

Pilot of Community-Based Diabetes Self-Management Support for Patients at an Urban Primary Care Clinic

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Diabetes is the seventh leading cause of death in the United States (1). Furthermore, diabetes prevalence, diabetes-related hospital admissions and re-admissions, and risk factors are disproportionately higher in racial and ethnic minorities, indicating the need to focus efforts on reducing these disparities while also improving outcomes for all (2–4). Diabetes care and management vary significantly by race/ethnicity and insurance status and are less likely to be optimal in certain minority groups and the uninsured (5,6).

Because most resources and barriers to diabetes management are present within the broader context in which patients carry out their daily lives, the ability to support self-management from within health care delivery systems is limited. Conversely, the capacity for health care systems to partner with community-based programs to manage diabetes is almost limitless. For example, an expert synthesis of strategies to reduce diabetes disparities concluded that community-based efforts and health information technology are the “new frontier” for eliminating diabetes disparities (7). Health care is shifting from volume to value, from treatment to prevention, from patients to populations, and from discrete clinical encounters to whole-person care. In this new model, collaborative partnerships to promote health

and well-being within communities are increasingly relevant.

Evidence suggests that chronic disease self-management support provided in the community setting improves outcomes in patients with complex chronic conditions (8–10). Previous studies on peer-led support have shown improvements in participant self-care (i.e., nutrition, physical activity, and glucose monitoring), psychosocial outcomes (i.e., quality of life, self-efficacy, and depression), and treatment and appointment engagement (8,11). Positive social support has been shown to influence diabetes self-management practices such as eating a healthy diet, exercising, and monitoring blood glucose (8).

Peer-led diabetes social support in a community setting is gaining traction among people with diabetes (12). Pairing community-based support with clinical care may be a more effective strategy for promoting self-management of chronic disease than clinic or community programs alone (13). Partnerships offering the combination of clinical care with social support and self-care skill-building in the community setting may be important for improving self-management of diabetes. Although diabetes interventions involving social support have produced mixed results, reviews suggest that such interventions are promising and require further investigation (8,14).

The purpose of this article is to describe a clinic-community partnership for diabetes self-management

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support. The objectives were 1) to examine whether participation in a community-based diabetes self-management support program (CB-DSMSP) could improve diabetes self-care activities among adult patients with diabetes and 2) to assess patient perceptions of the usefulness of a community-based program.

Methods

We conducted a pilot study to assess a CB-DSMSP in partnership with a primary care clinic using a pre-post design. This study was reviewed and approved by the institutional review boards of Allina Health and Quorum (Quorum Review #28835/1) and the University of Minnesota (#1409E53841).

Study Setting

The primary care clinic is located in a socioeconomically and culturally diverse community and serves a diverse patient population. The clinic has the lowest percentage of people with diabetes who have met all five goals for clinical indicators of diabetes management in a health system that encompasses 65 clinics. The CB-DSMSP, a 501c3 member-named A Partnership of Diabetics (A-POD), is located within a community center approximately 2 miles from the clinic.

A-POD was formed as part of The Backyard Initiative, a project to improve the health of people who live in the community through encouraging active engagement, addressing the root causes of illness, and building connections. A-POD serves English-, Spanish-, and Somali-speaking people and also serves a large population of American Indian and African-American individuals. It is a self-organized group of people with diabetes that supports diabetes self-management through networks of family, social, cultural, and community-based resources that complement the work of the health care providers.

A-POD offers 1) monthly breakfasts with speakers and activities relating to nutrition, fitness, cooking, and diabetes education; 2) weekly 1.5-hour peer group meet-ups

comprised of a talking circle, social support, and self-care activities/monitoring (i.e., weigh-ins and checks of blood pressure, glucose, and feet); and 3) additional experiential activities (e.g., physical activity classes in the adjoining community gym and cooking classes). A-POD is an ongoing CB-DSMSP; participants for this study were new members and were evaluated after 12 weeks.

Population

Primary care patients ages 18–75 years who had a diabetes diagnosis, had had two face-to-face visits in the past 2 years in a primary care clinic, and had had one face-to-face visit at the clinic in the past 12 months were eligible to participate ($n = 586$). Participants were recruited through a mixed-mode approach. Posters describing the study were displayed at the clinic. Onsite certified diabetes educators also introduced the study during diabetes education appointments. Researchers mailed eligible participants a letter introducing the study and a survey about living with diabetes. The mailing included a brief overview of A-POD and an invitation to learn more.

