwankwo, Whiten, & Oney, 2014). However, there is a dearth of research on strategies to facilitate implementation and quality of delivery. The broken line linking adherence to outcomes illustrates that outcomes are external but can be impacted by implementation fidelity (Carroll et al, 2007). Lastly, a component analysis to the program outcomes is conducted in order to determine the “essential” components (Carroll et al, 2007). This study is focusing specifically on the moderators for adherence to determine the behaviors and experiences of program facilitators.

**Purpose**

An assessment of the previous literature discussing the best practices for facilitator training provides a context for the current research on fidelity of implementation. This research explores how fidelity of implementation is managed in adapted DPP studies in
community settings. An evaluation of facilitator behaviors during program implementation illustrates how program protocols are adapted. Facilitator experiences’ during training and implementation provide context for the manner in which programs are presented to facilitators. Their experiences provide additional insight into the link between the researcher and the community.

This retrospective study examined program facilitators’ experience with implementing a prediabetes prevention program in a faith placed setting. Qualitative data that emerged from the audio recordings of the weekly GPS sessions and facilitator interviews provided insight into program facilitator experience and behaviors. Program facilitators are church members who provide health education throughout the 16 week intervention. Previous evaluations of program implementation focus heavily on health outcomes and program attendance. These aspects of program results are important but an exploration of the program facilitators’ role and behaviors provide further insight into program feasibility, implementation, and sustainability.

The purpose of this study is to examine the experiences of program facilitators in a community based participatory research prediabetes prevention program with 2 Philadelphia churches. The specific aims of this study were:

1. Reviewed literature discussing facilitator training in adapted diabetes prevention programs.
2. Determined best practices and recommendations for facilitator training from the current literature.
3. Evaluated how closely program facilitators followed the program manual during program implementation through an analysis of the session audio recordings.
4. Assessed facilitator experience with program facilitator training and program manual including strengths, shortcomings, and changes. This was achieved through analysis of individual interviews with each facilitator.

5. Provided recommendations for facilitator training for future health education and intervention programs and the importance of these recommendations for shaping policy for dissemination of evidence-based program.

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**Paper 1 Abstract**

This review summarizes the reporting of fidelity of implementation in adapted Diabetes Prevention Program (DPP) interventions, specifically, evaluation of facilitator fidelity of implementation. Fidelity of implementation is key to ensuring participants receive the necessary program components. However, researchers must balance fidelity with adaptations needed to develop interventions appropriate for the intended population.

Incorporating components of the PRISMA Framework, this systematic review consists of 23 articles from 2002 to 2014. Our review focused on only those studies that reported evaluation of facilitator fidelity of implementation. A majority of studies reported certified personnel as responsible for program implementation. Facilitator training was reported by 74% of studies in this review (n=17) and a majority of these studies (n=10) utilized non-standardized facilitator training. Non-standardized training techniques varied from 1 hour to two weeks of training and were facilitated by a variety of staff from the research teams to certified diabetes educators. Facilitator interviews were the most common facilitator evaluation measure, reported by 33% of studies (n=12). This review found a lack of reporting on methods for evaluating facilitator fidelity of implementation. In addition, researchers do not utilize standardized DPP training which could have important implications for standardized training and facilitator selection.
Introduction

Evidence-based interventions offer an opportunity to address health disparities. However, adapting programs to fit the needs of communities necessitates managing “fit and fidelity” (1). This tension has important implications for program and evaluation development. Research is needed to understand what contributes to the success and challenge of achieving participant outcomes and the process to successful implementation (2). Researchers conducting program evaluations can assess what components of an intervention are effective, for whom, and under what conditions (2). This study reviews literature of the Diabetes Prevention Program (DPP) as a case study for engaging a wider methodological question in public health research of how are we to develop standards and measures of fidelity in light of program adaptations, that is, researchers modifying the components of intervention programs.

Focusing on fidelity in the early stages of implementation promotes inclusion of core components and provides an avenue for balancing decision-making about fidelity and adaptation (3). Important areas for development include dose delivered and fidelity. Dose delivered is the “amount or proportion of the intended intervention that is actually delivered to program participants” (2). Determining the dose received is important to interpreting participant outcomes because they may not have received the program as intended (2). Fidelity is “whether the intervention is carried out according to a prespecified plan and whether it is carried out in both the intended manner and the spirit” (2). Measuring fidelity can be challenging due to difficulty in developing standardized and measureable tools for the intended manner and spirit of an intervention. Important limitations include those associated with self-reported qualitative data and the cost of methods for measuring fidelity (2). Adaptation to intended program protocol may occur
due to capacity, funding issues, mismatch of program components and participants’ risks, and the challenges of implementing every element of a protocol (3). However, strategies for adaptation should be guided by a “clear and culturally informed theory, model, or cultural frameworks” (1). Process evaluation allows researchers to assess the impact of interventions on selected subgroups (2). It also explains what components contribute to programs success, especially for constructs of theory-informed interventions (2).

An important evidence-based program critical to the effort of addressing health disparities is the Diabetes Prevention Program (DPP). The DPP was a multicenter clinical research trial that found that participants who lost 5 to 7% of their initial weight reduced their risk of developing diabetes by 58% (4). The original lifestyle intervention was consisted of multiple layers to program implementation. Participants in the original DPP Program engaged in a 16-week intervention, achieving weight loss through a lifestyle change consisting of increased physical activity and healthy eating habits (4). Each participant was assigned a case manager or “lifestyle coach,” who was often a registered dietitian or someone with Master’s degree training in exercise physiology, behavioral psychology, or health education (5). In addition, participants were provided supervised physical activity and flexible maintenance intervention sessions (5). A “toolbox” of adherence strategies was developed and materials tailored to address ethnic diversity (5). Participants were also provided training, feedback, and clinical support (5). In the original DPP study, the total direct medical cost of the lifestyle intervention was $1,399 per participant (6). Direct medical costs consisted of baseline history, physical exam, exercise test, core curriculum, materials, supervised activity session, lifestyle group sessions, in-person visits, phone calls, reminder phone calls, tool box, and overhead cost.
for personnel (6). An important step to dissemination of this lifestyle intervention is ensuring it both accessible and affordable (7).

Research aimed at translating the DPP into community settings have been conducted since 2002. Previous studies have assessed the impact of adapting program components to fit population and community needs. Reviews of these studies have examined a variety of program components modified to measure program success while addressing the needs of diverse communities. In one review of seven randomized DPP control trials, program fidelity was measured through an assessment of loss to follow-up, participant adherence or attendance, and participant goal achievement (8). However, the authors of the review did not report on whether these studies evaluated program facilitator(s) fidelity of implementation. Another review focused on assessing cultural adaptations of the DPP for African American, Hispanic/Latino, Native Hawaiians and Other Pacific Islanders, Arab Americans, and American Indian and Native Alaskan communities (9). This review of 6 studies assessed the translation methods utilized, success of translation methods, and suggestions for future translation efforts (9). However, intervention fidelity was mentioned only in a study aimed at adapting the DPP for Arab Americans. The authors mentioned that fidelity was assessed constantly and through observation and review pre and post-sessions (9). No further discussion was provided on fidelity or implementation by the program facilitators.

The RE-AIM framework is one of many important implementation models utilized within prevention science. The RE-AIM framework “is designed to enhance the quality, speed, and public health impact of efforts to translate research into practice” (10). Another review utilized the Reach, Efficacy, Adoption, Implementation, Maintenance
(RE-AIM) model framework to review 16 studies translating the DPP to hospital outpatient, primary care, community, work, and church settings (11). The authors found these studies lacked a description of program adaptation and fidelity (11). An example provided by the authors was the lack of discussion about adaptations to motivational interviewing, an important component to the one-on-one structure of the initial DPP intervention, in adapted studies that utilized group or media-based approaches (11). The approach of facilitators engaging with participants is an important area of the DPP to better understand the spirit and manner of program implementation.

The Consolidated Framework for Implementation Research (CFIR) framework goes a step further in understanding implementation. The CFIR framework “opens the 'black box' of the 'I' (implementation) component” and consolidates the constructs of previous implementation theories (12). This framework consists of five domains and 39 constructs (12). The five domains of the CFIR framework are Intervention Characteristics, Outer Setting, Inner Setting, Characteristics of Individuals, and Process (5).

However, a limitation of these frameworks is a lack of “‘how-to’ support for carrying out implementation endeavours since the determinants may be too generic to provide sufficient detail for guiding users through an implementation process” (13). The multifaceted nature of implementation obstructs development of a single implementation theory (13). While the DPP has been translated by researchers to ensure interventions are appropriate and effective for communities, there is a lack of research evaluating facilitator fidelity of implementation.
In this literature review, we will synthesize the translation of adapted DPP interventions to various community settings and assess the evaluation methods for facilitator fidelity to implementation. We will assess the 1) facilitator personnel implementing DPP adapted studies 2) training for program facilitators and 3) fidelity of implementation evaluation measures as they relate to program facilitators.

Methods

Identification of studies

Data sources

The primary electronic databases used in this review were MEDLINE, CINAHL, Web of Science, and PsycINFO. This systematic qualitative review included interventions adapted from the DPP, published between February 1, 2002 and December 31, 2014. This 12-year period was selected because the DPP was initiated in 1996, but findings were not published until February 2002.

Search terms

The first author (BOR) used the indexing term “diabetes prevention program” to search for studies that reported being based on the DPP. Studies of interest were those adapting the original DPP (reducing the number of intervention sessions, changing the program setting, selecting lay health personnel, etc.) but were based on DPP curriculum. Studies that did not explicitly state program materials or protocol were adapted from the DPP were excluded from this review. This DPP index term was combined with the terms “fidelity of implementation,” “facilitators,” “coach,” “facilitator training,” “coach training,” “community-based participatory research,” “process evaluation,” and “program evaluation.” In addition, the author (BOR) set up a Google Scholar Alerts query using
the terms “fidelity of implementation AND prediabetes” from February 28, 2014 to November 25, 2015.

Study Selection

The PRISMA Flow Diagram (14), in Figure 1 illustrates the identification of relevant articles screened by the first author of this review. Titles and abstracts of each article were reviewed based on the inclusion and exclusion criteria. If the author (BOR) could not determine from the title or abstract whether the study was based on the DPP or if facilitator fidelity of implementation was evaluated, the full text was reviewed to determine eligibility.

Article titles and the abstracts (n=761) were identified from the initial search and Google Scholar Alerts (n=86). Duplicate studies and abstracts were removed (n=255). Studies excluded (n=438), were those conducted outside the U.S.; non-English language publications; studies not based on or adapting the DPP; abstracts; literature reviews; statements; studies with participants diagnosed with type 2 diabetes; and diabetes management studies. The author only included those studies that were translations of the DPP, i.e., the authors described the study as a DPP translation or integrated the DPP 16-week curriculum. The first author included in this review; U.S. English language studies based in large part or partially on the DPP program designed to address diabetes or prediabetes prevention.

All relevant articles (n=154) were stored in EndNote by the first author (BOR) who reviewed the articles a second time. The studies that did not fit the inclusion criteria (n=79) were removed. Citations within the remaining articles were also screened. The first author reviewed the final 72 articles and removed studies that did not report
evaluation of facilitator fidelity of implementation (n=48). Twenty-three articles reported evaluation techniques for facilitator fidelity and were included in this review.

**Data abstraction process**

Information for each of the studies was charted through an abstraction process. The first author (BOR) abstracted data from each of the studies into a table in a Microsoft Word® document. Through the abstraction process characteristics of the study sample emphasized the study objective (intervention, duration, and site) and study population (sample size and participant racial/ethnic background). Further, this abstraction process highlighted the program facilitator(s) (credentials and racial/ethnic background) and program facilitator training (trainer, duration, and content). Lastly, included in this abstraction were the study program facilitator evaluation methods (evaluation of facilitator behaviors and experiences with program fidelity of implementation) and outcomes.

**Results**

Table 1 summarizes the author, year, facilitator personnel selected, facilitator training, and facilitator evaluation methods and outcomes for 23 adapted DPP studies. Categories and frequencies were assessed for facilitator personnel selected, training techniques, and evaluation methods for facilitator fidelity of implementation.

**Personnel Implementing DPP Adapted Studies**

Table 2 summarizes the different categories of personnel selected to serve as program facilitators in the adapted DPP studies. Of the 23 studies included in this review 11 reported more than one personnel implemented the intervention. Program personnel came from various professional and educational backgrounds.
Overall, a majority of studies 78% (n=18) reported the personnel implementing the study intervention. Studies most often reported certified personnel were selected to implement the intervention or portions of the intervention. Certified personnel reported in these studies were nurses (n=6), dietitians (n=5), exercise physiologist (n=2), certified fitness instructors (n=2), staff with a Bachelor’s degree (n=2), certified diabetes educators (n=1), nutrition specialists (n=1), and clinical psychologists (n=1). Lay personnel were also reported as program facilitators. This included peer educators (n=4), community health workers (n=1), lay health educators (n=1), and volunteers (n=1). However, lay personnel were usually included on teams with certified personnel. The lay personnel would often implement the session curriculum. Only one study reported lay personnel delivering the entire intervention.

Facilitator Training

Table 3 lists the 6 training approaches reported in these 23 studies. Twenty percent of the studies (n=5) did not report facilitator training techniques. Eighteen studies reported the facilitator training method utilized, however, a majority of these studies (n=10) utilized non-standardized DPP training methods. Non-standardized training techniques varied from a one hour training session to a two-week long workshop. In addition, trainings were delivered by a variety of personnel including Community Health Workers, consultants, a registered dietitian, a psychology graduate student, and certified diabetes educators. Training content also varied across studies ranging from discussion of roles, patient-centered communication, problem solving, goal setting, role-playing, training on mental health, and an overview of the study protocol. Three studies reported
including motivational interviewing in training of program facilitators, a component of
the original DPP study.

Standardized DPP training utilized in 8 of the studies also varied in duration,
content, and training facilitator(s). The most commonly reported program facilitator
training was the 2-Day Group Life Balance™ training provided by the Diabetes
Prevention Support Center (n=3). In addition, studies noted DPP training (n=2) and
training provided by the Indiana University Diabetes Translational Research Center
(n=1). Lastly, one study employed Maxwell’s 5M (Model, Mentor, Monitor, Motivate,
and Multiply) Training Model.

Evaluation of Program Facilitators Fidelity to Program Protocol

Table 4 lists the 13 evaluation measures reported in the 23 studies for this review.
Nine studies used multiple measures to evaluate fidelity of implementation. The most
commonly reported measures for evaluating facilitator fidelity of implementation were
interviews (n=12). Individual or group interviews were facilitated by the authors or an
independent evaluator. Interview topics included implementation barriers and facilitators,
recruitment, retention, and questions developed using a literature review. Fidelity
checklists (n=4) were used for two sessions or across study groups, by direct observation
by research staff or completed by individual facilitators. Two studies utilized
implementation CFIR and RE-AIM frameworks to structure their evaluation of facilitator
fidelity of implementation.

