CHARACTERISTICS OF DIABETES PREVENTION TRANSLATION PROGRAMS TARGETED TOWARDS AFRICAN AMERICAN POPULATIONS THROUGH THE LENS OF THE CDC'S RECOGNITION PROGRAM

by

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ABSTRACT

Reducing type 2 diabetes (T2D) is currently of public health significance since diabetes is considered to be a major national epidemic in the United States. While diabetes affects all racial/ethnic groups, African Americans are disproportionately diagnosed with T2D when compared to Non-Hispanic whites. With such pronounced disparities, it is crucial that effective interventions are critically developed and examined for their impact on populations considered to be at high risk for T2D.

The CDC's National Diabetes Prevention Program (NDPP) aims to reduce diabetes incidence rates by working with public and private partners to translate the effective and evidence-based lifestyle intervention for individuals with prediabetes into community settings. In order to ensure the standardization and fidelity of translated programs, the CDC created the Diabetes Prevention Recognition Program (DPRP). The DPRP highlights standard guidelines that are considered key components of the DPP curriculum and offers organizations/programs implementing the intervention an opportunity to be nationally recognized.

Many individuals aiming to translate the DPP for their targeted populations use current research as a guide for program development and implementation. However, the DPRP's standard guidelines have not been assessed systematically for translational research components and outcomes of published studies. This thesis, therefore, aimed to understand the characteristics

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of translational research through the lens of the DPRP. Two previously published systematic reviews were analyzed for this article. The first systematic review explored DPP translational research among the general population, whereas the second systematic review explored translations of the DPP specifically among African American populations. Overall, the results indicate that for both systematic reviews, only 15.4% of the articles met all of the assessed DPRP variables. However, studies among the general population were more likely to meet curriculum components, short-term weight loss goals and program eligibility requirements when compared to studies among African Americans. In conclusion, this thesis highlights the importance of assessing and reporting the DPRP standards in translational DPP research, particularly studies among racial and ethnic minorities. Assessing standard guidelines in research may increase the number of nationally recognized DPP programs that are translated and implemented into high-risk communities, hence, making a broader public health impact.

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1.0   INTRODUCTION

Reducing diabetes mellitus is currently a Healthy People 2020 objective, and with approximately 29 million individuals affected by the disease it is evident that diabetes is a national epidemic, specifically type 2 diabetes (ADA, 2014s; Healthy People, 2014). Individuals who are clinically diagnosed as having diabetes are at high risk for other severe health outcomes. For instance, individuals who have diabetes are over two times more likely to have cardiovascular disease and have a life expectancy that is up to 15 years less than the average American (Healthy People, 2014). Diabetes is the leading cause of adult onset blindness, non-traumatic amputations and loss of kidney function (Healthy People, 2014). Importantly, diabetes not only contributes to high prevalence rates of chronic illness in America, but creates significant economic burden. Researchers have estimated that by 2030, our healthcare system will have an expenditure of 490 billion dollars due to diabetes; an economic burden rate that is substantial and likely unsustainable (Strom & Egede, 2012).

Although diabetes is a problem in all racial/ethnic groups, the prevalence of diabetes is more pronounced in some racial/ethnic minority groups. Underrepresented minorities make up 25 percent of the diabetes population and African Americans alone are almost twice as likely to be diagnosed with type 2 diabetes when compared to Caucasian Americans (Healthy People, 2014). In 2009, the hospital discharge rates due to diabetes were two times higher for blacks than whites (CDC, 2014). In the same year, mortality rates for African Americans were approximately

1,000 per 100,000 whereas the mortality for whites was 800 per 100,000 (CDC, 2014). With such pronounced disparities, it is crucial that effective interventions are critically developed and examined for their impact on populations considered to be at high risk for type 2 diabetes.

The Diabetes Prevention Program (DPP) was shown to be one of the most effective primary interventions targeting individuals with pre-diabetes (The DPP Research Group, 2002). Therefore, many researchers have pushed to translate the national intervention into community settings. While there have been some large scale studies showing that community-based and culturally sensitive translations are effective (Katula et al., 2012; Kumanyika et al., 2009; Perri et al., 2008), the overall research has demonstrated that DPP-adapted interventions have been less effective, with regards to weight loss, for blacks when compared to non-Hispanic whites (Samuel-Hodge et al., 2014). Hence, there is a strong need for standard guidelines so that researchers in the field can compare studies and assess which methods are most effective when translating the DPP for African American populations.

The National Diabetes Prevention Program works with private and public partners to translate the DPP at a national level in an effort to decrease diabetes risk factors and reduce the incidence of diabetes. The National DPP and partnering organizations achieve their goals by delivering programs that are recognized by the CDC nationwide, training community organizations, increasing referrals to the CDC recognized lifestyle change programs for individuals who are high-risk, and also by ensuring the quality and adherence of evidenced based standards and programs (CDC, 2016). The Centers for Disease Control and Prevention (CDC) highlights the importance of standard guidelines through their Diabetes Prevention Recognition Program (DPRP); a program designed to highlight key intervention variables based on the original DPP. The DPRP offers programs and organizations that are interested in implementing

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the DPP an opportunity to be nationally recognized (CDC, 2016). Although, the DPRP is nationally known, there is a lack of research assessing whether current translational studies meet the necessary recognition criteria. This is particularly true with regard to interventions targeting African Americans.

This thesis is novel in the sense that it will present an article of publishable quality, which critically reviews the current translational research of the DPP in relation to the DPRP standard guidelines. Two previously published systematic reviews were analyzed for this article. The first systematic review evaluated is by Whittemore (2011), which explores the effectiveness of DPP translational research in 'real world' settings. The second systematic review included is by Samuel-Hodge et al. (2014), which explores the literature specifically related to the effectiveness of DPP translations among African American populations. The initial premise for comparing the aforementioned reviews was to offer insight into how studies specifically targeting African Americans are likely to implement the DPRP guidelines, which could be important for translation efforts.

The upcoming article offers insight into how the DPRP variables are currently being implemented into DPP translational research. A discussion on how translations among African Americans may differ in comparison to interventions targeting the general population is also incorporated within this article. In addition, this review offers some recommendations, based on the results and the DPRP guidelines, for interventions that are exploring effective adaptations of the DPP, particularly for programs targeting high-risk racial/ethnic minority groups.

2.0   BACKGROUND

2.1   SOCIAL-ECOLOGICAL FACTORS ASSOCIATED WITH THE TYPE 2

DIABETES DISPARITY IN RACIAL/ETHNIC MINORITIES

There are many social determinants that contribute to the pronounced health disparities seen in racial and ethnic groups. Researchers have shown that African Americans and Hispanics are more likely to live in poverty, report lower education status and also less likely to have health insurance in comparison to Caucasian Americans (Mama et al., 2014). Systemic factors, such as low income level and education status, limit an individual's access to the resources that may promote healthier lifestyles. Income largely predicts what neighborhoods individuals can afford to live in, and low-income neighborhoods are strongly associated with non-communicable diseases such as obesity and diabetes (Gallagher et al., 2010; Ludwig et al., 2011). This association may be due to numerous factors, such as the proximity of neighborhoods to quality grocery stores and to health care providers (Ludwig et al., 2011). Lack of resources, decreased accessibility to exercise facilities and the convenience and affordability of processed foods may also lead to a decrease in healthy behaviors (Mama et al., 2014; Robinson, 2008).

The perception of whether one's neighborhood is safe has been thought to play a significant role in physical activity behaviors and obesity. Perceived lack of safety has been defined as the belief by members of a community that their neighborhood has substantial

community violence (Gallagher et al., 2010; Ludwig et al., 2011). As one can imagine, the perception that a neighborhood is unsafe can play a major role in whether individuals decide to walk around in their neighborhoods (Gallagher et al., 2010; Ludwig et al., 2011). Other factors that are associated with perceptions of neighborhood safety also include how much traffic is on the road, how the sidewalks are paved, or if there is adequate lighting in the neighborhood (Gallagher et al., 2010; Ludwig et al., 2011). All of these factors specifically play a large role in whether older adults in underserved communities feel they can walk in their neighborhoods (Gallagher et al., 2010).

Some other barriers that may influence individual lifestyle behaviors and health are cultural perceptions about weight, perceived diabetes risk and lack of social support (Johnson et al., 2014; Robinson, 2008). Cultural perceptions of black women about weight, food and body image strongly differs in comparison to white women (Duncan et al., 2011; Kronenfeld et al., 2010). Research indicates that black women may perceive larger body types as preferable and report being more satisfied with their weight, on average (Kronenfeld et al., 2010). Lack of social support is also associated with decreased lifestyle behavior change and maintenance (Chlebowy et al., 2010). Women often reference what their husbands and friends prefer to eat, stating that their social circle influences what meals they prepare (James et al., 2004).

Factors that the African American community may perceive as barriers to dietary change are: time availability, lack of financial resources, the convenience of processed foods and the perception that habitual behaviors are unbreakable (Robinson, 2008). The fatalistic belief that one does not have control over their disease has shown a decrease in type 2 diabetes management, and may also have implications in the realm of diabetes prevention (Chlebowy et al., 2010).