Researchers followed up with all interested participants. In all, 10 clinic patients participated in A-POD. An additional 79 clinic patients who did not participate served as a comparison group.

Data Collection

Quantitative data were collected using mailed surveys. Primary outcomes of diabetes self-care activities were elicited through a survey questionnaire. All measures were collected at baseline (before A-POD) and after the completion of the A-POD program. Qualitative data were collected through a written program evaluation form implemented after the last session of the intervention period and semi-structured interviews with three participants.

Measures

Diabetes self-care activities were assessed using the Summary of Diabetes Self-Care Activities (SDSCA) tool (15). The SDSCA measures on how many of the past 7 days participants engaged in each of five activities: healthful eating, a specific meal plan, foot care, physical activity, and blood glucose monitoring.

Program evaluation included quantitative and open-ended questions in four areas: A-POD activities, program impact, program satisfaction, and linkages between A-POD and clinical care. Semi-structured interviews were also conducted with three participants.

Participant characteristics, including age, race/ethnicity, sex, educational attainment, marital status, income, health insurance coverage, self-reported health status, and diabetes-related medication use, were also collected on the mailed survey.

Analysis

The analytic sample included adult participants with diabetes who completed both the baseline and follow-up surveys ($n = 89$). Data were analyzed for 10 participants in the A-POD program and 79 participants in the comparison group. Each patient had a set of measures from two points in time, before and after A-POD, regardless of whether they participated. We assessed differences in patient characteristics by program participation group, using cross-tabulations with χ^2 tests. We used a nonparametric Wilcoxon signed rank test for paired data to test for differences in the distributions of days spent engaged in each of the five diabetes self-care activities from baseline to follow-up. We examined differences for the A-POD group and for the comparison group separately. All analyses were conducted using Stata SE version 13.1 (StataCorp, College Station, Tex.).

Qualitative analysis included tabular and graphic methods to summarize and display responses to the categorical questions from the

program evaluation. An informal thematic analysis was conducted on the open-ended responses and interview transcripts. Each data source was reviewed and summarized for key themes by three authors, two for each data source. Full summaries were presented to A-POD participants to ensure that what was captured and the resulting themes adequately reflected their experiences.

Results

Sample Characteristics

Table 1 shows the baseline characteristics of adults with diabetes by CB-DSMSP group participation. A-POD participants were predominantly female (80%), whereas nonparticipants were split evenly between the sexes. Additionally, 50% of A-POD participants were ≥ 65 years of age, and 50% were non-Hispanic white. A-POD participants were notably socially disadvantaged, as evidenced by 70% having no more than a high school education or the equivalent and all being low income ($< \$40,000$ household income). The distributions of health status and diabetes medication use were not significantly different for participants and nonparticipants, as would be expected from a sample of people with diabetes.

Diabetes Self-Care Activities

Table 2 shows patients' mean numbers of days participating in specific diabetes self-care activities per week both before and after participation in the A-POD program. Mean numbers of days engaged in each of the five self-care activities increased after participation in A-POD, although three (healthy eating, specific meal plan, and foot checks) had extremely small changes. The most notable increases were for exercise (from 1.9 to 3.9 days per week) and blood glucose monitoring (from 2.4 to 4.1 days per week), which increased by 2.0 and 1.7 days per week, respectively. The improvement in days with physical activity was statistically significant ($P = 0.01$). Similar to A-POD participants,

TABLE 1. Baseline Characteristics of Adult Patients Who Did and Did Not Participate in A-POD