Outcomes of Facilitator Fidelity of Implementation

Studies that reported evaluation of facilitator fidelity of implementation most
often utilized interviews. A majority of these interviews reported that lay health educators
developed trust with participants and provided culturally appropriate support. However, there was no discussion about adaptations made by program facilitator during program implementation. In addition, those with multiple responsibilities had limited time and focus on the intervention materials and duties. Motivational interviewing was noted by one study as a challenging component to implement. Further, some studies monitored fidelity but did not report results.

Discussion

This review found a lack of reporting on methods and related outcomes for evaluating facilitator fidelity of implementation. Various methods exist on how to approach evaluating facilitator behaviors and experiences during and with program implementation. However, no standard exists on best practices for assessing facilitator behaviors and experiences. The CFIR framework offers useful criteria for assessing program implementation, specifically, the “Process” and “Intervention Characteristics” domains.

The “Process” domain consists of quality of execution construct which includes fidelity of implementation to initial protocol, quality, depth, and timeline of implementation (16). If used consistently in DPP replication studies, this construct would provide researchers with a detailed assessment of the quality of implementation by the facilitator. Within the “Intervention Characteristic” domain is the adaptability construct, used to identify indispensable and adaptable elements through a component analysis (15). When applied to the DPP a component analysis would guide adaptations while maintaining the core intervention components. Further, complexity, another construct of the “Intervention Characteristic” domain, is the perceived difficulty determined through
duration, scope, radicalness, disruptiveness, centrality, and intricacy and steps required for implementation (15). Lastly, design quality and packaging, an “Intervention Characteristic” construct, explores how the intervention is presented and assembled which could impact perception of accessibility (15). These constructs highlight the multidimensional factors driving implementation and the benefits of knowledge gained from investigating adaptations.

Additional guidelines for “Balancing Program Fidelity/Adaptation,” have been published in the area of Substance Abuse Prevention (16). The author outlined the six steps including; assess adaptations necessary for the implementation site, consult with the community, and develop implementation plan based on these inputs (16). These frameworks would prove useful especially when seeking to implement appropriate evidence-based interventions, while maintaining fidelity. The complexity of implementation limits development of a single implementation framework, however, developing “how to” is needed to expand on these frameworks (13), particularly in diabetes prevention research.

Certified personnel were most often selected to implement adapted DPP interventions. Lay personnel were often reported as being part of team. Certified personnel reported as facilitators of the adapted DPP studies varied in title and professional background. This diversity in personnel implementing an adapted evidence-based program highlights an important component of adapting the DPP. The original DPP assigned each participant a case manager who possessed specific educational background (4). However, it has been reported that interventions staffed by lay health educators were associated with better weight loss, compared to studies staffed by medical
and allied health professional (17). Further, important aspects of training lay educators include basic knowledge, organizational skills, and empathy (17). Despite these results, there are no best practices or recommendations for how researchers can assess these competencies in potential staff. Determining the best practices for facilitator support and training is critical for studies that seek to utilize the Community-Based Participatory Research approach, especially, those working with lay health educators. One suggestion to ensuring the program matches the cultural needs of a community while maintaining fidelity is to develop a hybrid prevention program (1). A hybrid program in the area of prevention consists of developing core program components and adjusting the program to be culturally appropriate and match the needs of the community (1). An important adaptation is working with the appropriate program delivery staff such as lay health workers, who may impact program delivery due to their specific skills and perspectives (1).

In this review most interventions reported providing non-standardized facilitator training. These non-standardized training techniques varied in training duration, content, and training facilitator. A previous review suggests standardized training, program structure, and defined roles could limit reduced effectiveness (17). This disconnect between certified lifestyle coach training in adapted DPP studies highlights an important area of DPP research that is not well documented. Training for Lifestyle Coaches and Master Training are offered by a number of national organizations (18). However, the average fee for lifestyle coach training is $750 per person (19, 20). This financial requirement for certification as a lifestyle coach could impact whether programs seek standardized DPP training for lay/certified health educators. In addition, understanding
the mechanism of lay staff effectiveness would be beneficial to scaling programs to local settings and determining the core components of facilitator training (17). Training adaptations should be further assessed, especially with the diverse professional and educational backgrounds of program facilitators implementing interventions.

Those studies that did report standardized training utilized the DPP training or training provided by a Diabetes Translational Research Center. A majority of the studies in this review used the Group Lifestyle Balance™ (GLB) Program Training. The GLB is an adapted version of the DPP consisting of 12 weekly core sessions, 4 bi-weekly/monthly sessions, and 6 monthly support sessions (21). Lifestyle coach training is delivered by faculty from the University of Pittsburgh who has 10 years of experience implementing the GLB (22). Training attendees are provided with a GLB manual of operations, fat and calorie book, pedometer, self-monitoring book, GLB 12 session DVD, and Post Core Support Core Physical Activity DVD (22). On the first day of GLB training a review is provided on the background and rationale of the DPP, rationale and goals for the lifestyle balance intervention, translating the DPP, and a 30-minute review for each of the first sessions 1-7. The second day of training consists of breakfast, followed by a 30-minute review for each of the remaining sessions 8-12. This is followed with a 45-minute review of the post core session on transitioning and nutrition, physical activity, and behavior, and 1 ½ hour on leading effective groups (23). The GLB training consists of a systematic review of the intervention, a total of 13 hours of training. One faith-based study utilized Maxwell’s 5 M Model consists of the following steps:

1. Model (I do it): Become good at something before teaching it.
2. Mentor (I do it and you watch): Show another person how to do something.
3. Monitor (You do it and I watch): Coach someone as they do the task.
4. Motivate (You do it): Hand off task to other so they can do it.
5. Multiply (You do it and someone else is with you): The person trained should train someone else to do it (24).

This diversity in training content, duration, and facilitators should be viewed as an opportunity to determine best practices for program support and facilitator training.

Limitations

This study had a number of limitations including the studies in this review varied by target population, participant inclusion and exclusion criteria, and program setting (see Table 1). These are all important factors to program implementation and outcomes, but they were not assessed in this review. In addition, study quality was not weighted by study design or a review of records using a team approach (25, 26). While this review did adapt components of the PRISMA framework, specifically the flow diagram and portions of the checklist, we did not include all 27 items from the PRISMA checklist (27). This checklist consists of three sections; administrative information, introduction, and methods (28). Each section contains topics with a corresponding checklist item (28). Topics we did not include in this review include quantitative data synthesis or the confidence of cumulative evidence (28). Other studies that have used the PRISMA Framework have employed a similar approach as this study. The main focus of this study was to explore how facilitator fidelity of implementation was reported and evaluated in adapted DPP
studies. Outcomes were often qualitative or not reported preventing a holistic view of fidelity of implementation outcomes.

**Conclusion**

Evidence-based programs like the DPP hold a window of opportunity for preventing an individual’s progression to type 2 diabetes. Researchers often investigate techniques for addressing the needs of communities by adapting components of the original protocol. These adaptations include program length, personnel serving as facilitators, total intervention sessions, use of technology, role of social support, and partnering with local organizations. However, research on best practices are needed for evaluating fidelity of implementation in adapted DPP studies, by the program facilitator(s). Research defining adaptations and measurements of fidelity of implementation need to be included and reported in published studies to inform and shape future translation research efforts. In addition, the relevance and utility of standardized DPP training for interventions set in community settings should be further explored. Researchers hold an important role in evaluating prevention methods which inform best practices in the effort to eliminate health disparities.
Acknowledgements

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References


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Flow Diagram\textsuperscript{14}.

Identification

Records identified through MEDLINE, CINAHL, Web of Science, and PsycINFO searching

Records after duplicates removed (n = 506)

Screening

Records identified through Google Scholar Alert (n = 86)

Records screened (n = 154)

Records excluded (n = 352)

Eligibility

Full-text articles assessed for eligibility (n = 154)

Full-text articles excluded, with reasons (n = 79)
- Study conducted outside the U.S. (n = 19)
- Diabetes management (n = 6)
- Not DPP based (n = 27)
- Review papers (n = 3)
- Duplicates (n = 10)
- Not an intervention (n = 11)
- Ongoing study (n = 3)

Articles initially reviewed (n = 75)

Included in final review (n = 23)

