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Designing and Implementing Inclusive Community-Based Health Promotion Intiatives

Cassandra Herman
University of Alabama at Birmingham

DESIGNING AND IMPLEMENTING INCLUSIVE COMMUNITY-BASED HEALTH PROMOTION INITIATVES

by

CASSANDRA L. HERMAN

DORI PEKMEZI, CHAIR
ROBIN LANZI
SUZANNE PERUMEAN-CHANEY
KERRI VANDERBOM
BROOKS C. WINGO

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CASSANDRA L. HERMAN

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ABSTRACT

Background: People with disabilities (PWDs) have poorer health outcomes, yet are they are underserved by public health initiatives. PWDs face numerous barriers to participation in community-based health programs despite mounting evidence about these barriers along with recommendations and guidelines to become more inclusive of disability. Policy, system, and environmental (PSE) changes that are inclusive of PWDs can help create access to health promotion programs for PWDs. Systematically implementing inclusive PSE changes using implementation science principles can support effective and sustainable changes are implemented for each unique community context. The purpose of this dissertation is to explore the experiences of public health and disability health professionals in developing and implementing PSE changes inclusive of PWDs and identify determinants of implementation behavior that support successful inclusive PSE changes.

Methods: Interviews conducted with community coaches (n=19) representing 10 communities that were a part of The Reaching People with Disabilities through Healthy Communities (DHC) project were coded into the Theoretical Domains Framework (TDF) and the COM-B framework (capabilities, opportunities, and motivations to lead to behaviors), to identify emerging themes related to the determinants of implementation

behavior. Coaches also completed a questionnaire based in the TDF to determine self-reported determinants of implementation behaviors. Finally, using the Knowledge-to-Action Framework, we explore the use of a systematic implementation framework in implementing inclusive changes in a specific context.

Results: We found that the opportunities domain, consisting of environmental context and resources and social influences, was reported to have the greatest perceived effect on implementation processes of inclusive PSE changes.

Conclusion: Systematically navigating the environment, both social and physical, to build opportunities for inclusive PSE changes can assist in facilitating implementation of inclusive public health initiatives. Creating opportunities through allocation of resources and engaging the community members to implement inclusive changes within the community is a step towards addressing the health disparities faced by PWDs.

Keywords: Disability, physical activity, community, implementation

DEDICATION

For my family, who have been a constant source of love and support and never let me take myself too seriously. Thank you for encouraging me to be open to new opportunities and walking with me through each new adventure.

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LIST OF ABBREVIATIONS

BCW	Behavior Change Wheel
COM-B	Capabilities, opportunities, motivation, behavior
DHC	Reaching People with Disabilities through Healthy Communities
KTA	Knowledge- to-Action
PA	Physical Activity
PSE	Policy, systems, and environmental changes
PWDs	People with disabilities
TDF	Theoretical Domains Framework

INTRODUCTION

Physical Disability in the United States

Approximately 22% of Americans identify as having a disability, equating to 1 in 5 adults in the United States. The most common among those reported are mobility limitations (Courtney-Long et al., 2015). The World Health Organization (WHO) recognizes the presence of impairment, activity limitation, and participation restriction as defining characteristics of disability ("WHO | International Classification of Functioning, Disability and Health (ICF)," n.d.). The Centers for Disease Control and Prevention (CDC) define disability as "any condition of the body or mind (impairment) that makes it more difficult for the person with the condition to do certain activities (activity limitations) and interact with the world around them (participation restriction)" ("Disability Overview | Disability and Health | NCBDDD," n.d.). Disability is non-discriminatory in terms of those it affects though it is more common among older adults, which means the prevalence of age-related disability is likely to increase as Americans are beginning to live longer (Courtney-Long et al., 2015).

Disability as a Health Disparity

Public health aims to improve the health of all Americans. Unfortunately, persons with disabilities often remain an unrecognized health disparity within the field of public health. Health disparities are observed differences in health outcomes which may be avoidable if addressed properly. Though the field has advanced significantly since the days of institutionalization and sterilization of individuals with disabilities, there is still a lot of work to be done to improve the health status and quality of life of individuals with

disabilities (G. L. Krahn, Walker, & Correa-De-Araujo, 2015). Disability has previously been viewed as a result of poor health or an indicator that the individual was inherently unhealthily. Disability is often a surveillance outcome measure, indicating poor health. However, a paradigm shift has occurred over in recent years to view disability as a determinant of health, meaning that the disability is one factor to account for in the overall health of the person. The disability does not make the individual inherently unhealthy (G. Krahn & Campbell, 2011; McDonald & Raymaker, 2013; Rimmer, 2011). Instead, public health should be addressing the health and quality of life of those with disabilities to prevent secondary conditions in this population.

People with disabilities are more likely to have poorer health outcomes than those without disabilities. Those with disabilities are more likely to perceive their own health as fair or poor compared to those without disability (Pharr & Bungum, 2012) and were more likely to report a variety of secondary conditions. In fact, 87% of those with a disability reported at least one secondary condition which they connected directly to their disability (Kinne, Patrick, & Doyle, 2004). People with disabilities also have higher rates of multiple chronic diseases than those without disability including cardiovascular disease, diabetes, high blood pressure, high cholesterol, and stroke (Frith & Loprinzi, 2018; Pharr & Bungum, 2012; Reichard, Stolzle, & Fox, 2011). Moreover, people with mobility limitations have cardiometobolic profiles that place them at higher risk of adverse health outcomes than those who do not have mobility limitations (Loprinzi, Sheffield, Tyo, & Fittipaldi-Wert, 2014). All of these factors contribute to significantly higher health care expenditures than those without disabilities (Reichard et al., 2011). Many of these chronic diseases are largely preventable through healthy lifestyle behaviors.

People with disabilities are less likely to engage in protective health behaviors that can prevent or delay secondary conditions. People with disabilities are more likely to be overweight or obese with one surveillance study finding over 70% of those with physical disability were overweight or obese (Reichard et al., 2011). More recent data from the CDC suggest that this overall percentage remains consistent over time, as the 2016 data report that a combine 68.5% of individuals who report a disability are overweight or obese. Moreover, 38.2% those with disabilities fall into the obese category compared to only 26.2% of their peers not reporting a disability ("Centers for Disease Control and Prevention, National Center on Birth Defects and Developmental Disabilities, Division of Human Development and Disability," n.d.). This higher risk of obesity and secondary conditions may be due to disparities in behaviors such as physical activity, poor dietary habits, and tobacco use.

Physical Activity

Research consistently points to the promising effects of physical activity and lifestyle interventions as beneficial to people with disabilities. Across a variety of disabilities resulting in mobility limitation such as stroke, spinal cord injury and multiple sclerosis, physical activity has led to reductions in obesity, pain, fatigue, and risk of developing chronic disease, as well as increases in strength, balance, and quality of life (Ada, Dorsch, & Canning, 2006; Buchholz et al., 2009; Goodwin, Richards, Taylor, Taylor, & Campbell, 2008; Jelinek et al., 2016; Lai et al., 2018; Latimer-Cheung, Pilutti, et al., 2013; Williams, Smith, & Papathomas, 2014). A study by Firth and Loprinzi quantified the potential positive effects of physical activity on the lifespan for individuals with disabilities. They found that every 60 minutes per day of light physical activity

equated to a 14% reduction in all-cause mortality among people with mobility limitations (Frith & Loprinzi, 2018).

Yet over half adults with disabilities report that they are inactive (Carroll et al., 2014; McGuire, Watson, Carroll, Courtney-Long, & Carlson, 2018). People with disabilities consistently engage in more sedentary time than their counterparts without a disability (523.3 minutes per day compared to 417.9 minutes per day respectively) and engage in less objectively measured physical activity than those without disabilities. Those with disabilities participated in an average of 302.6 minutes per day of light intensity physical activity and 11.6 minutes per day of moderate to vigorous physical activity which was significantly less than their counterparts without a disability (363.7 minutes per day and 28.0 minutes per day respectively) (Loprinzi et al., 2014). This is despite recommendations for physical activity both for the general population inclusive of disability and for specific disability groups including but not limited to spinal cord injury and multiple sclerosis ("2008 Physical Activity Guidelines for Americans. Washington, DC: US Department of Health and Human Services; 2008.," n.d.; Carroll et al., 2014; Ginis et al., 2011; Goosey-Tolfrey et al., 2018; Latimer-Cheung, Martin Ginis, et al., 2013). Within the physical activity guidelines for the general population, people with disabilities are advised to participate in cardiovascular exercise of 150 minutes moderate intensity activity or 75 minutes of vigorous intensity activity per week. Additionally, strength training is recommended for all appropriate major muscle groups 2-3 days a week ("Chapter 7—2008 Physical Activity Guidelines—Health.gov," n.d., p. 7) . Specific suggestions or recommendations are provided for each disability type or category. For example, considerations should be made for heat sensitivity for individuals

with multiple sclerosis by exercising at a time of day when it is cooler (Halabchi, Alizadeh, Sahraian, & Abolhasani, 2017).

Disability in Public Health Promotion

Disability has been targeted as a population of particular public health importance since the Surgeon General's 2005 call to action in which focused on improving the health and wellness of people with disabilities (Office of the Surgeon General (US) & Office on Disability (US), 2005). There has been a recent trend of encouragement of disability inclusion in mainstream public health as well as a call for improved awareness and training for those in a position to improve population health (CDC, 2017; G. L. Krahn et al., 2015; *Strategies for Successfully Including People with Disabilities in Health Department Programs, Plans, and Services*, n.d.). Healthy People 2020 dedicated an objective to increase access and participation of people with disabilities in health and wellness programs, further confirming that there are still numerous barriers to including people with disabilities in health promotion efforts ("Disability and Health | Healthy People 2020," n.d.).

Even with the increased interest in the health equity of people with disabilities, the community level of public health professionals still lacks awareness about this issue. In 2014, the National Association of County and City Health Officials (NACCHO) surveyed a random selection of local health departments on their views and inclusion of people with disabilities. Of 159 local health department administrators, only 11% perceived people with disabilities as a health disparity population experiencing inequities in their health status. Though 58% reported being "knowledgeable/very knowledgeable" regarding accommodations needed to be inclusive of individuals with disabilities, this did

not translate to being inclusive in health promotion programming with as little as 16% of health programming reported as inclusive to people with disabilities (Leser, Jetty, Yates, & Li, 2016).

Barriers to Healthy Behaviors for People with Disabilities

Physical barriers

Many individuals with disabilities face barriers to making healthy choices that are outside of themselves. Healthy People 2020 calls for the reduction of barriers to accessing local health and wellness programs for adults with disabilities. Currently, 76.8% of people with disabilities report barriers exist that prevent them from accessing these services and programs ("Disability and Health | Healthy People 2020," n.d.). People with disabilities tend to be affected by common barriers to healthy behaviors including lack of motivation and lack of time, but also face additional and overwhelming barriers to participate in physical activity related to access (Barclay, McDonald, Lentin, & Bourke-Taylor, 2015; Buffart, Westendorp, van den Berg-Emons, Stam, & Roebroeck, 2009; Rimmer, Wang, & Smith, 2008; Van Riper, 2010; Williams et al., 2014). One systematic review found that elements of design (i.e. uneven sidewalks, barriers in paths of travel), and temporal barriers such as lack of clearing snow or limited time to cross at traffic signals inhibit participation in physical activity. However, much of this data was identified using qualitative methods and a lack of empirical evidence was acknowledged. The authors also identified limited studies focused on non-ambulatory people with disabilities and a lack of empirical tools to measure accessibility of the features that were present in the built environment (Eisenberg, Vanderbom, & Vasudevan, 2017).

Getting to a facility that offers services for health promotion, like a fitness center, can also be difficult. A commonly reported barrier to physical activity is inaccessible

transportation. The physical environment can be very detrimental to access if not set up properly. The design of the different environments surrounding the individual can affect their uptake of healthy behaviors.(Jaarsma, Geertzen, de Jong, Dijkstra, & Dekker, 2014; Kirchner, Gerber, & Smith, 2008; Lauer & Houtenville, 2018; Martin, 2013; Rimmer et al., 2008). The inability to get to a facility is associated with lack of physical activity behaviors, and points the need to address all barriers community-wide that contribute to poor outcomes for PWDs (Anaby et al., 2013; Vasudevan, 2016).

The internal design of a facility can encourage or discourage participation. An elevator inside the building, an accessible bathroom stall, or enough space to maneuver a wheelchair around exercise equipment may encourage participation, whereas the lack of these accessibility considerations may deter participation (Rimmer, Padalabalanarayanan, Malone, & Mehta, 2017; Rimmer et al., 2008). Though the Americans with Disabilities Act attempts to address these barriers in building design and access ("2010 ADA Standards for Accessible Design," n.d.), many facilities still lack accessible features rendering them unusable for individuals with disabilities (Calder, Sole, & Mulligan, 2018; Rimmer et al., 2017).

Social barriers

Beyond the physical environment, social barriers often act as a deterrent for PWDs participate in healthy behaviors. Through interviews with individuals with spinal cord injury, Goodridge and colleagues (2015) discovered several social barriers to participation within the community. One interviewee shared that they had come to feel unimportant due to the lack of willingness to make a change in the environment (Goodridge et al., 2015). Though the physical or built environment is important,

environmental considerations should not be limited to the physical environment, but also include the social, political, and informational environment (Springer, Evans, Ortuño, Salvo, & Varela Arévalo, 2017). Attitudes of those delivering programs and lack of support from service providers can make those with disabilities feel unwelcome (Anaby et al., 2013). Additionally, a loss of autonomy resulting in a reliance on others to participate and a feeling of otherness can reduce motivation to be active (Johnston, Goodwin, & Leo, 2015). Some cite lack of awareness of disability among fitness professionals or stigma surrounding exercise with a disability as barriers to an active lifestyle (Barclay et al., 2015; Jaarsma, Dijkstra, Geertzen, & Dekker, 2014; Rimmer et al., 2017; Shields & Synnot, 2014). Even physicians may lack awareness of lifestyle interventions for people with disabilities. Though there are many noted benefits to physical activity, 56% of people with disabilities did not report a recommendation for participation in physical activity from their physician (Carroll et al., 2014).

Addressing Barriers to Healthy Behaviors for People with Disabilities

Public health initiatives to target healthy behaviors must look beyond individual behavior, to a population-based approach. Adapting the environment, both social and physical, to make healthy choices easier has the potential to target a broad audience (Kumanyika et al., 2008). It remains vital that these efforts are inclusive of people with disabilities. Inclusion, as defined by the CDC, utilizes practices and policies aimed to identify and remove barriers in the physical, communication, and attitudinal contexts that might inhibit full participation by people with disabilities in society at the same level of those without disabilities (CDC, 2017). Inclusion is ensuring everyone is on a level playing field by incorporating policies, training, and environmental features that

encourage access and participation by all members of the community, including those with disabilities.

