Development of a Dissemination and Implementation Framework for an Early Childhood Obesity Prevention Program

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ABSTRACT
Dissemination and implementation (D&I) science addresses the disconnect between evidence-based research and practical application in community settings. Early childhood education settings are ideal for the application of D&I research because of their widespread use for implementing health promotion interventions. A D&I framework was applied to the Culture of Wellness in Preschools program, a comprehensive early childhood obesity prevention program. The development and application of the Culture of Wellness in Preschools D&I framework can lead to a more comprehensive approach to program evaluation and quality improvement and can contribute more broadly to the body of evidence of nutrition-related health promotion programs.

Key Words: obesity, implementation science, child nutrition (J Nutr Educ Behav. 2020;52:1160−1165.)


INTRODUCTION
There is currently a gap between the generation of knowledge, the development of evidence-based interventions, and the application of these programs into real-world settings.1,2 Dissemination and implementation (D&I) research addresses this disconnect between evidence-based research and practical application in community settings.3 Dissemination and implementation occupy a distinct phase along the research continuum, focusing on the adoption, adaptation, delivery, and sustainment of evidence-based practices that have been or will be implemented into practice.1 The goal of public health research is to improve population health outcomes; however, moving research forward from discovery to practice can be quite challenging. The process of translating research to practice is complicated by concerns with intervention fidelity, internal and external validity, and ensuring that the intervention meets community needs and is applicable to specific settings.1 Dissemination and implementation research can provide robust information, which can help researchers better understand perspectives on community disparities, assess community needs, generate or refine hypotheses, and understand how research can be best used in understudied or underserved populations.4

Dissemination and implementation research may be particularly useful when applied to early childhood obesity prevention interventions. Childhood obesity has more than doubled in the past 30 years,5 with low-income and ethnic minority children being disproportionately affected.6 Early childhood is a critical time to promote healthy weight development for 2 reasons: (1) early development of basic motor skills, which are linked to later physical activity levels,7 begin in early childhood; and (2) food- and nutrition-related attitudes, preferences, and behaviors are developed during these formative years.8 Children who do not develop healthy attitudes and behaviors and gain excess weight in their preschool years are more likely to be obese in adolescence and adulthood9 and to develop diabetes, hypertension, hyperlipidemia, asthma, and sleep apnea.10 Therefore, prevention and early intervention are key and are a public health priority.11 The majority of US children are placed in some form of nonparental care during their preschool years. Approximately 50% of 4–5-year-old children are placed in center-based care.12 Introducing classroom-based programming, having parent education opportunities, and making environment and policy changes in these settings has the potential to affect children’s physical activity and healthy eating behaviors and, therefore, reduce childhood obesity because the association between these factors is well documented. Unpacking the key ingredients of these intervention efforts using a D&I approach and understanding when,
how, and for whom they work has implications for both research and practice in early childhood.

Application of D&I research in early childhood education (ECE) centers is needed to better inform the implementation of health promotion interventions in these types of settings. Early childhood is a critical time of development that relates to later health outcomes, and a majority of US children are placed in some form of nonparental care during these critical preschool years.

In terms of obesity prevention programs, ECE settings provide a promising environment to implement nutrition-related and physical activity health initiatives through their provision of meals and promotion of physical activity during outdoor playtime. A 2020 Cochrane review of implementation strategies for obesity prevention programs in ECE settings found inconsistent and weak evidence for programs intended to improve implementation of policies, practices, programs, staff knowledge and attitudes, and child outcomes. This review highlights the need for D&I research to better understand the successful implementation of health promotion interventions in ECE centers.

Although a plethora of D&I frameworks exist to help guide health promotion work, including for school-based programs, a gap still exists related to D&I frameworks for health promotion work in ECE settings. To fill this gap and inform evaluation and implementation efforts, a D&I framework was developed and applied to the Culture of Wellness in Preschools (COWP) program, which is a multilevel, multi-strategy early childhood obesity prevention program. Current evaluation approaches do not fully capture the complexity of factors that impact the successful implementation of multilevel health promotion programs in ECE centers. This report describes the process used to develop and apply a D&I ECE obesity prevention program-specific framework. This process can be adapted for other ECE- and school-based health promotion programs to apply D&I research to implementation and translation efforts.

