



# Rethinking the Goals of Diabetes Prevention Programs

Briana Mezuk<sup>1</sup> and Julie Ober Allen<sup>2,3</sup>

*Diabetes Care* 2021;44:2457–2459 | <https://doi.org/10.2337/dci21-0038>

In September 2001, the Centers for Disease Control and Prevention (CDC) issued a press release stating that “twin epidemics of diabetes and obesity continue to threaten the health of Americans” but that encouraging new studies (i.e., the Diabetes Prevention Program [DPP] experimental trial) indicated that type 2 diabetes could be prevented and that “promoting healthy lifestyles should be a national priority” (1). Twenty years later, this press release could be issued today with almost no revision and be completely accurate. In 2001, 6.4% of the U.S. population had diagnosed diabetes; currently 10.5% of Americans do (2). Today’s prevalence closely matches projections made in 1992 based on “the overly pessimistic assumption that there will be no scientific or medical discoveries to reduce the prevalence of diabetes” (3).

Yet, strategies for preventing diabetes have been developed in the intervening years. In 2001, the DPP made history as one of a handful of clinical trials that was stopped early because the risk-benefit ratio so clearly favored the experimental interventions over placebo (4). This remarkable efficacy buoyed support for wide-scale implementation of the DPP “lifestyle” arm, which had the goals of promoting  $\geq 5\%$  weight loss and  $\geq 150$  min of weekly physical activity. Achievement of these two goals was demonstrated in the DPP trial to significantly reduce type 2 diabetes risk short-term (within 5 years).

Enthusiasm for the DPP trial sharply contrasted with the challenges of implementing diabetes prevention in the broader population (5,6). There is limited evidence that participants in subsequent iterations of the DPP provided in clinical and community settings reached weight loss goals (7) or had lower incidence of diabetes in the ensuing years (8). This prompted health care systems and community organizations to experiment with “adapting” or “tailoring” the DPP (e.g., incorporating stakeholder perspectives [9], peer vs. health care facilitators [10], in-person vs. online delivery [11]). These adaptations were made to address the weaker effectiveness of the program and to increase reach and retention of racial/ethnic minority, lower income, and other underserved populations with the highest diabetes burden (12).

## A Different Approach to Adapting the DPP

In this issue of *Diabetes Care*, Ritchie et al. (13) present a variant of the CDC’s DPP curriculum delivered in an urban safety-net health care system. This study examined the effectiveness of a “Flex” version of the DPP as compared with standard DPP using a sequential implementation comparative design. In this “Flex” DPP, participants select their own goals for the 12-month program, which may or may not involve weight loss and physical activity; vary goals over time; and focus their attention on only one

goal each week. What makes this study innovative is that it modifies the ends, or goals of the program (i.e., the weight loss and physical activity goals) rather than the means (i.e., the DPP delivery and curriculum, which were consistent with CDC guidelines for both the Flex and standard program). Richie et al. provide compelling evidence that this Flex-DPP is comparable to the standard DPP in terms of weight loss and retention during the program; both were, like in previous implementations of the DPP in community settings, far less than what was achieved in the original trial. Participants who completed the Flex-DPP, however, achieved other important diabetes prevention goals, such as being more likely than those who completed the standard DPP to have an HbA<sub>1c</sub> in the normoglycemic range.

## The Ends Justify the Means?

The logic behind this Flex model is twofold. First, it addresses the problematic mismatch between the goals of the DPP, i.e., “preventing diabetes” primarily via weight loss and physical activity, and goals of participants, which are often more akin to “getting healthier” or “feeling better.” Second, it recognizes that this mismatch, when paired with the reality that most participants fail to meet the DPP weight loss goal, contributes to participants disengaging with behavior changes and ultimately discontinuing the program. That is, the Flex-DPP did not merely

<sup>1</sup>Center for Social Epidemiology and Population Health, Department of Epidemiology, University of Michigan School of Public Health, Ann Arbor, MI

<sup>2</sup>Department of Health and Exercise Science, University of Oklahoma, Norman, OK

<sup>3</sup>Research Center for Group Dynamics, University of Michigan, Ann Arbor, MI

Corresponding author: Briana Mezuk, [bmezuk@umich.edu](mailto:bmezuk@umich.edu)

© 2021 by the American Diabetes Association. Readers may use this article as long as the work is properly cited, the use is educational and not for profit, and the work is not altered. More information is available at <https://www.diabetesjournals.org/content/license>.