Many individual level interventions have been undertaken to improve the health of individuals with disabilities, however, the aforementioned barriers to participation severely limit their potential outcomes and the sustainability of those outcomes. Looking beyond individual behaviors to the environment in which those behaviors take place may have the capability to reach a broad audience of people with disabilities and include them in mainstream health promotion activities. Though a gold standard repository exists for evidence-based population-level interventions, termed 'The Community Guide' ("The Guide to Community Preventive Services (The Community Guide)," n.d.), it still lacks interventions targeting people with disabilities, demonstrating a need for accessibility strategies and accessible interventions to be included in broader, public health efforts (Hinton, Kraus, Richards, Fox, & Campbell, 2017).

Accessibility, or the ability of an individual to physically take part in what is being offered, is vital to those with mobility limitations. This includes access to the physical environment, information, programming, and equipment (Iwarsson & Ståhl, 2003). Universal design is one approach to addressing physical barriers to health promotion programs. Originating with the disability rights movement in the 1960, universal design attempts to ensure independent access by all possible users and has been identified as a way to encourage further rehabilitation within the environment (Imrie & Luck, 2014; Steinfeld & Maisel, 2012; Story, Mueller, & Mace, 1998). One example of universal design is the automatic door. This change in design from a push or pull door to the use of a button adds a necessary feature for those who use power wheelchairs, but

also provide convenience for individuals holding packages or parents maneuvering a stroller. Though the adaptation may be designed to specifically assist a person with a disability, it also benefits a larger segment of the population (Steinfeld & Maisel, 2012). Specialized adaptive equipment can also make healthy behaviors possible. For instance, one systematic review of physical activity participation on children and adolescents with cerebral palsy found that appropriate adaptations to activities and equipment facilitated participation in physical activity (Bloemen et al., 2015).

In addition to the physical environment, the social environment must also encourage access to healthy behaviors. Awareness of the abilities of people with disabilities, the importance of physical activity and healthy eating for this population or the adaptations that can make healthy behaviors possible can have a huge impact in participation in those behaviors. For example, a feeling of being 'other' or not part of a group can negatively impact participation in physical activity (Bloemen et al., 2015; Jaarsma, Dijkstra, et al., 2014). Destigmatizing disability can positively affect participation in healthy behaviors, which requires raising awareness of disability health to those providing health promotion services. In a study of local health department administrators, only 58% reported that they were aware or very aware of the accommodations needed to serve people with disabilities (Leser et al., 2016). Increasing awareness of disability inclusion among those providing health promotion services of any kind is essential for reducing health disparities in this population. Thinking more broadly about the environment, both physical and social, in which the program takes place can lead to more use by people with disabilities and better overall health outcomes for this population.

Assessing Barriers

The first step in addressing disability inclusion, is assessment of the facility, programs, and staff to identify areas that need to be addressed. Tools to help better understand how the environment is helping or hindering access have been developed. One such tool is the Community Health Inclusion Index (CHII). This assessment provides a scoring mechanism which allows public health professionals, policy makers, business owners or community members to identify areas in which they can improve accessibility. The CHII requires an in depth look at the facility and surrounding area to address specific accessibility concerns. For example, the CHII may indicate the need for the addition of features specific to access such as curb cuts or to improve the quality of accessibility elements, such as remove a small, portable sign from a walkway, thus widening the walkway to allow a wheelchair user to pass through without barriers (Eisenberg, Rimmer, Mehta, & Fox, 2015). Tools that can objectively measure inclusion and accessibility can help to move public health practice toward inclusion of people with disabilities by creating awareness of areas of need, some of which can be remedied quickly and inexpensively.

Making Adaptations for Inclusion

After identifying areas in need of adaptation, the process of finding solutions for better inclusion of people with disabilities in public health programming can begin. Some strategies and tools have been suggested to assist in including people with disabilities in community health services. Numerous organizations have identified strategies that can help to include people with disabilities in their public health efforts. For example, The National Association of County and City Health Officials (NACCHO) suggests both internal changes, like universal design of the facility and equipment, and staff training in

disability needs, as well as external efforts such as establishing partnerships with organizations that specialize in disability health (*Strategies for Successfully Including People with Disabilities in Health Department Programs, Plans, and Services*, n.d.). To date, the CDC has determined the need to provide adaptations to their broader reaching public health initiatives to ensure they are inclusive of people with disabilities. With adaptations, it is likely that these programs can help overcome these barriers to services and programs (Hinton et al., 2017).

There have been programs that have successfully adapted their content or delivery to ensure inclusion. For example, Betts and Froehlich-Grobe modified the Diabetes Prevention Program (DPP) for people with impaired mobility. To account for transportation difficulty, sessions were delivered over the phone. The content was adapted to include physical activity specific for those with mobility limitations. The equipment used to measure activity was worn on the arm instead of the hip. These modifications are simple yet demonstrated feasibility, usability, and the potential for effectiveness for people with disabilities (Betts & Froehlich-Grobe, 2017). It is also important to note that adapting health programs must be an iterative process. Though there were planned adaptations, Betts et al (2018) reported additional adaptations that became necessary as the program was implemented, called responsive adaptations. For example, when self-monitoring adherence was low, use of the mobile application was encouraged over paper and pen recording to address those affected by limitations in the hand or fingers (Betts, Froehlich-Grobe, Driver, Carlton, & Kramer, 2018).

With many adaptations available, it can be daunting to identify which strategies are the most appropriate for any given program. One tool developed to assist in guiding

adaptations to public health programs is the Guidelines, Adaptations, and Recommendations Including Disability (GRAIDs). This set of guidelines provides evidence informed strategies aligned with CDC's Obesity Prevention Strategies ("Recommended Community Strategies and Measurements to Prevent Obesity in the United States," n.d.). An expert panel convened and identified ways to include individuals with disabilities in obesity prevention through a variety of avenues, including training, service provision considering the needs of people with disabilities, alterations to the built environment to provide access, inclusion of technologies, and recommendations for policy changes or additions. This tool can help to guide public health practitioners in steps to take to include people with disabilities in the programs, policies, training, and services (Rimmer et al., 2014).

Even with numerous available strategies and data documenting both health disparities for people with disabilities and experienced barriers to health behaviors, limited data remains about the implementation of adaptive strategies for disability inclusion in public health settings. Implementation of these suggested strategies for inclusion need to be further investigated to determine the effectiveness, reach, and feasibility of implementation. Additionally, the literature needs to further explore how to best implement these strategies throughout a variety of public health programs to make disability inclusion commonplace in public health initiatives.

Knowledge translation and implementation

Implementation of evidence-based interventions is a complex task requiring behaviors, environments, and knowledge to work together to improve population health. However, this endeavor is necessary to move knowledge into action. Though research has clearly shown a need for addressing barriers to physical activity for people with

disabilities, there remains a know-do-gap between knowledge and community-based practice. This gap results in sustained health disparities and a lack of intervention for improved health outcomes for PWDs (Graham, Kothari, & McCutcheon, 2018; Graham et al., 2006; Miller & Shinn, 2005; Rubenstein & Pugh, 2006). This points to a need to better understand the gap and how researchers can facilitate knowledge use by the intended end user. For example, PA guidelines have been developed specifically for spinal cord injury. However, without the proper knowledge of these guidelines, equipment to make adaptations to PA (i.e. a handcycle instead of an upright bicycle), and support to encourage these behaviors, health professionals may not have the capacity to put that knowledge into action. Though tools and trainings may exist, methods such as educational training are likely not enough to foster change in behaviors of health professionals (Scott et al., 2012).

Implementation of any evidence-based intervention or guideline is complex and requires not only education, but environmental, organizational, and social supports to create and sustain behavior change among those attempting to implement changes that support access to PA for PWDs. For example, at the organizational level, the support of the leadership in using inclusive practices is essential and approaches such as incentivisation can facilitate employees to put knowledge into practice. Additionally, ensuring access to resources to support implementation of guidelines and adaptations to encourage specific behaviors can build capacity for knowledge use (Brownson, Fielding, & Green, 2018). Partnerships and context also play a significant role in implementation (Harden, Johnson, Almeida, & Estabrooks, 2017; Rubenstein & Pugh, 2006; Salbach, Howe, Baldry, Merali, & Munce, 2018). Using frameworks and theories to better

understand what could foster implementation of knowledge supporting inclusion of PWDs in health promoting services within various contexts can advance research to practice more efficiently and can close the know-do gap (Atkins et al., 2017; Graham et al., 2018). What we know is that PWDs benefit from PA but are restricted in access to these programs. Evidence supporting removing barriers in the social and physical environments can be implemented to close this gap between what we know and what we do within public health practice.

Knowledge to Action (KTA) Framework

Frameworks are vital to the systematic translation of knowledge to practice. The Knowledge-to-Action framework by (Graham et al., 2006) offers flexibility and allows for context to play a part in the implementation. For example, the barriers prohibiting access to physical activity within a rural community would likely be different than the barriers in place within a metropolitan city center. This framework helps to systematically outline the process of creating knowledge and putting that knowledge into practical use within a given context. Figure 1 outlines the steps of the KTA framework.

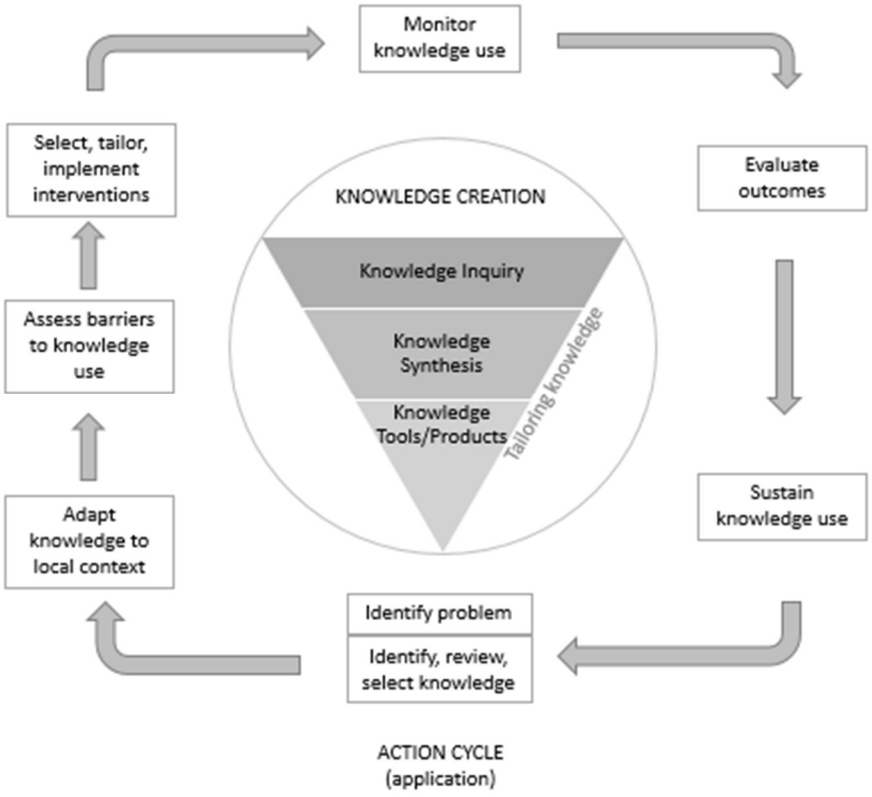

Figure 1: Knowledge-To-Action Framework (Adapted from Graham et al., 2006)

The KTA framework consists of two distinct phases: knowledge creation and action. Research typically informs the knowledge creation phase, beginning with knowledge inquiry or answering research questions, followed by knowledge synthesis (i.e., systematic reviews) giving strength to the evidence, and finally the identification of tools and resources for using that knowledge. The action phase starts with the know-do-gap and identifying knowledge that can inform how to fill that gap. Taking into account the context of implementation, the knowledge must then be adapted for use, barriers to knowledge use must be identified, and finally the knowledge can be implemented in the form of an intervention. The evaluation phase first monitors knowledge use, then evaluates outcomes and finally facilitates sustained knowledge use. The cyclical nature of

this framework means that the Action Cycle can move in any direction and adjustments can be continually made throughout the process if it is found that something new informs implementation of identified knowledge that will improve the health of a target behavior within a target population.

Theoretical Domains Framework

Theory-based frameworks can also help in understanding the behavior of implementation of behavior change interventions. The Theoretical Domains Framework (TDF) is one such framework that has been used to understand processes that contribute to behavior change and implementation behaviors. At the core of its development is the understanding that implementation is dependent on the behavior of those implementing (Cane, O'Connor, & Michie, 2012). For example, in the context of disability and physical activity, health professionals have been identified by people with spinal cord injury as either a facilitator or barrier to pursuing physical activity. One contributing factor acting as a barrier was insufficient knowledge of resources about physical activity for physical disability (Barclay et al., 2015). Health care providers are therefore vital to the behavior of the end user, the patient with a disability. This identifies the importance of those who act as knowledge brokers to healthy behaviors for a target population.

To better understand behaviors, a group of professionals in health psychology and health service research identified 12 domains of behavior change. Domains were determined based on 128 theoretical constructs from 33 psychological theories sorted to represent domains related to behavior change (S Michie et al., 2005). An original set of domains was established in 2005 and then refined in 2012 to include 14 total domains, as described in Table 1 (Cane et al., 2012; S Michie et al., 2005). A questionnaire has been

developed to measure 12 of the 14 domains with acceptable discriminant validity. Though originally developed for use in healthcare settings, this questionnaire allows for the action, context, time, and target of the implementation to be defined for each use. In a community setting, the action (implementation), context (community) and target (guideline/change) can be made appropriate for each setting (Huijg, Gebhardt, Crone, Dusseldorp, & Presseau, 2014; Huijg, Gebhardt, Dusseldorp, et al., 2014).

Table 1: Definitions of the domains of the Theoretical Domains Framework

Domain		Definition
D1	Knowledge	An awareness of the existence of something
D2	Skills	An ability or proficiency acquired through practice
D3	Social/professional role and identity	A coherent set of behaviors and displayed personal qualities of an individual in a social or work setting
D4	Beliefs about capabilities	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use
D5	Optimism	The confidence that things will happen for the best or that desired goals will be attained
D6	Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behavior in a given situation
D7	Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus
D8	Intentions	A conscious decision to perform a behavior or a resolve to act in a certain way
D9	Goals	Mental representations of outcomes or end states that an individual wants to achieve
D10	Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives
D11	Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behavior
D12	Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviors
D13	Emotion	A complex reaction pattern, involving experiential, behavioral, and physiological elements, by which the individual attempts to deal with a personally significant matter or event
D14	Behavioral regulation	Anything aimed at managing or changing objectively observed or measured actions

Adapted from Cane et al (2012)

Atkins et al. (2017) recently identified ways to best use the TDF to assess implementation behaviors. Specification of a target behavior is vital to implementation

research based in the TDF. Beginning with selection and specification of this target behavior, researchers interested in implementation behaviors must (1) select a study design typically involving interviews, questionnaires, observations, and focus groups; (2) develop study materials using templates from previous implementation studies adjusted to fit the appropriate context; (3) decide the sampling strategy typically reflecting exploratory study methods; (4) collect the data following previously reported study techniques (i.e. audio recorded interviews and questionnaires); (5) analyze the data categorizing it into relevant TDF domains according to the behavior and context; and finally (6) report findings (Atkins et al., 2017).