These individual and community-based perceptions about lifestyle, health and disease all contribute to decreased physical activity and healthy eating behaviors. A combination of dietary behavior and physical activity can influence the caloric uptake and energy expenditure of an individual (Wing et al., 2001). Increase in caloric intake and decrease in energy expenditure are linked to obesity, which is highly associated with the diagnosis of type 2 diabetes (Wing et al., 2001). According the US National Health and Nutrition Examination Survey (NHANES), approximately 76.2% of African American adults have a BMI over 25 compared to 67.2% of whites (Kumanyika, Whitt-Glover MC & Haire-Joshu et al., 2014). The percentage of black adults classified as severely or morbidly obese is double that of whites (Kumanyika et al., 2014). Although the obesity disparity is increasing in black men, it is much more pronounced when comparing black women to white women (Kong, Tussing-Humphreys & Odoms-Young et al. 2014; Kumanyika et al., 2014). Since obesity is such a large predictor of type 2 diabetes, many intervention strategies have focused on weight loss and management through modifiable factors such as behavioral and lifestyle change.

2.2   THE NATIONAL DIABETES PREVENTION PROGRAM

One of the most influential studies to focus specifically on individuals with pre-diabetes, was the Diabetes Prevention Program (DPP). The original randomized control trial (RCT), was a lifestyle intervention that consisted of a 16 session core curriculum and incorporated themes such as, self-monitoring, balancing caloric intake and output and managing stress (The DPP Research Group 2002; West et al., 2008). The intensive core curriculum was taught by a case manager, who was often a health professional (e.g. nurse, dietician) (The DPP Research Group, 2002; West et al.,

2008). The 16 session core curriculum was then followed by a 6 month maintenance period, where individual sessions were held with participants in order to reinforce behavioral and motivational strategies taught by instructors beforehand. Participants were randomized either to a control group, an intensive lifestyle program or a metformin group. The metformin group was provided with some information on lifestyle behavior change, but no intensive classes were provided for participants in this particular arm (The DPP Research Group, 2002). The overall goals of the DPP lifestyle intervention was to decrease an individual's initial weight by 7% and to increase physical activity up to 150 minutes per week (The DPP Research Group, 2002).

The results of this study demonstrated that this program was extremely effective in weight loss even when compared to the group that was administered metformin (West et al., 2008). The RCT results showed that for every kilogram lost in weight, there was approximately a 16% risk reduction of diabetes (Hays et al., 2014). Overall, for individuals participating in the intensive lifestyle intervention, there was a 58% risk reduction rate for the onset of diabetes (The DPP Research Group, 2002; Samuel-Hodge et al, 2014; West et al., 2008).

Since the clinical trial demonstrated that the lifestyle intervention was highly efficacious in reducing the risk of diabetes, researchers consequently have examined whether if the intervention was effective when translated into 'real world settings' (Whittemore, 2011). In order for the DPP to be translated into healthcare and other community settings, several variables were adapted to meet the needs of the targeted populations more cost-efficiently. Shifting from an individual model to a group model, using community health workers as lifestyle coaches and using community based organizations as intervention sites (e.g. YMCA, churches) have all been common adaptations to the original lifestyle protocol (Whittemore, 2011). Although further research is needed on factors including, but not limited to, mediators to efficacy, outcomes report

consistency, and potential mechanisms—there has been an extensive amount of translational research that indicate encouraging results (Whittemore, 2011).

The systematic review found that DPP lifestyle programs implemented in community-based settings demonstrated adequate attendance and retention rates, weight loss outcomes and cost benefit. With regards to attendance rates, hospital settings had the highest attendance rates (96-80%), followed closely by interventions provided in work and church settings (78-65%) (Whittemore, 2011). Weight-loss outcomes varied among studies and depended on factors such as length of maintenance intervention and type of intervention settings. However, overall, there were a few studies that met or surpassed the DPP 7% weight loss benchmark (Whittemore, 2011). The review also found positive results with regards to cost effectiveness and program sustainability. For the few studies that evaluated cost, all estimates were considerably lower than the cost of the original DPP (Whittemore, 2011).

Even though the translational research derived from the DPP has been promising for the general population, the current literature with regards to the DPP among African Americans shows that significant investigation remains necessary in order to increase the effectiveness and strength of outcomes in this population. Although the DPP trial demonstrated efficacy for all racial/ethnic groups, black participants, and in particular black women, lost less weight (West et al., 2008). The weight loss impact for black women was less than black men, with black men on average showing a 6% weight loss and black women losing 4.9% of their weight. Thus, the objective of subsequent translation studies was to implement adapted, community relevant lifestyle interventions and assess whether such interventions, particularly in minority women populations, were adequately effective (Kumanyika et al., 2014; Samuel-Hodge, 2014).

2.3 KEY ADAPTATIONS OF THE DIABETES PREVENTION PROGRAM AMONG AFRICAN AMERICANS

2.3.1 Faith-Based Settings

Adaptations of the DPP and weight-loss programs have been studied specifically in African American populations at the community level. One way researchers have adapted the DPP at the community level is by providing educational sessions in faith-based organizations. Since faith plays such an important role in African American culture, many researchers feel that incorporating interventions in the church may have a significant effect on weight loss in minority groups. Faith-based interventions are considered culturally relevant, which can play a large role in how educational materials are received, understood and accepted (Kumanyika et al., 2014; Lancaster et al., 2014). Along with cultural relevancy, the church creates a sense of community and social support, which has been shown to be effective in weight loss (Kong et al., 2014; Lancaster et al., 2014).

Although cultural relevancy is a primary goal in many of the faith-based adaptations, many studies do not directly assess relevancy as a variable (Kumanyika et al., 2014). Therefore, there is a limited amount of evidence that provides a clear indication of how cultural adaptations increase the effectiveness of lifestyle interventions (Butryn et al., 2011; Kumanyika et al., 2014; Laws et al., 2012). Kumanyika et al. (2014), shows that when comparing cultural adaptations to interventions that were not adapted, culturally relevant programs did not necessarily show better outcomes. However, directly comparing these two type of interventions is extremely difficult since design and methodology varies considerably across studies. Nonetheless, assessing participant perceptions of how contextual adaptations affected their motivation to change

behavior is perhaps a variable that should be assessed in more interventions (Kumanyika et al., 2014).

2.3.2   Health Professionals and Community Health Workers

In the process of designing interventions, one of the primary components researchers considered was who would deliver the evidenced-based program to community members. Some adaptations have continued to use clinical health professionals to implement interventions. Other studies have used community health workers to lead group interventions, with the notion that community members can be teachers, facilitators and provide effective support systems that promote behavior change (Lancaster, Carter-Edwards & Grilo et al., 2014). In some studies, such as 'Fit Body and Soul', lay community members were not used as the health educators, but rather the church pastors were the interventionists (Dodani et al., 2010). This study was a church-based lifestyle intervention that had successful weight loss percentages among participants. Although the single group, quasi-experimental design is a limitation, this study exemplifies the important role that church leaders and community advisory boards may play (Dodani et al., 2010; Lancaster et al., 2014). Notably, the investigators used a community based participatory approach (CBPR) and community advisory boards in order to create an informed and relevant study design, as well as adaptations to the standard manual of operations and curriculum. Forty adults were identified as being pre-diabetic and were recruited to participate in the study. Results showed that 35 out of 40 participants attended at least 10 out of the 12 sessions offered. Out of the 35 participants, a total of 48% lost 5% of their initial weight and almost 26% lost 7% of their baseline weight. 'THE WORD' was a faith-based study that also used the CBPR approach to guide their intervention (Yeary et al., 2011). The WORD study had high rates of follow up data (85%),

however participants only lost 2.7% of their baseline weight (Yeary et al., 2011). Nonetheless, both faith-based approaches stress the importance of using CBPR and Advisory Boards for recruitment and relevancy.

2.3.3   Faith-Based vs. Faith –Placed Interventions

There is a distinction in the literature between interventions that take place in a church versus interventions that incorporate spiritual components, such as bible study, prayer and scripture (Lancaster et al., 2014). For instance, in faith-based studies such as 'The WORD", a spiritual teaching was incorporated into every lesson (Yeary et al., 2011; Yeary et al. 2015). In a systematic review looking at the effectiveness of faith based interventions in African Americans, researchers compare faith-based programs to faith-placed studies. This comparison included 12 RCTs, 2 quasi-experimental and single group studies and 4 pilot studies (Lancaster et al., 2014). Researchers found that faith-placed interventions were more significant in weight reduction than faith-based studies. However, faith-based studies were more successful at increasing physical activity among participants (Lancaster et al., 2014).

This research indicates that the church undoubtedly plays a crucial role in translating diabetes prevention programs in African American communities. Although, more studies are needed to understand which elements promote specific positive outcomes. For example, faith-based interventions may be effective in increasing motivation, but clinical settings prove to be extremely effective in higher adherence and lower attrition rates (Lancaster et al., 2014).