See accompanying article, p. 2464.

“tailor” the DPP delivery or curriculum to minority populations to achieve the fixed goals of the DPP, as is common with DPP adaptations. Rather, it accepted that even in intervention studies of predominantly non-Hispanic White populations (who presumably require less tailoring to support program recruitment, engagement, and retention), there is substantial attrition and limited evidence that participants achieve DPP weight loss goals. Instead, it prioritized participant goals in (realistic) anticipation that a person-centered approach would also decrease diabetes risk, albeit potentially via other intermediate goals.

### Centering Diabetes Prevention Within a Health Equity Lens

While today there is suggestive evidence that the incidence of diabetes has stabilized and risk of complications and diabetes mortality have declined, these gains have not been experienced by all groups (14,15) and diabetes risk remains strongly patterned by social factors (12). For example, racial and ethnic minorities have ~50% higher prevalence of diabetes compared with non-Hispanic Whites, and the prevalence of diabetes among those with less than a high school education is approximately double that of those with some college education.

While the impact of the lifestyle arm in the DPP experimental trial on short-term (<5 year) incidence of diabetes did not vary by race/ethnicity (4), there were variations by race in achieving the  $\geq 5\%$  weight loss goal. In 2019, Apolzan et al. (16) reported that while 68% of White participants achieved  $\geq 5\%$  weight loss at 12 months, only 65% of Hispanic, 64% of Asian, and 48% of African American participants did (Appendix Table 1). Meeting this weight loss goal was associated with lower diabetes incidence at 15-year follow-up (61% vs. 39%). Taken collectively, these findings imply that the lifestyle arm of the DPP, if implemented as originally designed, may inadvertently widen racial disparities in diabetes risk long-term.

Leaders in the field have redoubled calls for centering diabetes prevention within a health equity lens (17–19). This means addressing not only individual-level social determinants of diabetes risk (e.g., food and housing insecurity,

mobility limitations, and psychosocial distress) but also structural factors (e.g., housing, employment, agricultural, and transportation policies) that shape individual-level determinants across generations. This perspective emphasizes the need to address not just the symptoms but also the systems and policies that produce diabetes disparities.

### Conclusions

While the CDC has begun making structural revisions to DPP implementation to improve reach of the program (e.g., Medicare reimbursement, reducing the weight loss goal from 5% to 4% of initial body weight), these changes are modest (20). Furthermore, proposals such as differential Medicare reimbursement based on participant weight loss (\$338 cap for those failing to achieve the weight loss goal vs. \$635 for those succeeding) (20) provide little financial incentive for organizations serving minority and underserved populations to offer the CDC's DPP (21,22).

In sum, anchoring DPP “success” to weight loss goals (that there is limited evidence can be achieved), rather than to goals related to improved functioning, quality of life, or health self-efficacy (23–25), serves as a disincentive to both program participants and to the community and health care organizations that are essential in offering the program, particularly those positioned to improve health in minority and underserved populations. Flexible approaches to diabetes prevention, like those proposed by Richie et al., that use the same means of the DPP, but to different ends, should be adopted as part of our national strategy of health promotion.

**Funding.** This work was supported by the Michigan Integrative Wellbeing and Inequality Training Program (National Center for Complementary and Integrative Health R25-AT010664) and by the Michigan Center for Diabetes Translational Research (National Institute of Diabetes and Digestive and Kidney Diseases P30DK092926).

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

### References

1. Centers for Disease Control and Prevention Media Relations. Press release: twin epidemics of diabetes and obesity continue to threaten the

health of Americans CDC says. Published 11 September 2001. Accessed 16 August 2021. Available from <https://www.cdc.gov/media/pressrel/r010911.htm>

2. U.S. Diabetes Surveillance System. Accessed 16 August 2021. Available from <https://gis.cdc.gov/grasp/diabetes/DiabetesAtlas.html>

3. Helms RB. Implications of population growth on prevalence of diabetes: a look at the future. *Diabetes Care* 1992;15(Suppl. 1):6–9

4. Knowler WC, Barrett-Connor E, Fowler SE, et al.; Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002;346:393–403

5. Chou CH, Burnet DL, Meltzer DO, Huang ES. The Effectiveness of Diabetes Prevention Programs in Community Settings. New York State Health Foundation, 2015