Culture of Wellness is Preschools Program

Culture of Wellness in Preschools is a comprehensive early childhood obesity prevention program, which aims to promote a culture of wellness in preschool settings by increasing fruit and vegetable consumption and physical activity levels. A unique aspect of COWP is that it takes a sociocultural approach by implementing 5 components that focus on the preschool children (eg, nutrition education and physical activity classroom programming), teachers (eg, workplace wellness programs), caregivers (eg, parent wellness workshops), and policy, system, and environmental (PSE) aspects of the preschool center environment (strategic planning process to make health-promoting PSE changes).

Culture of Wellness in Preschools is funded by the Nutrition Education and Obesity Prevention Grant Program, widely known as Supplemental Nutrition Assistance Program–Education (SNAP-Ed), which is the nutrition arm of the US Department of Agriculture (USDA) Supplemental Nutrition Assistance Program. Culture of Wellness in Preschools has been implemented in 14 counties across Colorado, providing programming to over 150 low-income ECE centers, and reaching over 48,000 students, caregivers, and teachers. Last year, COWP was accepted as an evidence-based intervention into the SNAP-Ed Toolkit, which makes program materials more broadly available to the 140 SNAP-Ed implementing agencies in all 50 states and 2 territories. Previous evaluations of COWP have only focused on program outcomes, and the inclusion in the SNAP-Ed toolkit will support current and continued spread, expansion, and adaptations of COWP. Therefore, the COWP team identified a need to develop a comprehensive D&I framework to better understand the system-, intervention-, structural-, and participant-level factors related to the successful implementation of the program in diverse ECE settings. The development and application of this D&I framework can contribute more broadly to other SNAP-Ed implementing agencies across the nation by providing a conceptual model for how to incorporate a D&I-based approach to evaluation efforts of existing SNAP-Ed programs, but it also can inform other nutrition education and health promotion programs used in ECE settings more broadly.

DESCRIPTION OF FRAMEWORK

DEVELOPMENT PROCESS

The COWP team convened a working group consisting of 7 individuals with prior experience in childhood obesity prevention and school-based health promotion programs, including the principal investigator, senior research faculty, COWP staff, and doctoral students affiliated with the program. The group met biweekly for 4 months then as needed after drafting the initial framework. An informal literature search was conducted to assess the applicability of existing D&I frameworks. Each member of the working group conducted an individual review of the literature and identified potential D&I frameworks that had been applied in ECE- and/or school-based settings. Group members then presented the identified frameworks back to the larger group. Over 20 D&I frameworks were reviewed. The working group evaluated each suggested framework for applicability and ability to address all 5 components and the multilevel structure (provides support that targets the child-, parent-, and staff-levels) of the COWP program. On the basis of this initial discussion, 4 potential frameworks were identified: (1) Reach, Efficacy, Adoption, Implementation, Maintenance; (2) the Consolidated Framework for Implementation Research (CFIR); (3) the Practical, Robust Implementation and Sustainability Model; and (4) a framework developed by Dreisinger et al. The working group then compared the 4 frameworks on the basis of fit and alignment with COWP programming.

Of these frameworks, 2 specifically fit the needs of COWP: the CFIR and the framework developed by Dreisinger et al. The CFIR was developed to address the overlapping theories and constructs, as well as the
inconsistency of definitions used in existing D&I frameworks. The result was a meta-theoretical framework, including constructs from the synthesis of existing theories. The final framework included 5 main domains with 37 constructs.25 The framework developed by Dreisinger et al27 was the only framework found that was developed specifically for an obesity prevention program. This framework was based on the Diffusion of Innovations theory. The primary focus was the dissemination of an initiative, including the systematic identification of a set of key variables that contribute to readiness for widespread distribution.27 Each of these frameworks provided key constructs for the COWP D&I model. The CFIR was used for its ability to provide guidance specifically on implementation, whereas the Dreisinger et al framework expanded on the dissemination of the program.

To ensure a clear understanding of all constructs included in the final COWP D&I framework, each construct was given an operational definition. For constructs that were based on existing frameworks, definitions were pulled directly from the source—the CFIR published manuscript25 and the Diffusion of Innovations theory28 for the Dreisinger et al framework. Novel constructs that were not included in either framework were identified on the basis of COWP’s evaluation efforts. For example, organizational-level factors such as staffing retention and center schedules that were specific to ECE centers were added to the framework. The definitions of new constructs came from various sources.25-30 The working group drafted operational definitions for all program-related constructs without an official definition provided elsewhere. A consensus process was conducted to ensure all definitions reflected the construct of interest. Working group members reviewed proposed definitions and discussed meaning and relevance. Operational definitions for the final framework were all approved by the working group through this process.

