

Participants' perspectives on perceived usefulness of digital and in-person diabetes prevention programs: A qualitative study to inform decisions related to program participation

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Abstract

Objective: Given the effectiveness of both in-person and digital diabetes prevention programs (DPPs), participants have an opportunity to select a delivery mode based on their needs and preferences. The objective of this study was to understand and compare participants' experiences with digital and in-person DPPs to identify factors that affected how useful participants perceived these two program delivery modes.

Methods: Semi-structured interviews with participants who were enrolled in DPPs as either a digital ($n = 23$) or in-person ($n = 20$) program within one health care system were conducted. Data were analyzed following the template method using the qualitative software NVivo 12.

Results: Findings from the interviews indicated that creating accountability for weight loss was crucial for all program participants. In the digital program, weight and food tracking played a central role in creating accountability, while in the in-person program, group interactions fostered accountability. The digital program was perceived to encourage self-monitoring, oftentimes resulting in participants' reflection on their habits. The in-person program provided a platform for group support and mutual encouragement.

Conclusions: Participants perceived both programs as similarly useful. Yet program characteristics such as the ability to engage with other participants in-person or to seamlessly track weight on a daily basis appealed to different participants. It may be beneficial to align participants' preferences with programs' characteristics and strengths.

KEYWORDS

diabetes prevention programs, participant perspectives, program delivery modalities, program usefulness, qualitative research

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1 | INTRODUCTION

Among the 88 million adults in the United States diagnosed with prediabetes, an estimated 5%–10% will develop type 2 diabetes each year and require lifelong clinical management.¹ Obesity is a major risk factor for type 2 diabetes. In fact, among 77,000 adult patients, those with both prediabetes and obesity have more than a 15% probability of developing type 2 diabetes in 2 years.² Thus, preventive services are crucial for limiting the human costs that include elevated risks for diabetes, heart disease, and stroke, as well as the economic costs of diabetes; in 2017, the estimated direct costs of diagnosed diabetes were \$237 billion.³ Lifestyle interventions, often targeting dietary intake, physical activity and behavior change strategies, tailored for at-risk adults with prediabetes have become more widely available and have helped prevent the development of diabetes, including diabetes prevention programs (DPPs).^{4–6}

The availability of DPPs has increased substantially in recent years as a result of the Centers for Disease Control and Prevention's (CDC) National Diabetes Prevention Program and the Centers for Medicare and Medicaid Services' (CMS) expansion of coverage for DPPs, starting in 2018.^{7–9} The goals of DPPs are for participants to achieve 5%–7% weight loss and ≥ 150 min of weekly physical activity.¹⁰ Several delivery modes of the program have emerged, including traditional in-person and digital programs.^{11–14} Past research has shown no significant differences in weight change for participants using different delivery modes of DPPs.^{15–17}

Therefore, an opportunity exists to engage potential participants in selecting the delivery mode that best suits their needs and preferences, as participants' success in weight loss programs has been linked to their satisfaction with and perceived usefulness of intervention components.^{18–20} Attrition in weight loss programs also is challenging,^{21–24} and empowering participants to select their mode of participation may enhance retention. To facilitate matching participants' preferences with different modes of delivery, it is important to better understand participants' perspectives on and experiences with in-person and digital DPPs.

Past qualitative studies focusing on the National DPP have foremost focused on participants' experiences when the program was tailored to different populations or delivery settings.^{25–28} These studies documented that participants are willing to try out different modes of delivery, and to embrace technology for participation in lifestyle intervention programs,^{29–31} including digital DPPs specifically,²⁷ but provided little insights into the specific components or features of the program perceived as most valuable. Furthering the understanding of how components in different delivery modes of DPPs are perceived is crucial for empowering patients to choose a program that best suits their needs.

For this qualitative study, interviews were conducted with patients from a large, integrated health system who participated in either a digital or in-person DPP to compare their experiences and the components of each program they found most useful. This information may help facilitate shared decision-making between

patients and providers and allow them to identify the most appropriate program modality for each patient, promoting DPP participation and completion.

