

A Pilot Study of the Diabetes Prevention Program on Weight Loss for Adults at Community Mental Health Centers

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Objective: This study was a pilot evaluation of the Diabetes Prevention Program (DPP) implemented by community mental health center (CMHC) clinicians to reduce weight for individuals with serious mental illnesses.

Methods: Participants (N=60) received the 16-week DPP core curriculum at one of six CMHCs. A comparison group (N=77) received usual care at one of five other CMHCs.

Results: Compared with participants in usual care, DPP participants lost significantly more weight and were nearly three times more likely to lose at least 5% of body weight. Participants and staff found the program acceptable and feasible to

implement. They also suggested incorporating exercise and cooking components, providing information about diabetes and the impact of medications on weight, simplifying intake and activity monitoring, providing at least twice monthly postcore sessions, monitoring lab values, and reinforcing group involvement between sessions.

Conclusions: The evaluation demonstrated the feasibility, acceptability, and preliminary effectiveness of engaging CMHC clinicians in implementing the DPP for adults with serious mental illnesses.

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Reduced life expectancy among individuals with serious mental illnesses is increasingly recognized as “among the greatest health disparities” in the United States (1). Increased rates of cardiovascular disease risk factors (smoking, obesity, hypertension, diabetes, and dyslipidemia) (2–4), exacerbated by second-generation antipsychotic medications (5), have been shown to lead to decades of premature cardiovascular mortality (6).

Weight loss of as little as 5% of body weight can prevent or delay the onset of cardiovascular disease and associated risk factors (7). Lifestyle modification interventions, such as the Diabetes Prevention Program (DPP), have been associated with weight reductions of 5%–7% in the general population (8) and among individuals with serious mental illnesses (9–11). Despite substantial efficacy data, evidence-based interventions to decrease cardiovascular disease risk are not typically available at community mental health centers (CMHCs), where individuals with serious mental illnesses are most likely to receive mental health treatment (10).

Over the past six years, the public mental health system in King County, Washington, has conducted an initiative to reduce cardiovascular disease risk among adult clients. Initial efforts to implement the joint recommendations of the American Diabetes Association and the American Psychiatric Association for screening and monitoring metabolic risk across 15 CMHCs

revealed that 90% of screened individuals met at least one criterion for metabolic syndrome; 72% were overweight or obese (12). This work revealed significant challenges in obtaining metabolic laboratory testing, including lack of motivation and transportation to obtain laboratory tests, difficulty adhering to the required fasting for the tests, and inconsistent communication between laboratories and CMHCs. Given the high prevalence of elevated weight in this population, in 2012 the focus of the initiative shifted to implementing an evidence-based intervention to promote weight loss.

After reviewing research on lifestyle modification interventions, we selected the DPP. The DPP is relatively brief and has user-friendly and publicly available materials. It is feasible to implement in community settings by lay people (13). In clinical trials involving adults with serious mental illnesses, interventions based on the DPP have been superior to usual care for promoting weight loss (14).

We report results of a pilot study of the DPP delivered by clinicians at six CMHCs. The pilot tested whether overweight and obese CMHC clients who participated in the DPP experienced greater weight loss than a comparison group receiving usual care at five other CMHCs. Participant and staff interviews provided information about feasibility and acceptability of the intervention and suggestions for enhancing its effectiveness.

METHODS

Eleven of King County's 13 adult-serving CMHCs participated in the pilot, with six implementing the DPP and five serving as usual care comparison sites. To achieve a sufficiently large sample while keeping the pilot manageable, the county administration initially requested that four agencies implement DPP groups. Ultimately, six agencies self-selected to participate, which were representative of other county CMHCs with respect to the populations served.

Eligibility criteria were based on the Centers for Disease Control and Prevention's (CDC) eligibility for the DPP: ≥ 18 years old with body mass index (BMI) $\geq 24 \text{ kg/m}^2$ ($\geq 22 \text{ kg/m}^2$, if Asian). At least half of the DPP participants were required to have a laboratory test within the past year consistent with prediabetes (hemoglobin A1c of 5.7%–6.4%, fasting plasma glucose of 100–125 mg/dl, or glucose tolerance of 140–199 mg/dl). The CDC allows up to half of participants to meet eligibility via the DPP seven-item risk screening that includes questions about weight, exercise, familial diabetes, and age.

Agencies recruited participants during November and December 2012, and DPP groups (and comparison group sites for weight monitoring) began in January 2013. Agencies targeted recruitment toward clients who were overweight or obese for both the DPP and comparison groups. The DPP CMHCs were provided a recruitment script describing the intervention as a group that would meet and have “weigh-ins” weekly for four months and focus on weight loss through healthy eating and physical activity. CMHCs providing usual care used a recruitment script asking clients if they would be willing to be weighed twice (baseline and after 16 weeks), with the understanding that “weight reduction is helped by paying closer attention to it through being weighed.” As such, both groups were presumably somewhat motivated toward weight monitoring or weight loss. CMHCs were asked to recruit until from ten to 20 individuals (depending on agency size) who met eligibility criteria had agreed to participate.