Behavior Change Wheel (COM-B)

Complementary to the TDF, the Behavior Change Wheel links a target behavior to intervention functions to achieve behavior change. Individual behavior is broken down into capability, opportunity, and motivation (COM-B). Michie et al (2011) define capability as the individual's actual capacity to engage in the activity; opportunity refers to the influences outside of the individual that prompt or allow for the behavior to take place; and motivation is the personal processes that provoke the behavior and direct the behavior within the individual. All of these can interact to influence behavior and in turn, the behavior can modify the individuals capability, motivations, and opportunities (Susan Michie, van Stralen, & West, 2011).

Where the TDF helps to explain behavior, the Behavior Change Wheel helps to design interventions to target specified areas of behavior driven by capability, opportunity, or motivation and the interaction between these constructs. Each domain describing the implementation behaviors in the TDF can be overlaid in the behavior

change wheel (figure 2) to further inform where and how to intervene to improve implementation. Together, the TDF and COM-B allow for better understanding of how to support implementers (Atkins et al., 2017; Cane et al., 2012). Achieving a better understanding of public health officials' behaviors and contexts regarding health promotion programming that is inclusive of people with disabilities will allow for use of the COM-B framework. Once the areas of need are identified, the next step is selection of intervention methods to target capability, motivation, and/or opportunity. In the case of disability and public health, the target behavior is including disability within community-based health promotion efforts. For example, if the public health practitioner is not aware of the accessibility needs of individuals with disability, the target domain is capability. An intervention strategy to target this domain could be training via an education session from a disability health profession to increase awareness and knowledge of resources. The COM-B overlaid with intervention functions can be found in Appendix B. Though there are contextual differences among different communities, the COM-B guides the design of behavioral interventions that can be informed by the literature and future public health research to better promote inclusion in public health programming.

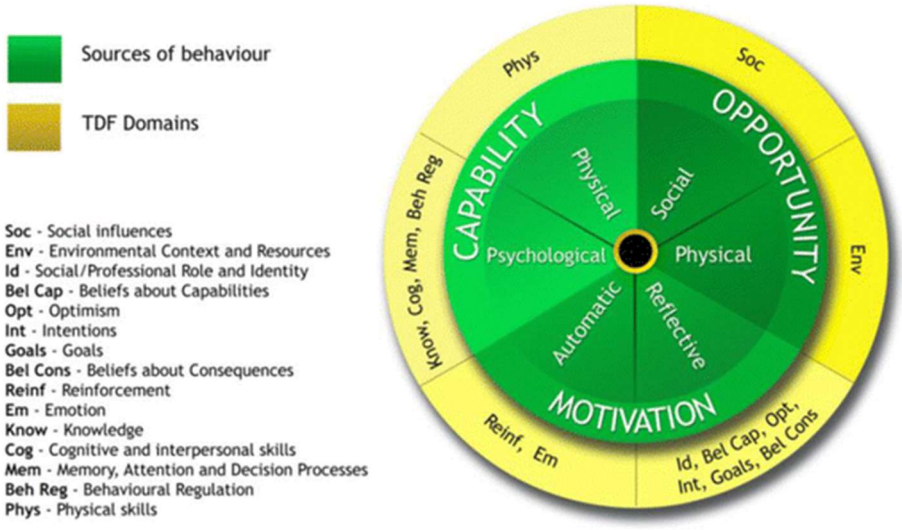

Figure 2: Theoretical Domains Framework and the Behavior Change Wheel (Atkins et al., 2017)

Reaching People with Disability through Healthy Communities Project

The Reaching People with Disabilities through Healthy Communities (DHC) project addressed disability through inclusion in health promotion activities. The DHC project was funded through a collaboration of 3 national entities, the National Association of Chronic Disease Directors (NACDD), the Centers for Disease Control and Prevention (CDC), and the National Center on Health, Physical Activity, and Disability (NCHPAD) with the purpose of bridging the gap between disability and public health resembling the model of the Action Communities for Health, Innovation, and EnVironmental change (ACHIEVE) program used in previous Healthy Communities projects. Healthy Communities projects focused on local public health professionals within different communities with an overarching goal to reduce chronic disease through community-based health interventions. The communities were to target physical activity, healthy eating, and tobacco cessation through policy, systems, or environmental changes

(Cox, 2009). Policy, systems, and environmental (PSE) changes have the potential to reach a larger proportion of the population than individual level interventions. In a review of 50 of these funded communities throughout the United States focusing on PSE changes, it was estimated that each PSE change had a potential reach of 43% of the overall population, supporting the use of this type of change in a health promotion context (Bunnell et al., 2012).

Due to the fact that people with physical disabilities are an underrepresented group in public health and behavior change, community-based strategies to promote healthy behaviors may not consider inclusivity in their planning process, continuing the cycle of disparate outcomes for people with disabilities. The DHC project, which funded 10 communities within 5 states, mandated a focus on disability inclusion to all policy, systems, and environmental changes within each community. Five applicants from existing CDC State Disability and Health Programs were selected to participate. Each state identified 2 communities within their state to receive funding for PSE changes. Communities included the following: Cattaraugus County and Syracuse in New York; Adams County and Marion County in Ohio; Helena and Butte in Montana; Umatilla County and Benton County in Oregon; and Sioux City and Carroll County in Iowa. Each community was to implement inclusive policy, systems, and/or environmental (PSE) changes to promote incision of people with disabilities in public health efforts. Two community coaches who were either local disability or public health professionals were tasked with coordinating implementation processes within their own communities. Each coach was provided initial training to ensure understanding of both disability inclusion and PSE change processes. A state disability expert from the CDC State Disability and

Health Programs for each state acted as a resource to the local community coaches, providing oversight, recommendations, and as needed assistance to the community coaches. Technical assistance was also provided by each of the overseeing organizations and the state expert and included as needed assistance or resources. Further support was provided by NACDD and NCHPAD through a variety or trainings (webinars, one-on-one consultation, site visits, information sharing).

The selected communities approached Reaching People with Disabilities through Healthy Communities through a six-phase model: (1) Commitment through coalition development, (2) Assessment of inclusive elements in the community, (3) Planning and prioritizing gaps in community access and development of an action plan, (4) implementation of the action plan and PSE change, (5) Evaluation, and (6) Dissemination of strategies implemented. Each community was given resources to guide and assist in developing PSE changes. First, the Community Health Inclusion Index (CHII) was used to objectively assess the current environments for accessibility and inclusion of people with disabilities (Eisenberg et al., 2015). Once general targets were identified, the Guidelines, Recommendations, and Adaptations Including Disability (GRAIDs) framework was provided as a resource to further develop PSEs as inclusive public health strategies (Rimmer et al., 2014). Working in tandem, the CHII helped to identify gaps in inclusion or access to community-based services and the GRAIDs helped to identify strategies to address those gaps.

Each community developed tailored PSE change plans addressing specific issues in their communities. Number and types of strategies differed by community, but each community was to create an action plan with 3 overall goals, one addressing physical

activity, one addressing healthy eating and the third addressing either physical activity, healthy eating, or tobacco use. Some examples of PSE changes implemented by the communities included initiation of an inclusive Monday Mile program in which a route accessible to people with disabilities was designated for a 1 mile walk every Monday, inclusion of handcycles in a school-based bike cooperative program, staff training on rock climbing for PWDs at a local fitness center, and installing power wheelchair charging stations throughout the community.

Communities were funded for an 18-month period including 6 months of training and planning and 12 months of implementation. Throughout this timeframe, a total of 9 quarterly progress reports were completed by both community coaches and state experts. Reporting included status of PSE implementations, use of implementation tools (CHII and GRAIDS), reach, barriers experienced, and other factors related to PSE implementation. Outcomes for PSEs include number and type of PSE's implemented, completeness of implementation, reach of PSE change and effectiveness of PSE change. Semi-structured interviews were completed midway through the project to identify barriers and facilitators to the six-phase process including commitment, assessment, planning and prioritizing, implementing, evaluating, and disseminating PSE changes throughout the community.

Purpose of Dissertation

There is an increasing need for implementation of public health to include individuals with disabilities in their public health efforts. Implementation science calls for better understanding of how to move knowledge into evidence-based practice and engaging community members in this process increases the ability to implement within

local contexts. Community-based public health professionals are uniquely situated for ensuring inclusion of individuals with a disability in their local public health efforts. The purpose of this dissertation is to explore the experiences of public health and disability health professionals in developing and implementing health promotion efforts inclusive of people with disabilities and identify factors associated with successful inclusive community changes for public health. This will allow for the identification of areas in which researchers can facilitate training and barrier reduction to reach more individuals with disabilities in public health efforts. First, barriers and facilitators to implementation of inclusive health promotion initiatives will be identified through interviews with public health and disability health professionals who acted as community coaches and state expert advisors during the DHC study of 10 communities. These community coaches were tasked with coordinating efforts to implement health promotion initiatives in their communities that were inclusive of people with disabilities. The aim of this study is to identify specific barriers and facilitators experienced by communities attempting to implement PSE changes addressing physical activity, nutrition, or smoking cessation inclusive of people with disabilities. The paper addresses the following research questions: (1) what barriers to implementation did the community coaches experience through the process of implementing PSE changes inclusive of people with disabilities within their communities and (2) what facilitated implementation of PSE changes inclusive of people with disabilities?

Secondly, the Theoretical Domains Framework will be used to identify domains of implementation behaviors reported by community coaches that are important to successful implementation of inclusive policy, system, and environmental changes. The

resulting barriers, facilitators, and domains were categorized into the COM-B framework to categorize targets for future implementation aims. This paper identifies the domains of implementation behaviors (i.e., skills, environmental context, motivation) that were perceived to have an impact on implementation of inclusive PSE changes and examined if these perceived determinants of implementation were correlated with reported successful PSE implementation. It was hypothesized that coaches who reported the implementation of more PSEs will also report more positive implementation behaviors. Additionally, coaches reporting successful implementation of more PSE changes will report higher scores in domains related to opportunity.

Lastly, the Knowledge-to-Action (KTA) cycle will be used to illustrate a way to systematically translate evidence to inclusive practice in a community-based setting. Individuals within the community that are already delivering physical activity services are key to community-based implementation. The use of implementation process frameworks can provide structure for understanding the context in which implementation happens. Navigating both the social and environmental contexts and identifying where inclusive practices fit within their current services can seem overwhelming. The KTA cycle identifies specific steps common to implementation that can guide community-based professionals through the process of moving evidence into practice and making their services inclusive of PWDs. This paper first, clarifies knowledge translation as it might apply to the community, then explores using this framework to implement inclusive changes to specific context (university recreation center) to demonstrate each step of the KTA cycle. Together, these papers will help to guide future interventions in

community-based public health practice that are evidence based and inclusive of individuals with disabilities.

Strengths

The proposed dissertation advances knowledge in the field of implementation science as it relates to physical disability. It investigates community public health workers as "knowledge brokers" to advance changes in their communities and allows for a better understanding of translating lifestyle interventions to the communities. Together, these papers will explore ways to support implementers within their community context and better reach people with disabilities as part of public health efforts, instead of as part of segregated public health efforts.

Potential Limitations

The proposed dissertation also has limitations. The small sample size of 10 communities may limit the generalizability of the findings to all communities. Elements such as staff turnover mean that some of the coaches identified joined the project as it was in process instead of from the beginning. This could influence results as these individuals may not have initially been given the same training as other coaches and instead were trained by other coaches and state experts in the processes. Additionally, the type of change the community implemented was not mandated. PSE changes were required to address physical activity, nutrition or smoking cessation, but there was no limitation applied to implementation. There is no control group as a part of this pilot project. Though it is possible to identify contributing factors that communities with successful PSE implementation have in common, a causal relationship will not be determined.

There also may be bias introduced into the study as in all self-report studies. First, recall bias at the time of the interviews could have affected the answers. There could also be bias due to desirability. Though interviews are conducted by an individual not affiliated with the funding agency, all communities want to come across as productive, therefore may have given the answers they believe the interviewer wants to hear. Due to the acquisition of more objective data through progress reports of actual implementation of PSEs, it is anticipated that answers regarding PSE outcomes can be verified. Assumptions were identified as part of this dissertation that could possibly affect the results. These include that the interviewees answered all questions honestly and accurately in the interview sessions (Ivankova, 2014). Some of the interviews were conducted with two community coaches, meaning that there could have been tension related to any part of the project that was not disclosed at the time of the interview. Though this format allows for the coaches to fill in answers more completely in terms of the project implementation, it fosters an environment where they may not feel comfortable answering honestly if there was an issue with the coach that was their partner. The relationship between the two coaches is not possible to evaluate with this format, which may have affected implementation of PSE changes.

Conclusions

People with disabilities need to be considered in public health initiatives. There is ample evidence supporting the need for people with disabilities to engage in protective health behaviors to close the gap in disparate health outcomes among this population. Moving this evidence from the clinical environment to the community is an important step to maintaining health and quality of life. Understanding how to best include

individuals with disabilities in public health efforts can significantly improve health, participation, and quality of life. The aim of this dissertation is to better understand the process by which inclusive changes can be made within public health. People with disabilities require unique adaptations to these public health initiatives which are not consistently considered. Even when they are considered, they are sometimes met with resistance due to misconceptions including cost or lack of need to adapt. Together, these studies will help to inform implementation of health promoting changes at the community level that are inclusive of people with disabilities. A better understanding of both the systematic process by which community members can implement evidence-based practices and how researchers can better support these processes will enhance utilization of evidence by the end user.

BARRIERS AND FACILITATORS TO IMPLEMENTATION OF COMMUNITY-BASED INCLUSIVE POLICY, SYSTEMS, AND ENVIRONMENTAL CHANGES FOR PUBLIC HEALTH

by

AUTHORS TBD

In preparation for *Implementation Science*

Format adapted for dissertation

Abstract

Background: People with disabilities (PWDs) are often excluded from health promotion efforts. Community-based strategies to promote healthy behaviors may not consider inclusion in their planning process, continuing the cycle of disparate outcomes for PWDs. Intentional inclusion in policy, systems, and environmental (PSE) changes has the potential for a broad reaching impact on access and participation in healthy lifestyle choices for PWDs. Understanding the needs of those tasked with implementing inclusive PSEs can guide future iterations of inclusive PSE implementation.

Purpose: To identify specific barriers and facilitators experienced by community coaches attempting to implement PSE changes addressing physical activity, nutrition, or smoking cessation inclusive of PWDs.