Articles excluded, with reasons (n = 52)
- Same study no additional information (n = 2)
- Lessons learned (n = 1)
- Did not report evaluation of facilitator fidelity (n = 49)
<table>
<thead>
<tr>
<th>Author(s), Year</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Program Facilitator</th>
<th>Training: Duration, Content, Facilitator</th>
<th>Method: Evaluation Facilitator Fidelity</th>
<th>Outcomes: Evaluation Facilitator Fidelity</th>
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<tr>
<td>Ackermann et al., 2008, (29)</td>
<td>Compare grief counseling alone vs. DPP lifestyle intervention, a group-based intervention, in partnership with the YMCA.</td>
<td>94 participants from 2 Indianapolis YMCAs (61% white; 71% men)</td>
<td>• Not reported.</td>
<td>• 2 1/2 day: Group-instructor training, DPP adapted structured training and certification process. Lesson content, group moderation, or medical questions. Reviewed attendance &amp; lesson checklist for adaptations. Experienced DPP investigators</td>
<td>• Fidelity: weekly discussions but no quantitative assessment.</td>
<td>• Not reported.</td>
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<td>Bozack et al., 2014, (30)</td>
<td>A mixed methods and outcomes evaluation of New York State Young Men's Christian Association (YMCA) delivery of the 16-week evidence-based model.</td>
<td>254 participants from 14 YMCA sites in New York state (77.9% white; 70.1% women)</td>
<td>• Not reported.</td>
<td>• Program consistent with National DPP curriculum and recognition standards.</td>
<td>• Surveyed coaches: program fidelity, participant engagement, time commitment, perceptions, and recommendation at the end of each core session. • Semi-structured individual or group interviews coaches</td>
<td>• Not reported</td>
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<tr>
<td>Brace et al., 2015, (31)</td>
<td>A process evaluation of translation of the DPP Program, FUEL Your Life, at Union Pacific Railroad locomotive maintenance facilities, using the</td>
<td>479 participants from 6 Union Pacific Railroad maintenance facilities (75% white; 94% male)</td>
<td>• Self-directed program. Peer Health Coaches. Occupational health nurses.</td>
<td>• Nurses trained with research team &amp; peer coaches individually met with research team to discuss role. Manual given to nurses and peer health educators.</td>
<td>• PHCs: 6 months, a 10-minute survey on program components, usefulness of the manual, &amp; management support. Occupational Health Nurse interviews: employee program participation, site characteristics, contact with participants, &amp; perceptions of the PHCs.</td>
<td>• OHN initially were the key personnel but had large caseloads and competing priorities. • PHC greatly underused, during the program 62% of participants never spoke with a PHC about the program.</td>
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<td>Author(s), Year</td>
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| Brown et al., 2013, (32) | RE-AIM framework. Translation of the DPP to, “Journey to Native Youth Health” for Native American youth, and assess implementation indicators and short term behavioral and physiological outcomes among a pilot sample. | 64 Native American Youth from 2 Montana Indian reservations (50% female) | • 1 educator with elementary education 4-year degree. 1 educator with 2-year degree in health sciences. | • 2 one-week-long training workshops; Overview original DPP & results; rationale for program goals; session-by-session overview; effective group leading skills; retaining participants; & disseminating program information. | • First author interviewed lifestyle educators at the end of the study to explore implementation issues. | • Lifestyle educators: had high confidence in their ability to implement the program’s behavioral and educational strategies of goal setting and problem solving.  
• Difficulty in keeping some participants interested in the session, suggest more interactive learning activities.  
• More information & activities to include participants’ families.  
• Staff training and supervision challenging due to varying levels of experience, comfort, interest in facilitating groups and diverse professional background/preexisting qualifications.  
• Program staff members split their time among other responsibilities. |
| Carroll et al., 2015, (33) | Assess feasibility of recruitment & implementation of the Healthy Living Program HLP, for low-income adults in primary care clinics, in Rochester, NY. | 92 participants from 4 primary care practices serving low income populations (60.9% non-Hispanic black; 82.6% female) | • Dietitian. Physical activity counselor. Trained peer counselors. Aerobics & Fitness Association of America certified fitness instructor. | • Not reported. | • Research team meeting notes, and feedback from the site coordinators.  
• Analysis incorporated constructs from the Consolidated Framework for Implementation Research (CFIR). | • The Community Health |
<p>| Cene et al., | Assess feasibility | 104 African | • 15 | • Maxwell’s 5 M Training | • 20 question semi-structured |  |</p>
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<td>2013, (34)</td>
<td>of a CBPR approach to implement the Power to Prevent (P2P) diabetes prevention education curriculum in rural African American settings.</td>
<td>Americans from Franklin, Halifax, and Wilson Counties in northeastern North Carolina (75% female)</td>
<td>Community Health Ambassadors with health backgrounds.</td>
<td>Model</td>
<td>30-60-minute interviews with facilitators.</td>
<td>Ambassadors felt the 60-90-minute session were optimal delivery time, the small group structure facilitated interactions, &amp; the material was easily understood.</td>
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<td>Damschroder et al., 2015, (35)</td>
<td>Evaluate cost-effectiveness &amp; budget impact of the Veterans Affairs (VA) DPP implemented in 3 VA medical centers.</td>
<td>Not reported.</td>
<td>• Coach with formal nutrition training and prior lifestyle coaching experience.</td>
<td>• A 2-day GLB training by the DPSC at the University of Pittsburgh.</td>
<td>• Interviews: Implementation experiences, assessing success or failure. • Barriers identified &amp; addressed with field notes, project meeting notes, and other documents. • Fidelity checklists completed for two sessions in each cohort and project coordinator rated items. • Ratings: Average coaching &amp; delivery compare the two.</td>
<td>• Not reported here.</td>
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<tr>
<td>DeJoy et</td>
<td>Pilot study</td>
<td>67</td>
<td>Peer</td>
<td>• A 1-hour training session</td>
<td>• Post study interviews with the</td>
<td>Peer coaches reluctant to</td>
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<td>Author(s), Year</td>
<td>Study Design</td>
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<td>al., 2013, (36)</td>
<td>findings for the FUEL Your Life (FYL), a workplace translation of the DPP through the Union Pacific Railroad.</td>
<td>participants from a Union Pacific Railroad maintenance facility. (79% white; 85% male)</td>
<td>health coaches. On-site nurses.</td>
<td>for nurses with the research team &amp; given manual.</td>
<td>OHN and peer coaches.</td>
<td>initiate contact with participants, few interactions or consultations with participants during the intervention. • The OHN workload prevented her from contacting participants on a regular basis. • Not reported.</td>
</tr>
<tr>
<td>Dutton et al., 2015, (37)</td>
<td>Evaluation of feasibility, acceptability, &amp; outcomes of pilot study weight loss treatment for African American patients in primary care using peer coaches.</td>
<td>33 participants from 7 family medicine practice (84.8% African American; 87.9% female) Not reported.</td>
<td>Peer coach. 1 Clinical psychologist. Registered dietitian. Exercise physiologist.</td>
<td>6 hours of training on patient-centered communication, problem solving, goal setting, motivational interviewing, didactic presentations, role-playing &amp; given feedback.</td>
<td>Calls: Support &amp; supervision on issues &amp; consistency of treatment delivery.</td>
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<tr>
<td>Finch et al., 2009, (38)</td>
<td>A formal group-based adaptation of the DPP lifestyle intervention curriculum to train community workers to deliver in YMCA.</td>
<td>YMCA staff with Associate or baccalaureate degree (exercise or a related health) or equivalent training &amp; certification</td>
<td>Formally trained annually renewal certification process. Training by Indiana University Diabetes Translational Research Center (IU-DTRC) staff. Structured training curriculum, formal ongoing review session logs, &amp; access to a panel expert to review issues.</td>
<td>Delivery skills: 20-minute mock group session during training, other trainees act as participants. Critique from the IU-DTRC staff and fellow trainees and trainee earns a 1-year, formal training certificate. • A comprehensive review of performance. • Wellness coordinator visits each instructor’s group 4 times over a 6-month period to observe group sessions and</td>
<td>Not reported here, ongoing study.</td>
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<td>Author(s), Year</td>
<td>Study Design</td>
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<td>Islam et al., 2013, (39)</td>
<td>Assessed impact and feasibility of a pilot randomized controlled trial, Project RICE (Reaching Immigrants through Community Empowerment), with Community Health Workers (CHW).</td>
<td>48 Korean Americans living in New York City (64.3% female)</td>
<td>Trained, bilingual Korean American Community Health Workers.</td>
<td>60-hour core-competency-based training, over 8 days in 3-weeks. By two trainers from an independent Community Health Workers association. Additional 30 hours of training on mental health &amp; other related topics.</td>
<td>CHWs completed detailed logs during follow-up phone calls with the participants, documenting challenges to healthcare access and engaging in healthy behaviors, as well as a proposed follow-up plan by the CHW. CHW Qualitative interviews by an independent evaluator: Assessed experiences with implementation, barriers &amp; facilitators to recruitment, retention, &amp; diabetes prevention promotion. Questions developed by the lead investigator &amp; evaluator using a literature review. Focus group of active and non-active participants: facilitated by an independent Korean-speaking evaluator assessed participant satisfaction post intervention.</td>
<td>CHW expressed that being from the same culture helped overcome resistance and language barriers due to limited English proficiency in the community. Participants did not question the CHW’s role and qualifications to lead the intervention compared to a clinician. Follow up phone calls helped CHW tailor advice. Some participants motivated to participate so they don’t let the CHW down.</td>
</tr>
<tr>
<td>Islam et al., 2014, (40)</td>
<td>A quasi-experimental two-group observational study</td>
<td>126 Sikh Asian</td>
<td>3 trained, bilingual,</td>
<td>Two-part 105-hour core training by 2 trainers from</td>
<td>CHW supervisor qualitative interviews: Quarterly basis by</td>
<td>Scheduling for face-to-face meetings with</td>
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<td>Author(s), Year</td>
<td>Study Design</td>
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<td>Jaber et al., 2011, (41)</td>
<td>Assessed feasibility &amp; adaptability of community-based, culturally-specific, DPP adapted group lifestyle intervention.</td>
<td>71 Arab-Americans (62% female)</td>
<td>Trained bilingual nurse.</td>
<td>Structured training curriculum by study investigators &amp; consultants. Additional training provided by the DPP lifestyle team at the University of Pittsburgh.</td>
<td>Adherence to scheduled sessions. Intervention fidelity across study groups was further examined by direct observation &amp; ongoing review of the formal core-curriculum.</td>
<td>Participants to collect survey questionnaires and clinical measurements in addition to six group sessions was a challenge.</td>
</tr>
<tr>
<td>Krukowski et al., 2013, (42)</td>
<td>Described the training of Lay Health Educators in delivering an evidence-based lifestyle intervention.</td>
<td>Not reported.</td>
<td>8 Community volunteers. Lay Health Educators health background not required.</td>
<td>Onsite basic training at each center over a series of half-day or full-day sessions.</td>
<td>Not reported.</td>
<td>Not reported.</td>
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<tr>
<td>Ma et al., 2009, (43)</td>
<td>A 3 arm randomized</td>
<td>Not reported.</td>
<td>Dietitian. Exercise</td>
<td>Dietitian completed GLB 2-day training offered by</td>
<td>Checklists ensure protocols followed and session</td>
<td>Not reported.</td>
</tr>
<tr>
<td>Author(s), Year</td>
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<tr>
<td>Ma et al., 2013, (44)</td>
<td>Evaluation of the 3 arm primary care-based randomized trial Lifestyle Interventions to Treat Elevated Cardiometabolic Risk in Primary Care (E-LITE).</td>
<td>From a single primary care clinic in the Silicon Valley (78% non-Hispanic white; 53% male)</td>
<td>• Registered dietitian GLB certified.</td>
<td>• Dietitian completed GLB certification training from the University of Pittsburgh Diabetes Prevention Support Center before the intervention &amp; “train the trainer” workshop during intervention. No training for fitness instructor.</td>
<td>• All classes audiotaped.</td>
<td>• Audiotape not reviewed and did not monitor interventionist adherence.</td>
</tr>
<tr>
<td>Porterfield et al., 2010, (45)</td>
<td>A case study of DPP Initiative Interventions Focus Area implemented at 5 sites.</td>
<td>Participants from state Diabetes and Prevention Control programs; California, Massachusetts, Michigan, Minnesota, &amp; Washington 293</td>
<td>• Not reported.</td>
<td>• Not reported.</td>
<td>• Review of program documents from each state, developed and completed state-specific Program Summary Forms (PSF)</td>
<td>• Not reported.</td>
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<tr>
<td>Reddy et Assessed</td>
<td></td>
<td></td>
<td>• Nurses.</td>
<td>• Not reported.</td>
<td>• Focus group assessing</td>
<td>• Facilitator reflected on</td>
</tr>
<tr>
<td>Author(s), Year</td>
<td>Study Design</td>
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<td>al., 2011, (46)</td>
<td>successful elements of the Greater Green Triangle Diabetes Prevention Project &amp; the Montana Cardiovascular Disease &amp; Diabetes Prevention programs.</td>
<td>participants from Montana Cardiovascular Disease and Diabetes Prevention programs and 237 participants from the Greater Green Triangle Diabetes Prevention Project in Australia.</td>
<td>Dietitians, Certified diabetes educators, Personnel with exercise science training.</td>
<td>Facilitators’ experiences with recruitment, establishing the program, the components &amp; influence of rurality on delivery.</td>
<td></td>
<td>challenges due to lack of access to facilities for physical activity, impact of depression on participant behavior change, and lack of effective partnerships with health care providers.</td>
</tr>
<tr>
<td>Schneider et al., 2012, (47)</td>
<td>Diffusion of Innovations Theory used to integrate DPP through collaboration of researchers, organizations, &amp; qualitative work of the DPP in community mental health organization.</td>
<td>14 participants (71.5% white; 50 female)</td>
<td>2 Peer Wellness Specialists, Some Wellness Specialists: certified peer specialists completed training &amp; state certification in peer counseling</td>
<td>A registered dietitian provided the DPP training. 5 half day sessions: DPP rationale, structure, basic behavioral counseling, manual, materials, delivery methods, tools, &amp; discussion of difficult patient situations. All DPP Research Group’s website materials. Some Wellness Specialists: certified peer specialists completed training &amp; state certification in peer counseling</td>
<td>Key informant interviews with peer group leaders</td>
<td>Peer group leaders suggested an ongoing program be implemented, as oppose to the 19 week intervention, more time needed for participants to understand and integrate principles into their lives. Participant knowledge and intentions didn’t always translate to behavior.</td>
</tr>
<tr>
<td>Author(s), Year</td>
<td>Study Design</td>
<td>Sample Size</td>
<td>Program Facilitator</td>
<td>Training: Duration, Content, Facilitator</td>
<td>Method: Evaluation Facilitator Fidelity</td>
<td>Outcomes: Evaluation Facilitator Fidelity</td>
</tr>
<tr>
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</tr>
<tr>
<td>Simkin-Silverman et al., 2011, (48)</td>
<td>Described an online lifestyle intervention coaching protocol adapted from the DPP lifestyle intervention curriculum.</td>
<td>50 participants from a large academic general internal practice (86% white; 76% female)</td>
<td>- Coaches with lifestyle counseling skills &amp; clinical experience. Nutrition specialist.</td>
<td>- Previous formal DPP training. Reviewed online DPP training material: Acceptance, support, &amp; tailor advice. How to write online coaching notes &amp; moderate chat sessions. Identify red flags for medical/psychosocial concerns &amp; contact person.</td>
<td>- Weekly meetings for 1 year with investigators &amp; study coordinators:</td>
<td>- Not reported.</td>
</tr>
<tr>
<td>Tang et al., 2012, (49)</td>
<td>Evaluate feasibility &amp; acceptability of training peers as lifestyle coaches deliver a church-based lifestyle modification program, Power to Prevent.</td>
<td>6 African American adults (50% women)</td>
<td>- Peer lifestyle coach 8th grade reading &amp; writing level</td>
<td>- One day 8-hour training 2 hour booster session a week before intervention. Trained by a dietitian, certified diabetes educator, &amp; psychology graduate student.</td>
<td>- Facilitator program satisfaction, efficacy of behavioral training tools, and program efficacy. Confidence levels performing core (asking open-ended questions, 5-step behavioral goal-setting process) and advanced skills (addressing resistance, discussing sensitive topics).</td>
<td>- Reported high confidence levels for performing core and advanced skills. - Reported being very satisfied with the length of training, content and skills development, and preparation for leading activities. - Suggest limiting the time between training and implementation, and a 2-person facilitating team.</td>
</tr>
<tr>
<td>Whittemore et al., 2009, (50)</td>
<td>Examine reach, implementation, &amp; efficacy of a 6-month lifestyle program implemented in primary care by</td>
<td>58 adults from New England (45% white; 92% female)</td>
<td>- Nurse practitioner in primary care.</td>
<td>- 2-hour lifestyle program training: standard care protocol, reading &amp; 45-minute motivational interviewing DVD. Two 2-hour motivational interviewing workshops</td>
<td>- RE-AIM (Reach, Efficacy, Adoption, Implementation, Maintenance) model - Nurses interviewed at 3 &amp; 6 months about implementation.</td>
<td>- Motivational interviewing was the most challenging to implement - Difficult to complete the session in 20 minutes, participants discussed</td>
</tr>
<tr>
<td>Author(s), Year</td>
<td>Study Design</td>
<td>Sample Size</td>
<td>Program Facilitator</td>
<td>Training: Duration, Content, Facilitator</td>
<td>Method: Evaluation Facilitator Fidelity</td>
<td>Outcomes: Evaluation Facilitator Fidelity</td>
</tr>
<tr>
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<td>-----------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Whittemore et al., 2014, (51)</td>
<td>Describe process of implementing a DPP program provided by homecare nurses.</td>
<td>Residents of public housing communities (47% Hispanic; 79% female)</td>
<td>• 1 nurse 5 years as a community homecare nurse. 1 nurse experienced homecare nursing &amp; diabetes education. 1 Community Health Worker.</td>
<td>• 8 hour training CHW received approximately 4 hours of training &amp; ongoing supervision by nurses &amp; the principal investigator of the study.</td>
<td>• Protocol implementation checklist  • Calculated implementation by dividing number of items completed per class by total number possible items per class.  • Coinvestigator interviewed Nurses &amp; CHW 3 months post study about implementation barriers &amp; facilitators.</td>
<td>• Interviews: Nurses need more training on supervising CHW &amp; child-care employees. Positively discussed training, reviewing protocols, &amp; tailoring content. Felt confident to respond to participant needs.  • CHW experienced significant personal issues deterring them from being on time and completing tasks. Interactive methods most effective. Community perceived the nurses are “more official,” and didn’t take the walking group seriously.</td>
</tr>
</tbody>
</table>

nurse practitioners.

(baseline & at 3 months).
Table 2. Personnel Implementing DPP Adapted Studies (n=23).

<table>
<thead>
<tr>
<th>Personnel</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Certified Personnel</strong></td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>6</td>
</tr>
<tr>
<td>Dietitian</td>
<td>5</td>
</tr>
<tr>
<td>Exercise physiologist</td>
<td>2</td>
</tr>
<tr>
<td>Certified fitness instructor</td>
<td>2</td>
</tr>
<tr>
<td>Staff with a Bachelor’s degree</td>
<td>2</td>
</tr>
<tr>
<td>Certified Diabetes Educator</td>
<td>1</td>
</tr>
<tr>
<td>Nutrition specialist</td>
<td>1</td>
</tr>
<tr>
<td>Clinical psychologist</td>
<td>1</td>
</tr>
<tr>
<td><strong>Lay Personnel</strong></td>
<td></td>
</tr>
<tr>
<td>Peer educator</td>
<td>4</td>
</tr>
<tr>
<td>Community Health Worker</td>
<td>1</td>
</tr>
<tr>
<td>Lay health educator</td>
<td>1</td>
</tr>
<tr>
<td>Volunteer</td>
<td>1</td>
</tr>
<tr>
<td>Not reported</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>33*</td>
</tr>
</tbody>
</table>

*11 studies reported more than one category of personnel implementing the intervention.
Table 3. Facilitator Training In DPP Adapted Studies (n=23).

<table>
<thead>
<tr>
<th>Training</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>10</td>
</tr>
<tr>
<td>Not reported</td>
<td>5</td>
</tr>
<tr>
<td>Diabetes Prevention Support Center Group Lifestyle</td>
<td></td>
</tr>
<tr>
<td>Balance 2-Day Training</td>
<td>3</td>
</tr>
<tr>
<td>DPP Training</td>
<td>2</td>
</tr>
<tr>
<td>DPP Training 2.5- day</td>
<td>1</td>
</tr>
<tr>
<td>Indiana University Diabetes Translational Research Center</td>
<td>1</td>
</tr>
<tr>
<td>Maxwell’s 5 M Training Model</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

DPP: Diabetes Prevention Program
Table 4. Measures for Evaluating Facilitator Fidelity to Program Protocol during Implementation in DPP Adapted Studies (n=23).

