“During early implementation you just muddle through”: factors that impacted a statewide arthritis program’s implementation

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Abstract

The need to scale-up effective arthritis self-management programs is pressing as the prevalence of arthritis increases. The CDC Arthritis Program funds state health departments to work with local delivery systems to embed arthritis programs into their day-to-day work. To encourage organizational ownership and sustainability of programs, funding is restricted to offset program start-up costs. The purpose of this study was to identify factors that impacted the success of implementing an evidence-based arthritis self-management program, funded by the CDC Arthritis Program, into the Oregon Extension Service. We interviewed staff and partners involved in implementation who had and had not successfully delivered Walk With Ease ($N = 12$) to identify barriers and facilitators to scaling-up. Document analysis of administrative records was used to triangulate and expand on findings. Delivery goals defined by the funder were not met in Year 1: only 3 of the expected 28 programs were delivered. Barriers to implementation included insufficient planning for implementation driven by pressure to deliver programs and insufficient resources to support staff time. Facilitators included centralized administration of key implementation activities and staffs’ previous experience implementing new programs. The importance of planning and preparing for implementation cannot be overlooked. Funders, however, eager to see deliverables, continue to define implementation goals in terms of program reach, exclusive of capacity-building. Lack of capacity-building can jeopardize staff buy-in, implementation quality, and sustainability. Based on our findings coupled with support from implementation literature, we offer recommendations for future large-scale implementation efforts operating under such funding restrictions.

Keywords

Implementation, Translation, Prevention, Arthritis, Scale-up, Interventions

INTRODUCTION

Arthritic conditions are the leading cause of disability in the USA and affect 23% of adults nationwide [1, 2]. Behavioral interventions can mitigate the impact of arthritis by increasing physical activity and facilitating arthritis self-management skills [3]; however, few have

Implications

Practice: Thorough planning prior to implementation of programs is essential and cannot be overlooked or rushed; centralized administration of key implementation activities can reduce pressure on staff time and help guide implementation

Policy: Defining implementation goals in terms of capacity-building for program delivery can legitimize the importance of capacity-building and better facilitate organizational ownership and program sustainability.

Research: Further research is needed to establish whether the CDC Arthritis Program funding model is effective at promoting organizational buy-in and sustained implementation; the 5-year CDC funding cycle ends in 2017 and represents a prime opportunity to compare experiences and outcomes across all 12 state recipients of the CDC Arthritis Program grants.

been implemented on a broad-scale [4, 5]. More research supporting strategies to increase the implementation of behavioral interventions is supported by an increased call for Type-4 (T4) translational research [6]. T4 translational research focuses on strategies that support the widespread implementation and institutionalization of behavioral interventions to have sustainable and population-level health benefits.

The Centers for Disease Control and Prevention’s (CDC) and the Arthritis Foundation have identified increasing T4 translation of behavioral interventions as a key priority in their strategic plan to address arthritis [7]. Specifically, the plan seeks to increase the availability of behavioral interventions that teach arthritis self-management skills and promote physical activity. The CDC’s Arthritis Program provides over US\$25 million in funding across 12 state health departments to expand the availability of arthritis intervention programs in community settings [8]. A

hallmark of the CDC funding scheme is for state health departments to build partnerships with local delivery systems to institutionalize, or “embed” interventions into their day-to-day operating procedures. State health departments do not deliver programs but act as brokers that contract with delivery systems to implement arthritis interventions. Delivery systems are large organizations that have established capacity to deliver interventions across multiple sites. Examples of delivery systems include coordinated care organizations, large employers like school systems or regional governments, and large non-profit organizations with multiple sites. Implementing via delivery systems takes advantage of existing organizations’ established infrastructure, including established staff, relationships with the community, facilities, operational budget, to deliver behavioral interventions. The hypothesis is that supporting new health programming through established community-based delivery systems can result in rapid and efficient implementation of a new program at a reduced cost [4].

Another component of the funding scheme is to reduce the reliance of organizations on external funding. To this end, the CDC limits the use of grant funds to offset intervention start-up costs instead of supporting general operational costs of the organization. The purpose of limiting funds is to encourage the delivery organizations to mobilize alternative resources and develop a long-term financing strategy. This approach is hypothesized to facilitate sustainability of intervention delivery that extends beyond the funding period [5]. To our knowledge, however, very limited if any research examines how the CDC Arthritis Program funding model works in practice.

Embedding a new program into an established organization is a complicated process, and one that more often results in failure than in success [9, 10]. Despite the challenges inherent in implementing new programs, studies reporting on program outcomes rarely report barriers encountered and addressed during early stages of implementation, [11] often called the “installation” phase [10]. This omission is problematic because successful capacity-building and problem-solving during early implementation influences the quality and outcomes of implementation [12]. To increase the likelihood of successful implementation of community-based health interventions, organizations need guidance to navigate barriers and capitalize on facilitators to promote successful implementation.

Thus, the purpose of this study was to explore the experience of one multi-site delivery system in Oregon, the Oregon State University (OSU) Extension Service, funded via a CDC Arthritis Program grant to implement a state-wide, community-based arthritis intervention. In particular, this study focuses on the first year of implementation in order to better understand the barriers and facilitators to introducing and embedding a new program into an established delivery system. The research questions were as follows: (1) what are the factors that program staff and state-level partners identify as barriers to implementation, (2) what are the factors that program

staff and state-level partners identify as facilitators to implementation, and (3) was a sufficient level of buy-in from OSU Extension staff generated to embed the new program into the OSU Extension delivery system?.