6. Kahn R, Davidson MB. The reality of type 2 diabetes prevention. *Diabetes Care* 2014;37:943–949

7. Ali MK, Echouffo-Tcheugui J, Williamson DF. How effective were lifestyle interventions in real-world settings that were modeled on the Diabetes Prevention Program? *Health Aff (Millwood)* 2012;31:67–75

8. Cardona-Morrell M, Rychetnik L, Morrell SL, Espinel PT, Bauman A. Reduction of diabetes risk in routine clinical practice: are physical activity and nutrition interventions feasible and are the outcomes from reference trials replicable? A systematic review and meta-analysis. *BMC Public Health* 2010;10:653

9. Kitzman H, Mamun A, Dodgen L, et al. Better Me Within randomized trial: faith-based diabetes prevention program for weight loss in African American women. *Am J Health Promot* 2021;35:202–213

10. Thankappan KR, Sathish T, Tapp RJ, et al. A peer-support lifestyle intervention for preventing type 2 diabetes in India: a cluster-randomized controlled trial of the Kerala Diabetes Prevention Program. *PLoS Med* 2018;15:e1002575

11. Moin T, Damschroder LJ, AuYoung M, et al. Results from a trial of an online diabetes prevention program intervention. *Am J Prev Med* 2018

12. Hill-Briggs F, Adler NE, Berkowitz SA, et al. Social determinants of health and diabetes: a scientific review. *Diabetes Care* 2021;44:258–279

13. Ritchie ND, Sauder KA, Kaufmann PG, Perreault L. Patient-centered goal-setting in the National Diabetes Prevention Program: a pilot study. *Diabetes Care* 2021;44:2464–2469

14. Haw JS, Shah M, Turbow S, Egeolu M, Umpierrez G. Diabetes complications in racial and ethnic minority populations in the USA. *Curr Diab Rep* 2021;21:2

15. Mercado C, Beckles G, Cheng Y, et al. Trends and socioeconomic disparities in all-cause mortality among adults with diagnosed diabetes by race/ethnicity: a population-based cohort study - USA, 1997–2015. *BMJ Open* 2021;11:e044158

16. Apolzan JW, Venditti EM, Edelstein SL, et al.; Diabetes Prevention Program Research Group. Long-term weight loss with metformin or lifestyle intervention in the Diabetes Prevention Program

Outcomes Study. *Ann Intern Med* 2019;170:682–690

17. Golden SH, Joseph JJ, Hill-Briggs F. Casting a health equity lens on endocrinology and diabetes. *J Clin Endocrinol Metab* 2021;106:e1909–e1916

18. Haire-Joshu D, Hill-Briggs F. The next generation of diabetes translation: a path to health equity. *Annu Rev Public Health* 2019;40:391–410

19. Thornton PL, Kumanyika SK, Gregg EW, et al. New research directions on disparities in obesity and type 2 diabetes. *Ann N Y Acad Sci* 2020;1461:5–24

20. Meyer H. Though millions are at risk for diabetes, Medicare struggles to expand prevention program. *Kaiser Health News*. Accessed 16 August

2021. Available from <https://khn.org/news/article/diabetes-prevention-program-medicare-rules-expansion/>

21. Roberts S, Barry E, Craig D, Airoidi M, Bevan G, Greenhalgh T. Preventing type 2 diabetes: systematic review of studies of cost-effectiveness of lifestyle programmes and metformin, with and without screening, for pre-diabetes. *BMJ Open* 2017;7:e017184

22. Damschroder LJ, Reardon CM, AuYoung M, et al. Implementation findings from a hybrid III implementation-effectiveness trial of the Diabetes Prevention Program (DPP) in the Veterans Health Administration (VHA). *Implement Sci* 2017;12:94

23. Karamanakos G, Costa-Pinel B, Gills-Januszewska A, et al. The effectiveness of a community-based, type 2 diabetes prevention programme on health-related quality of life. The DE-PLAN study. *PLoS One* 2019;14:e0221467

24. Kozica SL, Harrison CL, Teede HJ, Ng S, Moran LJ, Lombard CB. Engaging rural women in healthy lifestyle programs: insights from a randomized controlled trial. *Trials* 2015;16:413

25. Cleo G, Hersch J, Thomas R. Participant experiences of two successful habit-based weight-loss interventions in Australia: a qualitative study. *BMJ Open* 2018;8:e020146