<table>
<thead>
<tr>
<th>Measures</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>12</td>
</tr>
<tr>
<td>Checklist</td>
<td>4</td>
</tr>
<tr>
<td>Session observation</td>
<td>2</td>
</tr>
<tr>
<td>Survey</td>
<td>2</td>
</tr>
<tr>
<td>Weekly meeting</td>
<td>2</td>
</tr>
<tr>
<td>Review program documents</td>
<td>2</td>
</tr>
<tr>
<td>Site coordinator feedback</td>
<td>2</td>
</tr>
<tr>
<td>CFIR&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1</td>
</tr>
<tr>
<td>Audio of session</td>
<td>1</td>
</tr>
<tr>
<td>Focus group</td>
<td>1</td>
</tr>
<tr>
<td>Observation form</td>
<td>1</td>
</tr>
<tr>
<td>RE-AIM&lt;sup&gt;2&lt;/sup&gt;</td>
<td>1</td>
</tr>
<tr>
<td>Facilitator log</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>*<em>32</em></td>
</tr>
</tbody>
</table>

*Nine studies used multiple measures to evaluate fidelity of implementation.

<sup>1</sup>CFIR: Consolidated Framework for Implementation Research

<sup>2</sup>RE-AIM: Reach, Effectiveness, Adoption, Implementation, Maintenance
Paper 2: Adaptations by Program Facilitators in the *Getting People in Sync*

*Prediabetes Prevention Program*: A Mixed Methods Study

Prepared for *Diabetes Educator*

**Authors:** Beatriz O. Reyes, MPH\(^a\); Nicole A. Vaughn, PhD\(^a\); Stephen Lankenau, PhD\(^b\); Candace Robertson-James, DrPH\(^c\); and Augusta Villanueva, PhD\(^b\).

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Paper 2 Abstract
Adaptations of the Diabetes Prevention Program (DPP) have the potential to ensure evidence-based programs reach communities in an appropriate and sustainable manner. However, there is an absence of research on fidelity of implementation, how closely implementation follows proposed program protocol. In theory, outcomes, participant weight loss, may not fully demonstrate the actual impact of the proposed protocol due to adaptations made during implementation. The purpose of this study is to evaluate adaptation behaviors of program facilitators in a DPP adapted faith-placed program, Getting People in Sync (GPS) Prediabetes Prevention Program, consisting of the 16-episode Project NOT ME® series. Recruited from the church health ministry GPS Facilitators served as lay health educators and each session of the 16 week intervention was recorded. This mixed methods study consists of a qualitative analysis of weeks 2, 8, and 15 audio files for 7 GPS Facilitators. In addition, a quantitative analysis of GPS Participant weight loss at post intervention. Audio files were professionally transcribed verbatim. Deletions and additions were coded through a comparison of the transcripts with the GPS Facilitator Guide. The most common adaptations were deletions of materials defining content, practicing new skills, and reviewing new material. Additions included discussions about the facilitators’ personal experiences, participant affirmations, “taking care of self,” and program activities not outlined in the guide. Adapted evidence-based programs should conduct and report process outcomes of facilitator adaptations during implementation. In addition, adaptation techniques should be addressed to determine important core components for program implementation and approaches to assess the impact of adaptations.
Introduction

According to the American Diabetes Association, every 17 seconds someone in the U.S. is diagnosed with type 2 diabetes\(^1\). The Centers for Disease Control and Prevention, reported in 2012 an estimated 29.1 million people in the U.S. have diabetes and 86 million people have prediabetes\(^1\). Addressing the impact of diabetes, public health practitioners must identify and tailor the most effective and innovative approaches to ensuring equitable access to evidence-based programs. The Diabetes Prevention Program (DPP) provides an opportunity for preventing the onset of type 2 diabetes. The DPP, a multicenter clinical trial, found a seven percent weight loss reduced an individual’s risk of developing type 2 diabetes by 58 percent\(^2\). Recently, the growing field of translation research has included efforts on how to best adapt the DPP for community settings. This study seeks to assess the process of implementation for a faith-placed adapted DPP program in two churches in Philadelphia, Pennsylvania.

According to Satancroce, Maccarelli, and Grey fidelity is the faithfulness to the procedures of an intervention\(^3\). Faithfulness to a protocol includes “the intended manner and the spirit”\(^4\). Evaluating fidelity to program protocol provides insight to the pathways of reaching the program outcomes. Previous studies that employed community members or volunteers without medical backgrounds, to implement adapted DPP programs\(^5\textsuperscript{-13}\), did not report evaluation of facilitator competence or adherence to program protocol during implementation. These previous studies focused heavily on participant weight loss as a benchmark for success. The Body & Soul project, developed to promote increased fruit and vegetable consumption among African American church members, conducted a process evaluation to assess relationship between participant outcomes and implementation\(^14\). The authors utilized the RE-AIM framework to analyze participant
surveys and qualitative interviews with project staff and found a statistically significant relationship between implementation fidelity and participant outcomes. 

Within the field of adapted evidence-based programs, such as the DPP, there is a dearth of research evaluating fidelity of implementation of program facilitators. While participant weight loss is the main outcome of interest of the DPP, research is needed on adaptations in the field by program facilitators during implementation. The outcomes of a completed intervention can be better assessed and strengthened with the inclusion of an evaluation of how the program was implemented. However, there is an underreporting of the fidelity of implementation in research. This underreporting is important when critically looking at program outcomes. Evaluating a program that is not adequately implemented can result in Type III Error. Participants not given the correct “dose” of program components outlined in the protocol are evaluated based on the assumption that they received the intervention. In theory, program outcomes may not highlight the actual impact of the program components being studied.

This study consists of qualitative and quantitative data from the *Getting People in Sync* Prediabetes Prevention Program (GPS)-an adapted faith placed DPP Program- to evaluate the fidelity of implementation by GPS Facilitators. The purpose of the initial GPS study was to implement a 16 week intervention at two Philadelphia, Pennsylvania, churches. Participants were provided health education to encourage adoption of increased physical activity and healthy eating habits, to achieve a 5-7 percent weight loss. Each individual group had a maximum of 15 participants, led by a volunteer from the respective church lay health ministry. This study seeks to assess how closely GPS Facilitators followed the facilitator guide during implementation, by comparing the
program session transcript to the GPS facilitator guide. In addition, we assessed the content of session write-ups from Drexel Co-facilitators, who provided weekly support to GPS Facilitators. Our analysis of this qualitative data seeks to observe an additional lens to program implementation, assessing the facilitators’ stories and to “put faces on the statistics” of program outcomes. The quantitative data included from the original GPS Study are participant weight and waist to hip ratio.

Methods

Sample

The purpose of this retrospective mixed methods study was to determine the adaptations made by GPS program facilitator during program implementation and assess relationship to participant weight loss. This study has a sample size of 36, consisting of 20 individual session transcripts and 18 corresponding co-facilitator session write-ups. Data was collected during program implementation; three groups began in the Spring of 2013 and four groups were held in the Fall of 2013. We included session transcripts from weeks 2, 8, and 15 in our analysis. Data was categorized as missing data if the session was not recorded or was blank due to improper use of the recording device. In place of those missing data points the first author assigned audio from the previous or following session.

Measures

Qualitative Measures

In this analysis we utilized strategies from Grounded Theory, specifically, that the data emerge from the transcripts through patterns and distinct differences. This process includes a comparison of the session audio to the facilitator guide to note any adaptations
to program content. An example of a weekly session from the facilitator guide is outlined as shown in Outline 1, Section 1 and Section 4 contents were structured exactly the same every week. These points served as a review of the previous week and a review of the current week. The first author analyzed the Co-facilitator session write-ups to identify emerging themes as they relate to program facilitators adaptations during program implementation.

Quantitative Measures

GPS Program participant weight from the initial GPS Study was included in this study. GPS Program participants were weighed at baseline and weekly for 16 weeks. At each weigh in participants removed their shoes and heavy coats, co-facilitators collected their weight in pounds using a Tanita FitScan scale. In addition, a SECA circumference measuring tape was used to collect waist and hip measurements in centimeters. Co-facilitators measured the participants’ waist circumference at smallest area of the natural waist above the belly button. In addition the participants’ hip circumference was measured at the widest point of the hips.

Procedures

Each of the GPS Facilitators were recruited from their respective churches’ health ministry or signed up after service following announcement of the opportunity. Drexel Co-facilitators, students enrolled in the Master of Public Health program at the Drexel University Dornsife School of Public Health, were each matched with a GPS Facilitator. Co-facilitators attended each weekly session to provide support and collect participant data. Following each session the co-facilitator submitted a session write-up form detailing the site, group, and facilitator information. At the end of the form was an open-ended
question allowing co-facilitators to describe the session goals, materials, group dynamics, challenges, and activities. Session write-ups were submitted weekly to the Community Research Coordinator. Our analysis will focus on the details in the open-ended questions.

During the 16 week intervention, all 16 sessions were recorded. However, for our analysis we selected three sessions. Week 2 was included because week 1 consisted of mostly introduction and background information about the GPS Program. The midpoint of the intervention, week 8, was included in this analysis. We included week 15, which was the last leg of the intervention. We selected these data points to explore potential patterns in GPS Facilitator behaviors at the beginning, middle, and end of the 16 week intervention. In addition, the co-facilitators collected participant weekly weight and entered into IBM SPSS 24. However, this study consists only of the baseline and week 16 weight and waist to hip ratio. The institutional review board at Drexel University approved all study procedures.

Data Analysis

Qualitative Analysis

Audio recordings from 20 sessions were professionally transcribed verbatim. The first author edited each transcript for clarity, removed personal identifiers, and gave each facilitator pseudonyms. The session materials from the facilitator guide for each data point and the corresponding transcripts were imported into QSR NVivo 10, a qualitative data analysis software package. The first author reviewed the transcripts multiple times following along with the GPS facilitator guide for comparison. Using QSR NVivo 10 the first author created topic and analytical codes. Topic coding was used to determine what was discussed in the passage selected for coding\textsuperscript{20}. The passages coded were for broad
and specific codes. One example of a broad topic code for the session transcript was “Adaptations”. Subcategories noted more specific topic codes. Subcategories for the session transcripts were “Changes,” “Deletions,” and “Insertion.” Topic coding was used also to manage the co-facilitator session write-ups, too. A topic code for the co-facilitator session write-ups was “Challenges” and a subcategory “Side Conversations.” This coding scheme allowed the author to manage the data that emerge from the transcripts and categorize each code to better assess the overall themes.

The author used analytic coding, which allows for a deeper analysis of what is going within the coded data. These codes require a reflection on the first author’s actions during coding. The first author reflected on their interest in the passage. With complex questions such as these a systematic approach was employed to ensure the research question was addressed and to document the decision-making process. Memos were stored with each code documenting the decision made when exploring what the author found interesting. The first author created In vivo Codes for data she found surprising or are recurring, these were documented as analytic codes. A coding matrix was created to determine the codes created and interpretations of each code. Memo writing was employed to document coding decisions. In addition, these memos guided the first author to ensure analyses and codes were related to the research question. Rereading the transcripts provided the first author context of each question. For each qualitative data set, an audit trail was created which allowed the first author to better organize the qualitative analysis.
Quantitative data analysis

Our primary dependent variable was GPS Program participant change in body weight in pounds. Our independent variables were GPS Facilitator and their adaptation behaviors. Using IBM SPSS 24 we assessed association between participant weight loss by program facilitator and adaptation behaviors. A one way ANCOVA was conducted to determine a statistically significant difference between facilitators deletion behaviors on mean difference in GPS Participant weight loss controlling for church site. In addition, a one way ANCOVA was conducted to determine a statistically significant difference between facilitators that deletion behaviors on mean difference in GPS Participant waist to hip ratio controlling for church site.

Results

Each session audio length ranged from 42 to 98 minutes ($M = 82$ minutes, $SD=13.80$) which included viewing of the Project NOT ME® DVD series that ran approximately 30 minutes. The most common adaptations by GPS Facilitators were deletions. Further, the content GPS Facilitators most often deleted were the sections that defined new materials, reviewed new material, and that prompted participants to practice new skills. In addition, GPS Facilitators added material to the program protocol.

GPS Facilitator Deletions

The first author coded the facilitator guide and the session transcripts by comparing the two documents to each other. This coding technique allowed the author to completely code the facilitator guide as a deletion, change, or covered material. Through this coding technique the first author was able to quantify proportion of deletions for each of the four sections of facilitator guide. Further, this allowed the author to distinguish if
facilitators were deleting introduction and coaching on new core materials, or the review of the previous and current weeks’ materials.

Graph 1 illustrates the percent of program material coded as a deletion in the GPS facilitator guide for the GPS Facilitators (n=5) with audio available for Session 2, “Ways to Eat Less Fat and Fewer Calories.” GPS Facilitators most often deleted section three. This section was scheduled for a twenty minute discussion on tips for the “Three Ways to Eat Less.”

Graph 2 illustrates deletions during Session 8, “Take Charge of What’s Around You,” for the five GPS Facilitators with session data. For this session, Sections 2 and 3 of the facilitator guide had the most materials coded as deleted. Section 2 consisted of a twenty-five minute discussion on food cues which opened up with a definition of cues then an overview of the program handout on food cues. In addition, facilitators were expected to facilitate a discussion about food cues at work, shopping cues, and changing food cues and habits. Section 3, consisted of a fifteen minute discussion on activity cues which opened with cues associated with inactivity, then lead into a discussion about positive cues and removing inactive cues. Lastly, section three concluded with a discussion about important reminders relating back to the Project NOT ME® DVD series.

Graph 3 illustrates the proportion of deletions during Session 15, “You Can Manage Stress,” for the five GPS Facilitators with session data. Materials from Section 3 were most often deleted. This section of the guide consisted of a 20 minute discussion on “Coping with Unavoidable Stress,” beginning with a discussion about catching yourself when you can’t avoid stress. In addition, GPS Facilitators were expected to manage a
discussion on ways to cope and practicing coping skills by creating an action plan for stress caused by the GPS Program.

**GPS Facilitator Additions**

GPS Facilitators added content to the program protocol during implementation. The first author’s coding of the session transcripts revealed that the most common additions were discussions about the facilitators’ personal experiences, participant affirmations, “taking care of self,” and program activities not outlined in the facilitator guide.

**Facilitators’ Personal Experiences**

Additions to the program protocol made by Danni, Frankie, Georgie, Charlie, and Erin included discussion about their personal experiences. During Session 2, “Be a Fat and Calorie Detective,” new material covered tracking both weight and fat intake. Additions included facilitator food choice and fat intake. Danni started Session 2 explaining his/her personal technique of snacking to help manage hunger.

“I eat nuts a lot and grains and I may get a little sandwich, the little, tiny - not even a sandwich - snack bags and put some nuts and raisins and raw sunflower seeds and all. You'd be so surprised how that fiber and that chewiness and the sweetness of a raisin satisfy your various taste buds and the fiber makes you full. Plus, it helps your digestive system.”