Program and context

In July 2012, the Oregon Health Authority was the awardee of a 5-year grant from the CDC Arthritis Program to disseminate and implement arthritis interventions via existing delivery systems in Oregon. The Arthritis Foundation’s Walk With Ease (WWE) program, a CDC-approved physical activity program, was selected by the Health Authority as the primary arthritis self-management intervention for implementation. The 18-session WWE program can be taught by volunteer lay leaders who undergo a self-paced online training and receive certification through the Arthritis Foundation. Over 6 weeks, WWE participants learn about safe physical activity, arthritis self-management skills, and participate in walks. Previous evaluations have shown that WWE is effective at improving physical functioning, reducing pain, fatigue, and stiffness and increasing self-confidence and perceived control over arthritis [13, 14].

The Oregon Health Authority contracted the OSU Cooperative Extension Service Family and Community Health program to be the primary delivery system to implement WWE programs across the state. The OSU Extension Service has local offices in each of Oregon’s 36 counties, and the Family and Community health program has employees in each county who coordinate and deliver programs on a range of wellness topics. In addition to OSU Extension, the local Arthritis Foundation chapter was contracted by the Health Authority to provide technical support, training, and assistance to OSU Extension, WWE leaders and WWE sites.

METHODS

We used multiple data sources to identify factors that impacted early implementation of WWE, including interviews with staff from three organizational partners and program records.

Interviews

In the final program month of Year 1 (e.g., June 2013), the primary author conducted interviews with all the staff involved in implementing WWE. All Extension Staff from involved in WWE implementation were interviewed as well as administrators from the Oregon Health Authority, the Arthritis Foundation, and the OSU Extension Service. We invited all people involved in implementation, whether or not they successfully delivered a WWE program during the study period, to participate in interviews; all accepted. Interviews were approximately 45 min in length, in-person ($n = 6$) or via telephone ($n = 6$), and participants were reimbursed US\$25 for their time.

Our study team developed a semi-structured interview guide based on the stages of implementation—adoption, installation, operation, sustainability—identified in the literature [10]. As interviewing commenced, it became evident that respondents had not progressed beyond the installation phase. Therefore, we revised the interview guide to explore barriers and facilitators to completing activities associated with implementing WWE. These activities included the following: (1) recruiting volunteer leaders, (2) training leaders, (3) identifying and securing sites for WWE delivery, (4) recruiting participants, and (5) supporting leaders during delivery of WWE program sessions. Additional questions explored the participants' job description and alignment of WWE with their other duties. Previous research has indicated that poor fit between settings and programs can be a cause for implementation failure [15]; therefore, respondents' opinions about whether WWE was a good fit for their community were solicited. Finally, participants reported what would help them to improve WWE implementation in the future.

Analyses of documents

We examined administrative documents from Year 1 (i.e., July 2012–June 2013) to establish a timeline of events, identify barriers encountered and solutions enacted, and triangulate findings from the qualitative interviews. Five sources of administrative documents were included in this analysis: (1) the funding contract between OSU and the Health Authority and the original grant application from the Health Authority to the CDC; (2) quarterly progress reports developed by OSU staff that described activities, successes, and barriers; (3) program forms that documented details of the WWE classes implemented and volunteers trained, and characteristics of the participants that attended the classes; (4 and 5) meeting minutes from two organizations: (a) minutes collected by the Health Authority that documented monthly planning calls with OSU Extension and the Arthritis Foundation and (b) minutes collected by OSU Extension staff from internal monthly conference calls with OSU Extension. These two types of minutes outlined the implementation activities in Year 1 from two different perspectives—that of the funder and that of the implementer. Altogether, the administrative documents recorded the implementation process as it unfolded, barriers encountered, and solutions enacted.

Analyses

We used NVIVO 10 software [16] to analyze the qualitative data using content analysis [17]. First, two researchers read all the interview transcripts in their entirety to become familiar with the data. Next, the researchers independently coded the transcripts before meeting to discuss and consolidate the codes to create a codebook. Then, the transcripts and documents were recoded by each researcher using the

complete codebook. The researchers collaboratively examined the codes and content and categorized them into barriers and facilitators to implementation. Despite this distinction, both researchers identified that some codes were both a barrier and a facilitator, and so, some content was double coded as such. Finally, like-codes within each category were grouped together to form themes. We tabulated quantitative data from the WWE participants' registration forms in STATA v.12 [18] and performed a descriptive analysis.

RESULTS

Our study included a total of 12 interviewees comprised of OSU Extension staff members who were responsible for WWE delivery across seven counties, and administrative staff who were engaged in WWE implementation from each organizational partner. All interview respondents were female. Respondents had been in their current roles from less than 1 year to over 25 years. There was no turnover in the staff who worked on WWE from any of the organizations during Year 1.

Seventy-nine documents were included in the analysis. These include the contract between the Health Authority and the CDC grant application ($n=2$), quarterly progress reports ($n=4$), program forms including participant registration forms ($n=39$), volunteer leader registrations ($n=19$), program detail forms ($n=3$), and meeting minutes ($n=12$).

The implementation plan and contract goals

The implementation plan outlined in the contract between OSU and the Health Authority stipulated that WWE be delivered in seven counties in Year 1 and then scaled-up to other counties in Years 2–5. The seven counties were selected by OSU administrators and occurred prior to and independent of this study. Four of the counties were metropolitan statistical areas, defined by the US Census Bureau as having an urbanized area with a population of at least 50,000 [19]; the other three were rural counties. OSU administrators explained that they selected the seven counties based on the existing relationships between themselves and the Extension staff in those counties. OSU Administrators believed that the selected staff had strong capacity to implement the program, and would be willing and amenable to assisting in early implementation.