Mental health clinicians delivered the DPP group curriculum at the CMHCs where they worked (www.cdc.gov/diabetes/prevention/recognition/curriculum.htm). The DPP focuses on weight loss through weekly weight measurement, reducing calorie and fat intake, and increasing physical activity. The curriculum includes 16 weekly core sessions, followed by eight monthly postcore sessions. Training in the DPP was provided by master trainers from the CDC's National Diabetes Training and Technical Assistance Center through collaboration with Washington State's Department of Health. At least three staff members from each CMHC participated in the DPP training, typically including a mental health clinician or case manager, a peer counselor, and a nurse.

The comparison group received usual CMHC care for weight loss, which ranged from nothing to walking or wellness groups that often include nutrition, exercise, medication management, or stress management components.

At the end of the 16-week DPP curriculum, interviews were conducted regarding feasibility and acceptability of

implementing the DPP and suggestions for improvement. Interview participants were 17 CMHC staff members involved in the pilot and a convenience sample of 26 group participants with a range of DPP attendance levels. Group participants were paid \$10 for their interview time.

The outcome of interest was change in weight between baseline and 16-week follow-up measurement. For DPP participants, weight assessed at the last session attended was used as the “16-week” follow-up measurement. For the comparison group, weight measured within a one-month “window” around 16 weeks was used as the follow-up measurement. Weight was assessed with standard medical scales with no additional calibration or reliability testing.

Independent group *t* tests and chi square analyses were used to compare demographic characteristics between participant groups. Planned adjustments were made if group differences were found. Group differences in weight and BMI changes were tested with *t* tests. Group differences in the percentages of clients who lost at least 5% and 7% of baseline weight were tested with chi square analysis. Odds ratios (ORs) were derived for the DPP intervention relative to the comparison group. Pearson correlations were used to examine the relationship between weight loss and DPP session attendance. To account for dependence within CMHCs, generalized estimating equation (GEE) models were used to document change in weight loss, with analyses clustering on CMHC and adjusting for covariates.

Responses to each interview question were summarized separately. Similar responses to separate questions were then collapsed. If more than one respondent mentioned the same issue, the response is reported. The DPP groups were part of a quality improvement initiative and therefore exempt from institutional review board (IRB) review. The University of Washington IRB approved study interview procedures.

RESULTS

The six intervention CMHCs enrolled 60 DPP participants. Two-thirds (65%) were female and 62% were white. Mean age was 51 years. Mean baseline weight was 226.3 pounds, and mean BMI was 36.7 kg/m^2 (Table 1). DPP participants were included in analyses regardless of number of sessions attended. The last session attended with weight measurement obtained was used as the 16-week weight.

The five CMHCs that administered usual care monitored weight for 77 individuals. Comparison group members did not differ significantly from DPP participants on baseline demographic or weight characteristics. Weight for all but one comparison group participant was obtained within an acceptable one-month “window” around the 16-week follow-up.

DPP participants lost significantly more weight (mean weight loss of 4.35 ± 9.25 pounds) than the comparison group (mean weight gain of $.05 \pm 11.50$ pounds) ($t = 2.41$, $df = 133$, $p = .02$). BMI was also reduced significantly more among DPP participants (mean \pm SD BMI loss of $.68 \pm 1.49$) than in

TABLE 1. Baseline characteristics of community mental health center participants in the 16-week Diabetes Prevention Program and a comparison group

Characteristic	Participants (N=60)		Comparison (N=77) ^a	
	N	%	N	%
Female	39	65	49	64
White	37	62	46	60
Age (M±SD)	51.0±11.6		49.3±13.5	
Weight (M±SD)	226.3±52.9		222.9±53.7	
Body mass index (M±SD kg/m ²) ^b	36.7±7.0		35.4±7.8	

^a Comparison tests were not statistically significant.^b Indices ≥25 indicate overweight or obese.

the comparison group (mean BMI change of $.00 \pm 1.82$) ($t=2.34$, $df=133$, $p=.02$). GEE analysis showed that after accounting for CMHC variance, the weight-loss and BMI differences between groups remained statistically significant (Fisher's exact $p=.01$). With respect to clinically significant weight loss, 22% ($N=13$) of DPP participants and only 9% ($N=7$) of the comparison group lost at least 5% of initial body weight (Fisher's exact $p=.05$). The odds of losing at least 5% of baseline weight were almost three times greater for the DPP group than for the comparison group ($OR=2.69$, 95% confidence interval=1.00–7.24, $p=.05$). Although proportionately twice as many DPP participants versus comparison group members lost 7% or more of their baseline weight (10%, $N=6$, versus 5%, $N=4$), this difference did not reach statistical significance.