Danni continued to discuss in great detail how this impacted a person’s physical health and digestion until right before playing the DVD. During this opening section the facilitator did not ask any of the questions or review the previous week’s topics outlined in section 1 of the facilitator guide. Georgie began the session 2 reviewing the questions from section 1 of the facilitator guide, asking the participants about their challenges and successes during the previous week which happened to be Thanksgiving week. One
participant responded and asked Georgie about his/her holiday. Georgie discussed a personal experience tracking foods when using a smartphone app and website like MyFitnessPal.

“I do like my food and I just found out that I eat a lot of sweets. I eat a lot of sugar. When you track on MyFitnessPal, be careful sometimes the number can go to red. - becomes red. That means there's something wrong. As long as it's green, it's fine. But when it becomes red-- I had six red days. I had pecan pie. I had a brownie, and I had another pie.”

The role of family in the facilitator’s experience was expressed by Frankie during Session 15. The co-facilitator discussed at length the importance of catching moments of stress and reacting appropriately, taking a time out, as mentioned in the program manual. Frankie followed up this discussion with a reflection on the health status of a relative influencing his/her own perspective of health. Frankie began by discussing a relative’s health status and a personal desire “to live a healthy life.” Frankie stated, “I bet you, each and every one of us in here knows somebody in our family who has a bag of medicine.” Frankie continued describing the impact of watching another family manage their type 2 diabetes with insulin,

“I was stressing out and I said, ‘I'm not, I'm not, I do not want to do this, I don't. I want to live a healthy life.’ Each one of us in here, we listen to Bishop and you see one of the things that he's really into, he's really into his health... And you see all these people with medications and things. We want to live our life as clean as we possibly can...”

**Participant Affirmations**

GPS Facilitators often provided affirmations when participants’ mentioned or expressed challenges. Often they challenged participants to reflect on their progress, these responses varied in length and content. In the Facilitator Guide for Session 8, “Take Charge of What’s Around You,” facilitators were to discuss food and activity cues. Alex’s group started this session off with a discussion about their own tips for healthy
options for eating out from a local mart. One participant remarked that they think the food choices at a local café were not healthy. Alex discussed how participants should consider other changes to their health.

“But you're still making the choices - the fact that you haven't done, like you said, the pizza. You know what I mean? Sometimes it's not always about what's on the scale, but do you feel better?”

Erin also expressed similar support to a participant who stated they didn’t lose weight. When Erin asked participants to share their progress from the previous week one participant expressed that they ate less but they were the same weight. Erin responded, “You're still the same? Well, on the flip side, you didn't gain--.”

Frankie started off Session 15 with a discussion about the participants' progress during the week. One participant expressed that it was a pretty good week. Frankie followed-up encouraged participants to “stay on track.” Frankie stated,

“We want to make sure we keep this body in sync and stay on the right track. Keep these things that we've been learning here at this program and just keep focused and staying on track on what we have to do. Because even after this program is over we still want to do the things that we've learned here, staying on track and stuff like that. So with these kinds of things, what we've been going through, and sometimes when we get stressed out, and fall off the bandwagon, get back on it.”

Georgie also mentioned a similar sentiment when covering the section 1, check-in, of Session 15.

“We have one more week to go. That doesn't mean the end of healthy habits. It's just the end of the program. And maybe some people, they are not where they wanted to be. Maybe some of you didn't reach the goal yet. We still have one more week, and after the week we still have a whole life to go.”

Taking Care of Self

When coding for additions, a code for “taking care of self” emerged from the transcripts. During Session 2, Danni discussed at two points in the session how important
it is for participants to take care of themselves and how it relates to taking care of others
starting the discussion off with the statement, “The thing is, we want to be a living
example for those who we love.” Danni continued with an emphasis on caring for self,
“It's about you and that's the mindset you have to take upon yourself and not feel guilty.
It's all about you.” Danni used flight emergency instructions as an example of how
important it is not to neglect one’s self.

“Therefore, you do the best you can, but don't neglect yourself. Because
I'm going to say this one thing, they said to me, ‘When you get on the
airplane, first thing you do, if you have a little baby with you, a kid, the
first thing they do is put you-- the life support on. Because if anything
happens to you, who's going to take care of them?’ In the airplane they
don't tell you to put it on your child first, they say put it on yourself.”

In Session 8, Frankie expressed the importance of self in the context of
accountability and “being better within self.” Frankie stated, “We know we have to work
for ourselves. We know what we have to do for ourselves. I'm not there looking over
your shoulder, your shoulder, or your shoulder. It's something we have to do for
ourselves.”

During Session 15, Erin’s group was discussing the struggles they see their family
and friends have with saying not to loved ones. Erin added that saying no is not about
being a “Grinch” but participants can’t let other things take them away from the program.

“You know what, I start practicing, I’m not trying to be a Grinch or
anything or just be mean. Everybody here pretty much knows me, I'm not
like that, right? But, if it's going to take you away from your program,
what you've got to do, your healthy eating, it's going to stress you out -
you've got to think about you first, okay. You've got to think about you,
because nobody else is going to.”

While Charlie was reviewing the practice activity for making a plan for
preventing stress for Section 3 Erin began discussing the importance of purpose and
perspective in engaging with the GPS Program. Erin reminded participants, “Remember
your purpose. This is the rest of your life. You don't want to give God extra burden too, when He's got to heal you. You know, you mess around and you can get sick.”

During a discussion about stressors one participant in Alex’s group expressed that they feel stress from having a task list. Alex followed up to this response with the importance of doing it for self, during Session 15, when discussing meal preparation.

“You always hear about how the people that are around you, they're okay, they're healthy because you've taken care of home versus yourself. If it's a food thing, then you might have to take, like the Sunday-- after church or something. And that might have to be your prep day for all meals for the week. That's a helpful thing that I used to do, is take that Sunday that's supposed to be rest, you come from church and you just cook, and you just put it in the refrigerator so that you can grab.”

**Program Activities Not Outlined in the Facilitator Guide**

GPS Facilitator made additions that were program related but not outlined in the Facilitator Guide. Activities not outlined in the Facilitator Guide were planning for the maintenance phase and proctoring of the weekly episode survey. Facilitators often had questions regarding these activities because they were not included in the facilitator guide. There was some confusion as to the appropriate time to complete the episode survey. Further, during Session 15 a significant portion of the session consisted of planning the maintenance phase for all groups. This included discussions about how to stay in contact and what steps to take in preparation for the maintenance phase.

**GPS Participant Weight Loss**

Coding adaptation in the Facilitator Guide allowed for QSR NVivo 10 to provide percent deletions for each session. Participant outcomes were grouped by GPS Facilitator deletion behaviors. Table 2 shows the average percent deletions by Facilitators, Danni’s deletion behaviors were excluded due to missing audio sessions from weeks 14, 15, and 16. In addition, we excluded from this analysis the GPS Participants weight loss and
waist to hip ratio data for Danni’s group. The sample size (n=50) for this analysis was also small when stratified by facilitator and the overall deletion behaviors to the program manual were very high (Table 2). The first author selected the cut off point for deletions, 60%, due to four of the five facilitators’ average deletion of material overall was more than 50%. Facilitators (n=6) were placed into two groups, those who deleted an overall of 60% across the three sessions as shown in Table 4. Alex who had 11 participants complete the study and on average deleted 31% of the overall facilitator guide. Further, grouping by an average of 60% deletion Georgie (n=8) who deleted an average of 53% was grouped with Alex.

There was no significant effect of Facilitator deletion behavior on GPS Participant mean weight loss after controlling for church site, F (1, 47) = .25, p=.619. In addition, there was no significant effect of Facilitator deletion behavior on GPS Participant mean difference in waist to hip ratio after controlling for church site, F (1, 44) = 1.19, p=.281. The impact of deletion behaviors were not detected due the large variation in participant weight loss data available. GPS Participant data for this analysis only included those with data at weeks 14, 15, 16, and baseline. After grouping by deletion behaviors the groups had different sample sizes, those who deleted more than 60% (n=31) and those who deleted less than 60% (n=19).

The results of the Independent t-test were not significant, t (45) = - .738, p = .088, indicating there is no significant difference between the changes in participant waist to hip ratio between those groups that deleted more than 60% of the material (M = -.047, SD = .05, n=29) and those that deleted less than 60% of the material (M = -.04, SD = .04, n=19). The 95% confidence interval for the difference between the means was -.04 to .02.
In addition, the difference in GPS participant weight loss between the two groups was assessed in IBM SPSS 24. The results of the Independent t-test were not significant, \( t(48) = -.156, p = .191 \), indicating no significant difference between the changes in participant weight loss between those groups that deleted more than 60% of the material (\( M = -7.75, SD = 8.71, n= 31 \)) and those that deleted less than 60% of the material (\( M = -7.25, SD = 13.77, n= 19 \)). The 95% confidence interval for the difference between the means was -6.87 to 5.88.

The first author also assessed deletion behaviors by facilitators within each section of the facilitator guide. With the program guide consisting of mostly of new core materials evaluating each section (Graphs 1, 2, and 3) based on the guide an assessment of deletions within each section was conducted. Facilitators were deleting more within the sections of new core materials but an average of these deletions was less than 20% of the facilitator guide.

**Discussion**

In this study the most common adaptations by GPS Facilitators were deletion of materials in the Facilitator Guide. Most often, GPS Facilitators deleted new core materials. Deletions are important to account for because an adaptation to one core implementation component means adjusting another core component\(^{23}\). In addition, in previous process evaluation of health behavior interventions there were statistically significant relationships between implementation fidelity and participant outcomes\(^{14, 24}\). In this study, even among those facilitators who deleted the least amount of material, there was still an increase in deletions over time. Researcher and program facilitators should determine the essential elements at the beginning of the program and the
consequences of modifications\textsuperscript{24}. However, this must be paired with how the facilitator or program site “may want to personalize or tailor the intervention as a way of enhancing their identity”\textsuperscript{24}.

The faithfulness to an intervention protocol\textsuperscript{3} is critical to internal validity and expected outcomes\textsuperscript{25}. In this study, the Independent t-test did not detect a significant difference in weight loss or waist hip ratio between the groups of facilitators with more than 60% deletion and those that with less than 60% deletions. There was an extreme outlier, Alex, who deleted the least amount of material to the overall facilitator guide. While an association between deletions behaviors and GPS Participant outcomes, weight loss and waist to hip ratio, were not observed other outcomes affected that were not studied include facilitator addition behaviors, co-facilitator implementation behaviors during sessions when the facilitator was absent, facilitation style, and participant/facilitator responsiveness to materials (Carroll, 2007). In addition, there was no assessment of GPS Participant attendance and one year follow-up weight loss in the initial GPS study. This highlights a need within adapted DPP research, assessing the role of program materials, social support, and program facilitators in achieving participant outcomes.

Additions made by the GPS Facilitator to the program protocol were not problematic or different from the program materials. Often, additions were program related such as expanding on specific topics and program activities seen on the DVD. These additions were not a negative behavior but the authors felt it would be important to note any additions not outlined in the program protocol. These results highlight the complexity of adding to meet the needs and dynamics of a group session. The facilitator
guide should also list who, when, and how of proctoring the episode survey. Future research should determine the relationship between program deletions, additions, and changes relate to program outcomes. In this study participants were provided health education through the DVD series but were provided an additional form of support through facilitated group discussion.

Previous studies adapting the DPP for implementation in community settings explore the optimal number of sessions needed to achieve the original program outcomes\(^26\) and group based programs\(^27\). In addition, researchers have assessed the impact of adapted programs serving diverse communities\(^28\-31\) and interventions in diverse settings\(^32\-36\). Studies have assessed the use of technology\(^37\-40\) and the importance of a community-based participatory research approach\(^41\). These components are important to program development and implementation in community settings. However, evaluating a program without ensuring the protocol is implemented as designed researchers risk a “black box” evaluation\(^42\) without determining the process of achieving program outcomes. In addition, a Type III Error, evaluating a program not implemented as intended\(^17\). Adjusting program inputs and evaluating program outcomes to determine what components are critical to achieving participant behavior change and weight loss can be challenging.

Within prevention science these findings highlight an area of research understudied. The benefits of developing evaluation tools could benefit other national chronic disease prevention programs. Developing these tools for evaluation would contribute to determining the best practice for monitoring fidelity of implementation, training facilitators, and developing measurement tools. One similar national program is
the WISEWOMEN (Well-Integrated Screening and Evaluation for WOMen Across the Nation) Program, a community-based lifestyle program addressing cardiovascular disease risk. This program is offered through health care providers who screen women ages 40 to 64 years. Additionally, the DPP study focuses on weight loss through healthy eating habits and increased physical activity. These outcomes are important for preventing other chronic diseases such as coronary health disease, high blood pressure, stroke, and osteoarthritis. Strengthening the implementation and evaluation of the DPP could directly and indirectly impact other national programs.

Limitations

This mixed methods study focused on the baseline, midpoint, and the week 15 of the 16 week GPS intervention. There was missing session audio, co-facilitator write-ups, and GPS participant biometric data. Missing data was due to recording device failure, absent program facilitators, or participant absence and attrition rate. We did not include data from sessions facilitated by a Drexel graduate student or the Community Outreach Coordinator. This study included only data from the GPS Program, outcomes are not generalizable. Additional variations not addressed in this study were the diversity in GPS Facilitator experience and facilitating style. In addition, due to the small sample size and low retention rates we were unable to detect a relationship between facilitator adaptation and participant weight loss.

Strengths

This analysis included proportions from coding the GPS facilitator guide and patterns between and across sessions and Facilitators. The facilitator guide served as a standard for each session guiding our assessment of adapted materials. Further, our study
explored complex and dynamic transcripts. Taking a closer look at the additions we were able to determine that GPS Facilitator additions were not inherently good or bad, but highlight the additional support facilitator provided during implementation.