The deliverables outlined in the OSU contract were defined by the CDC and the Health Authority, and aimed at enrolling 336 participants into WWE programs in Year 1, June 2012–July 2013. The recommended WWE program size averages 12 participants so OSU was to deliver 28 programs, or 4 programs per county. The local Arthritis Foundation chapter and the Health Authority were to provide assistance in recruiting and training volunteer leaders and marketing classes. Regular communication between the Health Authority and OSU was required and included no less than one telephone meeting per month to

monitor implementation progress and address emerging barriers. Other deliverables included collecting and submitting program data (e.g., participant registration and liability forms and documentation of certified leaders), creating promotional materials, providing technical assistance to any new leader in Oregon, and developing a sustainability plan.

Each OSU staff was expected to manage implementation activities in their local areas, including recruiting and registering volunteer leaders for training, assisting volunteer leaders in recruiting participants, securing facilities, and delivering WWE. OSU Extension divided the contract funds among the staff in the seven counties to use towards implementation. The contract dictated that the funds could be used towards training volunteer leaders, program materials, and incentives.

Implementation outcomes

By the end of the contract year, three WWE programs with 39 total participants had been delivered—only 11% of the contract goal. Two programs were delivered by volunteers who recruited community members to participate in WWE. One program was held in a park, the other at a retirement center. The third was delivered by OSU staff to employees who worked in a large office complex. All three programs were delivered in urban areas. WWE participants were mostly female (85%), white (77%), and averaged 65 years of age (standard deviation = 14). Nineteen leaders obtained WWE certification during Year 1, six of whom were OSU staff.

SU participated in monthly conference calls with the Health Authority throughout the year and collected and submitted the required paperwork. They did not, however, develop a sustainability plan or develop marketing materials within this period. A timeline of key events during WWE implementation is presented in Fig. 1.

Themes emerged during the qualitative analysis that provide insights into the challenges OSU faced in meeting the deliverables in Year 1. These themes were grouped into a framework of organization-level and

program-level barriers and facilitators to implementation. Despite this arrangement, themes were closely related to each other and often overlapped. Verbatim quotations for organization-level themes are presented in Table 1, and program-level themes in Table 2.

Organization-level barriers to implementation

Poor planning and timing—Although the grant year started on July 1, there was a 4-month delay in finalizing the contract between OSU and the Health Authority (see Fig. 1). The contract outlined the deliverables, the roles and responsibilities of the partners, and proper use of contract funds. Despite the delay, OSU was expected to deliver the 28 classes outlined in the initial plan before the end of the grant year. Additionally, new organizational protocols, such as developing liability forms, marketing strategies, billing, and communication protocols between the partner organizations, needed to be established. Staff described WWE implementation as feeling “rushed” and reported confusion about which partners were responsible for which tasks. The delay meant that OSU Extension staff were tasked to deliver WWE programs during the winter months, further complicating the ability to find suitable locations for the walking program. As a result, all staff delayed delivery until spring of 2013. Unexpectedly, the federal Budget Control Act of 2011 impacted the Extension Service at the same time that WWE was implemented [20]. An OSU administrator estimated that the Extension Service experienced an approximate 28% decrease in the overall Family and Community Health budget. Respondents reported that local county budgets decreased and resulted in layoffs. Staff struggled to maintain their current level of programming with fewer fiscal and personnel resources, and questioned whether WWE was a priority given other commitments.

Implementation focused on meeting enrolment quotas—The focus on reaching the enrolment quota outlined by the CDC funding drove many aspects of implementation—from the selection of the WWE program, to the rigidity of the implementation plan, to the pressure on OSU to deliver classes. Although the Health

Fig. 1 | Timeline of events during Year 1 of Walk With Ease implementation, June 2012–June 2013

Table 1 | Select themes and quotations from in-depth interviews: organization-level barriers and facilitators to Walk With Ease implementation

Organizing framework	Themes (N)	Supporting participant quotations
Organization-level barriers	Poor planning and timing (5)	“This [program] rollout is atypical with the [budget cuts] and the amount of laying people off, people are fired...Some of the [staff] who might've concentrated quite willingly on this project were really looking at: “Do I give people termination notices?” “Do I remove myself from promises that I have made in a community that has long memory?” The attention that would've been devoted to figuring out the logistics for [Walk With Ease] could not be present to it.”
	Implementation focused on meeting enrollment quotas (3)	“I keep going back to [the enrolment] numbers. It's not like we don't care about the individuals because really, our goal is to impact health in Oregon] - but that's done through numbers!”
	WWE was harder to implement than expected (8)	“I kind of got a sense that a commitment was made at the organizational leadership level without a clear understanding of what that commitment would mean for implementation at the local level.”
	Insufficient staffing (9)	“It's a new project, we weren't completely ready. And I just thought it would go easier. And [the funders] did, too.” “[Our office has] some general time [to lead the program] ...but we have coworkers [in other offices] who have 5% of their peak position description available to [Walk With Ease]. There is not enough time to do the program and figure out the program.”
	Established infrastructure of OSU Extension Service (5)	“We normally go out to the people, particularly in this region, people don't come to our Extension office. We go to them. So, I think that already sets us up for going into the communities and getting neighborhood walks.... That's one of the reasons that Extension works is because we're all passionate about [the community].” “I've tried this initial go-around to look for [partners] who are already involved in doing this kind of thing as part of their work, to see if they would integrate it. Because I figure they have the expertise and the tools to do that, and I can just coordinate with them.”
Organization-level facilitators	Extension Staff had previous experience implementing new programs (7)	“I'll tell you what we've learned, is sometimes with Extension programs in general, [during] early implementation you just muddle through things. And sometimes maybe hanging back just a little is a good strategy because some of the things get ironed out.” “The initial start-up is always slow getting all the kinks worked out and figuring out what's the best way to implement. I think that now that things are in place, it should go a little more smoothly.”
	Centralized administration of key activities (4)	“[a facilitator was] having a point person who was willing to take care of the details to try to make—try to reduce the barriers with the county faculty. Someone that they could call with questions.”