2 | METHODS

2.1 | Setting

Kaiser Permanente Northwest (KPNW) is an integrated health care system that provides care to approximately 610,000 members in Oregon and southwest Washington. In 2017, KPNW began an implementation pilot of a DPP with health plan members who had prediabetes (hemoglobin A1C 5.7%–6.4%) and obesity (body mass index [BMI] ≥ 30 kg/m²). Specifically, in April 2017, KPNW sent out invitation letters to 4132 health plan members, aged 65–75, inviting them to participate in a digital DPP. The age group was limited to 65–75 because KPNW wanted to initially focus on the Medicare population in preparation for CMS starting to cover DPPs for Medicare beneficiaries the following year (2018). Between July 2017 and January 2019, KPNW invited 2669 health plan members, aged 19–75, to participate in an in-person DPP.

2.2 | Participants and procedure

Participants were eligible for this qualitative study if they were KPNW members who had enrolled in digital or in-person DPPs. There were 511 and 172 health plan members who enrolled in the digital DPP and in-person DPP, respectively. Participants in each program type were randomly selected to invite to complete qualitative interviews. Among digital DPP participants, potential interview participants were randomly selected, stratified by sex, until the recruitment goal was met and interviews were completed with 23 participants between September and December 2017. At the time of the interviews, digital participants were either engaged in the intensive or maintenance phase of the program. Among in-person DPP participants, 40 potential participants were randomly selected to invite for interviews, stratified by sex and age group (50–64 years), to create a comparable group to the digital DPP cohort. Twenty in-person DPP participants were interviewed between February and April 2018. In-person DPP interviewees were also engaged in either the intensive or maintenance phase of the program. All participants were offered a \$20 gift card for participation. The study was approved by the KPNW Institutional Review Board (approval number 1394338).

2.3 | DPPs

Activities were similar across both programs (see Table 1). Participants were asked to track their weight, food intake, and minutes of physical activity; familiarize themselves with educational materials

TABLE 1 DPP characteristics

Program characteristics	Online DPP	In-person DPP
Self-monitoring of weight, food intake, and activity	Daily weigh-ins with cellular-enabled scale, manual pedometer, and digital food and physical activity logs, accessible by health coach	Patients provided with hard-copy logs to track their food intake, physical activity, and weight. During weekly meetings weigh-ins were encouraged and the health coach recorded weight, food intake, and physical activity
Educational content	New lessons posted weekly for 16 weeks, to be completed within a week of release	Presented by a registered dietician at weekly meetings (for first 6 months) then monthly meetings (for second 6 months). Patients received hard copies of curriculum materials
Scheduling	At participants' convenience	Sessions at regularly scheduled times
Goal setting	Individuals set their own goals in addition to goals stipulated by program	Individuals set their own goals in addition to goals stipulated by program
Social accountability from peers	Virtual support through a private social network of 18–24 similar participants	Group meetings included approx. 20 peers and involved group discussions
Social accountability from professionals	A health coach participated in online group discussions and provided individualized feedback on food and activity logs via online messaging and phone	The group facilitator provided individualized feedback at group meetings

Abbreviation: DPP, diabetes prevention program.

either with help from a health coach or through self-study; and set individual goals. Both programs also involved a peer social accountability component and individualized feedback from health coaches. Both programs were provided at no cost to invited KPNW members.

2.3.1 | Digital DPP

The digital DPP was developed by Omada Health, the largest CDC-recognized digital DPP provider. The program was a 12-month intervention with educational modules delivered through a web-based platform. The program includes a 16-week intensive program and a 36-week maintenance phase. Participants were instructed to complete lessons on their own schedule within a week of the lesson being posted. Participants were asked to weigh themselves daily and to track their food intake and exercise. To facilitate self-monitoring, participants received a cellularly connected, wireless scale and a manual pedometer. These devices transmitted data to a digital log that was accessible in real time to both the participant and the health coach via the web-based platform. Participants were also able to log meals and physical activity in the online platform. Participants received small-group support through a virtual, closed group of 18–24 participants; participants were assigned to groups using a proprietary algorithm based on participant demographics and BMI. Group participants were encouraged to communicate through a private social network. A health coach monitored online group interactions, facilitated conversation topics, and provided individualized feedback on food and physical activity logs. Coaches and participants communicated through private online messaging and/or phone calls when requested.