**Conclusion**

Adaptations of evidence-based programs with the inclusion of lay health educators offer the opportunity to create culturally, socially, and community-based appropriate programs. However, to better serve communities seeking these prevention programs, researchers must better assess fidelity of implementation by program facilitators. An important area of research is exploring the impact of adapting program materials on participant to inform the best practices for training and support lay health educators. In addition, funding for evaluation should provide for time and resources to assess the behaviors of program facilitators through qualitative analysis. Lastly, evaluation of lay health educator’s fidelity of implementation in adapted DPP studies has implications for other national programs and prevention programs.
Acknowledgements

This research was supported in part by a Northwest Native American Research Center for Health (NARCH) Fellowship, sponsored by the National Institutes of Health and the Indian Health Service Grant#: U261IHS0074, the Gates Millennium Scholars Program, and the Office of Navajo Nation Scholarship and Financial Aid. In addition, the initial Getting People in Sync Prediabetes Prevention Program was funded by Comcast and United Health Foundation. We thank Crystal Wyatt, Purni Abeysekara, Alexis Amankwanor, Kimberly Arnold, Elizabeth Dalianis, Laura Hunter, Juhi Mawla, and Idris Robinson for their contributions in the development and collection of qualitative. Special thanks to the GPS Program Facilitators and GPS Program Participants.
References


Paper 2 Chart

Outline 1. Facilitator Guide Outline

Week 8: Take Charge of What’s Around You (Video: 34:47)

1. Section 1. Weigh in, Review, and Focus of Week 8 (10 mins)
   a. Weigh in and Recording
   b. Review of Week 7
   c. Participant Q&A
   d. Episode 8 Viewing
   e. Focus Week 8

2. Section 2. Food Cues (25 mins)
   a. Defining Cues
      i. Food cues: things that affect eating
      ii. Activity cues: things that affect activity
   b. Cues that Make You Eat (Food Cues Handout)
   ASK: What are some food cues for you?
   c. Managing Food Cues at Work
   d. Shopping Cues
   e. Changing Food Cues and Habits

3. Section 3. Activity Cues (15 mins)
   a. Cues Associated with Inactivity
   b. Positive Cues
   c. Removing Inactive Cues
   Important Reminders

4. Section 4. Review and Self-Monitoring (10 mins)
   a. Review of Week 8
   b. Tracking and Homework
   c. Next Week
Paper 2 Graphs

Graph 1. Facilitator Deletions to Facilitator Guide within Sections for Session 2, “Being a Fat and Calorie Detective” (N=5).

*Session 2 missing data noted with lined bars.*
Graph 2. Facilitator Deletions to Facilitator Guide within Sections for Session 8, “Take Charge of What’s Around You” (N=5).

*Session 8 missing data noted with lined bars.
Graph 3. Facilitator Deletions to Facilitator Guide within Sections for Session 15, “You Can Manage Stress” (N=6).

*Session 15 missing data noted with lined bars.
### Table 1. Sample Statements from Codes of Session Transcripts for Additions Made to Program Protocol by GPS Facilitators (N=7).

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sample statement from codes of session audio</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facilitators’ personal experiences</strong></td>
<td>“I do like my food and I just found out that I eat a lot of sweets. I eat a lot of sugar.” –Georgie</td>
<td>Session 2: Be a Fat &amp; Calorie Detective</td>
</tr>
<tr>
<td></td>
<td>“I eat nuts a lot and grains and I may get a little sandwich, the little, tiny - not even a sandwich - snack bags and put some nuts and raisins and raw sunflower seeds and all.” –Danni</td>
<td></td>
</tr>
<tr>
<td><strong>Participant affirmations</strong></td>
<td>“But you're still making the choices - the fact that you haven’t done, like you said, the pizza. You know what I mean? Sometimes it's not always about what's on the scale, but do you feel better?” –Alex</td>
<td>Session 8: Take Charge of What’s Around You</td>
</tr>
<tr>
<td></td>
<td>“You're still the same? Well, on the flip side, you didn't gain--”–Erin</td>
<td></td>
</tr>
<tr>
<td><strong>Taking care of self</strong></td>
<td>“Right now it’s about you. Because you take care and you are concerned about everybody else, but it’s about you right now. It’s about you and that's the mindset you have to take upon yourself and not feel guilty. It's all about you.”–Danni</td>
<td>Session 2: Be a Fat &amp; Calorie Detective</td>
</tr>
<tr>
<td></td>
<td>“You always hear about how the people that are around you, they're okay, they're healthy because you've taken care of home versus yourself. If it's a food thing, then you might have to take, like the Sunday-- after church or something. And that might have to be your prep day for all meals for the week.”–Alex</td>
<td>Session 15: You Can Manage Stress</td>
</tr>
</tbody>
</table>
Table 2. Average of Total Percent Deletion for Sessions 2, 8, & 16 of the Facilitator Guide by Facilitator.

<table>
<thead>
<tr>
<th>Facilitator</th>
<th>Participants</th>
<th>Sessions</th>
<th>Deletions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex</td>
<td>11</td>
<td>3</td>
<td>31.10 (2.09)</td>
</tr>
<tr>
<td>Georgie</td>
<td>8</td>
<td>3</td>
<td>53.13 (17.67)</td>
</tr>
<tr>
<td>Erin</td>
<td>5</td>
<td>3</td>
<td>61.90 (12.99)</td>
</tr>
<tr>
<td>Charlie &amp; Erin</td>
<td>11</td>
<td>3</td>
<td>63.01 (13.01)</td>
</tr>
<tr>
<td>Bobbi</td>
<td>11</td>
<td>3</td>
<td>67.35 (10.80)</td>
</tr>
<tr>
<td>Frankie</td>
<td>4</td>
<td>3</td>
<td>71.24 (13.64)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>18</strong></td>
<td><strong>57.96 (7.71)</strong></td>
</tr>
</tbody>
</table>

1 Dann was not included in this analysis because audio was only available for sessions 2 and 9.
2 Imputed missing data with Sessions 3.
3 Imputed missing data with Session 7.
Table 3. Mean Difference in Baseline and Week 16 GPS Participant Weight and Waist Hip Ratio by Facilitator.

<table>
<thead>
<tr>
<th>Facilitator</th>
<th>Participants</th>
<th>Weight</th>
<th>Participants</th>
<th>Waist Hip Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M(SD)</td>
<td>N</td>
<td>M(SD)</td>
</tr>
<tr>
<td>Alex²</td>
<td>11</td>
<td>-8.26(7.14)</td>
<td>11</td>
<td>-0.04(0.03)</td>
</tr>
<tr>
<td>Georgie</td>
<td>8</td>
<td>-5.87(20.28)</td>
<td>7</td>
<td>-0.03(0.05)</td>
</tr>
<tr>
<td>Erin</td>
<td>5</td>
<td>-4.20(7.78)</td>
<td>5</td>
<td>-0.03(0.02)</td>
</tr>
<tr>
<td>Charlie &amp; Erin</td>
<td>11</td>
<td>-7.46(3.58)</td>
<td>10</td>
<td>-0.64(0.47)</td>
</tr>
<tr>
<td>Bobbi³</td>
<td>11</td>
<td>-6.64(6.04)</td>
<td>10</td>
<td>-0.05(0.05)</td>
</tr>
<tr>
<td>Frankie</td>
<td>4</td>
<td>-16.05(19.89)</td>
<td>4</td>
<td>-0.06(0.04)</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>-7.56(10.78)</td>
<td>47</td>
<td>-0.04(0.05)</td>
</tr>
</tbody>
</table>

¹Danni was not included in this analysis because audio was only available for sessions 2 and 9.
² Imputed missing data with Session 3.
³ Imputed missing data with Session 7.
Table 4. ANCOVA Descriptive Statistics: Difference in Baseline & Week 16 GPS
Participant Weight and Waist Hip Ratio by Average Overall Total Deletions for Session 2, 8, and 15.

<table>
<thead>
<tr>
<th>Deletion</th>
<th>Participant</th>
<th>Weight</th>
<th>Participants</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M(SD)</td>
<td>N</td>
<td>M(SD)</td>
</tr>
<tr>
<td>More than 60%</td>
<td>31</td>
<td>-7.7484(8.71)</td>
<td>29</td>
<td>-.05(.05)</td>
</tr>
<tr>
<td>Less than 60%</td>
<td>19</td>
<td>-7.2526(13.77)</td>
<td>18</td>
<td>-.04(.04)</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>-7.5600(10.78)</td>
<td>47</td>
<td>-.04(.05)</td>
</tr>
</tbody>
</table>

1Danni was not included in this analysis because audio was only available for Sessions 2 and 9.

Running header: GPS Facilitator Experiences: Qualitative

Prepared for Diabetes Educator

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Paper 3 Abstract

The purpose of this retrospective study was to assess facilitator experiences implementing the *Getting People in Sync (GPS) Prediabetes Prevention Program* an adapted faith-placed Diabetes Prevention Program. Specifically, this qualitative evaluation explored GPS Facilitator experiences and behaviors with the GPS Program manual, training, and implementation. Individual interviews were conducted using a semi-structured interview guide and short survey. Interview audio was professionally transcribed verbatim and managed in QSR NVivo 10 and survey data was managed and analyzed in IBM SPSS 24. Facilitators reported being more comfortable after they received training and the program manual. In addition, they reported being unsure of the co-facilitators’ role at the beginning of program implementation. Additionally, the GPS Facilitators responded differently to the repetition in the program manual. Lastly, Facilitators reported that the video series utilized in the GPS Study was useful in engaging GPS Participants. This study highlights how program materials like the Project Not Me DVD series influence facilitating behaviors in an adapted DPP study. In addition, training of lay health educators should address how to approach repetitive materials. Future research should explore the impact of adapting the motivational interviewing component of facilitator training and implementation in addition to the best practices for limiting adaptation to core material.
Introduction

Community Health Workers provide researchers an opportunity to work with communities to ensure programs are developed and implemented appropriately for diverse populations in various settings. Community Health Workers is a term that includes lay health educators, community health advocates, community health representatives, peer health promoters, community health outreach workers, and promotores de salud (Wiggins & Borbon, 1998). These liaisons serve as a link between health care professionals and community members with the goals of improving appropriate health care use and reducing health risks (Nemcek and Sabatier, 2003). However, important areas of research underreported are the experiences and behaviors of lay health educators during implementation of adapted evidence-based interventions.

Lay health educators hold an essential position within the dissemination of evidence-based programs. Assessing facilitator experiences with program implementation provides researchers with guidance for developing best practices for lay health educator training and support. An evaluation assessed the fidelity of the Strengthening Families Program for Parents and Youth 10–14 Program, a program consisting of videos and manuals with scripted activities (Hill, Maucione, & Hood, 2007). The authors interviewed the 42 program facilitators and found that 50% of all reported changes were due to lack of time, forgetting the material, or disagreeing with the content (Hill, Maucione, & Hood, 2007). Comparing facilitator perspectives on adaptations in theory and practice provided an important finding in facilitator program fidelity. “Those who were confident about their abilities as facilitators were more likely to report adding materials as acceptable but less likely to report actually changing materials” (Hill, Maucione, and Hood, 2007). This difference in facilitator awareness and behavior as it...
relates to program fidelity during implementation highlights an important area of prevention research, developing best practices for facilitator support and training. Changes were less likely to be viewed as acceptable by facilitators with more experience and those who did make changes often felt guilty (Hill, Maucione, and Hood, 2007). This tension of following program protocol and adaptation behaviors during implementation is under researched.

The Diabetes Prevention Program (DPP) is one evidence-based program researchers have adapted to meet the needs and strengths of communities in various settings. It has been adapted for faith-placed and faith-based settings to reach communities disproportionately affected by diabetes (Boltri et al., 2008; Dodani and Fields, 2010; Sattin et al., 2015; Yeary et al., 2015). Reaching communities through faith settings offer a number of benefits to strengthening the collaborative relationship with researchers. Developing trust with participants can be facilitated through inclusion of the church staff and members in the research process. Established institutions such as the church are highly visible, respected and credible for many community members (Campbell, Hudson, Resnicow, Blakeney, Paxton, and Baskin, 2007). This distinct role of the church can build and strengthen the relationship between church members and the research team (Dodani and Field, 2010). Programs placed in a church allow for researchers and participants to maintain contact. Churches provide the benefit of continued contact and support with program participants (Dodani and Fields, 2010). These components are beneficial not only to program development and outcomes but the collaborative relationship.
Working with lay health educators includes various advantages. Lay health educators have a strong understanding of the local language and cultural beliefs which provides insight on development of health materials (Dodani and Fields, 2010; Nemcek and Sabatier, 2003). In addition, they hold an important position of connection to their communities. The level of allegiance to their communities must be respected and sustained by programs in order to build capacity at the individual and system level (Nemcek and Sabatier, 2003). Lay health advisors are important to promoting community ownership (Dodani and Fields, 2010). Successful integration of lay health educators provides for a culturally and linguistically competent manner of meeting the needs of diverse populations (Dodani and Fields, 2010; Nemcek and Sabatier, 2003). Lay health educators provide an additional partner to researchers who seek to engage with diverse populations.

The DPP has been adapted to fit other settings in an effort to make the intervention accessible to communities. The YMCA holds promise for those populations with access to the YMCA facilities (Ackermann, 2013; Ackermann & Marrero, 2007). In addition, the DPP has been adapted by the University of Pittsburgh with outcomes focused on weight loss, waist circumference, and body mass index (Kramer et al., 2009). These programs report successful participant weight loss but do not report the best practices for assessing experiences of program facilitators. Previous DPP studies have interviewed program facilitators to assess their experiences with program implementation (Bozack et al., 2014; Brace et al., 2015; Damschroder et al., 2015; DeJoy et al., 2013; Islam et al., 2013; Islam et al., 2014; Schneider et al., 2012). In addition, researchers have utilized fidelity checklists to assess facilitator behaviors during program
implementation (Damschroder et al., 2015; Finch et al., 2009; Ma et al., 2009; Whittemore et al., 2014). However, best practices for program evaluation of facilitator behaviors and experiences during program implementation have not been reported.

The GPS Program utilizes a faith placed approach and videos to reach communities disproportionately affected by diabetes. This prediabetes prevention program utilized the 16-episode series Project NOT ME® to aid in disseminating the Diabetes Prevention Program (DPP) curriculum. The videos were developed by UnitedHealth Group and made accessible by Comcast On Demand (United Health Group, n.d.; Vojta, 2014). In the video series, six adults complete a 16-week intervention in an effort to lose 5 to 7% of their body weight to reduce their risk for type 2 diabetes by 58% (United Health Group, n.d.; Vojta, 2014).

This study seeks to report the experiences and behaviors of program facilitators during implementation of the Getting People in Sync (GPS) Prediabetes Prevention Program. Program components discussed during individual interviews with GPS facilitators included GPS program training and manual. In addition, assessments of GPS facilitators’ experiences with the co-facilitators are included.

Methods

Participants

Participants were 5 self-identified Black/African American women who ranged in age from 26 to 66 (M=42.20, SD=16.71). A convenient sample 5 participants were recruited from a total of 7 individuals who facilitated the GPS Program. During program implementation, three women served as facilitators for the Spring 2013 cohort and three women and one man facilitated the Fall 2013 cohort. Data for this study was collected
between January and February 2016 through individual meetings with each facilitator. The five participants in this study reported some college education (n=2), associate’s degree (n=1), bachelor’s degree (n=1), and doctorate/law/medical degree/equivalent (n=1). In addition, these five participants reported their current occupations as an assistant director (n=1), nurse (n=1), retired (n=1), student (n=1), and temporarily unemployed (n=1).