| | A-POD Participants (n = 10), % | Comparison Group (n = 79), % | Total (n = 89), % | P |
|---|-----------------------------------|---------------------------------|----------------------|-------|
| <i>Sociodemographic characteristics</i> | | | | |
| Age, years | | | | 0.676 |
| 18–64 | 50.0 | 43.0 | 43.8 | |
| ≥ 65 | 50.0 | 57.0 | 56.2 | |
| Sex | | | | 0.079 |
| Female | 80.0 | 50.6 | 53.9 | |
| Male | 20.0 | 49.4 | 46.1 | |
| Race/ethnicity | | | | 0.683 |
| Non-Hispanic white | 50.0 | 57.1 | 56.3 | |
| Non-Hispanic black | 40.0 | 27.3 | 28.7 | |
| Others ^a | 10.0 | 15.6 | 14.9 | |
| Marital status | | | | 0.635 |
| Married | 60.0 | 67.5 | 66.7 | |
| Others ^b | 40.0 | 32.5 | 33.3 | |
| Education | | | | 0.397 |
| Less than high school | 30.0 | 12.0 | 14.1 | |
| High school graduate/GED | 40.0 | 37.3 | 37.7 | |
| Some college | 20.0 | 26.7 | 25.9 | |
| Bachelor's degree or higher | 10.0 | 24.0 | 22.4 | |
| Income | | | | 0.124 |
| $< \$20,000$ | 71.4 | 38.9 | 42.6 | |
| $\$20,000$ – $39,999$ | 28.6 | 24.1 | 24.6 | |
| $> \$40,000$ | 0.0 | 37.0 | 32.8 | |
| Insurance status | | | | 0.469 |
| Private | 25.0 | 42.3 | 40.5 | |
| Medicare | 50.0 | 23.9 | 26.6 | |
| Medicaid | 12.5 | 16.9 | 16.5 | |
| Other ^c | 12.5 | 16.9 | 16.5 | |
| <i>Health-related characteristics</i> | | | | |
| Self-rated health status | | | | 0.954 |
| Fair or poor | 30.0 | 29.1 | 29.2 | |
| Good, very good, or excellent | 70.0 | 70.9 | 70.8 | |
| Medication use | | | | 0.937 |
| None | 20.0 | 24.7 | 24.1 | |
| Insulin | 20.0 | 20.8 | 20.7 | |
| Diabetes pills | 60.0 | 54.6 | 55.2 | |

Data represent patients who completed both baseline and follow-up surveys. ^aIncludes American Indians, Asians, Native Hawaiians, and other Pacific Islanders. ^bIncludes separated, divorced, widowed, and single. ^cIncludes other public programs (Veterans Affairs, Military Health, MinnesotaCare, Indian Health Services). GED, general education diploma.

TABLE 2. Mean Number of Days in the Past Week that Adults With Diabetes Who Did or Did Not Participate in A-POD Engaged in Specific Self-Care Activities

| | A-POD Participants (n = 10) | | | | Comparison Group (n = 79) | | | |
|--------------------------|--------------------------------|-----------|------------|-------|------------------------------|-----------|------------|-------|
| | Baseline | Follow-up | Difference | P* | Baseline | Follow-up | Difference | P* |
| Healthy eating | 4.5 | 4.7 | 0.2 | 0.718 | 4.7 | 4.9 | 0.2 | 0.969 |
| Special meal plan | 4.5 | 4.6 | 0.1 | 0.468 | 4.5 | 4.9 | 0.4 | 0.477 |
| Physical activity | 1.9 | 3.9 | 2.0 | 0.010 | 3.3 | 4.0 | 0.7 | 0.008 |
| Blood glucose monitoring | 2.4 | 4.1 | 1.7 | 0.225 | 4.3 | 4.3 | 0.0 | 0.676 |
| Foot care | 5.5 | 5.6 | 0.1 | 0.954 | 4.6 | 5.0 | 0.4 | 0.309 |

*P values based on Wilcoxon signed rank test.

the mean numbers of days for all diabetes self-care activities improved in the comparison group. However, all activities increased only modestly (by <1 day per week). Also similar to the A-POD group, the change in mean days of physical activity for the comparison group was significant from baseline to follow-up.

Program Evaluation

Eight of the 10 A-POD participants completed the program evaluation. Figure 1 shows the perceived impact of participation in the A-POD program. All eight patients who completed the evaluation reported that their ability to manage diabetes, live with diabetes, check their blood glucose, and manage what and how often they eat was somewhat or much better as a result of participating in A-POD. Seven of the eight participants who completed the program evaluation reported that the amount they exercise was either somewhat or much better because of participating in A-POD.