WWE Walk With Ease

Table 2 | Select quotations and themes from in-depth interviews: program-level barriers and facilitators to Walk With Ease implementation

Organizing framework	Themes (N)	Supporting participant quotations
Program-level barriers	Managing volunteers (12)	<p>“...we’ve burnt out our volunteers...we don’t have a lot of people to choose from here and the people who volunteer, volunteer for everything”</p> <p>“[A barrier is] finding the time to run another volunteer program because volunteers aren’t like other employees. You have to coax them along, you have to encourage them, you have to find the volunteer for the right match.”</p> <p>“Some [volunteers] would have no problem doing an online training and others that that would be the main barrier to participation...just navigating it, hearing the word “online.” I have people in our program that don’t have a computer, don’t use the internet, don’t have a cell phone and they’re perfectly happy that way.”</p>
	Rigidity of WWE program design (5)	<p>“When I checked with the [CDC they said]...‘you need to do it [the way it was designed] or it’s not done with fidelity to our research.’ We wouldn’t be able to count [the program] if it’s done outside of [the approved design].”</p> <p>“The challenge is some [volunteers] are not comfortable with a turnkey program. They like to design or develop or veer away from a written script. Some enjoy, the flexibility or creativity piece.”</p>
	WWE’s evidence-base and pre-packed design (5)	<p>“There’s lots of programs out there that are great, but if they’re not proven to be effective then we can use them but I think they’re less likely to have the impact that we want it to have”</p> <p>“I prefer evidence-based [programs] in my role. I think it’s easier, it’s more effective. It requires less prep and clean-up. Also, funders are more likely to fund something...it’s easier to convince a collaborator to offer it at their site or to put staff time to leading the walk.”</p>
Program Fit		<p>“I thought that there was a gap in the [community for] walking programs...And the fact that [WWE] was evidenced-based was real good...so there was a need and it seemed like there was an interest...and it looked like there was a nice formatted program...So all those kind of pieces came together.”</p> <p>“I think it’s a really good program. I just think it was rolled out before they worked out the kinks and we really need to figure out a lot of these barriers.”</p> <p>“Anytime programs can come from within or from communities instead of above, my sense is that it’s going to be more successful because either the community is asking for it or the staff’s identified that it’s a need.”</p>

WWE Walk With Ease

Authority recognized that the delays impacted SU's implementation timelines, the Health Authority were expected to meet the enrollment quota to secure funding from the CDC for future years. As a result, the Health Authority had little flexibility to change the implementation timeline or deliverables for Year 1, creating increased pressure on OSU to deliver programs.

The Health Authority had conducted a small pilot of WWE before selecting it and later acknowledged that WWE was challenging to deliver. Yet, given the grant objective to reach "this astronomical number" of people in a short timeframe, the Health Authority felt WWE was the best option of the eligible CDC-approved programs [21]. An administrator stated, "We could look at a couple of programs which are, believe it or not, harder to implement and more costly so we chose...Walk With Ease."

WWE was harder to implement than expected—Due to the delays in finalizing contracts, planning activities undertaken by OSU Extension were based on a partial understanding of the work that was required. OSU Extension administrators agreed to implement WWE with the understanding that WWE was simple to deliver, demanded little staff time, and would be supported by the other partners. After implementation began, OSU Extension reported that running the program, working with volunteers, and marketing was more complicated than expected.

Insufficient staffing—Extension administrators estimated that implementation would require about 5% of each assigned staff persons' overall full-time equivalent (FTE) (i.e., 2 h a week for a full-time, 40 h/week staff person), and so allocated this amount of time into the staff's work plans for the year. All staff reported that the allotted 5% FTE was insufficient to implementing WWE, especially given that planning was incomplete. Further, there were disparities across counties in the amount of time and personnel that staff had available to them to implement WWE. Respondents from large offices reported that they could engage other office staff who, though not allocated time to work on WWE, could assist in prepping for WWE implementation. Staff in small, rural county offices had fewer general office staff who could help and described more difficulties in implementing WWE.

Organization-level facilitators to implementation

All respondents reported that they were actively working to address the previously reported barriers. Many had already seen some progress and were able to identify facilitators that had already proven useful.

Established infrastructure of OSU extension service—Three components of the existing OSU Extension Service infrastructure were identified as helpful: (1) the reputation of the OSU Extension Service in local communities, (2) existing community partnerships, and (3) mentoring relationships between OSU Extension staff. Respondents explained that the public looks to OSU Extension staff for assistance on a range of topics. This

reputation as deliverers of quality information makes OSU Extension well-suited to introduce new programs. Several respondents reported that they were working with existing partners and community organizations to deliver future WWE programs. OSU staff reported that strong intra-organizational relationships between county staff would help disseminate information and assist staff in future counties to learn from the implementation experience of the first seven. Two respondents suggested building time for mentoring into staff's work plans to help facilitate the delivery of WWE.

The Extension staff's previous experience implementing new programs—The OSU Extension staff had previous experience implementing new, evidence-based programs and understood the accompanying challenges. This experience translated into an understanding and tolerance for the difficulties experienced in Year 1 of WWE implementation. A few respondents described previously seeing programs, initially difficult to implement, later become embedded and self-sustaining in their local communities. Most respondents were confident that, after they had more experience with WWE, implementation would improve.

