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Evaluating Fidelity to the National Extension Dining with Diabetes Program: Challenges and Opportunities

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The objective of this study was to evaluate fidelity to the Dining with Diabetes (DWD) program. Data were gathered cross-sectionally in 2019 using class profile forms (i.e., checklists) containing items reflecting the core components of DWD: delivery personnel, curriculum, hands-on cooking, and goal setting. Fidelity was calculated as the proportion of core components completed as intended. Educators (N = 9) completed class profile forms for 10 complete DWD programs (i.e., all four classes). Fidelity to components of completed DWD programs and individual DWD classes was high (over 70% in each category). Overall, fidelity was high, and adaptations reported likely did not detract from effectiveness (e.g., a 2-hour class lasted 2.5 hours). However, the response rate was low and may not reflect those who deliver with lower fidelity. Assessing fidelity should be incorporated as a standard part of community-based diabetes management program evaluation; these data can inform changes to programs to make them more effective in the “real world.”

Keywords: diabetes, nutrition, community organization, process evaluation, evaluation design

Introduction

Type 2 diabetes requires medical and lifestyle intervention to reduce the risk for long-term medical complications and early death. Nearly 1.5 million Americans are newly diagnosed with type 2 diabetes each year, and over 10% of the United States (U.S.) population was estimated to have type 2 diabetes in 2018 (American Diabetes Association, 2020). Interventions for type 2 diabetes management include encouraging changes to nutrition and physical activity behaviors and/or drug therapies to manage blood glucose (American Diabetes Association, 2021a, 2021b).

Nutrition and lifestyle interventions for disease management are particularly complex for newly diagnosed clients and require extended educational interventions (Powers et al., 2017). Reduced portion sizes and controlled carbohydrate intake for blood glucose management are core

components of nutrition interventions (Franz et al., 2017). Likewise, improved physical activity is also recommended to mitigate insulin resistance (Franz et al., 2017). Such interventions are commonly delivered in outpatient as well as community settings, including by the national land-grant university Cooperative Extension System, which is particularly well suited to improve public health among vulnerable U.S. populations (Strayer et al., 2020). In this system, county-based Educators (also called Agents) deliver programs to community members.

To deliver these interventions, using a planning and evaluation framework is recommended. One framework that has been suggested for use in Extension is RE-AIM (reach, effectiveness, adoption, implementation, maintenance), which includes both individual-level and organizational-level factors and is designed to speed the translation of research to practice (Balis, John, et al., 2019; Glasgow et al., 2019). Yet, few Extension programs have reported using RE-AIM for planning or evaluation (Harden et al., 2019). Extension program evaluation typically focuses on reach and effectiveness (Balis, Strayer, et al., 2019). By including the organizational-level dimensions, external validity can be assessed – that is, whether programs work in the “real world.” (In particular, the implementation aspect of RE-AIM has been underreported in nutrition and physical activity interventions (Harden et al., 2015). This dimension captures 1) fidelity to core components of an intervention to determine whether it is consistently delivered as intended; 2) adaptations made to the intervention, and 3) costs and staff time commitments associated with delivering the intervention (Glasgow et al., 2019).

Assessing fidelity to programs’ core components (the elements of the program that should not be changed, as they have been tested and found to lead to the desired outcomes; Chambers & Norton, 2016), as well as any adaptations made during delivery, can be useful for determining necessary changes to the program or to training strategies. For example, a lack of fidelity to core components may result in program drift (i.e., consistent changes made over time that minimize program integrity); this can reveal a need for enhanced training and technical assistance. Or, delivery personnel may document adaptations to the program (e.g., adding activities) that result in positive deviance (i.e., better outcomes; Chambers & Norton, 2016) and can be incorporated into future program iterations. Assessing fidelity is a necessary first step to understanding how programs are delivered in the field and refining them to improve fit.

Dining with Diabetes (DWD) is one Extension program that includes organizational-level evaluation indicators. DWD is coordinated through the National Extension Dining with Diabetes Working Group (NDWD), which provides leadership and coordination for unified program delivery and evaluation across states (Balis et al., 2022). Data are compiled from multiple states each year to determine the overall impact. DWD is evaluated through pre, post, and follow-up surveys that capture effectiveness and maintenance (Balis et al., 2022). Reach and adoption are calculated from participating states, as state coordinators report the number of Educators delivering the program as well as the number of participants and their demographics. However, as of yet, no efforts have been made to capture implementation data. Anecdotally, Educators

delivering the program have reported various adaptations to the programming, including changing the number of sessions, dose, delivery agents, and delivery format. This led members of the NDWD leadership team to evaluate the implementation of DWD, which is the purpose of this study.