Figure 2 shows perceived interactions with primary care caregivers after participation in A-POD. Seven of eight participants who completed the program evaluation reported that their relationship with their physician was better or somewhat better because of participating in A-POD. Seven of eight also reported that their relationship with their diabetes educator and their overall relationship with the

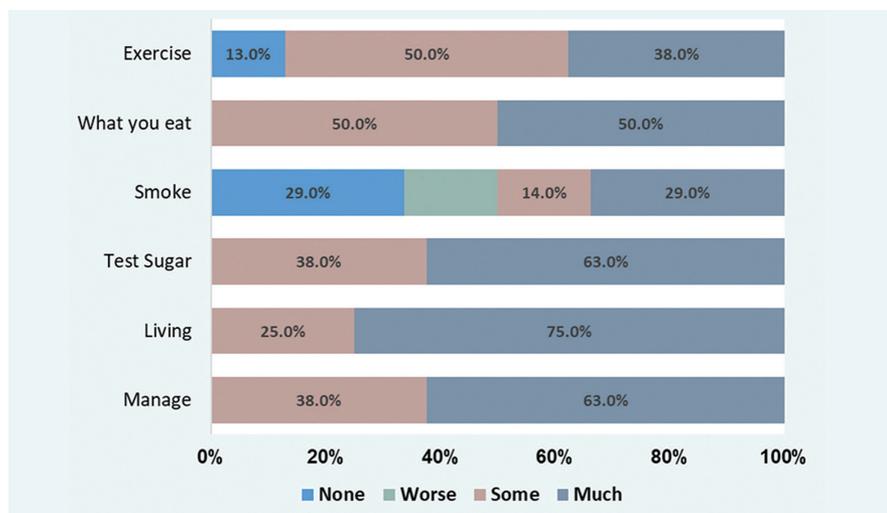


FIGURE 1. Impact of A-POD on diabetes self-management activities.

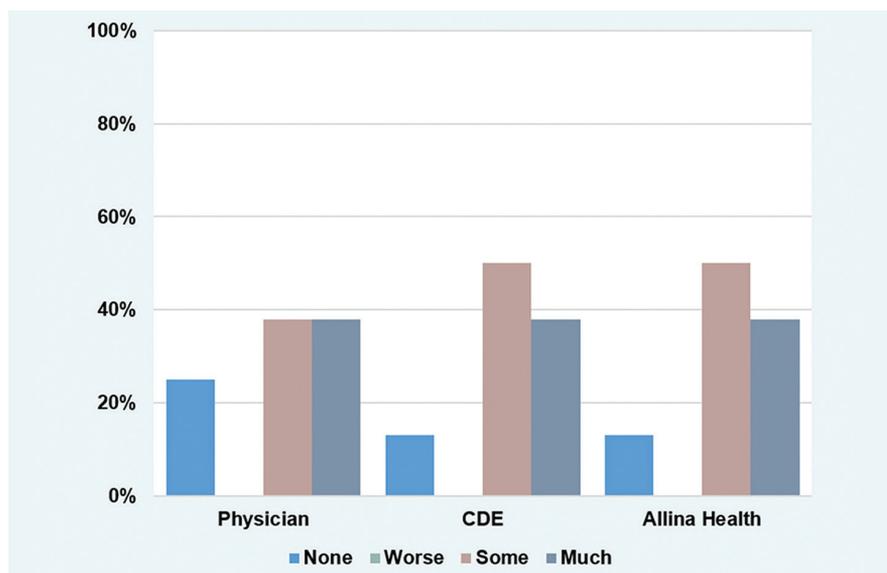


FIGURE 2. Change in interaction with caregivers after participation in A-POD.

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clinic was better or somewhat better because of participation in A-POD.

Table 3 describes themes that emerged from the open-ended responses and interview transcripts. Three thematic areas came up repeatedly: shared disease experience, knowledge sharing, and the importance of diabetes self-management. Participants were motivated to participate in A-POD due to the shared commonality of disease experience (i.e., diabetes status of fellow participants, including the facilitators). This commonality additionally gave participants the opportunity to share experiences and access peer knowledge. Most of the respondents noted that discussing ways to manage various aspects of their diabetes with others who had diabetes gave them concrete suggestions, as well as examples of what not to do. The A-POD experience also appears to have increased awareness of the importance of diabetes self-care activities and self-management. This is partially consistent with the quantitative results that showed significant increases in the mean number of days participating in physical activity and improvements in checking glucose according to the doctor's recommended schedule. Finally, transportation emerged as an important consideration for the future of this program. Limited transportation was mentioned by five of the eight respondents. Transportation was not initially provided. This was identified as a large barrier to participation, so additional funds were provided for cab vouchers.

Discussion

Participants in the A-POD CB-DSMSP reported improvements in diabetes self-care, ability to manage and live with diabetes, and relationships with primary care providers. Peek et al. (16) assert that integrated diabetes interventions involving partnerships between health care organizations and community-based organizations will become increasingly important for re-

ducing disparities in diabetes. Results of our study support this assertion and also support the important role of the trusting, authentic relationships and social connections many participants built with peer group members at the CB-DSMSP as an important resource for managing diabetes and overall health.