Methods: Semi structured interviews were conducted with community coaches or sets of coaches in 10 communities and with the state experts for each community that were active in the Reaching People with Disabilities through Healthy Communities project. Interviews were coded using a directed content analysis into the domains the Theoretical Domains Framework. They were then categorized into barriers and facilitators of implementing inclusive change strategies within the COM-B framework (capabilities, opportunities, and motivations influence behavior).

Results: The opportunities domain, including both the social influences and environmental context and resources, was identified as having an impact on PSE implementation. Within social influences, community support and utilizing existing partnerships facilitated PSE implementation, whereas lack of knowledge about disability in the community and fear regarding the potential resources needed to be inclusive acted

as barriers. Technical assistance from experts and identifying current initiatives that could support inclusion work within the community acted as facilitators, whereas a lack of resources (time, staff, additional funding) was a prominent barrier to implementation. Additional facilitators included optimism, beliefs that the outcomes of PSE implementation would be positive, believing in their own capability to complete the work and tying the work of implementation into their professional or social role and identity. **Conclusions:** In order to facilitate the implementation of inclusive PSE changes, supports should be provided addressing the opportunities domain. Addressing this domain through education, incentivisation, and persuasion can increase support in the community for inclusive PSE changes. This might include increasing community buy-in and awareness for inclusive changes, working with champions to complete implementation, and building relationships within the community can help further efforts towards inclusive PSEs. Communities should consider inclusion in their current PSE initiatives and support these efforts through funding opportunities and staff effort. Additionally, continued support of implementers should be considered (e.g. continued training and technical assistance) to maintain motivation and capabilities for inclusive PSE changes. This creates the opportunity to build a healthy, accessible community for all.

Introduction

People with disabilities (PWDs) continue to be an unrecognized health disparity population within public health (G. L. Krahn et al., 2015). There is a need for the prioritization of inclusion of PWDs in public health promotion and behavior change activities to ensure that PWDs can participate in activities that will positively affect their health. The National Center on Health Physical Activity and Disability (NCHPAD) defines inclusion as all individuals in the community are presumed competent, are recruited and welcomed as valued members of the community, can fully participate and learn with their peers, and experience reciprocal social relationships ("Definition of Inclusion," n.d.). Without intentional inclusion of PWDs, there is often unintentional exclusion by positioning barriers to access between the person and the healthy behavior. Specifically, at the community level, the literature has identified barriers such as transportation, lack of access in the built environment (e.g., curb cuts), absence of awareness of the needs of PWDs, and stigmatization of disability (Barclay, McDonald, Lentin, & Bourke-Taylor, 2015; Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004b) The social determinants of health recognize that the environment in which we live affects our health, and that environment, both social and physical, should promote health ("Disability and Health | Healthy People 2020," n.d.). Community wide initiatives must approach implementation with disability inclusion at the forefront to address these environmental barriers and promote health for people with disabilities in the community.

Healthy People 2020 recognizes the importance of accessibility in environmental design and public infrastructure as a critical emerging issue in disability and health and calls for communities to consider how to make their communities accessible for all

people to move, live and interact with their community ("Disability and Health | Healthy People 2020," n.d.). One approach to inclusive community change is through larger policy, systems, and environmental (PSE) changes. The PSE approach has the potential to reach a larger proportion of the population than individual level interventions within the context of health promotion (Bunnell et al., 2012). PSE changes The CDC identifies that inclusion of disability within mainstream public health initiatives is one of the ways to make the broadest impact on the health of PWDs in addition to addressing barriers affecting a range of PWDs accessing these community-wide efforts.

The Reaching People with Disabilities through Healthy Communities Project (DHC) project was a collaboration involving 3 national entities (the National Association of Chronic Disease Directors (NACDD), the Centers for Disease Control (CDC), and the National Center on Health, Physical Activity and Disability (NCHPAD)). Ten communities throughout the United States were funded to implement PSE changes inclusive of PWDs. As part of this project, each community had a goal to implement 3 PSE changes guided by the ACHIEVE framework (Cox, 2009). ACHIEVE is made up of 6 phases: commitment of a health coalition, assessment of the community's inclusion failures, planning & prioritizing PSE changes to address these inclusion failures based on their community's unique needs, desires, context, and resources and, implementation of the PSE changes, and evaluation. Each funded community had a set of 2 community coaches who led the implementation efforts. These coaches included one that worked in the local public health department and one that worked for a disability serving organization. Each community also was provided technical assistance from state experts

in their states public health department. State experts served as a resource to the 2 communities in their state (Hefelfinger, Patty, Ussery, & Young, 2013).

Vital to this project were the behaviors of the community coaches tasked with implementing the PSE changes. To understand these behaviors, the theoretical domains framework (TDF) was used. The TDF presents a comprehensive list of domains that contribute to behavior and understands that behavior is affected by both internal and external factors. This framework condensed common elements of 33 different psychological and organizational theories into 14 domains that describe behavior (Cane et al., 2012). The TDF has been utilized as a guiding framework to describe and address implementation issues experienced across a variety of contexts (Atkins et al., 2017; Francis, O'Connor, & Curran, 2012). The TDF works along with the COM-B (capabilities, opportunities, motivations and behavior) model of behavior change, which presents a broader model and identifies elements that might explain why a person engages in or does not engage in a given behavior. The COM-B categorizes these domains at a higher level of capability (C), opportunity (O), or motivation (M) which leads to a behavior (B) (Susan Michie et al., 2011).

In this study, the behavior of interest is the implementation of inclusive PSE changes within their community. The capabilities and motivations of the individual implementers (community coaches) and the opportunities presented in the physical and social community interact to either facilitate or hinder implementation. Both the COM-B and the TDF can then be overlaid with the behavior change wheel, which aligns specific, evidence-based behavioral interventions with each of the domains. For example, the intervention of training is suggested to increase capability of the implementer.

Interventions can be selected to address the domains that present numerous barriers to implementation behaviors. Understanding the domains that affect the behavior of those implementing inclusive PSE changes can help to identify ways in which to better support these individuals as they implement inclusive PSE changes.

The TDF and the COM-B both posit that behavior is affected by both internal and external factors. For example, if the implementer believes the PSE change will have positive effects, this serves as motivation to implement and is internal to the implementer. If the members of the community do not support implementation of a PSE change, this affects the opportunity available to the implementer and is an external factor. Thus behavior is a result of barriers and facilitators across these all of these domains (Coulson et al., 2016). The purpose of this paper is to identify barriers and facilitators experienced by the community coaches attempting to implement PSE changes that are inclusive of PWDs. The primary aim of this qualitative study was to understand the barriers and facilitators experienced during planning for and implementation of PSE changes that were inclusive of PWDs within a community context. Categorizing these barriers and facilitators across the domains of the TDF and the COM-B then allows for the identification of interventions to assist communities to better facilitate the work of local community coaches to implement inclusive PSE changes.

Methods

Research design

This qualitative study was conducted as part of the evaluation process of the DHC project. Data was collected in March and April 2017 through telephone interviews to understand the experience of the community coaches as they implemented inclusive PSE

changes in their respective communities. Community coaches acted as the primary implementers at the local level. The community coaches utilized the 6-phase ACHIEVE model (Cox, 2009; Horne, Miller, Silva, & Anderson, 2013) to systematically engage stakeholders, identify areas of where the community failed to include PWDs, develop strategies that addressed an area of health promotion that was inclusive of disability, and worked to implement those strategies. At the time of the interview, communities had been actively working through the ACHIEVE process for approximately 1 year. Examples of inclusive health promoting activities include increasing accessibility of active community locations (i.e. public pool or fitness facility), increasing access to adaptive equipment (i.e. handcycles or gardening tools), and implementing inclusive policies. Approval for the analysis of these interviews was obtained through the Institutional Review Board of the University of Alabama at Birmingham.

Participants

Participants were active members of the Reaching People with Disabilities through Healthy Communities project from 2016-2018 as either community coaches or state expert advisors. These communities included the following communities: Adams County, OH; Benton County, OR; Butte, MT; Cattaraugus County, NY; Carroll County, IA; Helena, MT; Marion County, OH; Sioux City, IA; Syracuse, NY; and Umatilla, OR.

Data Collection

Interviews were conducted with each community coach or set of coaches (n=10) and with each state expert (n=5). Interviews were semi-structured and conducted using GoToMeeting Software (LogMeIn®). Interviews were conducted as part of the process evaluation of the funding opportunity and were administered by a member of the research

team not previously involved with the project. All interviews were audio recorded and then transcribed verbatim. Interviews were conducted and coded using a phenomenological approach to understand the experiences of the community coaches as they worked to implement inclusive PSE changes within the context of their individual communities. Interview guides for the community coaches and state experts can be found in tables 1 and 2 respectively.

Analyses

Transcribed coach interviews were coded using a directed content analysis. The codebook used the theoretical domains framework (TDF), chosen for its comprehensive list of domains contributing to behaviors as well as how it works alongside the COM-B to describe sources of behavior change. The behavior identified in this study is the implementation of PSE changes. The TDF identifies that this behavior is affected by both internal and external factors, thus behavior is a result of barriers and facilitators across these domains. The COM-B categorizes these domains at a higher level, identifying each of the domains as a capability (C), opportunity (O), or motivation (M) which leads to a behavior (B). Definitions used for directed content analysis can be found in Table 2.

Coding of coach interview transcripts to the TDF domains was conducted by two independent researchers using NVivo software (Version 12, QRS International) and was subsequently discussed and collated. A third researcher resolved any disagreements for which consensus could not be reached. The coded references were then categorized using the COM-B to identify domains in which barriers must be addressed as a place to intervene in future implementation efforts. The state experts were not involved in the actual implementation of the PSE changes, but served as a resource to the local

community coaches. Therefore, due to the separation of their role from the behavior of implementation, the state expert interviews were summarized for comparison with the perspectives of the community coaches.

Results

Community coaches were more often female (n=13) than male (n=6). All were adults who were employed either by the local public health department or a disability-serving organization within the community. State experts were also more often female (n=6) than male (n=1) and employed by the state public health department. In 2 states, 2 state experts were included in the project. All other states had 1 expert per state.

The TDF domains referenced most frequently were 'environmental context and resources' (e.g. funding, time, tools) and 'social influences' (e.g. community awareness, champions, partner networks), which were cited 185 and 136 times respectively over the 10 interviews and are both parts of the opportunity domain of the COM-B. Optimism, or the view that there will be a positive outcome of the behavior, within the motivation domain of the COM-B was mentioned 107 times total over the 10 interviews. The capabilities domain, comprised of 'physical skills' (the physical ability to do something), 'cognitive and interpersonal skills' (other types of non-physical skills), 'knowledge' (awareness of something), 'behavioral regulation' (changing the implementers actions), and 'memory, attention and decision processes' (retaining and selecting information related to the behavior) were mentioned the fewest times collectively. The least influential domains were both in the capability domain, physical skills and memory, attention and decision processes, each being mentioned less than 5 times over the 10 interviews, indicating these may not have played a larger part as either barriers or

facilitators to implementation. Frequency of all domains referenced can be found in table 3.

Opportunity

The process of implementation was heavily impacted by both physical and social opportunity. This domain of the COM-B identifies elements of both the physical and social environment as influential to implementation behaviors.

Environmental context and resources

The most commonly reported influencer on implementation of inclusive PSEs was environmental context and resources. Resources included those who provided technical assistance (state experts, NCHPAD, NACDD), tools and products that were used to work through implementation, capacity to do the work (time and funding), and human capital that contributed to the work. Each of these acted as either a facilitator or a barrier depending on ease and availability of each item.

The most sought-after resource was time. Most of the communities indicated that there was not enough time to complete everything they would have wanted to complete. Access to resources served as a facilitator. All communities reported that they were provided the resources that they needed to work through the implementation process and were able to utilize the resources whenever it was needed.

The usability of some of the provided resources acted as a barrier in some communities. The formatting of the tools required a steep learning curve that hindered the progress of implementation due to the time and effort it took to work through suggested community assessment tool (Community Health Inclusion Index) and GRAIDs tool, which helped to identify ways to address the problems uncovered from the assessments.

Most communities felt the tools themselves were beneficial, but cumbersome to work through and required additional assistance at times to make sense of the results.

Communities also requested more resources in terms of funding and assistance. Many felt that additional people to complete the work would have benefitted the project. Additionally, funding to cover both the time of those working on the project and fund the changes themselves would have helped facilitate implementation. Some communities were able to find additional funds to support implementation which benefitted the project overall.

The context of the community also played a large role in creating opportunity for implementation. Some communities were able to work with existing implementation projects that would have a big impact on the community. Others were able to use resources available in their community context to assist in various stages of implementation. Additional help with implementation was identified through local organizations (i.e. volunteer organizations, schools, healthcare systems).

Social influences

Like the physical opportunities, social influences also acted as either a barrier or facilitator depending on the views of the individuals, organizations, or culture that was providing that influence. Towns that self-identified during the interview as rural or "small town" identified this as either a barrier or facilitator. In some cases, the small-town context contributed to the resistance to change. In other cases, a small town presented more opportunities to leverage personal relationships and professional networks. Existing relationships also lead to increased community buy-in for implementing PSE changes. If there was already a positive working relationship, the community was more likely to

support changes. The existing relationships that facilitated implementation included, but were not limited to, local leadership and elected officials and a variety of local service providers. A second aspect of positive community relationships was the identification of champions or 'movers and shakers' that would champion the disability inclusion in their spheres of influence. Discovering or capturing this community buy-in by either individuals, groups, or organizations was a prominent facilitator.

Lack of understanding or awareness about disability was widely identified as a barrier. Communities encountered individuals or groups that were in a position to influence the implementer progress towards implementation but were resistant to change. This lack of awareness also presented at times as fear, primarily the fear that learning more information will lead to the need to implement changes that will cost them money. Some communities were able to overcome this obstacle through deeper conversation, relationship building and training. This led to opportunities to gauge different organization's interest in future implementation.

In some communities, the lack of awareness was met with a willingness and desire to know more about how to address the issues related to inclusion. This facilitated creative solutions and capacity building within these communities through fostering relationships between individuals, organizations, and disability and health experts.

Motivation

Optimism

Optimism was reported as a facilitator to pursuit of implementation. Belief that there will be an overall positive impact as a result of implementation of PSE changes within the community encouraged continued steps towards implementation. This was not

just limited to the impact of the PSE change itself. There was also a view that there would be a positive ripple effect throughout the community as a result of going through the steps of implementation of inclusive PSE changes. Beliefs about the sustainability of the implementation of PSE changes also acted as a facilitator and motivated community coaches to continue with implementation.

Beliefs about capabilities

Beliefs about their ability to implement inclusive PSE changes and the steps associated with that behavior acted as a barrier and facilitator. Barriers included a lack of confidence in using the recommended tools and unclear expectations of the work to be done as part of the project. When communities perceived self-sufficiency it was associated with positive belief about their ability to implement PSE changes. They believed that with their skill set they already possessed they were capable of continuing to work through the steps towards implementation. Conversely, some communities viewed the ability to reach out to technical assistance as a great asset to implementation. It allowed the community coaches to feel more comfortable in their capabilities knowing that there was support if they ever needed it. Additionally, when the coaches felt that there was alignment of the implementation behaviors with their skillset and their context, community coaches felt confident in their abilities to implement inclusive PSE changes.