Centralized administration of key activities—Respondents reported that the addition of an OSU Extension program manager, hired late in Year 1, provided them with technical assistance, and helped streamline volunteer training and marketing efforts. Respondents, especially those without support staff, reported that they did not use the funds they were allocated because they did not have the time to develop program materials and were unable to recruit volunteers. Staff requested that central administration develop and distribute promotional program materials so that county staff could focus on recruiting volunteer leaders. As a result, a dedicated project coordinator was hired in Spring 2013 by OSU to help coordinate key implementation activities. The CDC contract, however, did not include funds to support staff time. Therefore, the coordinator position was developed and funded through internal OSU Extension funds.

Program-level barriers to implementation

Managing volunteers—Recruiting and training volunteers to deliver WWE placed additional burden on staff time. Existing volunteer leaders from other Extension programs were already engaged and often over-committed; therefore, staff were required to develop new partnerships to recruit WWE leaders. Assistance from the Health Authority and Arthritis Foundation in recruiting volunteers and participants at the state level increased the burden on local staff who then had to manage referrals by providing locally tailored assistance in addition to their local recruits. Respondents noted that they had insufficient time to build the personal relationships that are the necessary foundation to effectively managing volunteers. For those potentially interested volunteers, barriers to initiation included the time commitment of leading 18 classes and participating in the leader training. The

online training model proved problematic due to technical barriers and general disinterest from volunteers in computer-delivered training. To overcome such barriers, OSU staff encouraged volunteers to complete the training in county Extension offices so that they could assist; however, this placed an additional burden on staff time.

Rigidity of WWE program design—Respondents reported that potential volunteers were concerned about the lack of flexibility in the program design and the leader requirements. Because WWE emphasizes walking, an activity that most people do in their daily life, staff questioned the value of requiring leaders to obtain cardiopulmonary resuscitation certification and for volunteers and participants to complete institutional liability forms.

The OSU Extension Service provides outreach to diverse audiences including culturally and linguistically diverse populations. Therefore, respondents explained that changes to WWE would enable them to meet the varied needs of these different populations and adapt the program to local contexts. Suggestions included reducing the program meetings from thrice to twice a week to accommodate participant schedules, condensing the educational material to make the content more relevant to audiences that may not have arthritis but would benefit from the walking component, and training bilingual speakers to lead the program.

Despite recommending adaptations, meeting minutes reflected that staff wanted permission before enacting changes. Most OSU Extension Service programs are federally funded and must be implemented according to strict guidelines. Strong experience implementing these programs, coupled with support for research and evidence, meant that staff valued program fidelity and compliance with funding requirements. The program materials, however, provided guidance on neither clear immutable “core” program components, nor appropriate adaptations. Therefore, staff were unclear about whether and to what extent WWE could be adapted. As it became clear that WWE was challenging to implement in its current format, the Health Authority requested approval from the CDC to modify WWE in line with OSU staff’s recommendations. This request was not granted during the study period due to concerns that adaptations would threaten fidelity and outcomes.

Program-level facilitators to implementation

WWE’s evidence base and pre-packaged design—The evidence-base for WWE was a facilitator that OSU staff believed they could leverage to create buy-in with local community partners. Staff liked the WWE program design and pre-packaged materials because it supported volunteers to deliver the content. Several respondents planned to use WWE to reach new audiences and to complement other OSU Extension services such as nutrition and cooking classes.

Program fit—OSU Extension staff had mixed responses, and mixed feelings, about whether WWE was a good fit for OSU Extension. Most staff bought-in to the WWE program goals, and reported that there was a need for walking groups in their communities. Some respondents reported that WWE would be useful in providing a structure for walking groups, but others reported that more adaptations would be needed to meet local needs. Two OSU Extension respondents stated that their communities had more urgent priorities and questioned whether WWE would jeopardize their ability to attend to more pressing concerns. One of these respondents struggled with balancing national and statewide health priorities with community-identified needs saying: “It’s a catch-22... we know obesity is continuing to increase and that not enough people are exercising...but maybe I’m just not in the right place to hear those demands [from my community].” In general, most respondents reported that they needed more experience with and information about the WWE program in order to determine whether it would be a good fit for their communities.

DISCUSSION

This study explored factors that impacted the implementation of an arthritis self-management program by a large, statewide delivery system, the OSU Extension Service. Although established infrastructure, including skilled staff and a strong reputation in the community were strengths of the OSU Extension Service delivery system, several major barriers impeded implementation. A key barrier was that insufficient planning and preparation occurred prior to embedding WWE into the OSU delivery system. Insufficient planning was driven by delays in establishing inter-organizational contracts that defined the expectations, roles, and workloads of the three partnering organizations. In addition, there was pressure to hasten implementation to meet the goals of the funding contract. The funding agencies set the delivery goal of 28 classes with the expectation that preparation and delivery could occur during a 12-month time-period. Either this period was not sufficient or the poor timing of implementation contributed to 11% of the delivery goal being met.

Three aspects of the CDC funding model contributed to the barriers reported in this study. First, the success of implementation was defined by enrolling a targeted number of participants into WWE programs within a specific time period rather than by building capacity within OSU to implement WWE. For example, the contract prematurely emphasized developing a sustainability plan—an activity associated with later stages of implementation [10]. This pressure to deliver programs resulted in key implementation stages being skipped, chiefly, the preparatory stages during which program-specific capacity and a structure for implementation is created [15].