It is increasingly clear that intentional and relevant community-based support with meaningful social connections is an essential component to improving health outcomes. One study found long-term improvements in certain health indicators and behaviors (such as depression, communication with physician, and healthy eating), as well as improvement in self-efficacy (9). The results of our study support the notion that immersion in positive peer support experiences appears to increase participants' motivation to activate and improve their self-care. For example, the knowledge sharing, shared disease experience, and accountability reported by participants in the CB-DSMSP peer setting seemed to empower participants to better manage their diabetes and improve relationships with their health care team and to support participants in taking an active role in their overall health and health care.

Although evidence is mixed, some studies have also shown improvement in clinical outcomes such as A1C and blood pressure (8,10,11). Moving the needle on A1C takes time, however, given that it is an indicator of average blood glucose over several months (17). We did not have the capacity to conduct our study over a longer period of time. With more time, we could have determined whether A-POD participants experienced improvements in these clinical indicators. Future research will need to involve more participants over a longer study period to determine whether findings have clinical and statistical significance, whether improvements are sustainable, and whether such

resources can effectively reduce disparities.

Limitations

Our study had some limitations. First, the sample size for A-POD program participants was extremely small. The sample ($n = 10$) was only one-third of the target sample size ($n = 30$). Thus, the study was underpowered to detect statistically significant differences in most outcomes. If the desired sample size had been achieved, we would have had sufficient power to detect significant differences in changes over time for A-POD participants for exercise and blood glucose monitoring. Our sample size was constrained in part by limited human and financial resources. It was difficult to engage with and refer clinic patients to a CB-DSMSP with which they were unfamiliar. Attrition can bias findings if dropouts are significantly different from completers. However, retention of participants was impressive once familiarity was established and transportation barriers were eliminated.

Second, we did not have complete data for those patients who did not participate. Baseline and follow-up survey data were available for all A-POD participants. However, only 8 of 10 participants completed the program evaluation. It is possible that the two participants who did not complete program evaluations had very different experiences with A-POD that were not fully captured. Additionally, self-selection and social desirability may have introduced some bias. Participants self-identified and responded to an invitation to participate. It may be that this group represents a healthier population of people with diabetes, which does not tell us how this program might be used for people with less well-managed diabetes. Socially desirable answers to surveys about health-related behaviors are also not uncommon. Most responses here did not represent ideal behaviors, so it is possible that this bias was present.

TABLE 3. Themes From the Program Evaluation (n = 8) and Participant Interviews (n = 3)