2.3.4   Important Components that Impact Translation of DPP Interventions

In many adaptations, the health educator provides information in a group setting instead of an individual setting. The theory behind using group formats is that it offers participants a sense of community, social support, and mutual problem-solving (Lancaster et al., 2014). Some studies, however, have investigated whether social support within a participant's inner social circle plays a more significant role. The 'SHARE' study was a two-group parallel RCT that explored whether high support treatment increased the likelihood that participants would achieve weight loss goals (Kumanyika, Wadden & Shults et al., 2009). Kumanyika et al. (2009) recruited 344 African American adults with a Body Mass Index (BMI) greater than 27. Participants either enrolled in the study alone or with a family member or friend and then they were randomized within each strata and assigned to a high or low social support intervention condition. In the high social support family and friend enrollment strata the natural partners were asked to attend the treatment with the participant. For the high support individual enrollment strata, a partner was assigned to the participant from the group. Overall results showed that 23.3% of the participants lost at least 5% of their initial weight. The high support family and friend group had a higher percentage of individuals achieving weight loss goals (33.9%) when compared to individual high support groups (21.9%) (Kumanyika et al., 2009; Samuel-Hodge et al., 2014). Overall, for those who enrolled in the study alone, having an assigned partner did not have a significant effect on weight loss. However, enrolling with a family member or friend was associated with greater weight loss if the support system was actively involved in the process and also demonstrated significant weight loss. This study is a prime example of the roles that natural family and friend support systems play in weight loss goal achievement (Samuel-Hodge et al., 2009).

2.3.5 Overall Effectiveness of Translational DPP Interventions in the African American Population

In the systematic review by Samuel-Hodge et al. (2014), which examined the effectiveness of translational DPP interventions in the African American community, seven of the reviewed articles looked specifically at studies using 100% African American samples. The other ten articles reviewed used mixed-raced sample designs. Out of the seven articles that looked solely at African Americans, the majority of the studies were either pilot studies or quasi-experimental designs. Out of the quasi-experimental studies, three of the studies had only one treatment group. All three studies were faith-based interventions, such as: 'Fit Body and Soul' and the study performed by Boltri et al. (2011) looking at the translation of the DPP in rural church settings. The 'Fit Body and Soul' study was the only quasi experimental design that reported the percentage of participants who achieved the weight loss goals of 5% and 7%. In fact, out of the seven articles focusing specifically on African Americans the only other study reporting results on the 5-7% weight loss goal was Kumanyika et al. (2009), which showed that individuals with high family and friend support were more likely to lose 5% of their baseline weight in comparison to low support. Thus, when evaluating the literature or the effectiveness of DPP translations for African Americans one major problem identified is the consistency in reporting outcomes across studies.

Although some of the studies showed adequate weight loss in African American groups, the overall review of the literature suggests that translations of the DPP lifestyle intervention are not as effective for weight loss when compared to the original DPP trial (Samuel-Hodge et al., 2014). However, it is difficult to conclude to what extent each intervention is effective, since many of the studies have extremely small sample sizes and, as noted earlier, inconsistent

reporting standards (Samuel-Hodge et al., 2014). Only one study exceeded 300 participants, leaving a large number of the studies with a sample size smaller than 45 participants (Samuel-Hodge et al., 2014). Small sample sizes decrease the external validity of the studies and therefore many researchers cannot conclude that their adapted intervention would necessarily be effective for the general African American population.

2.3.6 A Gap in the Literature and the Next Step

The CDC Diabetes Prevention Recognition Program's standard guidelines have not been assessed systematically for translational research components and outcomes of published studies. The next section of this thesis is therefore a proposed article, which aims to understand the effectiveness of translational research through the DPRP. Assessing the characteristics of currently translated Diabetes Prevention Programs, through the lens of the DPRP, could potentially aid researchers in finding the most effective assessment and intervention tools for implementing studies in racial/ethnic communities for broad public health impact.

3.0 ARTICLE: CHARACTERISTICS OF DIABETES PREVENTION TRANSLATION PROGRAMS THROUGH THE LENS OF THE CDC'S RECOGNITION PROGRAM

3.1 INTRODUCTION

African Americans are disproportionately diagnosed with type 2 diabetes (T2D), and it is estimated that 13.2% of African Americans are diagnosed with diabetes in the United States (CDC, National Diabetes Report, 2014). Non-Hispanic African Americans are almost twice as likely to be diagnosed with T2D in comparison to Non-Hispanic whites. Importantly, T2D is also associated with many other poor health outcomes, consequently placing African Americans at higher risk for other diseases and co-morbidities including cardiovascular disease, stroke, renal failure, amputation and adult onset blindness (Dodani et al., 2009; Whittemore, 2011). Although the incidence of diabetes is high, perhaps what is more concerning is that the significant burden of diagnosed disease does not account for individuals who are currently undiagnosed or have glucose impairment or pre-diabetes (Dodani et al., 2009). Impaired glucose-tolerance or prediabetes is an urgent issue, since there is approximately 79 million individuals living in the United States who have prediabetes (Whittemore, 2011).

Since prediabetes in most cases is considered to be a reversible state, some researchers focused on prevention in African Americans, have been strong advocates for primary prevention rather than tertiary strategies (Boltri et al., 2011). The National Institutes of Health (NIH)

Diabetes Prevention Program (DPP) has been the most prominent RCT studying the effects that lifestyle behavior change has on outcomes such as weight-loss, physical activity and incidence of diabetes. The original DPP used health professionals to provide 16 intensive, individual-level lifestyle courses, with the goals of 7% weight loss, increased physical activity to 150 minutes per week, and overall to reduce the risk of T2D (The DPP Research Group, 2002; Samuel-Hodge et al., 2014; West et al., 2008). The results of the study showed that there was a 58% reduction in the risk of diabetes. Benefits were observed among both genders, all age groups and various racial, ethnic minority groups (The DPP Research Group, 2002; West et al., 2008).

Since the original RCT, researchers have aimed to translate the DPP in community-based settings for high-risk populations (Samuel-Hodge et al., 2014). Current research, however, shows that many of the translational DPP interventions among African Americans are not as effective in achieving weight loss outcomes (Samuel-Hodge et al., 2014). Adaptations vary significantly across studies and many of the standard guidelines proposed by the DPP have been adjusted in attempt to fit the needs of the community. However, in order to optimize outcomes for African Americans, there perhaps needs to be a steady transition and balance between the national standard guidelines set by the CDC and culturally relevant translations.

The CDC's Diabetes Prevention Recognition Program (DPRP) highlights the standard guidelines that were key to the DPP's significant outcomes. The DPRP is a program that allows organizations interested in implementing the DPP to become nationally recognized. In order for individuals to be considered by the DPRP, they must complete an application and ensure that their program meets 11 standard criteria considered to be crucial for the evidenced-based intervention. The DPRP offers programs the opportunity to increase visibility and credibility (CDC, 2015). The recognition program also aims to make the mobilization of lifestyle change

programs across communities a national effort (CDC, 2016). This review critically analyzes and compares two relevant, published, systematic reviews through the lens of the DPRP. One review, by Whittemore, explores the DPP translations among a broader population in 'real-world' settings and the other review, by Samuel-Hodge et al., explores the efficacy of translations among African Americans (Samuel-Hodge et al., 2014; Whittemore, 2011). The DPRP standard variables are used in this review to evaluate whether current translational literature are meeting the CDC national program requirements. In particular, we were interested in understanding where the translational research among the African American population stands in comparison to the general translation of the DPP in 'real-world' settings.

3.2   METHODS

3.2.1   Systematic Review Selection

A literature review was performed on both the topic of diabetes prevention and the adaptation of the DPP in the African American population. One of the most prominent and recent articles that arose from the literature review was a systematic review performed by Samuel-Hodge et al. (2014); specifically focusing on research around the translation of the DPP among African Americans. To our knowledge, this is the first systematic review that specifically assesses the DPP translations among African Americans and so the articles incorporated in the Samuel-Hodge et al. review were used for this analysis. In this particular review, some variables that the authors explored were adherence rates, curriculum components, recruitment requirements and weight loss goal outcomes (Samuel-Hodge et al., 2014).

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For the translations of the DPP among the general population, three systematic reviews were identified (Ali et al, 2012; Laws et al., 2012; Whittemore, 2011). Upon exploration, the systematic review by Whittemore (2011) was chosen, which looked at the translational studies in "real-world settings" among the general population. This systematic review was chosen for a few reasons. First, Whittemore explored efficacy of translations by using the RE-AIM model (reach, efficacy, adoption, implementation and maintenance) (Whittemore, 2011). Due to Whittemore using the RE-AIM model as guidance for data analysis and Samuel-Hodge et al. assessing effectiveness, many of the variables reported between the two systematic reviews were comparable. Also, there was little overlap between the two systematic reviews, hence, increasing the number of studies that could be analyzed. Further, both reviews included studies within the same timeframe. Samuel-Hodge et al. included literature from the years of 2003-2012 and Whittemore (2011) included articles from 2002-2011.