2.3.2 | In-person DPP

The in-person DPP was a 12-month program that closely followed CDC Diabetes Prevention Recognition Program standards,³² and was led by a KPNW registered dietitian. The intervention included weekly in-person group meetings for the first 6 months and monthly meetings for the following 6 months. Groups with approximately 20 participants each were held at two KPNW clinic locations at a variety of times (daytime and evening) on weekdays and weekends so that participants could attend at their preferred time and place. Participants received hard copies of all curriculum materials, including logs to track weight, eating behaviors, and physical activity, and were encouraged to weigh themselves at home weekly. At the weekly meetings, participants recorded their weight, number of food records kept, and minutes of physical activity from the previous week, and shared these with the group facilitator if desired. Communication among participants was not facilitated outside of the group meeting but was encouraged.

2.4 | Data collection

The interview guide was developed to apply to either the digital or the in-person DPP participants. Most interview questions were relevant to both groups, with a few exceptions related to health coaches and prompts about specific components (i.e., wireless scale and online activities for the digital DPP). The interviews explored patients' reasons for participating, barriers and facilitators to ongoing participation, perceived sense of usefulness, and recommendations for improving and sustaining the program. All interviews were conducted on the phone by two researchers; participants provided

verbal consent for participation at the beginning of the interviews. The researchers had no prior relationship with the participants and were introduced as study team members. All interviews were audio-recorded with participants' permission.

2.5 | Data analysis

All interviews were professionally transcribed and transcripts coded in NVivo 12. Qualitative analysis followed a three-step process combining deductive and inductive approaches to content analysis.³³ First, three researchers reviewed the transcripts and developed a code list based on pre-defined themes of interest and codes that had surfaced during transcript review. They then each applied this code list to the same three transcripts and compared their coding decisions. The researchers discussed their coding decisions and revised the code book to further refine the codes and their definitions. Finally, one researcher (Alison Firemark) used the final list of 22 codes to code all interview transcripts. For the present analysis, we focused on the codes capturing perceived usefulness of the programs, likes and dislikes, and general feedback for each program.

3 | RESULTS

3.1 | Participant characteristics

Participant characteristics are summarized in Table 2. Participants in the in-person DPP who participated in a qualitative interview

were on average 10 years younger ($M = 59.1$) than participants in the digital DPP ($M = 69.1$). More participants in the in-person DPP were men (45%) compared with participants in the digital DPP (25%), and a smaller proportion of participants in the digital DPP identified as Black (4.2%) and Other (8.3%) compared with participants in the in-person DPP (Black 10% and Other 10%). Participants in the in-person DPP attended 17.8 sessions on average (out of 24 total) and participants of the digital DPP attended 11.4 sessions on average (out of 16 total).

3.2 | Interview findings

The two DPP modalities—digital and in-person—provided different structural conditions that affected participants' evaluation of the programs. Participants identified distinct logistical and interpersonal program elements that influenced the perceived usefulness of each program, including logistical requirements and flexibility, interpersonal interactions, self-monitoring activities and tools, educational curriculum and materials, and personalized goal-setting activities.