Attendance at a greater number of sessions was associated with greater weight loss ($r=.24$, $p=.06$). All participants who lost 7% or more of initial body weight had attended at least 13 of the 16 DPP sessions.

Interviews revealed that the DPP was feasible and acceptable to clients and staff. DPP participants reported that they gained knowledge (in regard to food triggers, intake monitoring, and so on); felt enhanced confidence; increased their exercise; reduced their intake; and experienced benefits, including weight loss, less severe depression, and increased energy. They appreciated having the program at their CMHC, where they felt most comfortable.

CMHC staff members uniformly felt the program was important to implement within CMHCs and that it informed them about clients' health risks. Staff appreciated the high-quality DPP materials, and they wanted to continue implementing the DPP. Most staff members needed 1.5–2.0 hours for each weekly session (rather than the anticipated one hour), plus about one additional hour per week for preparation and make-up sessions.

Staff members reported some difficulty identifying enough eligible individuals who did not already have diabetes, and they advocated for an intervention for clients with diabetes. Moreover, laboratory data to identify people with prediabetes were not always readily available.

Participants found that using the highly detailed DPP food and activity tracker was challenging. Staff perceived the

curriculum to be otherwise straightforward and easily understood by participants.

Some agencies enhanced the DPP groups with more active components (such as cooking demonstrations or time for exercise, dance, or stretching) that appeared to increase client engagement. Respondents also indicated that information about diabetes, the impact of medications on weight, and low-budget nutrition and cooking methods would be helpful. In addition, respondents felt that more frequent contact with the DPP group would be needed after the 16-week core curriculum (twice monthly rather than monthly as in the standard DPP postcore curriculum). Group adherence could also be bolstered by clinician follow-up between sessions.

DISCUSSION AND CONCLUSIONS

This pilot study demonstrated the feasibility, acceptability, and preliminary effectiveness of implementing the DPP lifestyle modification program led by CMHC clinicians for adults with serious and persistent mental illnesses. DPP participants realized significantly greater weight loss than those receiving usual care. The difference in mean weight loss (4.4 pounds) is consistent with studies of other lifestyle interventions for this population (1,10) and with community-based DPP groups (14), although it is somewhat lower than found in the original DPP study, in which DPP was individually administered by specialist clinicians to individuals who did not have a psychiatric illness. Perhaps of greater importance is our finding that 22% of DPP participants lost a clinically significant 5% of initial body weight, suggesting a substantial health return for a small clinical investment.

The generalizability of study findings was somewhat limited by the use of convenience samples of clients and self-selected agencies. Participants in both the DPP and comparison groups may have been more motivated than other CMHC clients to make behavioral changes. Clients in the two groups may have differed in their level of motivation toward weight loss because the DPP group was explicitly recruited for a weight-loss intervention, whereas the comparison group was recruited simply for weight monitoring. Moreover, staff members at CMHCs that self-selected to provide DPP may have had more interest in promoting weight loss, which may, in turn, have translated into greater enthusiasm and weight loss by DPP participants relative to the comparison group. In addition, information about participants' psychotropic medications, which could have affected rates of weight loss, was not collected. Finally, some clinicians made enhancements to the DPP and the usual care interventions varied widely, both of which limited our ability to definitively draw conclusions about effectiveness.

Despite these limitations, our study demonstrated the feasibility of real-world implementation of the DPP by CMHC clinicians. These findings have implications for the epidemic of obesity and diabetes among persons with serious mental illnesses. With passage of the Affordable Care Act, many individuals with serious mental illnesses will be served by

CMHC-based health homes seeking to implement evidence-based interventions to improve medical outcomes. Previous clinical trials demonstrating positive outcomes from similar lifestyle interventions have involved complex and costly interventions delivered by highly trained specialists (nutritionists, exercise physiologists, and psychologists), coupled with expensive enhancements (such as meal or menu replacement and access to personal trainers or exercise facilities) (10). Given the budgetary constraints of most CMHCs, these complex interventions are not likely to be widely disseminated. In contrast, our study shows that training CMHC clinicians to deliver the DPP within CMHCs could be a scalable strategy.

Implementing lifestyle modification interventions in CMHCs also provides a platform for integrating weight loss goals into mental health treatment and capitalizing on frequent clinical contacts with case managers, peers, nurses, and psychiatrists to reinforce goals and progress. Clinical teams could support participant attendance at groups, consider medication changes to decrease cardiovascular risk, and ensure connection to primary care providers for evaluation and treatment of cardiovascular risk.

CMHCs are more than just convenient locations for health promotion interventions for persons with serious mental illnesses. More work is needed to leverage the unique opportunities afforded by delivering lifestyle modification interventions in a mental health treatment setting.

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