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The Diabetes Prevention Program for Underserved Populations: A Brief Review of Strategies in the Real World

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IN BRIEF This review highlights examples of the translation of the Diabetes Prevention Program (DPP) to underserved populations. Here, underserved populations are defined as groups whose members are at greater risk for health conditions such as diabetes but often face barriers accessing treatment. Strategies to develop and evaluate future DPP translations are discussed.

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The Diabetes Prevention Program (DPP) has been successfully translated across many real-world settings since the results of the landmark study were published (1). Some populations are at relatively higher risk for type 2 diabetes, are less likely to have access to resources to prevent type 2 diabetes, or are medically underserved, so it is important to consider the effectiveness of the DPP lifestyle change intervention within these specific groups. This article reviews studies that have translated the DPP into these underserved populations, including racial/ethnic minorities, rural populations, and populations with low socioeconomic status (SES). The prevalence of type 2 diabetes among racial/ethnic minorities (8.0–15.1%) is greater than that of non-Hispanic whites (7.4%) (2). However, there is variation within racial/ethnic groups and by region. Although the Centers for Disease Control and Prevention (CDC) reported the prevalence of type 2 diabetes among American Indians and Alaska Natives as 15.1%, this includes a rate of 6.0% for Alaska Natives and 22.2% for American Indians in the Southwest (2).

The relationship between SES and type 2 diabetes incidence and prevalence is complex because of other confounding circumstances (e.g., health care access, opportunities to exercise, and access to healthy foods) and overlapping risk factors (3). Racial/ethnic minorities now make up 21% of rural populations; their health status is poorer than those of both rural whites and urban minorities (4). Poverty is more prevalent in rural and inner-city communities, further increasing the risk of diabetes within these communities (4). Therefore, increasing engagement and retention in the DPP lifestyle change intervention is crucial among these high-risk groups. Some DPP translation studies have included populations with multiple categories of risk factors, in which case they are referenced in multiple categories as appropriate. This review discusses *1*) how the DPP has been adapted for different underserved populations and *2*) strategies for how to adapt and assess future translations of the DPP for other populations. This article highlights some of the work done to provide the DPP to underserved populations, but it also aims to highlight approaches for assessing findings from these translations and to emphasize the need to share information more broadly with others.

Methods

Other articles have reviewed DPP translations in different settings (5),

for different racial/ethnic groups (6), for level of cultural adaptation by theoretical frameworks (7), and for degree of cultural adaptation and implementation strategy (8) and have proposed a framework for evaluating the effectiveness of cultural tailoring (9). This work discusses strategies for tailoring and implementing the DPP and broadening definitions of underserved populations to racial/ethnic minorities, rural populations, and individuals with low SES. The focus is on studies that have specified that they translated the DPP. These studies were identified through a literature search using the search terms "diabetes prevention program" *and* "underserved" or "minority" or "ethnic" or "tailored" or "low income" or "rural" in PubMed and Google Scholar. Studies identified through other articles on DPP translations are also included.

Review of DPP Translations for Underserved Populations

DPP Tailored for Racial/Ethnic Minorities

The previously described CDC report on diabetes rates among minorities had limited data on more specific categories of populations (2). For example, the 2014 Native Hawaiian and Pacific Islander (NHPI) National Health Interview Survey showed that 15.2% of NHPI adults had diabetes, ranging from 14.2% for Native Hawaiians to 22.1% for Samoans (10). This level of granularity is important for understanding different levels of risk and outcomes, especially when studying different racial and ethnic groups. A 2012 meta-analysis of DPPs (11) found an average of 4–5% weight loss at 12 months. A 2011 systematic review (5) found a range of 2.7–6% weight loss within DPP translations (compared to almost 7% in the original DPP study). Within these outcomes, however, there appear to be racial/ethnic disparities. The original DPP study population was notably 45% minorities, including 22% African Americans. However, the DPP was less effective for African Americans (1,12) relative to other racial/ethnic groups in the sample; African Americans averaged only half of the overall average weight loss, and weight loss outcomes were smallest for African American women (13).