3.2.1 | Logistical requirements and flexibility of digital DPP

Digital DPP participants commented positively on the program's ease of access and flexible scheduling. The digital DPP facilitated participation by allowing participants to engage in program components on

TABLE 2 Select patient demographics and clinical characteristics

	All interviewees ($n = 44$)	Digital DPP ($n = 24$)	DPP in-person ($n = 20$)
Age, mean (SD), years	64.5 (6.1)	69.1 (2.4)	59.1 (4.5)
Sex			
Female	29 (65.9%)	18 (75%)	11 (55%)
Male	15 (34.1%)	6 (25%)	9 (45%)
Race			
White	37 (84.1%)	21 (87.5%)	16 (80%)
Black or African American	3 (6.8%)	1 (4.2%)	2 (10%)
Other	4 (9.1%)	2 (8.3%)	2 (10%)
Ethnicity			
Non-Hispanic	32 (72.7%)	19 (79.2%)	13 (65%)
Unknown	12 (27.3%)	5 (20.8%)	7 (35%)
Hemoglobin A1c, mean (SD)	6.0 (0.2)	5.9 (0.2)	6.1 (0.1)
BMI, mean (SD)	36.5 (5.2)	35.7 (4.2)	37.5 (6.0)
Session attendance, ^a mean (SD)	14.4 (6.6)	11.4 (6.1)	17.8 (7.1)

Abbreviations: BMI, body mass index; DPP, diabetes prevention program.

^aPossible sessions for digital DPP attendance = 16; possible sessions for in-person DPP attendance = 24.

their own time. As one digital DPP participant expressed: "I can make it fit my schedule, would be the main thing...Is ease of access" (Participant A1). A few digital DPP participants remarked that a limitation was that participants needed to be familiar with using and accessing technology. Overall, the flexibility of having access to, and being able to interact with, information at their own pace was perceived as highly useful.

3.2.2 | Logistical requirements and flexibility of in-person DPP

In contrast, in-person DPP participants remarked that attending weekly meetings was challenging for multiple reasons. Traveling to these meetings was time-consuming, committing to a specific time slot for a long period of time was described as challenging, and finding a time slot that worked well with most participants' schedules was also difficult. As one in-person DPP participant remarked:

"I think the time of day was really sucky. So I think just thinking about what... it is a big time commitment. I think we were meeting at 12:30 on a Saturday and that was like oh my God, you have to plan around it you know. You can hardly do anything before that time and then the whole afternoon is gone at 1:45. I'm exaggerating but it is in the middle of the day and I think if it was 10:00 AM then you'd have the whole rest of the day or if it was an evening class that might work better." (Participant B1)

Participants also remarked that it could be burdensome to carry the notebook that was used in class every week to the in-person meeting and that digital materials may have been preferable. However, participants also noted that encouragement to attend meetings facilitated a sense of accountability. One remarked: "Well, in a general sense I like the accountability, the weekly accountability when it was weekly. That worked and I think it was a significant factor for everybody in the program" (Participant B2)

3.2.3 | Interpersonal interactions during digital DPP

Digital DPP participants rarely mentioned interpersonal connections with other participants as occurring. While some participants appreciated the fact that the program made communicating with other participants voluntary, more experienced this lack of interaction as disappointing. As one participant expressed:

"It's part of the deal that they wanted you to agree to when you started was that you would participate online with the group, you know? And I think there's only three of us, out of this whole group that...at least that I'm seeing. [...] maybe I'm just misunderstanding. But it

looks to me like there's only three people out of this whole group that are even responding." (Participant A2)

Overall, most group members would have appreciated additional support from other group members.

3.2.4 | Interpersonal interactions during in-person DPP

Valuable interpersonal connections stood out as the single most important component that influenced how useful participants perceived the in-person DPP. One in-person DPP participant described this as follows:

"Well, I think the interaction with people that are in a same situation as myself, people that are potentially pre-diabetic. And the fact that, you know, there's people of all sizes, shapes, colors, everything else. I mean, we come from a wide variety of backgrounds. And yet, we share the same common denominator, and that's the fact that we're pre-diabetic. And...and that, you know, everybody shares their own stories and their own successes and failures and doesn't feel like... They don't feel like they're needing to hide anything." (Participant B3)

This sentiment was not limited to interactions with other group members. The in-person DPP participants also perceived the interpersonal connection with the health coach as useful:

"The instructor is wonderful. You know, she's just... She's got so much great information, is a great facilitator. Makes you feel very comfortable in sharing and, you know, very responsive to questions. And I think that, for me, is most of it. I'm not much of a group person, so... But I'm enjoying hearing everybody else's perspective. But for the most part, I think it's probably the instructor, [Name], that kind of keeps me coming back because I learn something every week." (Participant B4)

While some participants mentioned the presence of dominant individuals in the group as distracting, most participants in the in-person group greatly enjoyed the meetings and felt they increased their level of engagement.