Professional and Social Role and Identity

When community coaches identified that their work on this grant was aligned with their professional duties or with a role that they typically play within their community, it was largely a facilitator of implementation. This included established roles through either previous work in their professional capacity or service to the

community. Some identified that they had a passion for work on inclusion as it aligned with their work in public health.

Goals and Intentions

Having both broader inclusion goals and specific intentions promoted inclusive implementation with the community coaches. Intentions were typically related to broader identification of groups to engage in the process of implementation or an intention to implement inclusive changes both as part of this project and into future work.

Goals were more often specific plans of action that the coaches were pursuing with their implementation. Some coaches identified that this clear picture of what to implement was beneficial in feelings of success in their inclusion work. It should be noted that part of the 6-phase model was to develop a community action plan, or CAP, part of which included specific goals to be accomplished. Communities often pointed to specific examples within their community where the implementation process was occurring or was set to occur.

Beliefs about consequences

Beliefs about consequences were largely regarding positive outcomes. Many believed that the work that they were doing towards implementation would lead to positive changes in the community and for the health of people with disabilities. They also believed that working towards implementation lead to positive cultural changes and conversations about access and inclusion that would positively benefit the community. There was a general acknowledgement that these conversations had to be approached in a very unassuming and educational manner, but the opportunity for these conversations was overall a positive consequence of implementation.

Community coaches also identified that the progression through phases of the model was important to implementation. This included a commitment phase, a planning phase, conducting assessments, and including PWDs throughout. The inclusion of people with disabilities in the processes was largely believed to have positive impacts on inclusive implementation.

Reinforcement

Community coaches identified that experiencing or observing positive outcomes of actions related to implementation encouraged continued action. For example, positive responses to conversations about disability health or the sharing of success stories within communities helped to reassure community coaches that they were having an impact within the community.

Capabilities

Knowledge

Generally, community coaches identified that the process of implementation increased their awareness of inclusion issues within their community. As they became more aware of areas they could improve and potential solutions, they felt more capable of implementing after learning more or seeking assistance. This acknowledgement that there was more to learn was deemed *'eye-opening'* by many communities and was typically a result of looking at the assessment results. The assessment also allowed for the identification of good inclusive practices that were occurring within the community.

One of the trainings was held at an inclusive physical activity facility where all the communities came together and learned about the implementation processes. Communities cited exposure to inclusive physical activity as a facilitator as it showed

examples of inclusion solutions that they might be able to bring back to their communities.

Cognitive and interpersonal skills

Previous experience which provided the opportunity to have built skills around assessment and implementation was a facilitator to the implementation process. Where previous experience was lacking, implementers identified that practice was necessary as well as additional training to help to understand the steps of the process and feel confident in preforming the necessary tasks. This was typically related to conducting community assessments and prioritize solutions identified by the assessment data.

Behavioral Regulation

Many coaches identified that as a result of becoming more aware of the needs of people with disabilities, they could approach their work differently to include disability. This requires restructuring how they approach the work that they do in a different way.

State Experts

The state experts were involved in providing technical assistance to the community coaches as experts in disability and health at the state level as opposed to the local community level. The views of the state experts on the community coaches' implementation efforts largely supported the views of the community coaches. Overall, the state experts reported the communities had the capabilities to implement inclusive PSE changes within their contexts (beliefs about capabilities, knowledge, and skills) and described beliefs that the consequences of the implementation of inclusive PSE changes will be positive for the health of PWDs within each community. Additionally, they identified the opportunities, both social and within the context of the unique

communities, that affected implementation. In one interview, connections to a community stakeholder through a site visit within the community created opportunities to introduce inclusion to an ongoing community project, facilitating inclusive PSE changes in their community.

There were some state experts that voiced some concerns about adhering to the implementation processes as described by the funding opportunities. The goal was that the PSE changes were sustainable as a result of involving the important stakeholders throughout the entirety of the process and allowing the data collected in the assessments to drive the decisions to implement. One state expert identified that the stakeholders within the community that were identified during the commitment phase could have been more actively involved in the process. Another state expert expressed concern that there was little involvement of others outside of the community coaches in the decision processes and therefore unsure of its sustainability if fully implemented.

However, for the majority of the communities, the state expert served as a resource for the community coaches and provided positive feedback about the coaches themselves and the strategies they chose to implement. State experts perceived the community coaches as committed to implementing inclusive PSE changes and as having the capabilities to do so. They identified that the changes would reach a large number of people with disabilities in the communities and would be generally effective for increasing healthy behaviors within those communities.

Discussion

Environmental context and resources followed by social influences were the most referenced TDF domains within the 10 interviews. It is understood that frequency alone is

not sufficient to understanding the experiences of the community coach's implementation behaviors, however, frequencies can help shed light on important domains and can be further explored for the positive and negative impacts within the domains. The opportunities available in both the social and environmental context of each community was identified by all communities in both positive and negative lights, indicating a need to further explore opportunities related to inclusive PSE implementation.

Addressing policy, systems, and environmental changes targets the broader levels of the Social Ecological Model (SEM) (McLeroy, Bibeau, Steckler, & Glanz, 1988). While this type of change has the potential to reach a larger amount of the target population than an individual level change, for success of implementation, the necessary opportunities and resources must be available. Disability inclusion is vital to all community and public health efforts. Therefore, it is advantageous for those with expertise in disability inclusion to be at the table each time a proposed community or public health change is planned and implemented. Identifying inclusive practices at the beginning of an initiative can save both time and money in the long run. Many inclusivity issues can be attributed to a lack of awareness. Previous research has identified the lack of information among community members prevents PWDs from engaging in physical activity within the community. Specifically, community members need to better understand the 'why' behind inclusion and rationale of what the ADA requires (Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004a). In order to facilitate better opportunity for inclusion, training and incentivisation are recommended interventions that can be implemented at the community level (Susan Michie et al., 2011).

The social environment must also be addressed. The barrier of lack of awareness was very prevalent throughout the communities. Even within local health departments, awareness of the disparities faced by PWDs and having a poor understanding of how to provide accommodations to PWDs is low. In a survey of local health departments, only 57.6% reported being knowledgeable about providing accommodations to support PWDS (Leser et al., 2016). More efforts should be made on the local and national levels to provide training and continue raising awareness so that disability inclusion does not become an afterthought.

Professional networks and relationships also played a large part in creating a social environment that invited inclusive PSE changes and welcomed assessment to determine where changes could be made. In communities where the local leadership has been involved with the implementing agencies in the past and that relationship had been positive, it was easier to accomplish the goals of the project. In communities where those relationships did not yet exist, the timeframe for implementation was longer due to the need to form relationships. Previous work on implementation of PSE changes regard the community's capacity as important to implementation. Capacity often consists of key stakeholders and resources to implement PSE changes. A case study of 13 National Comprehensive Cancer Control Programs (NCCCP) explored the resources necessary to implement PSE changes. They found that the inclusion of stakeholders with appropriate expertise as well as dedicated funding to support implementation were essential components of a program's capacity for PSE implementation (Rohan et al., 2019) Another study found that the involvement of mayors in PSEs aimed at obesity reduction resulted in more significant changes (Betancourt et al., 2017). This points to the

significance of social influences in PSE implementation and the need to involve a wide variety of stakeholders in the process for successful implementation.

Outside of opportunity, the motivations of the implementers were important to driving implementation behavior. Specifically, optimism towards implementing, beliefs that the end goal of inclusion of individuals with disabilities would have positive outcomes within the community, and alignment with professional role and current capabilities. A significant training component for the implementers was part of this grant which may have contributed to motivations, as the communities understood the importance of inclusion and what could be possible with inclusive changes. Another NCCCP study compared grantees who participated in a more structured and supported implementation process with grantees who did not receive this structure. The more structured approach included technical assistance from experts, trainings, a theory driven process for implementation and peer support. This group was more successful in PSE implementation overtime through increased capacity to implement (Townsend et al., 2019). The grantees in the DHC project followed a similar structure which likely contributed to both capability and motivation to implement PSE changes. The funding opportunity also included consistent technical assistance. This played a role in supporting these capabilities and motivations as well and experts should be made available to those trying to implement inclusive changes in their community. Technical assistance has been shown to be valuable in sharing skills and identifying best practices for PSE implementation (Hefelfinger et al., 2013). It often helps to have additional individuals contributing to the decision processes and can encourage individuals attempting to implement these larger types of changes.

Limitations

Some limitations were identified within our study. Interviews were conducted most often as pairs of coaches. This facilitated complete answers as they were able to remind each other of examples and processes. However, we were not able to understand the relationship between implementers and if that had any effect on implementation. Finally, there was a potential for response bias as the interviews were conducted in accordance with an evaluation by the funding agency. However, the interviewer did not have any prior contact with the communities and was external to the funding organization to try to mitigate this potential for bias.

Conclusions

This paper served to identify barriers and facilitators to implementing PSE changes that were inclusive of PWDs. The opportunities domain presented as a domain that influenced the community coaches' ability to implement PSE changes. Providing support through funding, staffing and providing other resources can help to facilitate opportunities. The social climate of a community must be navigated well in order to facilitate implementation of PSE changes inclusive of disability. This might often involve raising awareness of the needs of PWDs, strategically engaging with partners both in disability-serving organizations but also in positions of influence. Future research should investigate strategies for increasing opportunities for inclusive PSE implementation. Identifying ways to facilitate inclusion within PSE changes allows individuals with disabilities to participate within their communities and can improve overall health outcomes for PWDs through increased access to all health initiatives their community has to offer.

Table 1: Questions guiding the community coach interviews

Community Coach Interview
1. Think about the steps or phases that were part of the community change process. This includes commitment, assessment (CHII), planning & prioritizing (developing the CAPS, using the GRAIDs), implementation (putting the CAP into action). What do you think worked well for the NACDD phased approach to healthy community change? **
2. What didn't work well? **
3. Would you recommend the use of the CHII? The GRAIDs?
4. How do you think the PSE changes affect how organizations address people with disabilities? **
5. How effective do you think the PSEs will be in improving access? **
6. And how about for increasing health behaviors? **
7. Did you have any unexpected outcomes of implementation? **
8. How valuable did you find the technical assistance from state experts? NACDD? NCHPAD?
9. What were the most beneficial aspects of technical assistance?
10. Did you feel you were provided all the resources and networking you needed to implement your PSEs?
11. Was there anything you feel like you weren't provided that you needed/would have liked to have?
12. What types of individuals (what sectors) were represented on your coalition?
13. What factors do you think contributed to organizations feeling capable of implementing PSEs? **
14. What kept organizations engaged and active in the project? **
15. What barriers came up during the project and how were they overcome? **
16. Were you able to stick to the timeline? If not, what delayed your project?
17. Do you think the PSE changes you implemented are sustainable? **
18. Do you think your coalition will be able to sustain its efforts going forward? How? **
19. Is there anything else you would like to say?

**These questions were also asked to the state experts

Table 2: Definitions for TDF domains creating the codebook for thematic content analysis.

COM-B Domain	TDF Domain	Definition
Capabilities	Knowledge	An awareness of the existence of something
	Physical Skills	An ability or proficiency acquired through practice pertaining to the physical ability to do the skill
	Behavioral regulation	Anything aimed at managing or changing objectively observed or measured actions
	Cognitive and interpersonal skills	An ability or proficiency acquired through practice pertaining to the other types of skills requiring development
	Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives
Opportunities	Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behavior
	Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviors
Motivations	Social/professional role and identity	A coherent set of behaviors and displayed personal qualities of an individual in a social or work setting
	Emotion	A complex reaction pattern, involving experiential, behavioral, and physiological elements, by which the individual attempts to deal with a personally significant matter or event

Beliefs about capabilities	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use
Optimism	The confidence that things will happen for the best or that desired goals will be attained
Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behavior in a given situation
Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus
Intentions	A conscious decision to perform a behavior or a resolve to act in a certain way
Goals	Mental representations of outcomes or end states that an individual wants to achieve

Table 3: Frequency of each code in the COM-B and TDF domains in coach interviews

COM-B Domain	TDF Domain	Frequency
Capabilities		87
	Physical Skills	2
	Knowledge	44
	Behavioral regulation	18
	Cognitive and interpersonal skills	24
	Memory, attention and decision processes	4
Opportunities		321
	Environmental context and resources	185
	Social influences	136
Motivations		429
	Reinforcement	35
	Emotion	12
	Beliefs about capabilities	82
	Optimism	107
	Beliefs about consequences	49
	Social/professional role and identity	75
	Intentions	47
	Goals	22

Table 4: Barriers to PSE implementation categorized by domain

COM-B Domain	TDF Domain	Emerging themes	Representative quotes - Barriers
Capabilities			
	Cognitive and interpersonal skills	Lack of practice/experience	"I think [the assessment] was a little bit cumbersome at first but once you got used to it, it was pretty easy to use out in the community"
Opportunities			
	Environmental context and resources	Lack of time	"...there are a lot of times that I felt like I didn't do as much as I would have liked to, that my time was limited. Even now, I feel like there are so many more things that maybe could have been accomplished if I had more time or more people to help me accomplish those things"
		Usability of resources and tools	"Once I actually got there the whole book then there's a big chart that was printed out for us and it was really hard, kind of hard to navigate and it was on ledger size paper and it came through and that was hard to put all together. So even if that could have been given to us earlier maybe or maybe earlier or something or in an easier format to navigate even maybe."
		Lack of funding and personnel	"I mean we have partners, especially at the city that we have been working with and they have been doing some work as well but it's not like we have other people, we don't have interns or anything. We have kind of done all of the work." "...there was a funding gap …for those system changes, it required a larger pot of money than what we had originally allocated..."
	Social influences	Resistance to change	"This town is tough in regards to people agreeing to go the extra mile and I think [this project] has kind of put feet to the fire."
		Lack of awareness of disability/accessibility	"And so for, you know, a smaller community with numerous small businesses, those businesses are just, you know, they're not educated enough to understand that"

		Fear of cost to address accessibility	“I think that people are scared that if they, you know, somebody comes in and find that maybe there's something that they're not doing correctly, or at least in the eyes of that particular, you know, if we find a problem that they're somehow going to be, you know, in some kind of trouble, or there's going to be some major financial requirement that they're going to have to come up with.”
Motivations			
	Beliefs about capabilities	Lack of confidence in using recommended tools	“And the most time I mean, completely time consuming part of the project was just trying to understand that huge document and what it is and the resources in it, and, and how it can be useful to our project partners. Right. So it was it was kind of that in between, you know, after we did the assessments or starting kind of that planning and prioritizing the project and understanding the data that that was the most difficult part,”
		Unclear expectations	“I haven’t done a lot of work where I have had to make that action plan and have to think through all of those separate steps to get to it and I was honestly starting to get kind of worried like, hey uh oh we haven’t done, we haven’t followed this exactly.”