3.2.2   Article Selection and Inclusion

In the systematic review exploring the translation of the DPP among African Americans, authors reviewed a subset of studies that had a mixture of racial/ethnic participants and also studies that solely recruited African Americans. Eligibility criteria and study selection methods are described in detail in the methods sections of the article (Samuel-Hodge et al., 2014). As a part of the criteria, a study had to include at least 10 African American participants in the intervention (Samuel-Hodge et al., 2014). Overall, 21 full text articles were assessed for eligibility and 17 articles were included in the qualitative synthesis (Samuel-Hodge et al., 2014). Out of the 17 articles, 7 of the studies included 100% African American participants and 10 studies had a mixed-sample (Samuel-Hodge et al., 2014). For the purposes of our study, all 17 articles

included in the systematic review were assessed. The primary exclusion criteria were articles that solely incorporated type 2 diabetes participants, as we were interested in looking at variables that were based on the standard guidelines of the national DPP, which only includes individuals with pre-diabetes (Cramer et al., 2007; Mayer-Davis et al., 2004; West et al., 2007). Due to limited literature, however, studies that incorporated participants with pre-diabetes and diabetes were kept in the analysis.

Whittemore's (2011) methods and inclusion criteria is also explained in detail in the systematic review (Whittemore et al., 2011). In order to be included into the systematic review, the author states that the study had to be a published report specifically looking at the translation of the DPP for adults at-risk for type 2 diabetes (Whittemore, 2011). The author identified 16 articles that met aforementioned criteria and were therefore included in the systematic review (Whittemore, 2011). Some baseline characteristics of the studies included in the review were that sample sizes ranged from 8 –1,003 participants, samples were predominately female and there was a large variation in race and ethnicity inclusion (Whittemore, 2011). In the Whittemore review, there were no studies that solely looked at type 2 diabetes participants. A total of 25 articles were reviewed for this study.

3.2.3   Data Abstraction and Evaluation Methods

All articles were reviewed by the first author to evaluate whether they met the standard guidelines for the DPRP. These guidelines are presented in Table 1. The first variable was excluded in analysis because it referred to the application process, which would not be reported in the research studies. The next three variables aim to evaluate whether the lifestyle intervention consists of the recommended 16 core curriculum, provides follow up maintenance sessions, is a

one year program, and also assesses the overall intensity of the intervention. The fifth guideline evaluates whether the average attendance rate among participants was 9 out of 16 sessions. The sixth variable is an assessment of whether the intervention had an average weight loss of 5% by 6 months. The next two variables address the documentation of weight and physical activity per core session. The ninth and tenth guidelines address the average attendance and weight loss at a 12 month time point, and the final variable consist of the program eligibility requirements.

The eligibility criteria set by the DPRP, requires that a minimum of 50% of participants must be included based on a blood test or a history of gestational diabetes mellitus (GDM) (CDC, 2015). The other 50% of participants included in the study may be based on the CDC Prediabetes Screening Test, the American Diabetes Association's Risk Test or a claims-based risk test (CDC, 2015). Since many of the research articles did not provide information about the percentage of participants included based on blood tests versus screening tests, studies were only penalized if there was no mention of using fasting glucose or blood tests as part of their eligibility requirements.

While we were more lenient with the eligibility requirements and the documentation of weight and physical activity per session, we were more stringent with the lifestyle curriculum variable. In the DPRP standard guidelines manual, the lifestyle curriculum requirements appear to include not only the 16 week core sessions, but the monthly maintenance sessions as well. Studies that did not meet maintenance requirements did not receive a score for the lifestyle curriculum, lifestyle duration and lifestyle intensity variables. It is important to highlight the fact that studies that followed the modified Group Lifestyle Balance (GLB) program, a 12-week core intervention recognized by the CDC, were considered to meet the core curriculum and intensity requirements.

After review, the standard guidelines looking at documentation of weight and physical activity per session were rarely reported. Even though the two variables were assessed, they were not included in the overall analysis of the DPRP guidelines. Therefore, an article was considered to meet all standard guidelines if 8 out of the 12 DPRP variables were met.

3.3   RESULTS

Overall, the results showed that for both systematic reviews, 15.4% of the articles met all 8 assessed DPRP variables (Table 5). Although both systematic reviews had the same number of studies that met all criteria, the average percentage of variables met was overall higher for studies among the general population. The average percentage for the general population studies was around 60.6% (4.85 variables) compared to 35.6% (3.0 variables) for studies among African Americans (Table 5).

Our major interests are in understanding the specific characteristics of studies targeting African American populations. Since one of the limitations of the literature-base among African Americans was the relatively high number of pilot and smaller scale studies, we decided to separate articles that may be considered 'higher-quality'. To be considered a higher quality study, the research had to be a RCT and needed a sample size of 40 or greater. On average, higher quality studies among African Americans met more variables when compared to other studies (Figure 1). However, the difference between higher quality studies and other studies among African Americans was marginal.

Comparing the literature base of all translational studies, those among African American populations scored lower for 7 of the standard guideline variables. Studies in the Whittemore

article were more than twice as likely to meet the lifestyle curriculum, intensity and duration guidelines in comparison to the studies targeting African Americans. Overall 30.8% of the articles looking at the translation of the DPP in African Americans met the lifestyle curriculum, lifestyle duration and lifestyle intensity requirements (Table 4). While many of the studies among African Americans did complete the 16 week core curriculum guidelines, a large portion of the studies did not meet the maintenance requirements of the intervention. Literature evaluating the general translation of the DPP into the community were much more likely to incorporate the maintenance portion of the intervention and therefore, 76.9% met the lifestyle intervention variable, 69.2% met the lifestyle duration of one year and 69.2% met the intervention intensity goals (Table 4).

Session attendance for the 6 month core intervention was around 76.9% for the research among the general population and 53.8% for articles exploring the DPP among African Americans (Table 4). The 7-12 months attendance rates for both populations significantly dropped to 38.5% (Whittemore) and 30.8% (Samuel-Hodge et al.) (Table 4).

The program eligibility requirements were met by 84.6% of the articles reviewed in the Whittemore article, but only 53.8% of the articles in the Samuel-Hodge et al. review (Table 4). As stated previously, articles were not recognized as meeting the variable requirements if authors did not mention participants' eligibility being based on clinical tests or fasting blood glucose tests.

Overall, the percentage of studies that met the average weight loss goals of 5% within 6 months was relatively low for all studies incorporated in this review. For articles translating the DPP for African Americans, only 15.4% met the weight loss goals set by the recognition program (Table 4). For the general translation studies, 30.8% of research studies had an average

of at least 5% weight loss from baseline weight (Table 4). For articles that reported having a 12 month follow up, weight loss was achieved by 23.1% of the studies targeting African Americans and also of the studies among the general population (Table 4). Evaluating weight loss was highly dependent on how research studies reported weight and whether the evaluation took place at the correct time points.

3.4   TABLES AND FIGURES

Table 1. CDC Diabetes Prevention Recognition Program (DPRP): Standard Requirement Variables and Guideline Descriptions

Standard Requirement Variables	Requirement Guidelines
1. Application to the recognition program	**(Not Included in Analysis)**
2. Lifestyle Intervention curriculum components	Core and maintenance curriculum as stated in the DPRP manual, Section II E
3. Intervention duration	1 year
4. Intervention intensity	Minimum of 16 sessions, delivered approximately once per week during months 1-6, followed by a minimum of sessions, delivered at least 1 session per month, during months 7- 12
5. Session Attendance	Minimum of 9 sessions attended, on average
6. Documentation of Body Weight	**(Not Included in Analysis)** On average, participants must have had body weights recorded at a minimum of 80% of the sessions attended
7. Documentation of Physical Activity	**(Not Included in Analysis)** On average, participants must have had physical activity minutes recorded at a minimum of 60% of all sessions attended
8. Weight loss achieved at 6 Months	Average weight loss achieved by participants attending a minimum of 4 sessions must be a minimum of 5% of "starting" body weight.
9. Participant Average Session Attendance during 7-12 months	Minimum of 3 sessions in months 7- 12
10. Weight loss achieved at 12 months	Average weight loss achieved over the entire 12 month intervention period by participants attending a minimum of 4 sessions must be a minimum of 5% of "starting" body weight.
11. Eligibility	Minimum of 50% of participants must be eligible for the lifestyle intervention based on either a blood test indicating prediabetes or a history of GDM. The remainder (maximum of 50% of participants) must be eligible based on the CDC Prediabetes Screening Test, the American Diabetes Association Type 2 Diabetes Risk Test or a claims- based risk test.