3.2.5 | Self-monitoring activities and tools during digital DPP

Participants in the digital DPP pointed to the daily self-monitoring of weight and food intake as the single most useful facet of the program. They remarked that this practice was an important tool for routinely

monitoring their own food habits and that it helped them gain better awareness of their eating habits, which for some participants resulted in eating less. Many participants stated that weight and food tracking became a daily habit. A crucial aspect of the success of the daily weight monitoring was the seamless transition between the cellularly connected scale and the digital tracking log:

“They sent us a package. And in the package is a digital scale. And it's wireless. And every morning we're supposed to weigh ourself. And that information goes to DPP online and into our account. And it will show up in the system, how much weight...how much we weigh and what we lost. And it shows a graph. And I thought getting on a scale every day would be a negative. But it turned out to be a positive for me.” (Participant A3)

Many participants echoed these sentiments and felt that while they were initially dreading weight tracking, they found it rewarding and positive once they were familiar with the system. They reported continuing the daily tracking beyond their participation in the program. Some participants reported that they would have appreciated more feedback about their daily tracking logs.

3.2.6 | Self-monitoring activities and tools during in-person DPP

Few participants in the in-person DPP commented on the weekly weight tracking activity or logs provided for tracking food and physical activity, indicating this component was not a major factor in whether participants found this mode of the program useful.

3.2.7 | Educational curriculum and materials during digital DPP

Participants in the digital DPP appreciated the content of the lessons they received and thought the information was educational and helpful. One participant described that they appreciated the wide range of materials they received:

“I appreciated the lessons. I appreciated the leaders sending some good links for information, you know, some recipe links, some other links about motivation, about how to deal with urges of like I have to eat this now and just how to deal with, you know, feeling a little hungry, that that's okay to feel. It will pass. And so I really took advantage of the resources they provided.” (Participant A4)

The only limitation mentioned was that information was available progressively only week by week and not accessible outright at the onset of the program.

3.2.8 | Educational curriculum and materials during in-person DPP

Participants in the in-person DPP described receiving information in a group setting as very beneficial. The information they received stimulated critical reflection about their eating habits:

“I think just having the information and the awareness and some of the tips that the instructor has given on stop and think before you eat. Why are you eating? What's your motivation between opening your mouth and putting that food in it? Is it pleasure, is it social, is it nourishment? Why are you eating? Just the awareness, and stopping and thinking and being mindful. She [the group facilitator] uses that word a lot, mindfulness, and that's really what it is, so much of it is being mindful of what you're doing.” (Participant B5)

Participants also described the learning atmosphere the group facilitator created as non-judgmental and conducive for exchanging experiences and information.

3.2.9 | Personalized goal-setting activities during digital and in-person DPP

Participants in both programs described the flexibility provided by these programs in determining their own goals as very positive. Participants in both groups were able to set their own priorities and also to make their own choices about food intake and activity levels, which they found highly useful.

Participants in the digital DPP remarked that they found it important to maintain autonomy in making food choices:

“So when this program came along, the thing that's cool about it for me, was they didn't say get up every morning and have a half a cup of cottage [cheese]...They didn't tell you what to eat, really. They don't have like a...They give you options and stuff. But there wasn't a program really. So I got to make a lot of decisions myself. I really liked that...a lot.” (Participant A5)

In a similar vein, participants in the in-person DPP appreciated the flexibility to use the information they learned in their own way:

“The program is entirely friendly. And, there's nothing bossy about it. Nobody is trying to, gosh, oppress us? No, that's not even the right word. No one is trying to regiment us. There's information that we have access to. Here is...here are the facts. And here are some things you can do, if you'd like to head off diabetes. And you can enter in at any seriousness level you want

to. You can do a little. You can do a lot. You can start with a little and increase. And...and we encourage that." (Participant B6)

Thus, participants appreciated the autonomy to use the information they learned in the program as they saw fit as a form of empowerment.