Second, existing OSU Extension staff time could neither be supplemented using the grant funding nor

could new staff be hired due to the limitations on use of monies for program costs. Insufficient staff time and resources are known threats to successful implementation of evidence-based interventions [22, 23]. Despite this evidence, the rationale for restricting funding was to reduce organizational reliance on external funding and encourage capacity building for program sustainability [5]. Although a grant coordinator was funded at the state level to facilitate communication between organizational partners, a dedicated program coordinator within the OSU Extension system was needed to guide WWE implementation. Because of the lack of funds for staff time, hiring a coordinator was an unanticipated expense that OSU Extension Service had to absorb post hoc. This resulted in extra pressure on existing staff to incorporate WWE into already full workloads.

These findings are concerning because staff support and motivation to deliver a program is critical to quality implementation [24]. Additionally, staff turnover has been linked to lack of organizational support for staff, and staff buy-in for new programs [25]. New implementation efforts that increase the workload of existing staff without additional resources may affect not only the quality of the intervention, but the stability of the organization [26]. Therefore, ensuring that time is spent preparing, training, and support staff for new implementation is essential to intervention sustainability and organizational functioning.

The third aspect of the CDC funding model that impeded implementation was the requirement that the Health Authority select an evidence-based program from a list of six CDC-approved programs, and implement it without adaptation. Although the Health Authority was aware of the problems with WWE, they chose it as the best available option. During Year 1, the CDC did not approve the use of a modified version of WWE, further complicating the ability to adapt WWE to local settings.

The challenges to implementing WWE in the real world, as evidenced in this study, reflect one of the most important problems in translational behavioral medicine: the implementation of evidence-based programs is not seen as a complex intervention in and of itself and, therefore, subject to rigorous of planning and appropriate resourcing. In research contexts, for example, multiple tools and processes are designed to guide the development of interventions [27] and test their efficacy. Interventions designed without consideration to key steps, such as linking intervention objectives to an appropriate theory of behavior change, or establishing an evaluation plan to test efficacy, are unlikely to be published or funded. Conversely, despite that translational research has established that implementation quality affects program outcomes [12] and identified a plethora of factors that may make or break new programs—e.g., over 120 in just one study [28]—funders rarely require evidence of detailed implementation plans or contingency plans should barriers arise.

Our findings show that as programs move from research to practice settings, the context and restraints of the real-world restrict ideal program implementation. Despite that real-world implementation often

occurs in messy, uncontrollable, and often unstable environments, it is possible to plan ahead and develop strategies to adjust the implementation plan to address problems as they arise. Many of the barriers encountered in this study reflect those identified in the literature and could have been prevented given time for quality planning. For example, the Quality Implementation Framework outlines key activities that should occur during each implementation stage [12], including the importance of creating an implementation plan and structure during early implementation. Both the OSU staff and the Health Authority recognized the lack of planning as an oversight and expressed frustration with the timeline. Regardless of this awareness, the pressure from funders to meet participant enrollment goals drove premature implementation and impeded capacity building.

Despite the many barriers to implementation, an important facilitator that may moderate the impact of insufficient planning was the established infrastructure of the OSU Extension Service. In particular, Extension staff showed tolerance and understanding of the problems inherent in implementing new programs. Staff were aware that barriers would exist and were knowledgeable about how to work through them. In addition, OSU was able to draw on existing capacities and resources—including established networks with community partners and funds to hire a program coordinator—to help support implementation. These facilitators illustrate the benefit of targeting established delivery systems to implement new programs and represent strengths of the CDC funding model. Established capacity, however, was necessary but not sufficient for successful implementation. OSU still needed to build program-specific capacity to successfully incorporate WWE delivery into the existing infrastructure.

The small sample size was a limitation of this study. Though small, we recruited all individuals from the three organizations in Oregon who were involved in WWE implementation. The small sample size further reflects the lack of staff time and resources devoted towards implementation activities aimed at achieving statewide delivery. Triangulating data from multiple sources provided a more comprehensive understanding of the factors that affected implementation and allowed corroboration of the interview findings; however, generalizability is limited. Another limitation is that the interviews were conducted by the program coordinator whose familiarity with the interviewees may have generated a social-desirability bias in the participants' responses. The established relationship between the interviewer and respondents was based on partnership and collaboration towards the goal of improving future implementation. Therefore, response bias may have overly emphasized barriers as respondents were aware that their feedback could directly influence changes to future delivery.

Our findings support previous research that indicates that implementation failures are often due to barriers encountered during the early stages of implementation [29], marking this a key stage for enhanced support,

resources, and technical assistance. Despite this evidence, funders, eager to see progress, continue to define implementation goals in terms the reach of programs, e.g., the number of classes delivered and people enrolled. Although the barriers in this study correspond with previous research about barriers to implementation, it bears repeating that when fundamental issues are ignored—insufficient planning, resources, staff, and lack of coordination—implementation suffers. Based on the results of this study and supported by implementation literature, we make the following recommendations:

- **Funder-Level Considerations**

Defining key organization-level capacity-building targets (e.g., conducting trainings, identifying organization-level champions, delineating tasks, establishing protocols, developing organization-specific marketing plans) in funding contracts in addition to delivery targets, has four potential benefits: 1) it legitimizes the value of engaging in quality planning, without which quality implementation would be impossible; 2) it would allow organizations to take the time necessary to pilot and refine implementation processes and build capacity for implementation without jeopardizing their other commitments, programs, or staff; 3) promoting capacity-building activities reduces pressure on staff to deliver quality programs without sufficient knowledge, buy-in, or support and increases the organizations' willingness to continue implementing the new program and solving problems; 4) it promotes the quality of implementation and likelihood for sustainability [28].

Targeting new implementation at delivery systems that have established infrastructure and staff experienced in delivering new programs can facilitate implementation by drawing on staff's knowledge, tolerance for unanticipated barriers, and experience problem-solving solutions.