CDC. (2015, January 1). Centers for Disease Control and Prevention Diabetes Prevention Recognition Program.
Retrieved January 29, 2016, from http://www.cdc.gov/diabetes/prevention/pdf/dprp-standards.pdf

Table 2. Assessment of the DPRP Standard Guidelines for Interventions among African American Populations

Author, Publication Year		Lifestyle Intervention (*Core and Maintenance*)	Intervention duration (*1 year*)	Intervention intensity (*6 month weekly, biweekly sessions and monthly maintenance*)	Session Attendance *Min. of 9 sessions attended*	Documentation of Body Weight *Average of 80% of sessions* (Not Included in Analysis)	Documentation of Physical Activity *Average of 60% of sessions* (Not Included in Analysis)	Weight loss achieved at 6 mo. (*Total Average weight loss of 5%*)	Average Session Attendance 7-12 mo.(*Min. of 3 sessions*)	Weight loss achieved at 12 months (*Total Average weight loss of 5 %*)	Eligibility *Blood Glucose and screening risk test*
Betfort et al. (2008)	NO	+16 week curriculum (+) Based on Lifestyle Balance Topics (-)No maint. sessions	(-) 16 weeks	(+) 16 sessions (-) No 7-12 mo. maint. sessions	(-)8.37 (mean) / 16 sessions (52%)	(-)5.42 /15 sessions = 36.13% (Self-Monitoring Logs)	(-)Not reported	(-) -3.0kg (2.8%) 5% weight loss (calculate from baseline) = 2.8%	(-)No maintenance sessions	(-) No follow up post Interven-tion	(-) Eligibility based on: Age (>/= 18 yrs) BMI= >30
Boltri (2008)	NO	(+)16 week sessions (+)Follow DPP Curriculum (-)Follow up did not include maint.	(+) 16 weeks (+) 12 Mo. Follow up (-) No maint. sessions	(+) 16 sessions delivered (1-6 mo.) (-) No report of sessions delivered 7-12 mo.	(+) Avg. 10.4 sessions (65%)	(-)Not reported	(-)Not reported	(-) Avg. Tot. Weight Change= (- 3.8%)	(-) No maintenance sessions	(-) Baseline = 205.6 Weight Change= 204.6 (-1 lb change)	(+) 18 years older (+) Complete risk assess-ment (+)Fasting Glucose testing
Kumanyika et al. (2009) (note: counted for family strata)	NO	(+) 6 month weekly sessions, following DPP and	(+) 2 years	(+) 6 months weekly sessions intervention (+) 6 month biweekly sessions	(+) FHSG= 15 sessions/ 26 sessions = 57.6%	% of participants assessed: FHSG= 6 mo. = 74%	(-) Not reported	FH= (-5.6 kg) (-4%) IH= (-3.8kg) - 2.2% (-) Overall for	(+) Avg. 3.5/12 sessions	(+) HSF (-5.8%) (-5.54%) (-)HIS (-4.4kg) (4.2%)	(-) No report on blood glucose levels, GDM or

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Table 2 Continued											
		Look AHEAD (+) Follow up maint. sessions (biweekly and monthly)		(+) 1 year monthly weight maint. Sessions	(-)HIS group = 32.7%	(-) IHSG= 59%		all index= -3.1 kg (-3.0%)			prediabetes screening test
Dodani et al. (2009) (2010)	NO	(+) 12 sessions, approved by DPSC, Univ. Pitt (+) Goals, Curriculum themes follow DPP (-) Did not meet monthly session requirmt.	(-) 12-14 weeks	(+) 12 GLB sessions (-) Did not meet 1 session/ month (7-12 mo.)	(+) 87.5% attended >/= 10 sessions	(-) Not reported	(-) Not Reported	(-) Absolute weight change = -3.8 kg (3.8%) (-) 6 months not reported Reported by S.H (2014)	(-) no 7-12 mo. maintenance reported	(-) Not reported	(-) States based on physical exam, BG not indicated in baseline charac. (+) BMI>25
Boltri et al. (2011)	NO	(+) 6 sessions and 16 session group (+) Follow up: 6 and 12 mo. (-) No maint. Sessions in 6-12 mo.	(+) 6 weeks and 16 weeks (-) Follow up but no maint. 6 and 12 mo	(+) 16 weeks (-) 6 week group (-) No 7-12 month maint. sessions	(+) 69% of 6 sessions (+) 57% of 16 sessions	(-) Not reported	(-) Not reported	(-) -1.1 kg (1.16%)	(-) Not reported	(-) -0.9 kg (.95%)	(+) All participants took diabetes risk assessment screen (+) All participants with DRA score at least 10 received

											Fasting Glucose (+) >/= 18 yrs
Table 2 Continued											
Yeary et al. (2011)	NO	(+) 16 sessions (-) No maint. Session Faith-based adaptations made to the curriculum	(-) 16 weeks	(+) 16 sessions (-) No maint. or follow up (7-12 mo.)	(-) 50% of 16 sessions (Samuel-Hodge et al. 2014)	(+) 22/26 (85%) provided 16- week follow up	(-) Physical activity outcomes not reported	(-) (-2.7%) after 16 week intervention	(-) No maint. sessions	(-) No 12 mo. Follow up	(-) No Blood Glucose testing (+)BMI >25 (+)Age >/= 21
Cox et al., 2012	NO	(+)12 sessions/ may be approved Based on DPP and LOOK AHEAD (+) Based on lifestyle goals and outcomes (-) No maint. sessions	(-) 12 weeks	(-) 12 sessions, check to see if approved (-) No follow up maint.	(+) Treatment group on average attended 62% of sessions (+) Overall 66% attendance of 12 sessions	18/ 21 completed data collection (- 3 mo) for lifestyle alone group 20/22 completed data for lifestyle stress Overall 38/43 = 88.4%	(-)Refer to overall documentation, PA not directly reported	(-) Absolute Weight Change = - 2.7% (Treatment) Overall Weight Change = -2.0 kg	(-) No Maint. Sessions	(-) No 7-12 mo. follow up	(+) Age >/= 21 BMI= 25-45 Female, AA Perceived stress scale of 17 /> (-) No report on FG levels or diabetes risk assess-ment
	YES	(+) 6 mo intervention	(+) 6 months	(+) 6 month intervention, (+)Maint.	(+) Overall attendance for 6 mo.	Rickel et al. (2011) Food and	Rickel et al. (2011)	Perri (2008) (+) Overall= 10.0 kg	(+) Phone = 13.8	All groups (18 mo.): -7.9 kg	(+) ages 50-75 years

Table 2 Continued Perri et al. (2008) Rickel et al. 2011		(+) Stated based on lifestyle DPP program, no statement of thematic changes	(+) 12 month maintenance and follow up 26 bi-weekly session either by phone face-to-face counseling or n.letter	treatment 26 biweekly sessions (6 and 18 month follow up (not 12)	intervention: 78.5% (n=234/298)	caloric intake log (+) 85% African American (+) 90% whites (-) no indication of weight log	PA log (+) 83.4% AA (+) 85.2% White	weight change Samuel Hodge states: (+) -8.8 kg overall (9.0 %) (just looking at rickels black and white analysis) AA: (-6.8 kg) (-6.9%)	sessions In person = 21.1 sessions	(-8.2%) Rickel (2011): Treatment group weight change from interv. AA: 1.9 kg White: 1.5 kg	(+) BMI >/= 30 (+) No diabetes, hypertension, cvd, renal disease (+) Physical exam: blood fasting glucose, weight, height, blood pressure
Whittemore et al. (2009	NO	(+) 6 mo. intervention (+) curriculum provided and follows all educational content (some content abbrev./ nutritional info adjusted) (-) No maint.	(-) 6 mo.	(-) No follow up maintenance period post 6 mo. sessions	Overall not directly reported (+) in person sessions: 96% (-) phone call sessions: 37% (+) Average of percentages= 66.5%	(-) Not reported Reported by S.H (2014) Analysis completers: (n=18) (total n= 58)	(-) Not reported	S.H not reported (-1.5%) AA: (+0.7%) 25% achieved weight loss 0f >/= 5%	(-) No maint. sessions reported	(-) No maint. sessions reported	(+) Age: 21 inclusive (+)BMI 25 inclusive (+) at risk for IGT metabolic syndrome (+) Family history, history of GDM taken into account

		curric.									
Table 2 Continued											
Katula et al., (2011)	YES	(+) 6 mo. Weekly sessions (+) 6 mo. follow up (+) curriculum based on DPP (+) 18 month maintenance phase	(+) Over 1 year	(+) 6 mo. weekly sessions (+) 7-12 mo. maintenance and follow up sessions. Bi weekly follow up, monthly newsletter.	(+) 83.4% (72.4% attended, 11% made up	(+) State primary outcomes at 6 mo (93.4%) info available. (+) 12 mo 90.2% participant info available.	(-) PA not reported	(+) -7.3kg (-7.5%) AA not reported	(+) 63.1% (49.2 % attended 13.9% made up)	(+) Total 7.4% (-6.97 kg)	(+) Evidence of prediabetes based on fasting glucose and (+) BMI > 25 kg/m2 (+) telephone screening performed prior to other testing
Hess et al., (2012)	NO	(-) 12 week, not GLB (-) No maint. Curric.	(-) 12 weeks	(-) 12 weeks of sessions (-) No 7-12 maint. Mo. sessions	(-)Not Reported	(-) 3.49 recordings per week (not reported per session)	(-) 1.37 recordings per week (not reported per session)	(-) + 0.9% (AA not reported) (Samuel-Hodge et al., 2014)	(-) No maint. sessions reported	(-)No 12 mo. assessment reported	(+) Blood Glucose Test (+)BMI (+) Clinical pre-screen
Kumanyika et al., (2012)	NO	(+) 16 core DPP sessions (Adapted) (+) Maintenance period, treatment group received	(+) 12 mo. (+): 24 mo. follow up and maintenance	16 core DPP sessions (Adapted) (+) 6 months of weekly sessions (+) 12 bi-monthly maintenance (+) 24 mo. Maintenance	(-) 6 months not reported	(-) Not reported	(-) Not reported	(-) Not reported	40% attended 3 of 4 sessions (+) Within 12 mo. Basic Group: 85%	(-) -1.6 kg (1.6%) (-) AA: -1.3 kg (1.2%)	(+) Ages 18-70 years (+)BMI >/= 27 kg/m2 (+) PCPs authorized initial contacts