Methods

Intervention Description

The goal of DWD is to improve participants' nutrition, physical activity, and diabetes management practices to decrease the risk of long-term medical complications and early death. Extension Educators partner with medical professionals (e.g., Registered Dietitian Nutritionist [RDN], Registered Nurse [RN], or Certified Diabetes Educator [CDE]) to deliver four two-hour in-person sessions and one follow-up reunion class. DWD is based on the Social Cognitive Theory, including expectancies (beliefs and self-efficacy) and reinforcement (perceived importance of behaviors; Bandura, 1986; Chapman-Novakofski & Karduck, 2005). The program includes lessons, SMART (specific, measurable, attainable, relevant, timely) goal setting, and hands-on food preparation and tasting (Balis et al., 2022).

Study Design and Recruitment

A cross-sectional design was used to assess fidelity to DWD. Extension educators responsible for delivering DWD were recruited through a series of emails sent to the NDWD listserv. NDWD members include Educators who deliver DWD as well as state specialists who oversee delivery. The University of Idaho Institutional Review Board exempted this research from institutional oversight.

Data Collection and Analysis

Fidelity to DWD was measured using a self-report class profile as has been used in other research (Balis et al., 2018; Wilson et al., 2018), since fidelity checklists have been recommended as a pragmatic measure of the implementation dimension of RE-AIM (Glasgow et al., 2020; Harden et al., 2020). The class profile checklist was selected as other options (e.g., video or audio recordings or in-person observation) were determined not feasible with no dedicated staff or funding. The class profile form captured the extent to which core program components were delivered as intended and prompted for any adaptations made during program delivery. This included components of DWD *programs* (i.e., a four-class series) as well as components of DWD *classes*.

Core components of programs included appropriate time between classes (classes taught once a week for four weeks with the follow-up three to six months later), completion of program evaluations (pre, post, and follow-up), and delivery personnel (partnering with a medical

professional for clinical expertise). Core components of classes included class length (two hours) and size (30 or fewer participants), the inclusion of hands-on cooking (using and sharing DWD recipes, demonstrating healthy cooking techniques, and allowing participants to sample healthy food), curriculum (using the included presentations and handouts), SMART goal setting, and any additional activities added. Resources for program delivery were also assessed, including the cost of food, facility rental cost, and program fee paid by participants. These were open-ended items, as there are no standard costs to deliver DWD or required participant fees. Demographic questions were not included to decrease the respondent burden.

Fidelity was calculated as the number and proportion of core components that were completed as intended when compared to the total number of programs/classes delivered. Means and standard deviations were calculated for the program delivery resource items.

Results

Nine extension educators responded to the national survey regarding 49 completed DWD classes between August 2018 and 2019. Seven of the nine respondents entered data for classes that were taught as part of a completed program; these respondents taught a total of 10 programs. The two other respondents each taught one stand-alone class (not part of a complete program).

Fidelity to Core Components of Programs

Fidelity to core components of the DWD program, which included classes taught once a week for four weeks, completed evaluations, and partnering with an RDN, RN, or CDE was reportedly high. Seventy percent of completed programs included the recommended follow-up class. Three follow-up classes were taught within the recommended three- to six-month time frame following the fourth session; the other four follow-up classes were taught less than three months following the last session. See Table 1 for details.

Table 1. Fidelity to Dining with Diabetes Programs (N = 10)

Core Component	n (%)
Classes taught once a week for four weeks	8 (80)
Follow-up class taught	7 (70)
Follow-up class taught three to six months post-series (N = 7)	3 (43)
Completed follow-up evaluation (N = 7)	5 (71)
Completed pre- and post-program evaluations	10 (100)
Partner with RDN, RN, CDE	10 (100)

Fidelity to Core Components of Classes

Fidelity to core components of DWD classes was calculated for the four core classes of the series. The follow-up classes are recommended but optional and do not have a specific lesson component. Overall, fidelity to class components was high (over 70% in each category). Of note,

when classes differed from the prescribed two hours, all were between 1.5-2.5 hours. One instructor did not use DWD recipes but noted that American Diabetes Association recipes were used instead. In five of the classes, the full presentation was not taught. Instructors reported they skipped slides and covered the material at a subsequent class due to time constraints ($n = 2$), skimmed the slides because the group was already familiar with them ($n = 1$), forgot a slide ($n = 1$), and deleted one slide ($n = 1$). See Table 2. In 14 of the classes (33%), it was reported that additional activities were added. These activities included grocery store tours, measuring cereals, and exploring online fast-food menus.