4 | DISCUSSION

Our study highlights the importance of the mode of delivery in shaping participants' appreciation for program components in digital and in-person DPPs. Although both programs followed the CDC curriculum guidelines and offered comparable program activities, the digital versus in-person structure substantially impacted what aspects of the program participants perceived as valuable. Digital DPP participants valued daily self-monitoring and convenient scheduling, while in-person participants valued educational content and social accountability from peers and the group facilitator. One common strength identified for both programs was the ability of individuals to set small goals to help them achieve the ultimate DPP goals of 5%–7% weight loss and ≥ 150 min of weekly physical activity.

Some of these findings resonate with insights from earlier studies. Ease of access and scheduling has been emphasized as a strength of digital programs.^{27,31} Creating accountability for weight loss has also been pointed out as important for achieving success.^{34,35} Empowering participants to participate in goal setting also can be an important tool for achieving weight loss.³⁶ The unique contribution of this study lies in pointing to the different ways that these components are amplified by different delivery modes of DPP.

Weight tracking was a crucial component of both programs, but was foremost perceived as beneficial among digital DPP participants. Relying on a cellularly connected, wireless scale or other digital device to facilitate the tracking process can play an important role in improving tracking experiences for participants regardless of the mode of program delivery.³⁷ In a similar vein, participants reported that engagement with educational materials was fostered in meaningful ways in the in-person setting, but not as much in the digital setting. Such an environment may be promoted during digital programs by including lectures by health coaches or online office hours to provide participants with additional opportunities for reflection on the materials. Nurturing connections and relationships was easier in the in-person DPP, contributing to a sense of accountability. Digital programs could enable and promote online group meetings to further create accountability among participants.³⁸ Facilitating social interactions among participants in digital weight loss programs has also been achieved by using platforms such as Twitter.³⁹

The preferences expressed by study participants regarding the two program modes suggest that it could be beneficial to systematically assess participants' schedules, educational preferences, and priorities prior to recommending a digital or in-person DPP; future

research could explore this approach. The flexibility and daily tracking that digital DPP participants found beneficial may appeal to people who are seeking ease of access and want to incorporate technology-based tools to facilitate self-monitoring into their daily schedules. For in-person DPP participants, personalized support from an engaged facilitator was the key component of the program. These participants also described a greater emphasis on content learning, especially about nutrition. As retention is a central component of participants' success in DPPs, aligning future participants' preferences with the strengths of each program mode could encourage program completion.

This study has some limitations. First, this study was only conducted at a single health care system with a predominantly white and fully insured patient population, therefore, limiting the generalizability of findings. Second, patients were not randomly assigned to the digital or in-person DPP, and the two groups had different demographic make-ups. Third, interview participants did not engage in direct comparison of the digital and in-person DPPs as they were exposed to only one delivery mode. Nevertheless, unique themes important to each group of participants were highlighted. Participants were not prompted to explicitly reflect on preferences about participation in a digital versus in-person program, which could have resulted in more detailed information.

This study highlights the importance of the mode of delivery in shaping participants' appreciation for program components in digital and in-person DPPs. If a health care organization is currently offering one delivery mode only, it may be beneficial to offer additional delivery modes to encourage participation and retention. In that same vein, if an in-person program is offered, allowing attendees to choose among time slots may promote engagement and retention. If multiple modes of delivery are already offered, it may be beneficial to assess how participants' interests align with programs strengths and to provide recommendations about the suitability of different programs for different participants, using the perceived strengths of each program identified here.

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CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

Stephanie L. Fitzpatrick conceived the study and acquired funding. Alison Firemark collected the data; Alison Firemark, Meghan Mayhew, and Inga Grub analyzed the data; and Inga Grub led the writing of the manuscript. All authors contributed to the writing process and reviewed the final version of the manuscript.