Table 2 Continued											
		sessions with PCP Sessions some of the content in the core content shift to maintenance period		period, treatment group received sessions with PCP every 4 months					(116/137 sessions) Basic Plus Group: 95% (118/127 sessions)		for medical eligibility, obtain pre-eligibility after pre-screening
Samuel-Hodge et al. (2012, 2013)	NO	(+) 16 weekly sessions (-) No maint. between intervention and follow up	(-) 5 months	(+) 16 week session (+) 5 mo. Follow up (-) No maint. between follow up within a year	(-) 50% of 16 sessions (Samuel-Hodge, 2014)	(-) SI group = 76% (+) DI group = 87% (+)Comb. = 81.5%	(-) Not reported by session	(-) Total Weight = -2.8 kg (-4.0%) AA: (-) -2.6 kg (-2.5%)	No 7-12 mo. Follow up for weight wise intervention	No 7-12 mo. Follow up	(+)BMI (+) Age (+) Diabetes exclusion (-) No Fasting Glucose Report

Table 3. Assessment of the DPRP Standard Guidelines for Articles in Whittemore Systematic Review

Author, Publication Year		Lifestyle Intervention (*Core and Maintenance Sessions*)	Intervention duration (*1 year*)	Intervention intensity (*6 month weekly,*)	Session Attendance *Min. of 9 sessions attended*	Documentation of Body Weight *Average of 80% of sessions*	Documentation of Physical Activity *Average of 60% of sessions*	Weight loss achieved at 6 mo. (*Total Average weight loss of 5%*)	Average Session Attendance 7-12 mo. (*Min. of 3 sessions*)	Weight loss achieved at 12 months (*Total Average weight loss of 5 %*)	Eligibility *Blood Glucose and screening risk test*
McBride et al. (2008)	NO	(+)12 sessions, Curriculum reported (+) Monthly maintenance sessions	(+) 1 year	(+) 12 sessions every week 1 hour session (+) Maintenance duration 8 mo. ; occurred monthly	(-) Stated as "good"	Report on 37 participants who completed program (64 entered)	(-) Not reported	(-) 11 pounds /5 kg at 3 mo. (4.6%) (-) 12 week report	(-) Not reported	(-) 4.1%	(+) Fasting glucose > 100 mg/dL (+) Age: 25-75 yrs.
Pagoto et al. (2008)	NO	(+) 16 group sessions based on DPP (+) 6 mo. maintenance phase (modified)	(+)18 mo. Including assessment	(+) 16 weekly sessions (+)6 mo. Maint. phase bimonthly in person and	(+) 13.2/16 sessions = 82.5%	75% attended visit 16 and had weight measure	(-) Not reported	(-) -5.57kg (-4.6%)	(-) Not reported	(-) Not reported	(+) All patients attended medical examination with physician (+) 59% metabolic syndrome

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Table 3 Continued				monthly phone call							
Vadheim et al. (2010)	NO	(+) 16 weekly core curriculum sessions (+) 6 monthly after core sessions	(-) 10 mo.	(+) 16 session weekly 1 hour (+) 6 monthly mainte nance session	(+) 88% (Telehealth) (+) 100% (Onsite)	(-) Not reported	(-) Not reported	-6.7kg telehealth group -6.5kg onsite groups (No baseline weight reported)	(-) Not Reported	(-) Not reported	(+) Age >/= 18 yrs (+)BMI >/= 25 (+) 50% of Telehealth group had prediabetes (IFG,IGT)
Vanderwood et al. (2010)	YES	(+) 16 core sessions (+) 6 monthly after core sessions Stated that followed DPP curriculum	(+) 12 mo. Follow up	(+) 16 weekly session 1 hour (+) 6 monthly session	(+) 14.9/16 sessions (93%)	(-) 10.1 weeks/ 14 weeks (72.1%) (Amundson et al. 2009)	(-) Not reported by session (70% met goal)	(+) -6.8 kg (-6.85%) (baseline 99.2)	(+) 3.7/ 6 sessions (62%)	(+) -7.7 kg (-7.9%) (baseline=97 .4)	(+) Age >/= 18 yrs. (+) BMI >/=25 (+) 52% prediabetes IFG, IGT
Kramer et al. (2009)	NO	(+)12 week sessions University of Pittsburgh, Group Lifestyle Balance Program	(+) 9 month mainte nance (+) 12 month Follow up	(+) 12 week session s, 1 hr. duratio n (+) 12 month follow up (+) monthly maint. session	(+) 10/12 sessions = 83%	(-) Sessions not reported, but state recorded at each weekly session	(-) Not reported	(+) -4.9 %	(+) participants who attended 50% of sessions included	(-) 4.5%	(+) Age 18-74 yrs (+)BMI >/= 25 kg/m2 (+) Metabolic syndrome (Physician Approval)

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Table 3 Continued

Study											
McTigue et al. (2009)	NO	(+) 12 sessions, group lifestyle balance program adaptation	(+) 1 year (10-14 months)	(+) Weekly sessions (+) 8 monthly maintenance sessions +) 1 year program	(-) Not reported	93% enrollees and 80% non-enrollees follow-up weight recorded	(-) Not reported	(-) Not reported	(-) Not reported	- 5.2 kg	(+) PCP referrals based on EMR (+) BMI >/= 25 kg/m2
McTigue et al. (2009)	NO	(+) 16 sessions online, following the core DPP curriculum (+) Maintenance sessions from DPP supplemental	(+) 1 year	(+) 16 week, weekly session with E-coaching (+)8 monthly maintenance sessions from DPP supplemental material	(+) 12.80/16 sessions (80%)	Avg # of weeks tracked: 17.62	Avg # of weeks tracked: 14.52	(+) -6.0 kg* (-5.8%) (Not reported directly, estimated from graph)	(-) 16% attended more than 20 sessions	(-) -4.79 kg (-4.7 %) (% estimated based on graph baseline weight)	(+) Age (18-80 yrs.) (+)BMI (>/= 25 kg/m2) (+) History of at least 1 diagnosis, including IFG

| Table 3 Continued											
Ackerman et al. (2008)	YES	(+) 16 sessions based on DPP curriculum (+) Follow up maint.	(+) 1 year	(+) 16 sessions, 16-20 weeks; (+) 0-90 mins long (+) Maint. sessions monthly	(+) 57% (overall attendance)	(-) Not reported by session	(-) Not reported by session	(+) -6.0% (-5.7 kg)	(+) Overall attendance = 57%	(+) – 6.0 % (-5.7 kg)	(+) ADA questionnaire; assessing glucose criteria for study (+) Age (+) BMI
Matvienko and Hoehns (2009)	NO	(+) 16 individual sessions (+) Monthly follow up sessions (+) Followed DPP Lifestyle Intervention Manual of Operations	(+) 1 year	(+) 16 individual sessions over 6 months (+) Follow up individual monthly sessions	(+) 94% completed sessions over 6 months	Not reported per session 6 and 12 month assessment	Not reported per session 6 and 12 month assessment	-6.1 kg (Estimated from graph: 4.7%)	(+) 84% completed 12 month sessions	(+) -6.1 kg (+Estimated from graph: -8.2%)	(+) Age (+) BMI (+)Diagnosed as glucose impaired or type 2 diabetes
Mau et al. (2010)	NO	(-) 8 group sessions	(-) 24 weeks	(-) 8 group sessions over 12 weeks	(-) Attendance not reported	(-) Not reported per session	(-) Not reported per sessions	(-) - 1.5 kg (Baseline weight= 103 kg)	(-) No follow up maintenance sessions	(-) No 12 month assessment	(-) No report of blood glucose or questionnaire