Most studies described using stakeholder or community feedback to inform their translations and implementation process. This process helped to identify preferred settings for classes, delivery, and content. The more common adaptations were a group-based approach, the use of peer coaches, and a shortened number of sessions delivered (6,8,9), sometimes due to concerns about feasibility (14). Community settings (e.g., churches and recreation centers) were chosen for their cultural value or common use for community gatherings. Some programs built the setting into the delivery (e.g., recruiting church members or scheduling classes right after church), whereas other programs recruited more broadly in underserved neighborhoods (15,16).

Common characteristics for peer coaches included bilingual skills, a racial/ethnic match to participants, and being from the local community. Peers were used to help build trust and have coaches that could relate to participants; most programs with peer coaches reported successful weight outcomes for participants (9,11). Some challenges (9) arose when coaches were only available on a part-time basis (17), which limited their ability to engage with participants, and also when there was not consistency in the content being delivered (i.e., the coaches each designed their own curriculum) (18). Stakeholder feedback also led to content modifications such as adding topics that the community found relevant (e.g., how to eat healthy on a low income and how to discuss personal matters with a doctor) (19) and adding activities (e.g., providing a food guide to use on a supermarket tour and holding practice walking sessions with pedometers) (20) to address gaps in knowledge or existing barriers to lifestyle changes.

DPP for Rural Populations

Rural areas have a higher prevalence of type 2 diabetes (17% greater than in urban areas) but face limited access to diabetes management programs (62% of nonmetropolitan counties do not have diabetes self-management education and support programs) (21). This problem is compounded by the lower ratio of providers to patients. Although 17% (59 million) of the U.S. population lives in rural areas, only 9% of doctors and 16% of registered nurses practice in such settings (4). Although rural stakeholders noted diabetes as their third highest health priority (behind nutrition and weight status), access to health care remains the greatest need (4). A systematic review and meta-analysis by Joiner et al. (22) found a wide range of eHealth DPP translations delivered through the Internet, mobile phones (applications or text messages), DVDs, interactive voice response telephone calls, videoconferencing, and video-on-demand programs. The authors categorized the interventions into stand-alone, behavioral support from a remote counselor, and behavioral support from an in-person counselor and found average percentage weight losses of 3.34, 4.31, and 4.65%, respectively. However, across these studies, participants were mostly female, college-educated, and white. The authors recognized a need for additional studies with more diverse populations, rural residents, and those with less education.

One such study (23) compared outcomes for an in-person and a telehealth DPP in Montana. A telehealth site was chosen in each of seven different towns (an average of 83 miles from the main health care center). The DPP classes were provided on site at one main health care center and simultaneously broadcast at one of the telehealth sites (the telehealth sites rotated over time). There were no significant differences between

onsite and telehealth participants, respectively, in terms of attendance or meeting the 7% weight loss goal (38 vs. 41%). It was estimated that the average telehealth participant cost $125 less than an onsite participant (on top of an estimated $810 savings in participant travel costs).

Before their larger study, there was a pilot study to test the feasibility of the telehealth DPP, in which the onsite and telehealth groups had similar rates of attendance and weight loss (46 and 50%, respectively, met the 7% weight loss goal) (23).

To implement the telehealth DPP, there were again partnerships developed and coordination done before the start of the intervention. The main site had to get buy-in from the telehealth sites and ensure that they had equipment capable of hosting the telehealth sessions (usually existing telemedicine networks). Each telehealth site also needed a local site coordinator to weigh participants, set up rooms, conduct surveys, and collect and mail participant log books (due to unreliable Internet or cell phone access), while the main health care center provided the program materials. The onsite and telehealth classes were held simultaneously, so the onsite coaches had to be conscious of the need to make sure all class demonstrations were visible for the camera so the telehealth participants could see them. Because of limited community resources for participants, the lifestyle coaches established partnerships, including a local motel pool for water aerobics classes, a local high school for cooking classes, and a local grocery store that started offering $10 bags of produce (24).