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REFERENCES

- Gerstein HC, Santaguida P, Raina P, et al. Annual incidence and relative risk of diabetes in people with various categories of dysglycemia: a systematic overview and meta-analysis of prospective studies. *Diabetes Res Clin Pract.* 2007;78(3):305-312.
- Glauber H, Vollmer WM, Nichols GA. A Simple model for Predicting two-year risk of diabetes development in individuals with prediabetes. *Perm J.* 2018;22:17-50.
- Centers for Disease Control and Prevention. *National Diabetes Statistics Report 2020*. Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services. 2020. Accessed January 05, 2021. <https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf>
- Knowler WC, Fowler SE, Hamman RF, et al. 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet.* 2009;374(9702):1677-1686.
- DPP Research Group. Long-term effects of lifestyle intervention or metformin on diabetes development and microvascular complications over 15-year follow-up: the Diabetes Prevention Program Outcomes Study. *Lancet Diabetes Endocrinol.* 2015;3(11):866-875.
- Ely EK, Gruss SM, Luman ET, et al. A national effort to prevent type 2 diabetes: participant-level evaluation of CDC's National Diabetes Prevention Program. *Diabetes Care.* 2017;40(10):1331-1341.
- Albright AL, Gregg EW. Preventing type 2 diabetes in communities across the U.S.: the National Diabetes Prevention Program. *Am J Prev Med.* 2013;44(4 Suppl 4):S346-S351.
- Centers for Medicare & Medicaid Services Medicare Diabetes Prevention Program (MDPP) Expanded Model. 2019. Accessed June 24, 2019. <https://innovation.cms.gov/initiatives/medicare-diabetes-prevention-program/>
- Centers for Disease Control and Prevention. National Diabetes Prevention Program. 2019. Accessed April 27, 2021. https://www.cdc.gov/diabetes/prevention/lifestyle-change.html?CDC_AA_refVal=https://www.cdc.gov/diabetes/prevention/lifestyle-program/index.html
- DPP Research Group. The Diabetes Prevention Program (DPP): description of lifestyle intervention. *Diabetes Care.* 2002;25(12):2165-2171.
- Castro Sweet CM, Chiguluri V, Gumpina R, et al. Outcomes of a digital health program with human coaching for diabetes risk reduction in a Medicare population. *J Aging Health.* 2018;30(5):692-710.
- Grock S, Ku J-H, Kim J, Moin T. A review of technology-assisted interventions for diabetes prevention. *Curr Diabetes Rep.* 2017;17(11):107.
- Sepah SC, Jiang L, Peters AL. Translating the Diabetes Prevention Program into an online social network: validation against CDC standards. *Diabetes Educ.* 2014;40(4):435-443.
- Whittemore R, Melkus G, Wagner J, Dziura J, Northrup V, Grey M. Translating the Diabetes Prevention Program to primary care: a pilot study. *Nurs Res.* 2009;58(1):2-12.
- Moin T, Damschroder LJ, AuYoung M, et al. Results from a trial of an online Diabetes Prevention Program Intervention. *Am J Prev Med.* 2018;55(5):583-591.
- Ackermann RT, Liss DT, Finch EA, et al. A randomized comparative effectiveness trial for preventing type 2 diabetes. *Am J Public Health.* 2015;105(11):2328-2334.
- Ackermann RT, Sandy LG, Beauregard T, Coblitz M, Norton KL, Vojta D. A randomized comparative effectiveness trial of using cable television to deliver diabetes prevention programming. *Obesity.* 2014;22(7):1601-1607.
- Barte JC, ter Bogt NCW, Beltman FW, van der Meer K, Bemelmans WJ. Process evaluation of a lifestyle intervention in primary care: implementation issues and the participants' satisfaction of the GOAL study. *Health Educ Behav.* 2012;39(5):564-573.
- Dalcin AT, Jerome GJ, Fitzpatrick SL, et al. Perceived helpfulness of the individual components of a behavioural weight loss program: results from the Hopkins POWER Trial. *Obes Sci Pract.* 2015;1(1):23-32.