Table 3 Continued											assessment (+) Age (+) BMI
				(-) No maint. follow up session							
Seidel et al. (2008)	NO	(+) 12 sessions based on the modified GLP (-) No maintenance, free YMCA membership offered	(-) 12-14 week intervention, No maintenance	(+) 12 weekly sessions, 90 mins (-) no follow up maintenance session	(+) 70% of participants attended > 75% of sessions	(-) Not reported per session	(-) Not reported per session	(-) Average weight of participants not reported 46% lost 5% 3 months (67% sustained at 6 months)	(-) No follow up maintenance sessions	(-) No 12 month assessment	(+) BMI (+) at least 3/5 components of metabolic syndrome (+) Blood glucose levels assessed
Aldana et al. (2006)	NO	(+) 24 weekly sessions, following exact protocol	(+) 1 year	(+) 24 weekly sessions (+) Monthly maint. session (6 mo.)	(+) 67% attended program classes	(-) Not reported per session	(-) Not reported per session	(-) -2.94 kg (3.5%) Baseline= 83.64 kg	(+) 35/37 participants remained in program for 12 mo.	(-) -3.30 kg (3.9%) Baseline = 83.64 kg	(+) FSG testing > 95 mg/dL (+)BMI

Table 4. Percentage of Articles meeting Individual DPRP Variables in each Systematic Review

DPRP Standard Variables	Listed Requirements	Samuel-Hodge et al. (2014) % of Articles that met requirements	Samuel-Hodge et al. (2014) # that met requirements	Whittemore (2011) % of Articles that met requirements	Whittemore (2011) # of Articles that met requirements
Lifestyle Intervention	Core and maintenance curriculum as stated in the DPRP manual, Section II E	30.8	4/13	76.9	10/13
Lifestyle Duration	1 year	30.8	4/13	69.2	9/13
Intervention Intensity	Minimum of 16 sessions, delivered approximately once per week during months 1-6, followed by a minimum of sessions, delivered at least 1 session per month, during months 7- 12.	30.8	4/13	69.2	9/13
Session Attendance (1-6 mo.)	Minimum of 9 sessions attended, on average	53.8	7/13	76.9	10/13
Weight loss achieved at 6 months	Average weight loss achieved by participants attending a minimum of 4 sessions must be a minimum of 5% of "starting" body weight.	15.4	2/13	30.8	4/13
Participant average session attendance during 7-12 months	Minimum of 3 sessions in months 7- 12	30.8	4/13	38.5	5/13
Weight loss achieved at 12 months	Average weight loss achieved over the entire 12 month intervention period by participants attending a minimum of 4 sessions must be a minimum of 5% of "starting" body weight.	23.1	3/13	23.1	3/13
Program eligibility requirement	Minimum of 50% of participants must be eligible for the lifestyle intervention based on either a blood test indicating prediabetes or a history of GDM. The remainder (maximum of 50% of participants) must be eligible based on the CDC Prediabetes Screening Test, the American Diabetes Association Type 2 Diabetes Risk Test or a claims- based risk test.	53.8	7/13	84.6	11/13

Table 5. Percentage of DPRP Standard Variables Met By Each Study

Author(s) (Publication Year)	Percentage of DPRP Standard Variables Met by Study	# of criteria met by Study (of 8 variables)
Samuel-Hodge et al. (2014)	% of criteria Met	# of criteria met
Betfort et al. (2008)	0	0
Boltri (2008)	25	2
Kumanyika et al. (2009)	75	6
Dodani et al. (2009) (2010)	12.5	1
Boltri et al. (2011)	25	2
Yeary et al. (2011)	0	0
Cox et al., 2012	25	2
Perri (2008); Rickel et al. 2011	100	8
Whittemore et al. (2009)	25	2
Katula et al., (2011)	100	8
Hess et al., (2012)	12.5	1
Kumanyika et al., (2012)	62.5	5
Samuel-Hodge et al. (2012, 2013)	0	0
Total % of criteria met	**15.4% met all criteria**	**(2/13) met all criteria**
Average % of criteria met for each study	**35.6%**	**(2.85/ 8 variables)**
Whittemore (2011)		
McBride et al. (2008)	50	4
Pagoto et al. (2008)	62.5	5
Vadheim et al. (2010)	50	4
Vanderwood et al. (2010)	100	8
Kramer et al. (2009)	87.5	7
McTigue et al. (2009)	50	4
McTigue et al. (2009)	75	6
Ackerman et al. (2008)	100	8
Matvienko and Hoehns (2009)	87.5	7
Mau et al. (2010)	0	0
Seidel et al. (2008)	25	2
Aldana et al. (2006)	75	6
Davis-Smith et al. (2007) *AA study	25	2
Total % of criteria met	**15.4% met all criteria**	**(2/13) met all criteria**
Average % of criteria met for each study	**60.6%**	**(4.85/8 variables)**

Total number of DPRP variables met by studies targeting African Americans
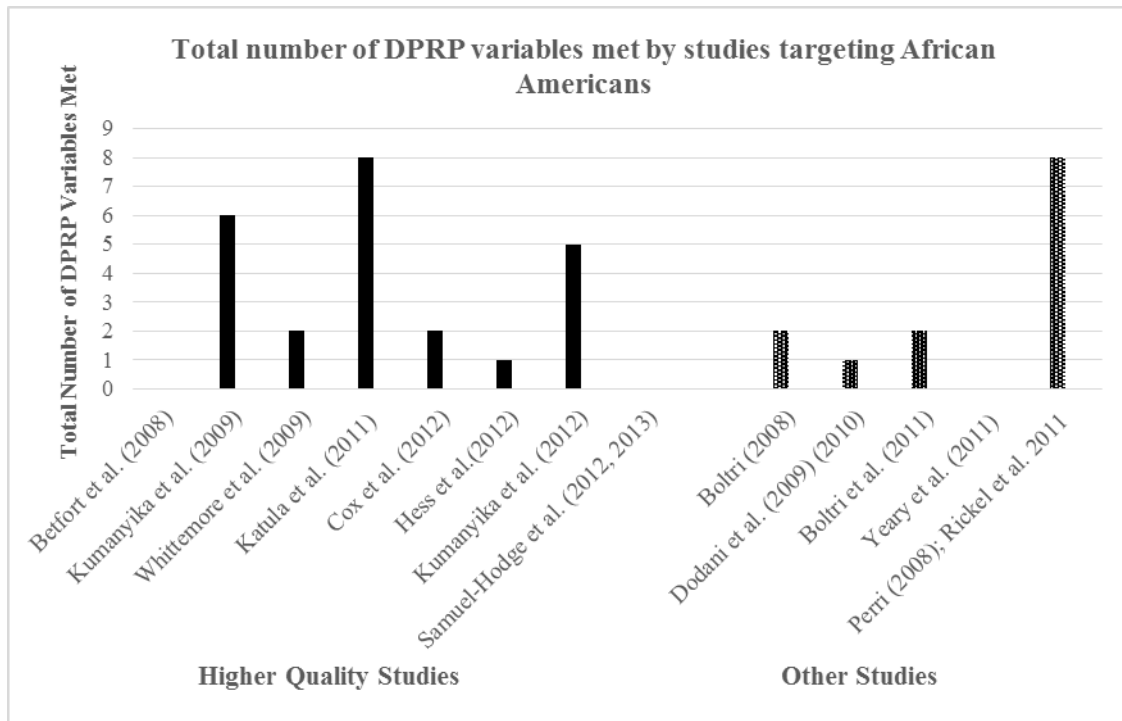
Higher-Quality Studies Met 2 Criteria:
1. Two-Group Parallel RCT
2. Sample Size >/= 40

Figure 1. Total Number of DPRP Variables met by Studies targeting African Americans

3.5   DISCUSSION

The results of our review showed that, overall, the percentage of DPP translation studies that would be considered recognized by the DPRP was relatively low. Perhaps one of the primary contributing factors is that many of the outcomes in the study were not reported in a manner that would allow the DPRP to accurately evaluate the necessary variables. For example, some studies only assessed weight loss at 3 months instead of 6 months. Other studies only reported the long term outcomes of 12 months. In either instance, if weight was not evaluated specifically at the recommended time points, it was not considered to follow the DPRP guidelines. Also, authors often reported weight loss goals by stating the percentage of individuals that met 5% or 7% weight loss from the baseline weight, but the mean weight loss of all participants was not explicitly stated. If baseline weights and mean weights were not provided, then the average weight loss percentage could not be assessed for the study. Since weight loss is such a crucial outcome of the DPP, it would be beneficial if weight loss variables were reported and evaluated in a way that is recognized by the DPRP.

Of major concern are the variables that were not reported or addressed. Due to extensive non-reporting within the literature, the documentation of weight and physical activity had to be excluded from analysis. This could be due to various factors and, therefore, more investigation is needed with regard to documentation of weight and physical activity per sessions. Also, while many studies were not penalized for eligibility requirements, reporting the portion of individuals that were eligible based on a fasting glucose blood test was often not included in the literature. Hence, it is likely that the number of studies that met the DPRP guidelines is smaller than noted within our study.

From our results, it seems that the literature focusing on the translation of the DPP for African American communities, on average, met DPRP requirements less often than the general translational studies. This is not to say, however, that research among African Americans are less significant or effective than those presented in the Whittemore (2011) review. There are a few factors that may have contributed to these results. One factor is the issue of non-reporting or reporting in a manner that does not match the DPRP listed requirements, which we discussed previously.