An estimated 4.7 million veterans live in rural areas, and a larger proportion of rural veterans (58% rural vs. 37% urban) enroll in the Veterans Administration (VA) health care system, even though they may not live near their closest VA medical center (25). More than half of rural veterans are ≥65 years of age and earn less than $35,000 annually, and 27% do not have home Internet access. These veterans are more likely to have health conditions such as diabetes. A multisite demonstration of the DPP within the VA, both in person and online, had promising weight loss outcomes (average of 3% weight loss at 12 months) (26). This program also demonstrated the feasibility and effectiveness of an online DPP, despite at least some participants being relatively new to both computer and Internet use.

The online VA DPP was completely virtual; a live coach communicated electronically, and weights were collected through a wireless Bluetooth scale. The online VA DPP vendor ensured that veterans were assigned to cohorts with at least one other veteran member in this study. There were benefits to the in-person DPP as well, with anecdotal data at one site about the positive impact of having a peer (fellow veteran) as a coach.

Damschroder et al. (27) describes using a hybrid type 3 implementation framework, a design in which the primary focus is on testing the implementation strategy for a program because it is believed to have an impact on the program's effectiveness, but that also includes assessment of program outcomes. In addition to assessing the implementation process at the different VA sites and fidelity to the original DPP curriculum, they also studied the effectiveness of the DPP relative to usual care. The online DPP enrolled participants from four different VA sites around the country, so another VA site served as the coordinating center to manage the collection and tracking of participant surveys and other study details. The coordinating center staff also visited each site to assess the fidelity of content delivered to participants by session.

DPP Tailored for SES

Low-income individuals often face access issues when it comes to health care and health-promoting resources, so they may be less likely to get screened for type 2 diabetes or to live near options for healthy eating or physical activity. As previously stated, type 2 diabetes risk factors related to SES (e.g., educational level and income) are often related to other risk factors such as race/ethnicity and rural location. The following studies each took a different approach in designing DPP programs.

Fontil et al. (28) described a collaboration between researchers and a digital health company to modify the DPP for low-income safety net clinic patients. They used focus groups and interviews in English and Spanish to modify the content (for general and health literacy) and the online platform. Content modifications included using simpler terms and providing health advice or examples that were more relevant or realistic, such as recommending dancing or playing sports instead of gym memberships or yoga classes. Additional tools (e.g., video tutorials and handouts with computer screenshots) were created to help with the online process of signing up and navigating the program. Some participants needed assistance setting up email accounts, and others rarely checked their email, despite reporting frequent Internet use. A conference call was added to the beginning of the program to help orient participants and build connections within the cohort. Weight loss outcomes are being analyzed (29).

Similarly, the Power Up for Health program (16) was implemented in accessible locations and provided participants with membership to local recreation centers. However, the memberships were underutilized, and post-intervention interviews revealed that participants wished they had had class time to exercise or been given demonstrations of exercises (30). This desire was not limited to exercise; participants also said they would have appreciated cooking demonstrations, help with meal planning, and information about outside resources to help with sustaining behavior changes. Overall, participants aver-

aged 3.8% weight loss (ranging from 1.3 to 6.2% by site) (31).

DPP Tailored for Sex

Although one program was specifically tailored to men (16,30) and another program by default served mostly men (26,27), there is little literature on lifestyle programs designed specifically for men and their health needs. Most studies on weight loss or lifestyle change have large samples of women. Studies that use group-based programs may deter male participants who view these sessions as female-oriented (e.g., Weight Watchers). Compounding this issue is the reticence of men to actively seek health care (especially prevention).

There can also be a cultural preference for sex-specific groups (32); while assessing cultural preferences for the delivery of the DPP translation within an Arab-American community, focus group participants noted a preference to have separate groups for men and women. Within that study, 44% met the 7% weight loss goal (59% lost at least 5% baseline weight). Within the VA, which has a majority of men, tailored DPP groups for women only also found success, with an average of 5.24% weight loss (33).