- VanWormer JJ, Martinez AM, Cosentino D, Pronk NP. Satisfaction with a weight loss program: what matters? *Am J Health Promot.* 2010;24(4):238-245.
- Dalle Grave R, Suppini A, Calugi S, Marchesini G. Factors associated with attrition in weight loss programs. *Int J Behav Consult Ther.* 2006;2(3):341-353.
- Jiang L, Manson SM, Dill EJ, et al. Participant and site characteristics related to participant retention in a diabetes prevention translational project. *Prev Sci.* 2015;16(1):41-52.
- Neve MJ, Collins CE, Morgan PJ. Dropout, nonusage attrition, and pretreatment predictors of nonusage attrition in a commercial web-based weight loss program. *J Med Internet Res.* 2010;12(4):e69.
- Tsai AG, Wadden TA. Systematic review: an evaluation of major commercial weight loss programs in the United States. *Ann Intern Med.* 2005;142(1):56-66.
- Brown BD, Harris KJ, Harris JL, Parker M, Ricci C, Noonan C. Translating the Diabetes Prevention Program for Northern Plains Indian youth through community-based participatory research methods. *Diabetes Educ.* 2010;36(6):924-935.
- Mau MK, Keawe'aimoku Kaholokula J, West MR, et al. Translating diabetes prevention into native Hawaiian and Pacific Islander communities: the PILI 'Ohana Pilot project. *Prog Community Health Partnersh.* 2010;4(1):7-16.
- Moin T, Ertl K, Schneider J, et al. Women veterans' experience with a web-based diabetes prevention program: a qualitative study to inform future practice. *J Med Internet Res.* 2015;17(5):e127.
- Ruggiero L, Rodriguez-Sanchez M, Oros S. Translating the Diabetes Prevention Program's (DPP) lifestyle intervention to the community: making the connection Latino pilot study. *Diabetes.* 2007;56:A226.
- Dennison L, Morrison L, Conway G, Yardley L. Opportunities and challenges for smartphone applications in supporting health behavior change: qualitative study. *J Med Internet Res.* 2013;15(4):e86.
- Kramer MK, Kriska AM, Venditti EM, et al. A novel approach to diabetes prevention: evaluation of the Group Lifestyle Balance program delivered via DVD. *Diabetes Res Clin Pract.* 2010;90(3):e60-e63.
- Tang J, Abraham C, Stamp E, Greaves C. How can weight-loss app designers best engage and support users? A qualitative investigation. *Br J Health Psychol.* 2015;20(1):151-171.
- Centers for Disease Control and Prevention. *Centers for Disease Control and Prevention Diabetes Prevention Recognition Program: Standards and Operating Procedures*. Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services. 2018. Accessed June 24, 2019. <https://www.cdc.gov/diabetes/prevention/pdf/dprp-standards.pdf>
- Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs.* 2008;62(1):107-115.
- Metzgar CJ, Preston AG, Miller DL, Nickols-Richardson SM. Facilitators and barriers to weight loss and weight loss maintenance: a qualitative exploration. *J Hum Nutr Diet.* 2015;28(6):593-603.
- Mohr DC, Cuijpers P, Lehman K. Supportive accountability: a model for providing human support to enhance adherence to eHealth interventions. *J Med Internet Res.* 2011;13(1):e30.
- Pearson ES. Goal setting as a health behavior change strategy in overweight and obese adults: a systematic literature review examining intervention components. *Patient Educ Couns.* 2012;87(1):32-42.

37. Thomas JG, Bond DS. Review of innovations in digital health technology to promote weight control. *Curr Diabetes Rep.* 2014;14(5):485.
38. Hales SB, Davidson C, Turner-McGrievy GM. Varying social media post types differentially impacts engagement in a behavioral weight loss intervention. *Transl Behav Med.* 2014;4(4):355-362.
39. Turner-McGrievy GM, Tate DF. Weight loss social support in 140 characters or less: use of an online social network in a remotely delivered weight loss intervention. *Transl Behav Med.* 2013;3(3): 287-294.

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