**FRAMEWORK OVERVIEW**

The Figure depicts the final COWP D&I framework. The COWP D&I framework consists of 6 domains: process, stages of dissemination, system-level and contextual factors, intervention factors, structural and participant factors, and outcomes. The process domain, including the constructs of planning, engaging, executing, reflecting, and evaluating, were drawn from the CFIR and is intended to represent the active change process that is required for the successful implementation of a program. The process can be linear or nonlinear, but all subprocesses or constructs are generally aimed at the same end goal of effective implementation.27 Specifically for COWP, planning involved the development of the program curriculum, background research, and material development. Engaging occurred through reaching out to ECE center directors and teachers, as well as parents and caregivers, to inform programming. Executing was the implementation of this planned program into ECE centers across Colorado. Reflecting is an ongoing process that includes examining current practices and exploring the goodness-of-fit of the program at each center and making adaptations, if necessary.
necessary. Evaluating occurs through multiple routes of data collection and assesses the intended outcomes and impacts of the program. This is a cyclical process; the pairing of reflecting and evaluating leads to a cycle of continuous quality improvement and can initiate the entire process from the beginning if refinements or adaptations are made to programming.

Stages of Dissemination

The stages of dissemination were included in the model to bring attention to the spread and reach of the program to other settings and locations. These stages were included on the basis of the Dreisinger et al. framework and are founded on the Diffusion of Innovations theory, which examines how an idea or product diffuses through a population or system over time. The stages included in the framework were: evidence-based intervention development, awareness, adoption, implementation, and maintenance. Each of these stages is considered relevant to the expansion of COWP, not only by geographic location but also within centers and the ECE network. Each stage, beginning with intervention development based on specific context to maintenance, is key to ensuring the continued success and spread of COWP.

System-Level Factors

System-level and contextual factors influence the successful implementation of a program. On the basis of their expertise and extensive background working in ECE settings, the working group developed a list of system-level and contextual factors that may have the largest impact on the implementation and dissemination of COWP. These included: community characteristics (eg, community infrastructure, geographic location, income), social determinants of health (conditions in the places where people live, learn, work, and play), the ECE system, the stages in the food system (growing, harvesting, packing, processing, transforming, marketing, consuming and disposing of food) at both the local and national level, complementary initiatives (eg, other health promotion programs currently being implemented with the target population), and the current political environment. Although the identification and measurement of these factors may present challenges, their inclusion in the framework was necessary to ensure the COWP D&I framework accounted for varying contexts.

Intervention-Level Factors

Culture of Wellness in Preschools is a comprehensive program that includes 5 main components: nutrition education, physical activity, parent wellness workshops, workplace wellness, and a PSE strategic planning process. Because of the inherent differences between each of these components, they were separated within the framework with each including their own intervention factors. For the intervention factors, a combination of constructs from the CFIR and additional constructs identified by the COWP team were added, including active ingredients, fidelity, dose, accountability, and cultural sensitivity. These additional constructs were deemed important and relevant to the intervention components of COWP by the working group, along with input from other COWP staff.

Organizational-Level Factors

Existing structures and characteristics related to the organization affect the implementation of a program, especially in the ECE and school setting. Organizational factors such as implementation climate and organizational commitment have been identified as central to the success of school-based obesity prevention programs. A majority of organizational constructs came from CFIR, including communication, leadership engagement, resource allocation, implementation climate, readiness for implementation, and wellness champion. The COWP team added constructs relevant to the program and the specific setting COWP functions within (ECE centers). These included: management support, staffing retention, policies, center schedules, quality rating, staff buy-in, and family engagement.

Individual-Level Factors

Individual characteristics also impact the implementation of a program. These characteristics may influence people’s adoption and acceptance of the program and may also be altered over time by exposure to the program. Because COWP targets not only preschool students but teachers and parents with their programming, individual factors were separated by these 3 groups. A majority of these constructs and their definitions came from CFIR, including knowledge, skills, personal characteristics (other traits or attributes such as motivation, competence, learning style, and values), and commitment to organization (for teachers and parents only). These were supplemented with additional constructs identified as important or relevant specifically to COWP. Attitudes were added under each of the 3 groups, and engagement was included for teachers and parents only.