To create a DPP that men would attend, Power Up for Health (16) started with focus groups, discussions with community leaders, and an advisory panel to help adapt the curriculum before piloting their work. Some focus group participants expressed concern about being able to fully share and discuss issues with women in the group. The male community leader noted that societal expectations around masculinity could make conversations difficult. Interviews conducted after the program ended revealed that participants appreciated having men-only groups that were composed of fellow minorities because they felt like they could trust them and relate more. They also appreciated having coaches that had personal experience with diabetes or weight issues.

Other underserved populations are not fully discussed in this article because of space constraints rather than a lack of importance. For example, although a history of gestational diabetes is often part of eligibility criteria for these interventions, there are few programs available for postpartum women (especially minority women, who receive less diabetes screening) (34). The few studies that exist unsurprisingly report difficulty with engagement due to the competing demands of being a new mother, although one ongoing study (34) is incorporating tailored health coaching calls to try to address that barrier. Individuals with severe mental illness are at risk for obesity because of the psychotropic medications used for treatment and high rates of sedentary behavior and unhealthy diet. One translation of the DPP into a community mental health organization demonstrated its feasibility, although with minimal weight loss (35). Unlike the previous studies discussed, in which the overall number of sessions or timeline was condensed to reduce participant burden, stakeholders here reported the need for more time to process information and practice strategies.

Summary

The DPP continues to be translated for use in many diverse populations, with program staff making adaptations to tailor program content and structure to specific populations or regional barriers and needs. As technology continues to evolve, there may be more options for delivering the DPP even more widely, as long as there is Internet or mobile network access. Fortunately, DPP modifications do not appear to affect weight loss outcomes (36); for example, peer coaches have been shown to be just as effective as medical or allied health care providers and require lower program costs (11). Most of the DPP translations reviewed here included formative work to determine what aspects of the DPP to adapt; many used community-based participatory research (CBPR) methods as guidance (8,9). CBPR methods can be valuable when tailoring the DPP for any population—not just racial/ethnic minorities (37). In addition to learning more about common barriers or group preferences, there is the opportunity to include key stakeholders throughout the research process.

Many of the studies reviewed used one or more of the following as a part of their formative research: focus groups, community advisory boards, and stakeholder interviews (e.g., community leaders). Although not discussed in detail, the authors described having relationships with community partners and other organizations to conduct this formative work. Furthermore, having direct conversations with members of underserved populations may reveal regional or population differences that might differ from those described in the current literature. For example, as previously mentioned, a population with severe mental illness requires more, not fewer, sessions. Time to build relationships and trust and to show the value of the programs such as the DPP is important, especially in populations that do not usually have access to care or have often had negative experiences with health care. One example of this can be found in the study by Jaber et al. (32), in which participants who declined the intervention could choose to participate in the educational arm instead. After completing the educational arm, participants were again given the option to enroll in the intervention, and interest was higher than expected (78% decided to enroll).

Fewer of the studies described their implementation process or guiding framework. There are common challenges in real-world implementation related to recruitment and retention, program delivery, and continuation or expansion of the program after initial funding ends. As more translations of the DPP are conducted within underserved populations, it is even

more important to share their implementation findings in addition to the health outcomes they achieve to gain a better understanding of why certain strategies may work or how to make improvements. Although populations and regions have their unique characteristics and differences, considering the strategies used by others can be helpful.

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Duality of Interest

No potential conflicts of interest relevant to this article were reported.

Author Contributions

M.A.Y. conducted the literature search and wrote the manuscript. T.M. identified additional references and reviewed and edited the manuscript. C.R.R. reviewed the manuscript. L.J.D. reviewed and edited the manuscript. M.A.Y. is the guarantor of this work and, as such, had full access to all of the articles cited in this review and takes responsibility for the integrity and accuracy of the review.

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