Table 5: Facilitators to PSE implementation categorized by domain

COM-B Domain	TDF Domain	Emerging Themes	Representative quotes - Facilitators
Capabilities			
	Knowledge	Exposure to existing adaptations for inclusion	"…I got to see a lot of things that made working out in a gym a lot easier that were not hard. You know, I never thought about those great big ropes that you shake up and down, well they have them up there! They have them upstairs and I never even thought about taking them downstairs for people in wheelchairs. So it's so nice because I would have never thought of stuff like that…"
		Increased knowledge of inclusion issues	"I think the major thing that I saw and was really a little shocked by is that when we did the CHII assessment after going back and looking at them and viewing them, seeing how negligent – we hadn't done a better job of inclusion in our community"
	Behavioral regulation	Identifying ways to include disability	"it really dawned on me that a lot of the other projects I'm currently working on; I could easily look at accessibility when I'm out in the community. And I didn't do that before."
	Cognitive and interpersonal skills	Previous experience	"But [coach] had been involved in doing those kinds of assessments before so she really understood it. I think someone who had never seen an assessment like that before would be a little overwhelmed"
Opportunities			
	Environmental context and resources	Technical assistance	"the ability to communicate you know, our state expert coach has been amazing. You know, she is readily available for questions at any time I can email her at any time and get a pretty you know immediate response from her but I I've gotten that same - same thing from NACDD and from NCHPAD. They have been willing to answer questions, provide information guidance, so I don't really know that anyone is more valuable."

		Existing community initiatives	"...I was pondering how we were going to lay out our project and then kind of a dawning on us that we had three major community undertakings underway"
	Social influences	Existing relationships	"we in our community have great working relationships and strong Coalition's so I think already having those established relationships because I think everyone that we did, we knew somebody from that organization that we could make a phone call to. And that's probably why we're so successful in getting in there. We weren't just making cold calls, we actually knew these people that were calling and we had prior working relationships with them on you know, whatever project"
		Local champions	"…you still get some communities where somebody just has a burning desire, as you do, you know, in your belly for this work. And so it makes it easier if you have a champion…Our champions have been a lot of elected officials."
		Openness to engage in conversation	"I think the CHII assessment process was very useful in making connections with organizations and figuring out, it was basically a good foot in the door to have conversation about what they might be open to doing with our project and you know helped us get a better sense of their readiness to engage with implementation so it seemed to work well as a step I think."
		Willingness to learn	"The biggest thing would be, what's the openness to, you know, see what changes needed to be made or what changes could be made to impact others. And so as long as they were open to talking to us, and looking at what information we had, we could do great things"
Motivations			
	Reinforcement	Experiencing positive outcomes or feedback	"You just talk about it for a few minutes and it's amazing for people who are going, 'Oh yeah, I should be doing my part'"
	Beliefs about capabilities	Perceived self-sufficiency	"But since then, you know, that was at the beginning of the project, we really haven't had a huge need for technical assistance…and process probably gave us a better idea of what - what things we need to look into a little bit more, but we'd already had some tools that we were comfortable using as resources."

		Realistic goals and expectations	"I think we just set realistic goals. We knew what we could accomplish within our community."
	Optimism	Beliefs about PSE change sustainability	"I think that the PSE changes that we are hoping for will be really sustainable. And I think we have the capacity to be able to push for those changes after the grant period is over."
		Belief of overall positive community impact	"I think the changes are going to make the whole community healthier and not just affect people with disabilities that make everybody healthier."
	Beliefs about consequences	Positive outcomes for the community	"I think it's prompting a bit of a shift culturally"
		Importance of conversations	"I think the way you approach the assessment overall has a lot to do with it. You know we weren't coming out to do anything punitive, to tell them 'you are going to be fined for this because you are doing something wrong'. It was really more of like, this is educational, we just really want to see what you are doing here and what could be improved in order for you site to be more accessible to our community members who are living with disabilities"
	Social/professional role and identity	Previously established roles	"Probably because we both lived here our whole lives.... we have served on so many committees and boards and we are present in the community ourselves so it just kind of makes it easy."
		Passion for work	"you know, we – we have, I think, a good amount of passion for the work. And I think that we have that fire in our bellies that we want to continue the work"
	Intentions	Intentions to work towards project goals	"…to continue with some of the additional ideas and improvements and suggestions that we are going to be looking for funding for …projects that we can, as a coalition continue to rally around and work towards that common goal"
		Intentions for long term change	"...we saw the state working with the county, the projects kept changing. So our focus was, regardless of what they end up with, how are we going to affect change on projects like this in our community for the long-term..."

	Goals	Setting clear goals	"…..a couple of simple ones I think we will be able to get done in the not so distant future….there is staff right at [city department] that is kind of looking into the recommendations and doing a cost analysis to see what some of those, sort of quick wins might be"

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COMMUNITY COACH PERCEPTIONS OF IMPLEMENTATION BEHAVIORS FOR POLICY, SYSTEMS, AND ENVIRONMENTAL CHANGES INCLUSIVE OF PEOPLE WITH DISABILITIES

by

AUTHORS TBD

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Abstract

Background: Policy, systems, and environmental (PSE) changes have the potential to reach a broad audience at the level of population health. If inclusion of people with disabilities (PWDs) is at the forefront of the implementation process, inclusive PSE changes can address the numerous health disparities felt by this population and increase access to healthy behaviors among PWDs. However, little is known about implementation of PSE changes that are inclusive of disability at the community level. A better understanding of the behaviors, beliefs, and contexts of those who are charged with implementing is needed.

Purpose: To identify community coaches' perceived implementation behaviors related to implementation of inclusive PSE changes within their community based on the TDF, and identify if certain domains of behavior correlate with reported PSE implementation.

Methods: A cross-sectional survey was conducted with 10 communities across 5 different states via online questionnaire. Responses from 13 community coaches represented 9 of the 10 communities. Descriptive statistics were used to describe the self-reported determinants of implementation behaviors, the number of PSE changes implemented within each community, and their reach for PWDs. To examine relationships between determinants of implementation behaviors and implementation of PSE changes, bivariate correlations were conducted between each TDF domain, overall TDF score, each COM-B domain, number of PSEs implemented and reach of PSEs.

Results: Community coaches generally report high scores related to overall implementation. The TDF sub-scale with the lowest mean response by far was

environmental context and resources (4.81 ± 0.95). This indicates that the coaches did not feel strongly that they had the resources or networks to support implementing inclusive PSE changes. When looking at the broader COM-B domains, the lowest scores were reported for the opportunities domain (5.54 ± 0.64), indicating a feeling that the resources and social influences did not support implementation as much as how they felt about their capability and motivations to implement inclusive PSE changes.

Conclusions: Community coaches in the DHC project generally felt that capable and motivated to implement inclusive PSE changes within their communities. However, the environmental context and resources was identified as the weakest domain of the TDF in relation of implementation of inclusive PSE changes within the community. Future research should consider addressing the opportunities domain with interventions targeting both resource acquisition and creating more positive networks around implementation. Addressing the broader community context in which the implementation must take place has the potential to further support inclusion and address the health disparities experienced by community members with disabilities.

Introduction

One in five adults in the United States identify as having a disability with mobility limitations as the most prevalent among those with disability (Carroll et al., 2014). This population is largely unrecognized as a health disparity and yet reports poor health outcomes that are often preventable through lifestyle changes such as engaging in physical activity (Buchholz et al., 2009; Frith & Loprinzi, 2018; Goodwin, Richards, Taylor, Taylor, & Campbell, 2008; Krahn, Walker, & Correa-De-Araujo, 2015). Awareness of the need to address this disparity has increased over recent years, however, 76.8% of people with disability (PWDs) report facing barriers to participation in evidence-based health and wellness programs designed to address these chronic conditions through lifestyle change ("Disability and Health | Healthy People 2020," n.d.). Many of these barriers are a result of both the physical (e.g. no curb cuts, facility not accessible to people who use wheelchairs) and the social environments (e.g. negative attitudes towards disability, lack of knowledge or awareness of accessibility needs) that limit their ability to participate in community public health efforts. Additionally, when systems are not set up to include PWDs, it perpetuates the message that they are not welcome to participate (Jaarsma, Geertzen, de Jong, Dijkstra, & Dekker, 2014)

Targeting inclusion in public health requires assessing areas in which adaptations to enhance accessibility for PWDs might increase their ability to participate in healthy lifestyle activities like physical activity and implementing those changes. One increasingly popular approach to affecting population health is to prioritize policy, systems, and environmental (PSE) changes. PSE changes have the potential to reach a larger proportion of the population than individual level interventions, making this

approach essential for public health departments focused on population health in their communities (Bunnell et al., 2012). PSE changes have the potential to break down barriers to participation for PWDs.

The Reaching People with Disabilities through Healthy Communities (DHC) project was a joint project between 3 national entities (the National Association of Chronic Disease Directors (NACDD), the Centers for Disease Control (CDC), and the National Center on Health, Physical Activity and Disability (NCHPAD)) which provided funding to 10 communities throughout the United States and tasked each community to implement PSE changes inclusive of PWDs. Each community had a goal to implement 3 PSE changes guided by a process in which the community coaches oversaw a health coalition that was inclusive of PWDs, assessed the community for inclusion failures, developed policy, systems, or environmental changes to address these failures based on their community's unique needs, desires, context, and resources. Each funded community had a set of 2 community coaches who worked as partners to lead implementation efforts within their communities. Community coaches were local health department staff and the staff of local disability organization that partnered with the health department on this initiative.

At the core of successful implementation are the behaviors, beliefs, and contexts of those who are charged with implementing. One framework that helps to describe and categorize these behaviors and what may affect these behaviors is the Theoretical Domains Framework (TDF). The TDF was originally developed 2005 based on consolidating constructs from 33 psychological theories organized into constructs that describe behavior change (S. Michie et al., 2005). The TDF was then refined by Cane et

al to include 14 domains suggested to capture the determinants of implementation behavior (Cane, O'Connor, & Michie, 2012). These 14 domains are defined in Table 1. The TDF has been used to explore implementation behaviors for most prominently in healthcare but also in other populations (Curran et al., 2013; Francis, O'Connor, & Curran, 2012; French et al., 2012). This framework is useful as a tool to identify influences and potential mediators of behaviors. Moreover, it works in tandem with other behavior change models to help identify ways to intervene with implementers to facilitate behavior changes (Atkins et al., 2017; Francis, O'Connor, & Curran, 2012)

The COM-B model of behavior change is one of these models that works with the TDF and says that capability (C), opportunity (O), and motivation (M) are the broader domains that lead to a behavior (B). Together, the TDF and COM-B frameworks can help provide a better understanding where support is needed to perform the behavior of implementation of inclusive PSE changes within their communities. The Behavior Change Wheel (BCW) is the final framework that works with the TDF and COM-B. The BCW identifies interventions that can be used with implementers to increase either their capability, opportunity, or motivation to implement (Susan Michie, van Stralen, & West, 2011). Figure 1 depicts the COM-B, TDF, and recommended interventions of the Behavior Change Wheel overlaid to work together and better understand approaches to behavior change. Identifying the domain that is impacting the behavior, the behavior change wheel suggests potential ways to intervene and improve that domain. For example, if an individual identified that within the capabilities domain of the COM-B they do not have the skills to implement a PSE change, training is suggested to increase skills. Using the TDF, barriers to implementation can be identified, categorized and

targeted for intervention. If the community coaches identify that they would like to implement a curb cut as their inclusive PSE change but it is not supported by their supervisors/management (social influences according to the TDF), this would indicate the need for interventions to target 'opportunity' domain within the COM-B. An effective next step based on this framework would be to present data on why the built environment and the potential this change has to improve access and reduce discrimination against PWDs in the community (persuasion) as a means to increase support and buy in from those social influences.

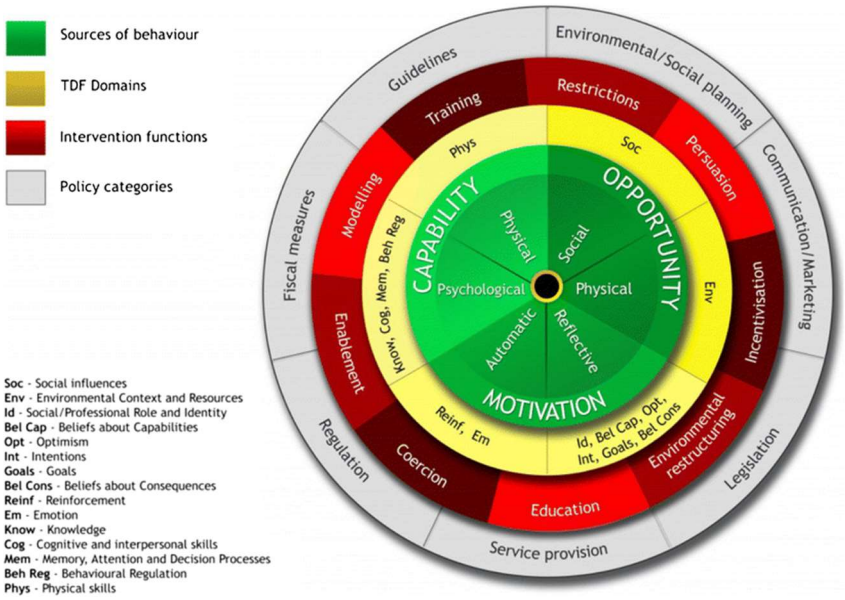

Figure 1: Theoretical Domains Framework, COM-B, and the Behavior Change Wheel (Atkins et al., 2017, Cane et al., 2012, Michie et al., 2011)

To date, research on implementation behaviors has largely focused on the healthcare sector. Little is known about implementing inclusive PSE changes in the

community. Understanding the perceptions of the community coaches as they navigate PSE implementation in addition to the inclusion of PWDs in those efforts will help to identify ways to support communities in their unique contexts. Therefore, the purpose of this paper is to identify coaches' perceived implementation behaviors related to implementation of inclusive PSE changes within their community based on the TDF, as well as correlations between their perceived implementation behaviors and reported implementation of inclusive PSE changes in their community within the DHC project. It was hypothesized that community coaches that successfully implemented more PSEs would have more positive implementation behaviors. We also hypothesized that those coaches reporting more successful implementation of inclusive PSEs would have higher scores in the domains related to opportunity.

Methods

Overall design

A cross-sectional survey was conducted with 10 communities across 5 different states. This included a potential 19 community coaches who were invited to complete the survey via email. Approval was received from the institutional review board at the University of Alabama at Birmingham prior to contacting potential participants. These participants were local public health employees or partner coaches that worked for a disability-serving organization, both termed in this study as community coaches, who participated in the Reaching People with Disabilities through Healthy Communities project between 2016 and 2018. Potential participants represented 10 different communities across the United States. Communities represented both rural and urban contexts across 5 different states: Iowa (Carroll County, Sioux City), Montana (Butte, Helena), New York (Cattaraugus County, Syracuse). Ohio (Adams County, Marion

County) and Oregon (Benton County, Umatilla). The survey identified which community they represented but not the individual coach completing the questionnaire.