Another factor that may have played a large role in fewer average criteria met was the fact that many of the articles did not include a maintenance component post the core intervention. This meant that the curriculum, intensity and duration variables automatically counted against many studies in the African American systematic review. In order for future researchers and health care providers to implement a recognized program, there have to be guidelines on a maintenance component that is complementary to the translated core intervention. Incorporating maintenance components would increase the likelihood that studies specifically targeting African Americans meet the standard guidelines relevant to the intervention. Although we would recommend incorporating maintenance components in studies, it is important to note that many of the articles presented in the review were smaller, pilot studies. Limited resources are often an issue with regards to small scale, pilot studies and we therefore acknowledge that this could have been a contributing factor to the small percentage of studies that met maintenance and duration criteria. Nonetheless, if feasible, researchers may want to make maintenance follow up sessions a priority along with the core curriculum.

On the topic of the lifestyle curriculum, we noticed that specifics on how the curriculum was adapted per session was often not listed. The DPRP guidelines state that for the lifestyle

curriculum components, adaptations may be considered but that all translated courses must be submitted and approved by the recognition program. It therefore would be helpful for researchers to explicitly state which courses were adapted or added to the original material set by the DPP. Interventionist can therefore report to the DPRP which components of the curriculum remained the same and which were adapted in order to be more effective for the targeted community. By providing aforementioned evidence-based information, the DPRP may be more likely to accept translations for high-risk minority groups.

Finally, a factor that could have played a significant role in the difference between the systematic reviews, is that the review targeting the general population had stricter article eligibility requirements. In order for articles to be incorporated into the Whittemore review, articles had to be a published report on the outcomes of a translated DPP study based on the curriculum set by the DPP (Whittemore, 2011). Participants within the study also had to be adults that were considered high-risk for type 2 diabetes (Whittemore, 2011). While Samuel-Hodge's review had strong article inclusion methods, the overall review could not compensate for the fact that there was limited literature specifically around the DPP translation for African Americans. Due to the fact that a majority of studies exploring the translation are pilot studies or have a low number of participants, other larger scale studies among African Americans had to be taken into account. However, some of the randomized controls trials incorporated are not solely based on the DPP but also include other weight-loss and management program components (e.g. Look AHEAD) (Samuel-Hodge et al., 2014). Since the original inclusion criteria for the review of the DPP among African Americans had to be more lenient with the literature incorporated, there is more variability in the outcomes evaluated between studies. In studies that incorporated other evidenced-based components, researchers may not have been as concerned with following

the standard guidelines of the DPRP in such a strict and detailed manner. While this was a limitation for the systematic review targeting African Americans, it highlights the fact that there remains a great need for researchers to specifically study the translation of the DPP for African Americans, and on a larger scale (Samuel-Hodge et al. 2014).

3.5.1 Strengths and Limitations

The primary strength of this study is that it compares a significant portion of literature assessing the translation of the DPP to the national standard guidelines set by the CDC DPRP. To our knowledge, there is no study that explicitly assesses the requirements of the DPRP in relation to current literature, especially not with regards to high-risk populations, such as African Americans. This study also makes a comparison between studies exploring the translation of the DPP in the general population versus in the African American population. Seeing such comparisons may aid future researchers in addressing the disparity that not only exists with respect to the incidence of type 2 diabetes, but also that clearly exists within the realm of interventions.

There are some limitations to this study. Since we used two systematic reviews as a guideline for article inclusion, this study cannot technically be categorized as a review article. Also, the two systematic reviews had different methods for inclusion criteria. Based on initial inclusion criteria, some articles may have been better suited for the analysis that we performed, therefore producing more adherent results. Another limitation is that due to under-reporting or lack of reporting, there were a couple of variables that were not included in the analysis. There were also some criteria that we chose to be more lenient with, since the primary goals of the selected studies were not to apply for recognition, but rather to assess

effective variables that could be translated for specific communities. Most studies would not meet the DPRP requirements based on the unreported number of sessions in which weight and physical activity were documented throughout the intervention. Nonetheless, we feel that our adjustments in analysis and methods was necessary in order to account for information that was simply unknown. Lack of reporting does not exclusively indicate that researchers did not incorporate or assess specific variables, and so we wanted to be sensitive to this notion.

3.5.2   Conclusion

It is understood that the primary aims of the research studies incorporated in this study were to implement and evaluate specific variables and outcomes in order to make the DPP more translatable at the community level. However, researchers must be cognizant that the overall goal of research in the field of diabetes prevention translation is to provide individuals with adequate knowledge and guidelines for effective implementation. Researchers and health professionals who want to implement a translatable DPP will have many limitations without a clear report of baseline eligibility criteria, weight loss outcomes, and curriculum and intervention components. In addition, many programs want to be nationally recognized as the DPP. Providing more literature with components and outcomes that are comparable to the standard guidelines set by the DPRP, could potentially increase the likelihood that more community-based interventions will incorporate the DPRP standard guidelines, hence, becoming nationally recognized.

4.0   CONCLUSION

While this thesis largely explores the characteristics of Diabetes Prevention Translation Programs among the African American population, it is important to recognize that the DPP translational movement goes beyond research and is a national effort. The National DPP uses a partnering framework, in which public and private sectors work together in order to reduce the growing problem of prediabetes and diabetes in the United States (CDC, 2016). Partners may include federal agencies, state and local health departments, national community organizations, public and private insurers, health care professionals and community education programs (CDC, 2016). Working with community-based programs and organizations is one of the key avenues the National DPP uses in order to achieve the goal of preventing diabetes. This demonstrates that community-based programs and research do not solely contribute at a local level, but are also crucial in achieving national goals.

In 2009, the Diabetes Prevention Act, was introduced and referred to the subcommittee of health (Congress, 2009). This particular bill stressed the importance of community-based programs by proposing that the Secretary of Health and Human Services (HHS) award grants to recognized eligible entities in order for them to: (1) support community-based diabetes prevention programs that work with health care professionals to identify individuals who are at high risk for diabetes and refer them to an affordable group-lifestyle program; (2) evaluate whether methods used in recognized community-based programs are scalable at a national level;

(3) evaluate the health and economic benefits that community-based lifestyle programs provide for patients who are considered high-risk and within a certain age group; and (4) identify and evaluate efforts of engagement among persons at high risk in both health care and community-based programs (Congress, 2009).

The Act of 2009 also proposed that the Secretary of HHS would develop and implement community-based programs and also provide quality assurance for each community-based program that would be recognized and funded (Congress, 2009). In addition, the Secretary would have been required to award grants and available funding towards research exploring diabetes prevention (Congress, 2009).

Shortly after the introduction of the Diabetes Prevention Act, a provision was made in the Affordable Care Act to make the DPP a national effort. It is important to note that the proposed Diabetes Prevention Act and the current National DPP effort, prioritizes community-based programs that are recognized. This reiterates the importance of following the CDC's recognition guidelines, for both research and program implementation. From a policy standpoint, programs and research that adhere to national guidelines may have more of an opportunity to receive funding. Increased resources will provide researchers and community-based programs with more opportunities to evaluate implemented lifestyle interventions; thereby, increasing their ability to develop more effective translations that can be expanded at a national level.

In order to expand the DPP at the national level to make a large impact in reducing diabetes rates in the United States, researchers and health professionals must think about the political implications of translated interventions. Policy has the potential to make a large impact on the National DPP's ability to reach high-risk populations. A current policy that deserves discussion is the Medicare Diabetes Prevention Act (MDPA), which is a bipartisan bill that

provides coverage of the diabetes prevention program for individuals who are considered eligible for the services (Congress, 2015). By defining lifestyle interventions as a recognized, and insurance-covered treatment plan, the MDPA can make a significant impact on reducing diabetes and the associated comorbidities.

Although the MDPA is a major victory in the field of diabetes prevention, the political efforts around insurance coverage and the DPP still needs advancement. Medicare only accounts for the senior population at risk. While pre-diabetes is a significant issue in the senior population, a large portion of older adults may already be diagnosed with diabetes. According to the American Diabetes Association, approximately 25% of older adults (ages 60 years and older) are currently diagnosed with diabetes (ADA, 2014). Once diagnosed with diabetes, the goal of health care professionals is no longer prevention, but to provide management and treatment services for their patients.

Moreover, to enhance prevention efforts, targeting middle-aged individuals will be imperative. In 2010, it was estimated that the number of new cases of diabetes would be the highest in the age group of 45-64 years (CDC Factsheet, 2011). This, therefore, stresses the need for diabetes prevention programs to start prior to the age of 65 years. This is particularly true for some high-risk minority populations, such as African Americans, who are more likely to be diagnosed with diabetes by the age of 65 in comparison to Non-Hispanic whites (CDC Factsheet, 2011). In order to target individuals prior to diagnosis, the next step should be to create policies that allow Medicaid and private insurers to cover DPP services for eligible individuals. Without such policies in place, individuals at higher risk for diabetes will have less access to lifestyle interventions, which could potentially contribute to the growing disparities that the National DPP and partners have strived to reduce.

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