**Procedures**

Each of the GPS facilitators was recruited to participate in an individual interview at the Dornsife School of Public at Drexel University in Philadelphia, PA. Letters were mailed to each facilitator to invite them to participate in a study to assess their experiences and behaviors with the program manual, training, and implementation. Prospective participants were contacted by phone to schedule interview times and dates. Two facilitators were lost to follow-up, one facilitator was unable to be reached after multiple unsuccessful attempts at meeting up and one facilitator did not respond to recruitment letters or phone calls. Participants received a $75 gift card and parking pass incentive. The institutional review board of Drexel University approved all study procedures.

**Measures**

**Quantitative Measures**

Participants (n=5) completed a brief self-administered demographic questionnaire that included questions about the participants’ gender, occupation, age, level of education, and their race or ethnicity. In addition, participants completed a survey with a scale of 1-10 assessing their adaptations to program content. Questions prompted
facilitators to rate on a scale of 1 to 10 how prepared they felt, the importance of program materials, adaptations to program materials.

**Qualitative Measures**

This study utilized a semi-structured interview guide consisting of questions about the facilitators experience with program training, adapting the program content and material, communication with participants between sessions, challenges, and facilitator recommendations. Examples of questions were those about facilitator level of comfort and relationship with the co-facilitator. Facilitators were asked to describe a time you felt very comfortable leading a session. How would you describe your relationship with the co-facilitators? How was this relationship similar or different from what you expected? In addition, facilitators were prompted to discuss their best recommendations for future facilitators when dealing with challenges. What would be your best recommendation for a new facilitator on what to do when the group begins to disagree on information presented in the video? The face-to-face interviews were conducted and digitally recorded by the first author in a private office at the Dornsife School of Public Health at Drexel University in Philadelphia, Pennsylvania.

**Data Analysis**

**Quantitative data analysis**

Responses to the demographic survey were imported into IBM SPSS 24 for quantitative statistical analysis. Statistical tests for averages and frequencies were conducted on the demographic data including sex, age, education level and race and ethnicity. In addition, average scores were calculated for each of the survey questions.
Qualitative Data Analysis

Audio recordings from the five individual interviews were professionally transcribed verbatim into a Text file. The first author edited each transcript for clarity, removed personal identifiers, and gave each facilitator pseudonyms. Each interview transcript was imported into the qualitative data software QSR NVivo 10. The first author then reviewed the transcripts to code sections according to patterns and distinct differences. A cyclical review of each transcript was conducted until the author reached saturation, no new patterns or distinct differences emerged from the transcripts (Charmaz, 1990).

Using QSR NVivo 10 the first author created topic and analytical codes. The first author used topic codes to determine what was discussed in the selected passage (Richards, 2009). These topic codes were categorized as broad and specific. An example of a broad topic code was “Co-facilitator Support”. Subcategories noted more specific topic codes (Richards, 2009). Subcategories included “Expectations” and “Debriefing Sessions.” The first author used this coding scheme to manage the data that emerged from the transcripts and categorized each code to better assess the overall themes. The first author used analytic coding for a deeper analysis of what is going on within the data coded (Richards, 2009). These codes require reflection from the first author about their actions during coding. The first author reflected on her interest in the passage (Richards, 2009). A systematic approach was employed to ensure the data inform the research question and as a way to document the decision-making process. Memos were stored with each code documenting the decision made when exploring what is interesting (Richards, 2009). In addition, In vivo Codes were created to manage data she found
surprising or are recurring, these were documented as analytic codes (Richards, 2009). Codes and their interpretations were saved in a coding matrix that was created by the first author. Rereading the transcripts provided the first author context of each question. An audit trail was created which allowed the first author to better organize the qualitative analysis (Ulin et al., 2004, p.168).

Results

Each individual meeting with program facilitators lasted approximately two hours. During the first 30 minutes consent was obtained and facilitators completed the survey. Facilitators then completed an individual interview with the first author for approximately 90 minutes. The first author found seven themes relating to the facilitator experiences with the GPS Program manual, training, and implementation. These themes shown in Table 1 include discussions about facilitator comfort level, co-facilitator support, the GPS Program manual, perspectives on the Project NOT ME® DVDs, and facilitator recommendation for future programs like the GPS Prediabetes Prevention Program.

Facilitator Comfort Level

An important theme that emerged from these individual interviews was the level of comfort GPS facilitators had delivering the program materials. Table 2 summarizes the GPS Facilitators’ responses to the survey instrument. When asked about their level of comfort facilitating before attending facilitator training, facilitator felt prepared (n=1), neutral (n=2), somewhat prepared (n=1), and not prepared (n=1). Facilitators felt the program manual was effective (n=3) and somewhat effective (n=2) in preparing them for
facilitation. Facilitators reported that after attending training they had higher levels of comfort facilitating.

In addition, during the individual interviews four out of the five facilitators discussed their comfort level, as it relates to their knowledge. When asked whether group dynamics changed her comfort level with facilitating, Alex responded that she didn’t get comfortable until the third session of the 16 week intervention.

“…Like I just was really hesitant, like, ‘I think they really need a dietitian to do this,’ or you know, someone like in health or like a nurse or you know, just someone that's a little bit more trained in it. And I was like, ‘Yeah,’ I was like, ‘I don't know about this,’ but I mean it was really easy. Like once you actually found out what it was about and you entered a training, and you saw your book-- the book, it's kinda like, ‘Okay,’ you know what I mean? It really is step by step, like you can do this, you just have to prepare in advance.”

However, even for Charlie who couldn’t recall a time she felt uncomfortable with facilitating, the group dynamics influenced her level of comfort,

“‘Oh, they're gonna look at me like, ‘This young girl, who are you to tell me to stop making mac ‘n' cheese,’…But, again with the manual, I read everything. You know, I went through nursing school but it's something you just gotta recap on, and me was pretty precise. But once I read over the manual, I felt comfortable, yeah.”

Other qualifications facilitators noted were their own personal health behaviors. When asked what contributed to feeling more comfortable with facilitating Erin responded,

“The major factor, if I'm going to be a facilitator, I had to practice what I preach.” She then discussed coming to the realization, “I realize that as a facilitator, it's not supposed to be about me, but I let them start and they talked.” GPS facilitators’ initial comfortability was influenced by their perceived knowledge and practice of healthy behaviors.
Co-facilitator Support

All the facilitators in this study (n=5) reported their co-facilitators’ attendance at each weekly session was very important. However, facilitators began with different and vague ideas of the co-facilitators’ specific role. Alex, Erin and Georgie all expressed that they viewed the co-facilitators as source of support during implementation. Georgie discussed how she felt the co-facilitator’s roles was to provide immediate onsite support,

“When we first started the week, the program, the co-facilitator was, she was pretty engaged when we started the program. So I wasn't really sure what her role was. I knew that she was here to assist me. She was here to stay in the class to make sure everything goes smoothly, to make sure I don’t have any difficulties. If I need help with something, at least I have somebody right here instead of me calling somebody on the phone.”

Charlie and Danni initially thought the co-facilitator had a larger role. Charlie thought the co-facilitator was going to run the group. Danni also stated, “I envisioned a co-facilitator, I would do half, the co-facilitator do the other half.”

Adaptations

Table 3 shows the averages for response to survey questions on a 10-point scale. GPS Facilitator responses to questions on adherence to program manual were generally similar with regards to how often they changed materials in the program manual, never (n=4) and rarely (n=1). Two facilitators reported adding materials, every session (n=1) and almost every time (n=1). Additionally, one facilitator reported rarely leaving out materials and another left out materials almost every time. Further, GPS Facilitators, including those who reported high levels of adaptations, felt individuals provided with the same program manual and facilitator training would rarely or never adapt program materials.
Program Manual

Redundant Material

When asked if there were sections of the program manual that seemed redundant all GPS Facilitator in this study (n=5) felt there was some redundancy, but they differed on how to approach this material. Three facilitators expressed the importance of repetitive material as beneficial. Georgie stated, “I believe that when something comes up often, that means it's important. Like, the more you say it, the more you realize, okay, that's an important element to consider.” However, Alex felt this redundancy was difficult because of participant reactions, “they're looking at you like, ‘Didn't we already talk about this?’” Erin expressed that, “everything that was in the manual was covered in episodes, so there were occasionally places that were like an instant repeat.” She further discussed these repetitions between the manual and DVD, “So, it was like that little section of the manual, I would say, you could skip and just go on to the next part.” Erin then stated,

“Even if it was covered in a video, you still ask questions or just bring up, you know you can incorporate it that way, as opposed to just going verbatim with the manual but soon you still got around to it.”

Fidelity

Program fidelity came up during conversations about the program manual and the role of the co-facilitators. In response to a question about what the program would look like without a program manual Alex stated,

“I don't know what you got taught, and what your person, the facilitator, got out the video, and what the other facilitator got out the video, and how they're gonna lead the discussion. So I do think, you know, the manual definitely provided as a consistence guideline of this is how it's supposed to be. These are the things that you should take from the video, and here is a, you know, way to guide your discussion…”
Danni also stated she believe the role of the co-facilitator was “to see whether the facilitator was staying on track.” Georgie also viewed the co-facilitator as a person to validate and reassure her of the information she was providing participants, “I'm like the person between the participant and the co-facilitator. So for me to tell something to the participant, I need to make sure, like, what I'm saying is true. And she's here to tell me, okay, what she's saying is true.”

**Support from Project NOT ME® DVD**

Facilitators were asked how they would feel facilitating the group without the videos. Alex stated it would be harder and she would need more training.

> “Like I feel like to say, "Here's the whole program," for one or two facilitator trainings and then give them a book, I just feel like people would feel uncomfortable or that they don't know enough, and that's what my thing was, like I'm like, "Do I really-- like that's not my forte." Do I know about healthy eating? Yes, but I feel like anybody can teach that between the videos and the book. Like, really like anybody can do it as long as you're able to like pay attention and you know you have the gift of gab, like you can really…I think I would have felt very unprepared if I didn't have the videos.”

Charlie also remarked that the videos gave participants a visualization of the materials.

Charlie, Danni, Erin, and Georgie expressed that the videos provided GPS Participants with people to relate to. Danni associated this relatability to participant interest,

> “Oh, if you took away the, uh, videos, I think it would be more difficult to present the program because videos played an important part. Like it, it really captured attention of the participants and the, each individual, in the video, someone in the audience felt that they could relate.”-Danni

Table 3 lists each facilitator’s top 5 recommendations for a GPS Facilitators. Facilitators most often mentioned the importance of preparing or planning. Further the importance of seeking support and communication with co-
facilitator was mentioned often as a recommendation. In addition, a few of the facilitators stated the importance of engaging the participants in the program.

**Discussion**

In this retrospective study, GPS facilitators reported higher levels of comfort with facilitating after attending training and due to having the program manual. In addition, facilitators discussed the impact of their knowledge and personal health behaviors on their level of comfort facilitating. These findings highlight the importance for facilitator training meeting the needs of program facilitators with diverse educational background, experience, and level of independence (Quinn & McNabb, 2001). With this information researchers can better tailor training and program support.

In addition, the complex nature of the health issue must be assessed to determine the knowledge and skills needed for implementation (Quinn & McNabb, 2001). Factors contributing to obesity include 108 variables and a network of influences including physiology, individual physiology, food production, food consumption, activity environment, individual activity, social psychology, individual psychology, and energy balance (Vandenbroeck, Goossens, & Clemens, 2007). The DPP and other chronic disease prevention programs focus on addressing the modifiable behaviors, diet and physical activity to improve health outcomes. Future research should focus on determining how to prepare and support facilitators in supporting weight loss, while still implementing an intervention is important during program training and implementation. Research is needed to understand the experiences and behaviors of facilitators in various roles in community-based programs such as adapted DPP.
The uncertainty expressed by the GPS Facilitators when discussing the co-facilitators’ role is important to consider when researchers intend on providing a supportive role during implementation. In the original GPS study the roles facilitator and co-facilitator was discussed at initial facilitator training. As recommended, the researchers in the GPS study did establish the roles of the facilitator and the researchers (Frank, Coviak, Healy, Belza, & Casado, 2008; Tang, Nwankwo, Whiten, & Oney, 2012) with an emphasis on the supporting role of the university (Quinn and McNabb, 2001). However, establishing the roles and expectations of facilitators and co-facilitators should go further and be addressed in training and program materials. During training, role playing exercises should include the role of the co-facilitators. Listening and asking open-ended questions offer the facilitator an opportunity to master these skills (Tang et al., 2012). Training in the initial GPS study did not often utilize role playing except for one session on how a co-facilitator was going to deliver a program activity. Further, delivery of this material during the intervention was done by a Drexel co-facilitator. In addition, the program manual did not indicate co-facilitators responsibilities, such as the episode survey and collection of weekly weight, demonstrating the supportive role of co-facilitators.

During the individual interviews facilitators expressed different ways they approached the repetition in program materials. Each facilitator relied on their own interpretation of this repetition between the program guide and the DVD series. The structure of the program was created to ensure the DVD series was providing DPP material and provided a structure for facilitators to imitate in fostering group discussion among program participants. Researchers created the program manual as a guide to allow
program participants to follow the activities and discussions in the Project NOT ME® DVD; it was purposely created to replicate the DVD series. A challenge to this program structure is approaching participants with information the facilitator or participant assumed was already covered by watching the video series. Facilitators may feel the information was already covered and there is no need to review materials again. Future research and evaluation of fidelity should include program participants to reflect on how program structures such as repetition influenced their learning. In addition, training should address this tension through role-playing and discussion with program personnel. Benefits of role playing include the opportunity for team building, self-evaluation, and constructive feedback among facilitators (Frank, Coviak, Healy, Belza, & Casado, 2008). The challenge of engaging participants may also require the development of more interactive learning activities (Brown et al., 2013). This is especially important to address if facilitators are having difficulty due to repetitiveness of program materials that may be core program material.

Future research should consider the role of Motivational Interviewing in group settings. The technique motivational interviewing comes from the field of psychotherapeutic treatment for problem drinking (Hecht et al., 2009). This technique was utilized by lifestyle coaches in the original DPP study as a technique to encourage behavior change among program participants (The Diabetes Prevention Program Research Group, 2002). Important techniques of motivational interviewing allow facilitators to focus on group dynamics and discussions. The fourteen strategies and techniques for using motivational interviewing are; Affirmations, Advice/Feedback, Asking Permission, Columbo Approach, Eliciting/Evoking Change Talk, Decisional
Balancing, Exploring Importance and Confidence, Listening, Normalizing Open-Ended Questions, Readiness to Change Ruler, Reflective, Statements Supporting Self-Efficacy, Summaries, and Therapeutic Paradox (2008). Each of these techniques holds promise for determining how facilitators can best cultivate discussion about eating and exercise behavior change. Eliciting/Evoking Change Talk is a technique facilitators would use to providing participants the chance to voice their need or reason for change by “address discrepancies between the [participant’s] words and actions in a manner that is nonconfrontational” (Nova Southeastern University, 2008). In addition, the technique of Exploring Importance and Confidence allows for discussion about the importance of change and possibility of change (Nova Southeastern University, 2008). Additionally, motivational interviewing includes Reflective Listening, allowing the listener to listen and guess what the speaker is saying and to state the change needed (Nova Southeastern University, 2008). The Columbo Approach consist of asking participants to address the inconsistencies what the individual is saying and doing while noting the change being discussed (Nova Southeastern University, 2008). These various techniques are important to fostering discussions on weight loss through eating and exercise changes by focusing on how participants may be approaching and practicing their new knowledge and skills. Adaptation of the DPP study includes moving from individualized coaching to a group setting.