Front-loading funding and resources during early implementation may help delivery systems adjust to and absorb the shock of introducing and embedding a new program into their current staffing structure. In lieu of funding for staff time the following considerations may support implementation: 1) Centralized administration of some implementation activities can alleviate pressure on staff time, guide implementation, and facilitate communication; 2) More time will be needed for the organization and existing staff to adjust to and absorb the new program into existing staff workload and obligations; 3) A support system that provides program-specific technical assistance, resources and coordination can help address barriers as they arise. In the case of this study, the centralized administrator acted as the support system. However, it has been suggested that external organizations can act as a support system to help program deliverers navigate program-specific barriers [30]. Further studies are needed to determine the key mechanisms by which

external support systems may facilitate capacity-building for implementation.

- **Organization-Level Considerations**

Thorough planning prior to implementation of programs is essential and cannot be overlooked or rushed [10, 15]. Sufficient time and energy must be devoted to establishing an implementation plan that is specific to the local setting, ensuring that staff support and buy-in is cultured, and that staff are trained and confident in their abilities to deliver programs. Lack of planning may result in poor implementation quality [12], staff turnover [26], or discontinued implementation [12].

Although many process and theoretical frameworks exist that identify pre-implementation planning as prerequisite for successful implementation [31], the key activities will need to be tailored to the qualities of the program and the organizational context in which it is implemented [24]. Piloting implementation processes before full implementation will help refine protocols and ensure they are relevant and feasible to the local setting.

A dedicated implementation coordinator is needed within the organization to drive implementation, provide motivation, and coordinate communication, especially when the organization represents a delivery system comprised of multiple delivery sites [29].

In the context of multi-site implementation, articulating site-level goals and conducting ongoing monitoring will enable the early identification of sites in need of additional support.

- **Program-Level Considerations**

Pre-packaged programs with evidence of effectiveness can facilitate implementation by establishing credibility, but evidence about implementation, e.g., the actual costs of implementation, adaptability, time required for delivery, barriers, facilitators, is needed for delivery systems and funders to have a clear understanding of the scope of time, work and resources that are needed to meet desired delivery targets [11]. If possible, observation of the program and learning from others' implementation experiences would help organizations develop a deeper understanding of the delivery requirements.

Programs selected for large-scale implementation should be carefully designed and packaged with this end in mind, though they rarely are. Programs that can be adapted to meet multiple needs of organizations and their clients are preferable to those that are narrowly targeted towards one health condition, behavior, or target audience [12]. Adaptations are often necessary and can strengthen programs by ensuring acceptability to target settings. Evaluation and monitoring can help ensure adaptations are appropriate and do not threaten effectiveness [32].

CONCLUDING REMARKS

Our study provides a case example of what happens when insufficient planning and resources are devoted to implementation in real-world settings. Chiefly, the focus on meeting delivery targets precluded attention to building sufficient capacity within OSU Extension to deliver WWE. As a result, OSU did not meet delivery targets in Year 1 and neither did WWE delivery become embedded into the routine work of the OSU Extension Service.

Although the OSU Implementation study identified major barriers to implementation in Year 1, the implementation of WWE in subsequent years significantly improved resulting in positive health outcomes for participants [33]. Now in Year 4, over 180 WWE classes have been delivered to over 1600 participants in 26 of Oregon's 36 counties (unpublished data). The rigidity of the implementation requirements were relaxed by the CDC, resulting in the development of new collaborative partnerships between OSU Extension and the Department of Corrections, American Indian tribal communities, coordinated care organizations, community colleges, community organizations, and state-government workforce wellness programs. These collaborations have spawned cross-organization efforts to seek funding to develop new walking initiatives and lay-leader training programs for walking groups in Spanish-speaking communities. Although it was beyond the scope of this study to further explore WWE implementation in subsequent years, these successes indicate that with more time, centralized coordination and a flexible implementation plan, OSU was able to overcome the barriers identified in this study. Future T4 translational research is needed to compare strategies used by organizations that are able to surmount problems to those who succumb to implementation barriers.