Outcomes

The domain of outcomes was based on the logic model that was created during the development of COWP and align with the stages of change from the Transtheoretical Model. Short-term outcomes (preparation) are focused on the child, parent, and teacher as these individuals can model and promote health behaviors to influence subsequent child behavior change. These include intention and goal-setting, as well as short-term or immediate behavior change for the child, parent, or teacher. At the organizational level, the implementation of PSE changes identified through the PSE strategic planning process is defined as short-term outcomes. Medium (action) and long-term (maintenance) outcomes are focused on the child who is intended to be impacted by the intervention and display long-term behavior change. Medium-term outcomes include an increase in physical activity and healthy eating of the child. Long-term outcomes include decreased obesity and related chronic disease.
DISCUSSION

Many current evaluation approaches for school- and ECE-based health promotion programs have a limited focus on outcome measures and structural factors. These approaches neglect to account for additional factors that influence implementation and program success, especially in complex interventions that address multiple levels of influence. With the proliferation of multicomponent interventions implemented in ECE centers, there is a need for D&I research to address the disconnect between evidence-based research and practical application into ECE settings. The COWP D&I framework builds on contextual factors that influence the implementation of obesity prevention programming in ECE settings. Implementation strategies in ECE centers have produced inconsistent and weak evidence of effect according to a Cochrane review of 10 trials, providing further support for the need for additional D&I research to examine factors that affect implementation and subsequent outcomes in ECE centers.

IMPLICATIONS FOR RESEARCH AND PRACTICE

The COWP D&I framework is innovative in 2 ways. Although 1 previous study applied D&I approaches to programming in ECE settings, there is a need for a comprehensive D&I framework that captures the complexity of multilevel obesity prevention programs, such as COWP. The development of the framework also followed a community-based approach. The team identified new constructs specifically related to the ECE context on the basis of 7 years of experience implementing and evaluating COWP in ECE settings with continual feedback from key stakeholders and program participants. The COWP team is beginning to explore the application of this framework to guide the development of research questions, additional data collection, and future analyses linking programming to healthy eating and physical activity outcomes. For example, the working group recently completed a review and alignment grid of all current data being collected by COWP to the constructs included in the framework. Gaps in data collection were identified, and the team is working on updating their evaluation strategies to fill these gaps for the upcoming implementation year. A survey measuring all constructs included in the COWP D&I framework was developed and administered to ECE providers participating in COWP in the Spring of 2020 (n = 395) with plans for longitudinal data collection. The team is using these data to investigate innovative research questions related to the linking of D&I constructs to outcome data. These analyses will inform key factors that should be targeted by health promotion programs in ECE centers to achieve maximum impact.

The COWP D&I framework was developed specifically for the COWP program and included constructs that may not apply to settings other than ECE centers. However, this framework and the process used to create it can be used to inform future application and development of program-specific D&I frameworks to help guide evaluation efforts of multicomponent health promotion programs in ECE- and school-based settings.

Dissemination and implementation provides a unique lens on an intervention that expands beyond program outcomes to provide information on why a program works or fails to have an impact. Multiple reviews have highlighted the mixed results and poor evaluation designs of early childhood and school-based obesity prevention programs and have called for future work focusing on program implementation. The variability of the effectiveness of these programs, coupled with the additional complexity added by the implementation of a multicomponent program, calls for a more comprehensive evaluation, and one that includes factors related to implementation and dissemination. The development of a D&I framework specific to COWP was an initial step in adopting a D&I focused approach to program evaluation and quality improvement. The use of D&I approaches could inform a deeper understanding of implementation, resulting in adaptations and improvements in current and future programming and evaluation efforts. The development and application of this D&I framework can also contribute more broadly to other SNAP-Ed implementing agencies by providing a road map of how to incorporate a D&I-based approach into evaluation efforts of existing SNAP-Ed health promotion programs. Research teams can also adapt this D&I framework and investigate factors that are most critical to the successful scalability of programs for unique contexts and communities.

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REFERENCES

7. Goodway JD, Robinson LE, Crowe H. Gender differences in fundamental motor skill development in disadvantaged


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