Future research should include an assessment of the impact of adapting participant support techniques, to understand how to best tailor training and support for lay health educators. Non-standardized DPP training for facilitators in the GPS study did not include motivational interviewing. Previous studies which utilized non standardized
DPP training have also not reported training facilitators in motivational interviewing (Dejoy et al., 2013; Krukowski et al., 2013; Tang et al., 2012; Whittemore et al., 2014). Among studies that reported training facilitators in motivational interviewing techniques (Dutton et al., 2015; Islam et al., 2014; Whittemore et al., 2009), one study reported that nurse practitioners implementing a 6-month intervention in a primary care setting found it difficult to implement motivational interviewing (Whittemore et al., 2009). This adaptation is important to consider because the original DPP assigned one lifestyle coach to support multiple participants individually (The Diabetes Prevention Program Research Group, 2002).

**Limitations**

A limitation of this retrospective study is due to the small sample size the outcomes of this study are not generalizable to all lay health facilitators. However, my focus is the richness, complexity, and detail of the data (Baker and Edwards, 2012). Individual interviews provided insight into the experiences and behaviors that may not be fully captured with quantitative data. In addition, these interview questions included sensitive topics relating to how well the program was implemented. There may be a possibility of social desirability bias as well (Callegaro, 2008). As a research assistant to the project the program facilitators were familiar with the first author’s role as the data manager. Facilitators may have felt guilty for not having fully implemented the program as detailed in the protocol. However, providing scenarios of what they would recommend to address challenges of fidelity allowed questions to be asked in a way that is not accusatory and allows those who successfully followed the protocol to discuss how to address these challenges. Another limitation of this study is the three facilitators from the
first cohort completed the intervention a year before being interviewed. However, as part of the GPS maintenance period following the intervention, each facilitator continued to communicate with program participants from the first cohort. Depending on the maintenance plan created by each group, facilitators were still engaging with participants about weight loss and program materials. Inter-rater reliability is a limitation because the first author collected, coded, and analyzed the data presented. However, in these interviews the data were created by the participants and the first author through an interaction during the interviews (Richards, 2009).

**Recommendations**

Improving the health of communities disproportionately impacted by chronic disease requires innovative approaches linked to evidence-based programs. Communities strengths and needs differ and may require program adaptation developed between the community and researcher. However, less often researched are those adaptations made during program implementation and the experiences of lay health educators. This study found that program materials should better demonstrate the supportive role of research staff during implementation. In addition, training should include techniques to address the repetitive nature of program materials, motivational interviewing, and the supportive role of the research staff. Moreover, future research is needed on assessing the impact of adapting or deleting the motivational interviewing component of the original DPP study. Future research should evaluate and report on the experiences and behaviors of program facilitators during implementation. Additionally, future research and evaluation of fidelity should include qualitative data on participants’ assessment of how program structures such as repetition influenced their learning. Lastly, this study found that lay
health educators hold an important role in the translation of evidence-based program to community settings.
Acknowledgements

We thank Crystal Wyatt, Purni Abeysekara, Alexis Amankwanor, Kimberly Arnold, Elizabeth Dalianis, Laura Hunter, Juhi Mawla, and Idris Robinson for their contributions in the development of survey instruments and program implementation. Special thanks to the GPS Program Facilitators.
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https://clinicaltrials.gov/ct2/show/study/NCT01768546


**Table 1. Sample Statements from Codes of Individual Interviews GPS Facilitators (N=5).**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sample Statement From Codes Of Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitators Comfort Level</td>
<td>“Like I had-- I had to get adjusted to the people, I had to get adjusted to the program, I had to understand the program.” - Georgie</td>
</tr>
<tr>
<td>Co-facilitator Support</td>
<td>“When I saw her, I was like, ‘Oh. I guess she's going to run the group.’ You know?” - Charlie</td>
</tr>
<tr>
<td>Program Manual</td>
<td>“I don't think it was redundant. I may have reviewed some of the previous things, which is good to refresh your mind.” - Danni</td>
</tr>
<tr>
<td>Project NOT ME® DVD</td>
<td>“I kind of like the Project Not Me videos for a simple reason, going back to it. Each person had a chance, and I noticed in phase one and phase two, everybody kind of identified with somebody in there in some way, shape, or form. So, that's where I think that was effective.” - Erin</td>
</tr>
<tr>
<td>Fidelity</td>
<td>“But not-- even if you feel anything is…contradicting in the study, you know, you stick to the facts. But if you don't know the answer, find the answer, yeah.” - Charlie</td>
</tr>
</tbody>
</table>
Table 2. Mean GPS Facilitator Response to GPS Program Facilitator Survey (N=5).

<table>
<thead>
<tr>
<th></th>
<th>M(SD)</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of feeling prepared to facilitate, before training(^1)</td>
<td>5.00(3.08)</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Effectiveness of manual in preparation to facilitate(^2)</td>
<td>8.80(0.84)</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Level of feeling prepared after training(^3)</td>
<td>9.00(0.71)</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Effectiveness of DVD(^2)</td>
<td>9.60(0.55)</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Importance of GPS Program Components</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program manual(^4)</td>
<td>9.80(0.45)</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>DVDs(^4)</td>
<td>9.80(0.45)</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Co-facilitator weekly session attendance(^4)</td>
<td>9.60(0.55)</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Ease program manual use(^5)</strong></td>
<td>9.40(0.55)</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Adaptation to program manual by GPS Facilitators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add additional materials(^6)</td>
<td>5.40(2.97)</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Leave out material(^6)</td>
<td>3.20(2.78)</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Change materials(^6)</td>
<td>1.60(0.89)</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Adaptation to program manual by a person with similar</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>training &amp; manual</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add additional materials(^6)</td>
<td>3.40(0.89)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Leave out material(^6)</td>
<td>1.80(0.45)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Change materials(^6)</td>
<td>2.20(1.30)</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

\(^1\)Using a scale of 1=Not at all prepared to 10=Fully prepared.
\(^2\)Using a scale of 1=Not at all effective to 10=Very effective.
\(^3\)Using a scale of 1=Very uncomfortable to 10=Very comfortable.
\(^4\)Using a scale of 1=Not important to 10=Very important.
\(^5\)Using a scale of 1=Very difficult to 10=Very easy.
\(^6\)Using a scale of 1=Never to 10=Every session.
<table>
<thead>
<tr>
<th>Facilitator</th>
<th>Lesson</th>
</tr>
</thead>
</table>
| Alex        | 1. Be prepared.  
               | 2. Know how to address difficult questions, be honest and pretty much say like, “I don't know, but let me get back to you.”  
               | 3. Draw from real life experiences, whether they're your own or someone else's.  
               | 4. Know how to engage people, start the conversation with your own response to questions.  
               | 5. Communicate with your co-facilitator. |
| Charlie     | 1. Relax, you have support.  
               | 2. Get to the session early and plan with the other facilitator.  
               | 3. Don’t just instruct, get the insight of the group.  
               | 4. Ask the co-facilitator if you even feel like you don’t have the answer.  
               | 5. Be professional because the participants are looking at you to keep the group engaged and fun. |
| Danni       | 1. Know your lesson and what you’re talking about.  
               | 2. Be on time.  
               | 3. Be prepared  
               | 4. Be neat and professional.  
               | 5. Have the participants participate in the session, get their input. |
| Erin        | 1. Be creative with food tracking, have participants take pictures of their meals.  
               | 2. Goal setting, your weight loss goals.  
               | 3. Get support from family/support groups.  
               | 4. Keep them motivated.  
               | 5. You don't want a person to stress if they’re not losing weight. |
| Georgie     | 1. It’s a learning process for you.  
               | 2. Establish trust between you and the participant.  
               | 3. Be teachable and coachable. |
Conclusion

The outcomes of these studies highlight the need for future research within fidelity of implementation. This dissertation focused on adapted DPP studies, however, these outcomes highlight a need for development of measures, methods, and best practices for evaluating fidelity of implementation within prevention research and public health practice. Further, health policy holds a critical role for ensuring accessible and affordable evidence-based programs. Together these various stakeholders can work toward improving the health outcomes in the U.S.

In my first study the main findings were there was a lack of research on how adapted studies defined adaptations and measurements of fidelity of implementation as it relates to the program facilitator(s). Evaluations of adaptation behaviors by program facilitators, methods and outcomes need to be reported in published studies to inform future translation research. In addition, research is needed on developing best practices for evaluating facilitator(s) fidelity of implementation. Further, research is needed to determine the relevance and utility of standardized national training for community-based interventions.

The second manuscript of this dissertation explored how adapting program materials relates to participant outcomes, weight loss. The most common adaptation by GPS Facilitators was deletions of new materials. An association between deletions and weight loss were not observed in this study. However, future research is needed to determine adaptation behaviors by program facilitators during implementation and assess association to participant outcomes. Understanding what drives the outcomes of interventions has the potential to developing best practices for selecting and
implementing program components. Components of a program that need to be better research include the role of the facilitator coupled with a DVD series in supporting participant weight loss. The outcomes of this study highlight the wealth of information provided by evaluating the behaviors of program facilitators during program implementation, specifically, qualitative analysis. A fidelity checklist would provide insight into program components implemented and deleted. However, this study demonstrates that through qualitative analysis facilitators also added information in the form of support with discussion about their own personal experiences, taking care of self, and affirming participant experiences and successes. These future research questions have important implications for other national chronic disease prevention program seeking to work with communities and lay health educators.

The final paper of this dissertation assessed the experiences of GPS Facilitators through individual interviews. Themes that emerged in this study were facilitators were initial not very comfortable with implementing the intervention, facilitators were not initially sure about the role of the co-facilitator, facilitators approached the intended repetition of program guide as either necessary or omitted materials, the Project NOT ME® DVD were seen as effective for providing participants with someone to identify with during the intervention, and facilitators stated the importance of following the guide and seeking support from the co-facilitator. These outcomes highlight the need for research on program adaptations & experiences of lay health educators. Additionally, facilitators in this study, like many other studies (Brown et al, 2013; Cene et al, 2013, DeJoy et al, 2013; Islam et al, 2014), did not provide training for motivational interviewing. Determining the impact of researcher adapting this program component of
the initial DPP study is important as many programs are moving from the individual to group setting. Training of program facilitators should include address repetitive materials, supportive role of research staff, and adaptations or implementation of motivational interviewing techniques.

The research and practice of evaluating fidelity of implementation have important implications for social justice within prevention science, specifically, community health education. Groups disproportionately impacted, diagnosed, with diabetes are American Indians/Alaskan Natives (15.9%), non-Hispanic African Americans (13.2%), Hispanic Americans (12.8%), and Asian Americans (9%) compared to non-Hispanic whites (7.6%) (American Diabetes Association, 2016). Community-based participatory research (CBPR) serves to address health disparities through research that engages community members in the research process (Agency for Healthcare Research and Quality, 2003). However, ensuring community members participating in research are appropriately supported and trained is important assess to ensure access to evidence-based programs. Reducing the risk and onset of chronic diseases like diabetes is an opportunity to reduce health disparities. The role of CBPR is also “providing immediate benefits to the community that participated in the research” (Agency for Healthcare Research and Quality, 2003). This dissertation highlights the lack of research on program adaptations definitions, evaluations, and reporting.

Further, the role of health policy is critical to supporting the dissemination and implementation of evidence-based program. Efforts must be made to ensure there is an infrastructure for community-based programs (Anderson, Riley and Everette, 2012). The YMCA has successfully delivered the lifestyle intervention, DEPLOY study, to 23 states
through 178 sites (Anderson, Riley, and Everette, 2012). However, efforts to ensure this intervention reaches all 50 states requires dedicated federal funding, access for Medicare and Medicaid beneficiaries, and funding public education on the existence of the program (Ackermann, 2012; Anderson, Riley, & Everette, 2012). Additionally, there is a need for communicating with policymakers (Ackermann, 2012; Israel et al, 2010). Training of mental health professional in dissemination and implementation research exist through the Training in Dissemination and Implementation Research in Health (TIDIRH) (Meissner et al, 2013), providing a possible approach to training and developing best practices for dissemination and implementation research for prevention science. Further, public health research is tasked with developing best practices for working with communities and the challenges of such partnerships. Challenges include shifting funding to front-end processes and flexibility of funding to support this process (Minkler, Blackwell, Thompson, & Tamir, 2003). Health policy holds a significant role in determining how to best support researchers and communities in efforts to address and eliminate health disparities.

Fidelity of implementation requires participation by researcher, public health practitioners, and communities to determine how to best adapt and implement evidence-based intervention. Ensuring these programs are reaching communities disproportionately impacted by health disparities, through affordable and accessible programs includes ensuring program maintain program fidelity. Accounting for adaptations hold potential for determining what is driving program outcomes and the best practices for further disseminating adapted evidence-based programs.
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Appendix 1

Figure 1. Conceptual Model of Implementation Fidelity (Carroll et al, 2007)

Potential moderators:
1. Comprehensiveness of policy
2. Strategies to facilitate implementation
3. Quality of delivery
4. Participant responsiveness
Vita

Beatriz Oralia Reyes was born in Gallup, New Mexico. She earned her Bachelor of Science in Zoology from the University of Oklahoma and her Masters of Public Health in Health Behavior at East Carolina University. During her time at the Dornsife School of Public Health she was a guest lecturer in the graduate course, Historical & Contemporary Developments in Social Justice, on topics such as “Marriage, Tradition, and the Dilemma of Social Justice in a Settler Colonial Society,” “Native American Populations, Sovereignty, and Social Justice,” and “Historical Perspectives on Native American Health.” Additionally, she lectured in the graduate course Outcomes Assessment in Community Health and Prevention, on “Fidelity of Implementation Health Promotion Programs.” She co-lectured at an Opening Doors Health Disparities Research Training Program seminar on “How to Work with Communities.” Lastly, she guest lectured at Pierce College in Introduction to Gender Studies on the topic of “Tribal Provisions of the Violence against Women Act.”

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