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- Hootman, J. M., Brault, M. W., Helmick, C. G., Theis, K. A., & Armour, B. S. (2009). Prevalence and most common causes of disability among adults—United States, 2005. *Morbidity and Mortality Weekly Report*, 58(16), 421–426.
- Barbour, K. E., Helmick, C. G., Theis, K. A., et al. (2013). Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2010–2012. *Morbidity and Mortality Weekly Report*, 62(44), 869–873.
- Brady, T. J., Jernick, S. L., Hootman, J. M., & Sniezek, J. E. (2009). Public health interventions for arthritis: expanding the toolbox of evidence-based interventions. *J Women's Health*, 18(12), 1905–1917. doi:10.1089/jwh.2009.1571.
- Hootman, J. M., Helmick, C. G., & Brady, T. J. (2012). A public health approach to addressing arthritis in older adults: the most common cause of disability. *Am J Public Health*, 102(3), 426–433. doi:10.2105/AJPH.2011.300423.
- Brady, T. J., Sniezek, J., & Ramsey, L. (2012). News from the CDC: scaling up sustainable intervention delivery—lessons learned from the CDC arthritis program. *Transl Behav Med*, 2(1), 3–5. doi:10.1007/s13142-011-0105-4.
- Fishbein, D. H., Ridenour, T. A., Stahl, M., & Sussman, S. (2016). The full translational spectrum of prevention science: facilitating the transfer of knowledge to practices and policies that prevent behavioral health problems. *Transl Behav Med*, 6(1), 5–16. doi:10.1007/s13142-015-0376-2.
- Centers for Disease Control. A national public health agenda for osteoarthritis. 2010; 1–62. Available at: <http://www.cdc.gov/arthritis/docs/oaagenda.pdf>. Accessed 22 Oct 2015.
- Centers for Disease Control. Funded state arthritis programs. 2015; <http://www.cdc.gov/arthritis/partners/funded-states.htm>. Accessed 1 Mar 2016.
- Burnes, B. (2004). Emergent change and planned change—competitors or allies?: the case of XYZ construction. *Int J Oper Prod Manag*, 24(9), 886–902. doi:10.1108/01443570410552108.
- Fixsen, D. L., Naoom, S. F., Blase, K. A., Friedman, R. M., & Wallace, F. (2005). *Implementation research: a synthesis of the literature*. Tampa, FL: University of South Florida.
- Glasgow, R. E., & Emmons, K. M. (2007). How can we increase translation of research into practice? Types of evidence needed. *Annu Rev Public Health*, 28(1), 413–433. doi:10.1146/annurev.publhealth.28.021406.144145.
- Durlak, J. A., & DuPre, E. P. (2008). Implementation matters: a review of research on the influence of implementation on program outcomes and the factors affecting implementation. *Am J Community Psychol*, 41(3–4), 327–350. doi:10.1007/s10464-008-9165-0.
- Bruno, M., Cummins, S., Guadiano, L., Stoos, J., & Blanpied, P. (2006). Effectiveness of two Arthritis Foundation programs: Walk With Ease, and You Can Break the Pain Cycle. *Clin Interv Aging*, 1(3), 295–306. doi:10.2147/cia.2006.1.3.295.
- Callahan, L. F., Shreffler, J. H., Altpeter, M., et al. (2011). Evaluation of group and self-directed formats of the Arthritis Foundation's Walk With Ease program. *Arthritis Care Res*, 63(8), 1098–1107. doi:10.1002/acr.20490.
- Meyers, D. C., Durlak, J. A., & Wandersman, A. (2012). The quality implementation framework: a synthesis of critical steps in the implementation process. *Am J Community Psychol*, 50(3–4), 462–480. doi:10.1007/s10464-012-9522-x.
- QSR International Pty Ltd. (2012). *Nvivo qualitative data analysis software* [Version 10].
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qual Health Res*, 15(9), 1277–1288. doi:10.1177/1049732305276687.
- StataCorp. (2011). *Stata Statistical Software: Release 12*. College Station, TX: StataCorp LP.
- Office of Management and Budget. (2013). *Revised delineations of metropolitan statistical areas, micropolitan statistical areas, and combined statistical areas, and guidance on uses of the delineations of these areas*. Washington, D.C.: United States Census Bureau.
- Budget Control Act of 2011, *Public Law 112–25*, 112th Cong (2011). <https://www.gpo.gov/fdsys/pkg/PLAW-112publ25/html/PLAW-112publ25.htm>. Accessed 25 Feb 2017.
- Centers for Disease Control. Arthritis appropriate physical activity and self-management education interventions: a compendium of implementation information. 2012; <http://www.cdc.gov/arthritis/interventions/marketing-support/compendium/docs/pdf/compendium-2012.pdf>. Accessed 12 Dec 2015.
- Brownson, R. C., Ballew, P., Dieffenderfer, B., et al. (2007). Evidence-based interventions to promote physical activity: what contributes to dissemination by state health departments. *Am J Prev Med*, 33(1), S66–S78. doi:10.1016/j.amepre.2007.03.011.
- Dariotis, J. K., Bumbarger, B. K., Duncan, L. G., & Greenberg, M. T. (2008). How do implementation efforts relate to program adherence? Examining the role of organizational, implementer, and program factors. *J Community Psychol*, 36(6), 744–760. doi:10.1002/jcop.20255.

24. Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*, 4, 50. doi:10.1186/1748-5908-4-50.
25. Ahmed, K., & Ahmed, H. (2013). The mediating effect of organizational commitment on the relationship between perceived organizational support and turnover intention. *Journal of Research in Social Sciences*, 1(2), 33.
26. Park, T., & Shaw, J. D. (2013). Turnover rates and organizational performance: a meta-analysis. *J Appl Psychol*, 98(2), 268–309. doi:10.1037/a0030723.
27. Bartholomew, L. K., Parcel, G. S., & Kok, G. (1998). Intervention mapping: a process for developing theory- and evidence-based health education programs. *Health Educ Behav*, 25(5), 545–563.
28. Flaspohler, P., Duffy, J., Wandersman, A., Stillman, L., & Maras, M. A. (2008). Unpacking prevention capacity: an intersection of research-to-practice models and community-centered models. *Am J Community Psychol*, 41(3–4), 182–196. doi:10.1007/s10464-008-9162-3.
29. Lorig, K. R., Hurwicz, M.-L., Sobel, D., Hobbs, M., & Ritter, P. L. (2005). A national dissemination of an evidence-based self-management program: a process evaluation study. *Patient Educ Couns*, 59(1), 69–79. doi:10.1016/j.pec.2004.10.002.
30. Wandersman, A., Duffy, J., Flaspohler, P., et al. (2008). Bridging the gap between prevention research and practice: the interactive systems framework for dissemination and implementation. *Am J Community Psychol*, 41(3–4), 171–181.
31. Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implement Sci*, 10(1), 1–13.
32. Milat, A. J., Newson, R., King, L., et al. (2016). A guide to scaling up population health interventions. *Public Health Res Pract*, 26(1), e2611604.
33. Conte, K. P., Odden, M. C., Linton, N. M., Harvey, S. M. (2016). Effectiveness of a scaled-up arthritis self-management program in Oregon: walk with ease. *Am J Public Health*, 106(12):2227–2230. doi: 10.2105/AJPH.2016.303478.