Measures

Data on perceived determinants of implementation behaviors was collected through an online questionnaire based on the Theoretical Domains Framework administered between November 2018 and June 2019. During this time, the initial funding period of the project was completed so all data on PSEs was representative of the final PSEs supported by the project.

In order to measure the determinants of implementers behavior, Huijg et al (2014) developed a questions for each TDF domain and included instructions for customizing the questionnaire based on your action (implementation), context (community) and target (inclusive PSE changes). The original survey measured 11 of the 14 domains with acceptable discriminant validity (Huijg, Gebhardt, Crone, Dusseldorp, & Presseau, 2014; Huijg, Gebhardt, Dusseldorp, et al., 2014). The final 25-item questionnaire measured 9 domains as it was determined inappropriate to ask about time sensitive domains (emotions and memory, attention and decision processes) due to the timing of the questionnaire. Both domains would be more accurately answered closer to the time of PSE implementation. The survey included 7 items in the capabilities domain (4 regarding knowledge and 3 regarding skills), 14 items addressing motivations (4 in professional and social role and identify, 3 for beliefs about capabilities, 2 for beliefs about consequences, 2 for optimism, and 3 in intentions) and 4 addressing opportunities (2 for environmental context and resources and 2 for social influences). Responses to each item were based on a Likert scale that ranged from 1 (strongly disagree) to 7 (strongly agree). Higher scores

indicated agreement with the phrase which represented a domain of the TDF. Survey questions categorized by the domain that they measure can be found in table 2. Data was summarized by domain where each set of questions that represented a domain were averaged to give an overall domain score. A total overall implementation score was also calculated based on an average of all responses given by the community coach in all domains.

Data regarding PSE implementation was collected through progress reports that were submitted quarterly to the project evaluation team throughout the project period. The evaluation team categorized the reported PSEs by type (physical activity, nutrition, tobacco, general accessibility). For the purposes of this paper, calculations were first completed solely for physical activity and general accessibility PSE changes. These calculations were also completed for total PSE changes, which included PSEs related to tobacco use and nutrition in addition to general accessibility and physical activity.

Potential reach and best estimate of actual reach, were calculated using population data from the American Community Survey (ACS) 2012-2016 5 year estimates on disability rates specifically for the communities that participated in the project. Potential reach was calculated as the number of PWDs that a PSE change could potentially reach after full implementation. This varied based on the PSE change. For example, a policy change specific to an organization would only reach the members of that organization whereas a curb cut within the community could reach every PWD in that community.

Best estimate of actual reach was a calculation developed by the evaluation team to provide a more realistic view of the reach of each PSE. This was calculated as a percentage of the potential reach that aligned with expectations of the number of PWDs

that would actually participate in a program. This resulted in the criteria of 1% of the potential reach for PSEs related to physical activity or nutrition and 10% of the potential reach for general accessibility. Actual reach was substituted when it was known (i.e. in limited settings).

Analyses

Descriptive statistics were used to describe the self-reported determinants of implementation behaviors by the community coaches as well as to describe the number of PSE changes implemented within each community and their reach for PWDs. To examine relationships between determinants of implementation behaviors and implementation of PSE changes, Pearson correlations were conducted between each TDF domain, overall TDF score, each COM-B domain, number of PSEs implemented and reach of PSEs.

Results

Communities and Community Coaches

The PSE implementation survey was sent to 19 community coaches and responses were received from 13 coaches (68.4%). Responses were submitted from coaches in 9 of the 10 possible communities. One community did not respond to the requests to complete the survey. The population of the communities ranged from 20,204 – 141,645 people. This indicated that there was a wide variety of community types participating in the project. Population data can be found in table 3.

Perceived Determinants of Implementation Behavior

Data on self-reported implementation behaviors are summarized in table 4 for both the TDF and COM-B domains. The reported responses for overall implementation

behaviors averaged 6.27 on a 7-point scale. This indicates that coaches perceived themselves as performing a high number of implementation behaviors across all TDF domains. TDF sub-scales with the highest mean responses were beliefs about consequences (6.65 ± 0.56, ranging from 5-7), knowledge (6.62 ± 0.46, ranging from 5.75-7), and skills (6.59 ± 0.49, ranging from 6-7). This shows that the coaches generally felt that their PSE would result in positive outcomes for the community, they felt knowledgeable about how to implement inclusive PSE changes, and they felt they had the skills necessary to implement inclusive PSE changes. The TDF sub-scale with the lowest mean response was environmental context and resources (4.81 ± 0.95, ranging from 4-7). This indicates that the coaches did not feel strongly that they had the resources or networks to support implementing inclusive PSE changes. When looking at the broader COM-B domains, the lowest scores were reported for the opportunities domain (5.54 ± 0.64). Community coaches reported high scores in the capabilities (6.61 ± 0.42) and motivations (6.31 ± 0.61) domains.

Number and Reach of PSE Changes

The number and reach of each community's PSE changes are summarized in table 3. The mean number of PSEs changes implemented across communities related to physical activity or general accessibility was 4.54 ± 2.96 PSEs with a range of 0 to 9 PSEs implemented during the 2-year project period.

The best estimate of actual reach of PSE changes related to physical activity and general accessibility averaged 2,334.6 ± 3,971 individuals and ranged from 0 to 10,701 individuals. The PSEs implemented had a mean potential reach of 8,786.15 ± 7198 and ranged from 0 to 22,817 individuals. When other PSEs addressing nutrition or tobacco use were incorporated, there was an average of 6.84 ± 4.8, with a range of 0 to 15 total

PSEs. The best estimate of actual reach averaged 2732.6 ± 3972 individuals and ranged from 0 to 10,701 individuals. The PSEs implemented (including those targeting tobacco use and nutrition) had a mean potential reach of 8,758 ± 7362 individuals and a range of 0 to 22,817.

Relationship between Determinants of Implementation Behavior and PSE Changes

There were no significant correlations among any of the TDF domains or COM-B domains with the number or reach of PSEs implemented. Correlation data is summarized in tables 5 and 6.

Discussion

The aim of this study was to identify perceived determinants of implementation behaviors and which of these determinants correlate with successful implementation of PSE changes inclusive of PWDs within a community context. Communities had varying levels of success implementing PSE changes that were inclusive of people with disabilities. The range was 0 to 9 PSE changes when PSE changes of interest were considered (PA and general accessibility) and increased to 15 when nutrition and tobacco related PSE changes were also considered.

With the exception of the opportunities domain of the COM-B and associated TDF domains, all other TDF and COM-B domains were reported as <6, indicating the community coaches either agreed (6) or strongly agreed (7) with each statement related to their perceived capabilities and motivations. The TDF subscales with the highest response was beliefs about consequences (6.66). This indicated that coaches believed that implementing inclusive PSE changes would benefit public health and that it would not cause any disadvantages to relationship with their communities. Overall, they view implementation of PSE changes as a positive for both their individual communities and

overall public health. Additionally, they were confident in their knowledge (6.62) and skills (6.59) to implement inclusive PSE changes. This indicates a need to continue building and maintaining these motivations and capabilities so that those implementers can continue this work to address inclusion in their communities.

The descriptive data did shed light on environmental context and resources as a domain of interest, well below the reported scores of all other domains. These items assessed community coach perceptions regarding the sufficiency of financial resources and good networks between partners involved in implementing inclusive PSE changes in their communities. The mean score was 4.81, indicating that on average, coaches neither agreed nor disagreed that the resources and networks were enough to support implementation of inclusive PSE changes. This affected the overall opportunities domain of the COM-B, for which on average the coaches somewhat agreed (5.54) with the statements related to this domain. Specifically, the opportunities domain focuses on context, resources, and social influences. The effect of these domains are not surprising. A recent study on implementation of PSE changes related to cancer control and prevention identifies navigating the local context as an influencer of PSE implementation. This included the process being facilitated by local champions and supportive social and political climate (Rohan et al., 2019). Capacity for implementation of PSE changes is often measured through stakeholder buy-in and commitment or by measuring awareness within the community context. This points to the community and the opportunities within unique community context as a vital part of the PSE implementation process (Betancourt et al., 2017; Honeycutt et al., 2015; Townsend et al., 2019).

To address the domain of opportunity, the behavior change wheel suggests incentivisation and persuasion. Incentivisation calls for creating a reward or prize structure. At the level of the community, this often involves grant funding or other mechanisms that can provide resources for implementation. Though there are some inexpensive solutions that can be implemented, many larger accessibility and inclusion projects require funding to see successful implementation. Though there are disability specific funding mechanisms, such as Community Change grants from America Walks, and Accelerating Disability Inclusion Micro-grants from the National Center on Healthy Physical Activity and Disability (NCHPAD), funding amounts are often limited, meaning there must be a consistent stream of funding to take on more inclusion projects. To encourage disability inclusion and allow for implementers to successfully continue their work, it is important to provide mechanisms for resource allocations to these efforts from both the local resources and national funding opportunities. Incentivizing community coaches to seek out or create opportunities could help to increase perceptions of opportunities. Examples of this approach could be merit bonuses for building a new partnership or rewards for submitting grant proposals to secure resources.

A second suggested intervention is persuasion which involves "using communication to induce positive or negative feelings or stimulate action" (Michie 2015). This intervention is highly suited for communities in which a lack of awareness of the needs of those with disabilities is evident. Individuals in positions of leadership and influence must be made aware of the inequities faced by PWDS the potential of this population if they are included in public health efforts. For example, a for-profit fitness center might buy in to inclusive PSE changes if the data regarding potential members

with disability and the return on investment through membership fees to the facility were presented. Knowing the audience that is being targeted to persuade would allow the message to be tailored to their interests (i.e. potential profit). Identifying ways to encourage others in the community to participate in and support implementation of inclusive PSE changes could open opportunities for partners and additional resources. The buy-in from the community at large is vital to support implementation and can potentially hinder efforts even when the coaches are motivated and feel capable of doing so.

As for limitations, it is important to note that all responses are the coachs' perceptions of their behaviors, not objective measures of each domain. It is possible for each domain to be an inflated view of actual capabilities and motivations. It also is possible that response bias was introduced, and that the coaches were answering in ways that they thought they should answer given their fields of public health and/or disability health. More objective measures or more in-depth questions may be considered in the future to get a better understanding of actual behaviors and why the coaches chose to rate the domains as they did. Additionally, the coachs' perceptions of a success may have differed from that of the funding agency. Small, reinforcing successes may have contributed to both motivations and perceptions of capabilities even when they were not considered a successful PSE change by project standards.

Our results identified no significant correlations between any of the TDF domains, COM-B domains, reach, or reported PSE implementation. None of the domains within either framework was significantly correlated with reach or reported PSE implementation. The addition of these PSE changes related to tobacco use and nutrition

did not affect the correlations. Though the purpose of this paper was to explore implementation behaviors related to PA and general accessibility, it is difficult to point specifically to those changes without considering the influence of additional successful implementation in other categories. The lack of significant correlations could be due to the small sample size of only 13 responses representing 9 communities. To produce a fuller picture of implementation, collecting similar information from others involved in implementing inclusive PSE changes should be considered. People from viewpoints other than public health or disability health have a role in implementation for successful, community-wide PSE changes. It is possible, especially considering that the environment presented the largest challenge to the coaches, that others supporting implementation did not feel as capable or motivated as the community coaches. Looking beyond the main implementing individuals may provide understanding of the community's ability to assist in implementation. Interventions focused on these groups may help to encourage more opportunities as well. Additionally, it may be beneficial to identify changes in perceived behaviors throughout the implementation process. Future studies might consider conducting pre-post assessments of implementation behaviors to identify which domains are affected over time by the experiences of implementation successes or failures.

Conclusions

The survey results identified that community coaches in the DHC project felt that they were capable and motivated to implement inclusive PSE changes within their communities. However, the environmental context and resources was identified as the weakest domain of the TDF in relation of implementation of inclusive PSE changes within the community. Coaches generally reported positive perceptions of all other

domains within the TDF, indicating that they felt both capable and motivated to implement PSE changes within their respective communities. Future research should consider addressing the opportunities domain with interventions targeting both resource acquisition and creating more positive networks around implementation. It would be beneficial to focus more efforts on those surrounding the lead implementers who might contribute to the implementation of inclusive PSE changes, providing more support to the community coaches. Addressing this broader context has the potential to further support inclusion and address the health disparities experienced by community members with disabilities.

Table 1: Definitions of the domains of the TDF within the COM-B Domains

COM-B Domain	TDF Domain	Definition
Capabilities		
	Knowledge	An awareness of the existence of something
	Skills	An ability or proficiency acquired through practice
	~Emotion	A complex reaction pattern, involving experiential, behavioral, and physiological elements, by which the individual attempts to deal with a personally significant matter or event
	**Behavioral regulation	Anything aimed at managing or changing objectively observed or measured actions
	~Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives
Motivations		
	Social/professional role and identity	A coherent set of behaviors and displayed personal qualities of an individual in a social or work setting
	Beliefs about capabilities	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use
	Optimism	The confidence that things will happen for the best or that desired goals will be attained
	Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behavior in a given situation
	**Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus
	Intentions	A conscious decision to perform a behavior or a resolve to act in a certain way
	**Goals	Mental representations of outcomes or end states that an individual wants to achieve
Opportunities		
	Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behavior
	Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviors

** Determined not to have discriminant content validity

~ Not measured due to time between implementation and survey data collection

Table 2: PSE Implementation Survey based on the TDF

TDF Domain	Survey questions
Capabilities	
Knowledge	1. I am aware of the objectives of inclusive PSE changes
	2. I know the objectives of inclusive PSE changes
	3. I am familiar with the objectives of inclusive PSE changes
	4. I am aware of how to implement inclusive PSE changes within my community
Skills	5. I have been trained how to implement inclusive PSE changes within my community
	6. I have the skills to implement inclusive PSE changes within my community
	7. I have practiced implementing inclusive PSE changes within my community
Motivations	
Social/professional role and identity	8. Implementing inclusive PSE changes within my community is part of my work as a public health or disability health professional
	9. As a public health or disability health professional, it is my job to implement inclusive PSE changes within my community
	10. It is my responsibility as a public health or disability health professional to implement inclusive PSE changes within my community
	11. Implementing inclusive PSE changes within my community is consistent with my profession
Beliefs about capabilities	*12. I am confident that I can implement inclusive PSE changes within my community even when the community is not motivated*
	13. I am confident that I can implement inclusive PSE changes within my community even when there is little time
	14. I am confident that if I wanted, I could implement inclusive PSE changes within my community

Optimism	15. With regard to implementing inclusive PSE changes within my community in uncertain times, I usually expect the best
	16. With regard to implementing inclusive PSE changes within my community, I'm always optimistic about the future
Beliefs about consequences	*17. If I implement inclusive PSE changes within my community, it will benefit public health*
	18. If I implement inclusive PSE changes within my community, it will have disadvantages for my relationship with the community (reverse scored)
Intentions	19. How strong is your intention to implement inclusive PSE changes within your community in the next year?
	20. I will definitely continue to implement inclusive PSE changes within the community in the next year
	21. I intend to implement inclusive PSE changes within the community in the next year
Opportunities	
Environmental context and resources	22. Within the socio-political context there is sufficient financial support (e.g., from local authorities, insurance companies, the government) for inclusive PSE changes
	23. Within the socio-political context there are good networks between parties involved in inclusive PSE changes
Social influences	*24. Most people who are important to me think that I should implement inclusive PSE changes in the community.*
	25. Most people whose opinion I value would approve me of implementing inclusive PSE changes in the community.