Table 2. Fidelity to the Dining with Diabetes Core Classes (Lessons 1-4), (N = 42)

Core Component	n (%)
Two-hour classes	29 (71)
Thirty or fewer participants	33 (78)
Dining with Diabetes recipes used	39 (93)
Healthy cooking techniques demonstrated	42 (100)
Participants sample healthy food	42 (100)
Recipes provided to participants	42 (100)
Suggested handouts provided to participants	41 (98)
All slides of the presentation taught	37 (88)
SMART goals set / discussed	37 (88)

Resources

The cost of food was reported for 24 of the delivered classes ($M \$19.69$, $SD \pm 10.54$), with an average of 18 participants per class ($SD \pm 16.57$). The facility rental cost was available for nine programs ($M \$8.88$, $SD \pm 23.15$) with an average class time of 2.0 hours ($SD \pm .26$). The program fee paid by participants was on average \$22.00 ($SD \pm 18.59$). Grants or program partnerships allowed for fee waiving or coverage among two programs.

Discussion

The results of this study show that DWD was delivered with high fidelity among those who completed the self-report class profile checklist. Only one component of the program or core classes was delivered with less than 70% fidelity. That component, teaching a follow-up class three to six months after the core series, was done 43% of the time. The other 57% percent of the time, the follow-up class was delivered less than three months after the series. The reasons for this deviation are unknown. Educators may have experienced scheduling difficulties, or the program materials may need to give more specific guidance for the follow-up lesson (i.e., the current directions of holding the class three to six months later may convey a vague timeline).

The resources required for Educators to deliver DWD and community members to attend the program varied widely. This is unsurprising, as food and facility rental costs differ by delivery location. The cost of participating in DWD could be a barrier to attendance for people with lower

incomes. Grants or partnerships to cover participation fees were not widely used. This option could be further explored, with guidance on seeking grants or sponsorships included in DWD materials.

Efforts are needed to include implementation outcomes as a standard part of DWD evaluation. Fidelity checklists (or other measures) could become a required part of program delivery (e.g., reported annually along with the effectiveness data). Including fidelity checklists as part of the program package (i.e., materials states are asked to use upon purchasing the curriculum) may also increase use. It is also important to clarify that the checklists are not meant to be punitive but rather to collect important information that can be used to make improvements to the program. For example, in this study, Educators reported adding grocery store tours to DWD, potentially increasing program effectiveness. However, if adaptations like this are not captured, they cannot be added to future program iterations to improve outcomes. Finally, a tracking system to capture these adaptations, such as a national DWD website, may help assess program drift and positive deviance (Chambers & Norton, 2016).

Assessing and intervening to improve fidelity can enhance the overall public impact of Extension-delivered programs – in diabetes management and beyond. Public health impact is highest when interventions *reach* the priority population and are *effective* at changing behaviors, *adopted* widely, *implemented* with high fidelity, and are *maintained* over time (Glasgow et al., 2019). In addition to including fidelity assessment tools as a standard part of program evaluation, structuring program evaluation materials around each of the RE-AIM dimensions (e.g., assessing the number, proportion, and representativeness of Extension Educators who choose to deliver interventions to capture *adoption*; Balis et al., 2018; Balis & Harden, 2021) could enhance Extension’s ability to capture and share data on overall program impacts.

Limitations

A major limitation of the study is the low response rate. It is possible that the Educators who participated in the study are those who deliver with higher fidelity, while those who deliver with lower fidelity may have chosen not to respond. Thus, whether DWD is delivered with high fidelity across the country remains unknown. Future research is needed to determine the best methods of assessing implementation in community-based settings and integrating implementation measures into standard program evaluation.

Implications for Research and Practice

Assessing implementation in programs delivered in natural (i.e., nonresearch) settings is challenging. Class profile forms, checklists, or brief surveys are recommended in low-resource settings. Still, without strict requirements from research protocols or funders, there may be little incentive for delivery personnel to complete them, as highlighted by this research. Observational methods (e.g., in-person, video recordings, and audio recordings) remove this burden from

delivery staff but are more costly and labor-intensive (Breitenstein et al., 2010) and may not be feasible. Focus groups have also been used to assess fidelity (Harden et al., 2015) and could potentially be preferred over class profile forms and completed remotely. Overall, efforts are needed to determine fidelity measures that are feasible, acceptable, and appropriate (Proctor et al., 2011) to those who deliver programs.

Conclusion

Programs like DWD are being implemented through Extension on a wide scale nationally; however, implementation data is underreported. Our implementation survey was disseminated via a national working group to fill this gap. However, poor responses limited the ability to understand if DWD is implemented with high fidelity. More research is required as well as approaches that build implementation assessments into program evaluation materials. Further, efforts to understand how to improve response rates when using national networks could improve the capacity for information sharing on a wide scale to improve the impact of DWD and Extension networks overall.

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