| Theme | Example |
|-------------------------------|---|
| Shared disease experience | <p>P1: “[It was helpful] . . . being with others like me.”</p> <p>P4: “[It was helpful] . . . just being among other people who are going through the same thing you are going through.”</p> <p>I1: “We are all diabetics, and discussing these issues brings a whole different light to our condition. When you’ve got a group of people who are focused on the same thing, and everyone is bringing in different suggestions, and it all boils down to one good one [suggestion], we do a lot better that way.”</p> <p>I3: “I try to be as proactive as I can by keeping well abreast, and listening, and attending that A-POD group, because different people in there have different stories, and I’m like, ‘Oh, I never thought about that.’”</p> <p>I3: “. . . you form relationships. You start to look for the person you saw last week, or the week before that, and you get to know them on a first-name basis, so they begin to share their experience—which is the better teacher, period: because it’s experience.”</p> |
| Knowledge sharing | <p>P1: “Their knowledge is my knowledge.”</p> <p>P3: “. . . I learned and am learning new and improved ways to take control of my chronic disease as well as my diabetes.”</p> <p>P3: “I was encouraged to share my experience and info and it appeared fellow participants seemed to listen . . . ”</p> <p>P5: “I found the group style helped me out a lot. I learned about the food to eat, and activities.”</p> <p>P7: “[I learned from other participants] what they did wrong.”</p> <p>P8: “The A-POD was very helpful to me. All this time I have been there, I have learned a lot of good ways to live.”</p> <p>I1: “We talk mostly about our diabetes. Then you talk [about] how you manage it, and you learn from each other, and then the director, or the guide that is managing that, he is a diabetic, so we learn a lot.”</p> <p>I2: “Sometimes you don’t even need to talk. You just sit down and listen to other people on their own suggestions, or what they’re doing, or how they’re managing it . . . You learn from people that have been in that sick for a long time.”</p> <p>I3: “That group is very valuable, very, very, very valuable, because even after 10 years of being a diabetic, I’ve learned some things in there that I did not know, and they don’t write them in books.”</p> |
| Importance of self-management | <p>P3: “. . . [I] am more aware of precautions and behaviors (mental and physical) I can take to manage diabetes.”</p> <p>P7: “. . . [A]t the meeting, I learned how to eat better, to have more activities in my life, to help my sugar. [I learned] how to eat and still eat good, how to work out to help with los[ing] pounds. It makes it a lot easier talking about it.”</p> <p>P8: “[A-POD] help[ed] me learn how to eat properly and monitor my blood sugar level.”</p> <p>I1: “Only if I could do better myself concerning my diagnosis, I think that would be excellent; by eating the right portions of food and exercising, maybe that would help me.”</p> <p>I2: “If you study diabetes, even though they say it’s a killer disease, it’s not. If you manage it well, you’ll be fine.”</p> <p>I3: “My numbers got more steady. I became much more aware of checking my blood sugar. That group in itself has helped me tremendously. Again, like I said, I’m maintaining my weight. I’m much more aware of protecting my feet than I used to be.”</p> |
| Social accountability | <p>P11: “[I] liked every person in the group, especially the facilitators. When I set personal goals, they were helpful and made me accountable to accomplish my goals.”</p> |
| Health care integration | <p>P3: “To have the ability, once diagnosed with diabetes, to be referred ASAP [as soon as possible], this would mean having an A-POD person to be made aware by doctors the same day. This would, I believe, encourage more persons with diabetes to get involved with A-POD and could cut down on the fear and/or denial of this disease that could deepen physical and mental problems when left unchecked and save money.”</p> <p>P3: “[My doctor should know that] we do also A1Cs . . . with weight and blood pressure tests at each meeting. That is kept in our charts at A-POD. I don’t really think the doctors would be able to have the time to review this info, however. I’m sure the diabetes educator would have the time and interest to know all she could about the different areas of interest related to . . . patients and diabetes.”</p> <p>P3: “[From A-POD, I learned] how to communicate my medical needs to my doctor and to build a team of medical persons to assist me [in] navigat[ing] the medical system to meet my needs.”</p> <p>P11: “[Providers need to recognize] A-POD as an extremely helpful group for the diabetic community.”</p> |

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However, we have no way to test for this.

Third, our primary outcomes were diabetes self-care activities pre- and post-intervention. Although it is reasonable to expect these outcomes to change immediately after participation in a program that aimed to foster diabetes self-care, measures of sustainability in these changes were not captured.

Finally, our qualitative analysis was an informal summary of the program evaluation responses, which were limited in scope. Thus, we were not able to address the standard issues of rigor for this analysis. Although we were not able to conduct a full qualitative analysis for this small pilot study, we do have invaluable preliminary data to guide our next steps.

Implications for Care Innovation

Primary care providers are limited in the support they can offer patients with diabetes outside of clinical encounters. Although diabetes educators also play a crucial role in helping patients understand and manage their diabetes, their sphere of influence outside of the clinic is also limited. CB-DSMSPs, particularly those with strong peer support, are a promising complementary asset for supporting patients in managing and living with diabetes. Clinic-based diabetes educators, care navigators, and community health workers could play a pivotal role in aligning CB-DSMSP with primary care. In collaboration, these individuals are uniquely positioned to 1) assess whether patients may benefit from participation in a CB-DSMSP, 2) provide referrals to these programs, 3) contribute to the content and participate with patients in CB-DSMSPs, and 4) help optimize alignment of CB-DSMSPs and primary care by identifying areas of redundancy and opportunities to reinforce each area of distinct expertise.

Conclusion

Preliminary evidence suggests that innovative care models connecting clinical and community partners hold promise for improving diabetes management. Efforts to pair primary care with community-based support provide a rich medium to realize the fertile intersection of health care and public health and offer a bold opportunity for health care organizations to collaborate with cross-sector partners to promote health equity and population health.

Duality of Interest

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

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Author Contributions

P.J.J. conceived the study, analyzed the quantitative data, and edited the manuscript. M.O. conceived the study and contributed to the qualitative analysis. D.O. and L.T. contributed to the qualitative analysis and drafted the manuscript. T.R. contributed to the quantitative analysis and interpretation of results and edited the manuscript. P.J.J. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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