Table 3: Community related descriptive statistics

	Mean (SD)	Median, Range
Population (total people)	63,080.8 (37,277.2)	65,814, 20,204 – 141,645
Population of People with disabilities	9,549.6 (546.2)	9,959, 2,246 - 22,817
PSE changes implemented (PA and general)	4.54 (2.96)	4, 0-9
Potential reach of PSEs (PA and general)	8,786.2 (7,198.7)	468, 0-10,701
Actual reach of PSEs (PA and general)	2,334.6 (3,971.0)	7,088, 0-22,817
PSE changes implemented (all types)	6.85 (4.81)	6, 0 - 15
Best estimate reach of PSE changes	2,732.77 (3,791.77)	952, 0 – 10,701
Potential reach of PSEs	8,758.46 (7,362.24)	7,088 – 0 – 22,817

Table 4: Descriptive statistics of implementation behaviors by TDF domain, COM-B domain, and overall*

Domain	Mean (SD)	Range
Capabilities	6.61 (0.42)	5.75 - 7
Motivations	6.31 (0.61)	4 - 7
Opportunities	5.54 (0.64)	4 - 7
Knowledge	6.62 (0.46)	5.75 - 7
Skills	6.59 (0.49)	6 - 7
Social and Professional role and identity	6.42 (0.9)	4 - 7
Beliefs about capabilities	6.06 (0.8)	5 - 7
Optimism	6.12 (0.58)	5 - 7
Beliefs about consequences	6.65 (0.55)	5 - 7
Intentions	6.38 (0.74)	4.67 – 7
Environmental contexts and resources	4.81 (0.95)	4 - 7
Social influences	6.35 (0.52)	5.5 - 7

*Responses based on a 7-point Likert scale where 1 indicates ‘strongly disagree’ and 7 indicates ‘strongly agree’

Table 5: Pearson correlations between self-reported implementation behaviors based on TDF domains and PSE implementation

	Number of PSEs (PA and General)		Best estimate reach of PSEs (PA and General)		Potential Reach PSEs (PA and General)	
	r	p-value	r	p-value	r	p-value
Knowledge	-0.034	0.913	0.022	0.943	-0.122	0.692
Skills	-0.064	0.835	-0.223	0.464	-0.198	0.516
Social and Professional role and identity	0.189	0.556	0.119	0.712	-0.373	0.233
Beliefs about capabilities	0.224	0.463	0.051	0.870	0.166	0.588
Optimism	-0.039	0.899	-0.455	0.118	0.245	0.419
Beliefs about consequences	0.427	0.145	0.247	0.416	-0.069	0.822
Intentions	-0.077	0.803	-0.135	0.660	-0.307	0.308
Environmental contexts and resources	-0.213	0.486	-0.343	0.251	-0.346	0.246
Social influences	-0.050	0.870	0.147	0.632	0.056	0.855
Average Overall	0.032	0.919	-0.112	0.716	-0.200	0.512

Table 6: Correlations between self-reported implementation behaviors based on COM-B domains and PSE implementation

	Number of PSEs		Best estimate reach of PSEs		Potential Reach PSEs	
PA and general						
	r	p-value	r	p-value	r	p-value
Capabilities	-0.023	0.941	-0.057	0.854	-0.171	0.578
Motivations	0.121	0.694	-0.071	0.817	-0.167	0.586
Opportunities	-0.277	0.359	-0.334	0.265	-0.252	0.405
All types						
	r	p-value	r	p-value	r	p-value
Capabilities	0.002	0.995	-0.061	0.842	-0.155	0.613
Motivations	0.026	0.934	-0.093	0.763	-0.158	0.606
Opportunities	-0.440	0.132	-0.388	0.191	-0.247	0.416

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USING THE KNOWLEDGE TO ACTION FRAMEWORK IN COMMUNITY-BASED INTERVENTIONS FOR PEOPLE WITH DISABILITIES

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AUTHORS TBD

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Abstract

People with disabilities (PWDs) are one of the largest health disparity populations that often go unrecognized and unaddressed within public health. There is a need to address this disparity at the community level. However, each community has unique characteristics that affect implementation of evidence-based public health promotion. Additionally, the process of identifying and adapting evidence can be difficult, especially with limited time and resources. Applying a framework to translate knowledge to practice in the community can help streamline the process and encourage sustainability of the implementation. The Knowledge-to-Action (KTA) framework is an applicable knowledge translation framework that can guide community-based health promotion professionals through the implementation of health promotion initiatives that are inclusive of PWDs. Though the KTA cycle has been applied to various settings, it has primarily been seen applied to clinical environments. This paper will provide an example outlining the use of this framework within the community, providing a model to advance research into community-based public health practice that is inclusive of PWDs.

The purpose of this paper is twofold. First, this paper will provide clarity on knowledge translation and the KTA framework as it might be applied in the community. Secondly, a systematic framework will be used to identify and implement evidence-based public health interventions inclusive of PWDs within the community. We will demonstrate how the KTA cycle can be used in specific community contexts, specifically using an example on a university campus to illustrate the phases of the KTA cycle in the community.

Background

People with disabilities (PWDs) represent approximately 22% of the US population yet are one of the largest health disparity populations that often go unrecognized and unaddressed within public health (Carroll et al., 2014; Krahn, Walker, & Correa-De-Araujo, 2015). PWDs are more likely to have poor health outcomes including higher rates of obesity and chronic conditions such as high blood pressure, diabetes, and high cholesterol than people without disabilities (Frith & Loprinzi, 2018; Pharr & Bungum, 2012; Reichard, Stolzle, & Fox, 2011). People with disabilities are also more likely to engage in behaviors that contribute to these conditions such as inactivity (Loprinzi, Sheffield, Tyo, & Fittipaldi-Wert, 2014). There is a growing body of evidence supporting the numerous benefits of physical activity for people with disabilities various disabilities. Physical activity has been shown to reduce obesity, pain, fatigue, risk of developing chronic conditions and a reduction in all-cause mortality across several disability groups. Moreover physical activity leads to gains in strength balance, and quality of life (Ada, Dorsch, & Canning, 2006; Buchholz, McGillivray, & Pencharz, 2003; Frith & Loprinzi, 2018; Goodwin, Richards, Taylor, Taylor, & Campbell, 2008; Lai et al., 2018; Latimer-Cheung, Pilutti, et al., 2013; Taylor et al., 2016). Guidelines for specific populations have been published in addition to literature reviews specifying recommendations for physical activity in different disability groups (Goosey-Tolfrey et al., 2018; Kim et al., 2019; Latimer-Cheung, Martin Ginis, et al., 2013). There is also a push from the field of public health to address increase access health and wellness

programs that can help them to meet published guidelines of physical activity (Healthy People 2020).

However, few PWDs meet these recommendations for physical activity and over half of adults with disability report being inactive (Carroll et al., 2014; McGuire, Watson, Carroll, Courtney-Long, & Carlson, 2018). Contributing to this lack of engagement in PA, 76.8% of PWDs report barriers to accessing health and wellness programs such as the physical, or built environment (e.g. physical access, curb cuts, universally designed facilities), the social environment (e.g. others perceptions, stigma associated with disability), and a lack of knowledgeable professionals to provide expertise and adaptations for participation in PA (Barclay, McDonald, Lentin, & Bourke-Taylor, 2015; Buffart, Westendorp, van den Berg-Emons, Stam, & Roebroeck, 2009; Jaarsma, Geertzen, de Jong, Dijkstra, & Dekker, 2014; Rimmer, Padalabalanarayanan, Malone, & Mehta, 2017)

Evidence suggests that the built environment has a significant effect on physical activity. When the built environment provides physical access to activity, there is a positive influence on engaging in physical activity (Barnett et al., 2017; Eisenberg, Vanderbom, & Vasudevan, 2017; Smith et al., 2017). Research has also shown that many facilities designed to provide opportunities for physical activity (i.e. fitness centers) are still lacking access in all of these areas (Calder, Sole, & Mulligan, 2018; Rimmer et al., 2017). This lack of accessibility is in spite of numerous tools, guidelines, and policies that exist to ensure facility accessibility. For example, the Guidelines, Recommendations, and Adaptations Including Disability (GRAIDs) are an evidence-informed tool that provides a wide variety of inclusion solutions that increase access for PWDs to physical

activity opportunities (Rimmer et al., 2014). Understanding what limits or contributes to the use of knowledge, in this case that is the removal of barriers to inclusion to increase access to physical activity opportunities, may facilitate better health outcomes for PWDs.

It is vital to look into the know-do gaps - gaps between the evidence we know and the current practice of what we do - that exist within the community setting. When we know what works yet are not putting what research tells us works into practice, it is not an issue of knowledge. It is an issue of action and implementing that knowledge into a context that will reach the end user it is intended to benefit. Any time there is strong evidence supporting effective solutions or services that are still not being offered or addressed or when ineffective solutions are implemented, it becomes imperative that more effective methods of putting that knowledge into practice are used to optimize population health outcomes. Knowledge translation, the process of systematically moving knowledge into practice, becomes a vital next step to utilizing the evidence in different contexts which is often neglected as part of the research process. Implementation science frameworks such as the Knowledge-to-Action (KTA) cycle, provide structure to address the consistent failure to translate evidence from research into community practice (Graham et al., 2006).

The purpose of this paper is to provide some clarity on the concept of knowledge translation as it applies to the community and disability inclusion, and demonstrate how an existing knowledge to action framework may be of use to community-based professionals and researchers interested in facilitating the use of research in decision making and practice. We first present general background concepts within knowledge translation before presenting the Knowledge to Action cycle, a

framework developed to help engineer change. We discuss the elements of the KTA cycle and illustrate its use within a community setting using a scenario focused on increasing physical activity for all individuals with mobility disability within a university campus setting.

Knowledge Translation

Numerous terms have been used to describe the use of research, or the broader concept of knowledge use. In the United States, it is often referred to as dissemination and implementation. In Europe, implementation science or research utilization are more prevalent. In Canada, the terms knowledge exchange, knowledge transfer, knowledge mobilization, and knowledge translation are common.

The Canadian Institutes of Health Research (CIHR) offers one of the more comprehensive definitions which defines knowledge translation as, "a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health [of Canadians], provide more effective health services and products and strengthen the health care system. This process takes place within a complex system of interactions between researchers and knowledge users which may vary in intensity, complexity and level of engagement depending on the nature of the research and the findings as well as the needs of the particular knowledge user" ("Canadian Knowledge Transfer and Exchange Community of Practice – Closing the Loop between Theory and Practice," n.d.). This definition has been built upon or adapted by numerous organizations including the National Center for the Dissemination of Disability Research (NCDDR), the World Health Organization, and the National Institute on Disability, Independent Living, and Rehabilitation Research

(NIDILRR). Across all definitions, there are key elements that describe knowledge translation. These include 1) moving beyond simple dissemination of knowledge into actual use of knowledge or the application of the knowledge in policy or practice with the goal of closing the know-do gap, 2) the importance of knowledge synthesis and knowledge exchange, and 3) the use of the term 'knowledge' rather than 'research' which recognizes that while empirical evidence from research is central, there are other forms of learning that build the knowledge base, such as practice guidelines. Taking a closer look at the key elements of the definition helps to increase the understanding of knowledge translation as a whole ("Canadian Knowledge Transfer and Exchange Community of Practice – Closing the Loop between Theory and Practice," n.d.; Straus, Tetroe, & Graham, 2009).

Knowledge synthesis, as defined by CIHR, means the contextualization and integration of research findings from individual research studies within the larger body of knowledge on the topic. Knowledge synthesis comprises a family of methodologies (e.g. systematic reviews, meta-analysis, realist reviews, meta- synthesis, narrative reviews, etc) for determining what is known in a given area and what are gaps in the existing knowledge. Synthesis methods can integrate quantitative and qualitative findings. **Dissemination** first identifies the appropriate audience, then tailors the message and the medium to that audience. Tailoring means that dissemination is more than just diffusion of the message (simply making the information available) as that holds an expectation that users will be able to find the information and will be able to put it into practice effectively. Dissemination actively takes a role in making the information accessible and useable to the target audience. The **exchange** of knowledge recognizes an

interaction between the knowledge user and the researcher, resulting in mutual learning through the process of planning, producing, disseminating, and applying existing or new knowledge. It comprises the concept of collaborative, action oriented research where researchers and those who would use the findings work together as partners through the research process. **Ethically sound application** of knowledge involves practices that are consistent with ethical principles and norms, social values as well as legal and other regulatory frameworks. Application also recognizes the iterative process that moves knowledge into practice. This involves knowledge that has informed or influenced the way users think about issues and the direct application of knowledge that influences behavior or practice via incorporation into decision making (Straus, Tetroe, & Graham, 2013).

The Knowledge to Action Cycle

To help to operationalize knowledge translation, Graham and colleagues develop a conceptual framework known as the Knowledge to Action (KTA) cycle based on a concept analysis of 31 planned action models and theories (Graham et al., 2006). The KTA framework was developed to help make sense of all the theories that exist for knowledge translation by integrating the concepts of knowledge creation and action, providing a holistic view of the knowledge translation process. The framework consists of two distinct phases: knowledge creation and action. Research typically informs knowledge creation beginning with initial research questions (knowledge inquiry), synthesizing knowledge to give strength to evidence (knowledge synthesis), and finally the production of tools and products that are resources to help implement the evidence.

Together, these phases make up the knowledge creation funnel that distills knowledge such that only knowledge with the appropriate evidence behind it is put into action.

The action cycle is divided into phases that were derived from the action components of each of the 31 planned action theories. Each of the action phases can be informed by the theories and models from which they were derived as well as other theories (e.g. educational, psychology, sociology, organizational, economic, and communication theories). The action cycle starts with the know-do-gap and identifying knowledge that can inform how to fill that gap. Considering the context of implementation, the knowledge must then be adapted for use, barriers to knowledge use must be identified, and finally the knowledge can be implemented in the form of an intervention. The evaluation phase first monitors knowledge use, then evaluates outcomes and finally facilitates sustained knowledge use. The cyclical nature of this framework means that the Action Cycle can move in any direction and adjustments can be continually made throughout the process if it is found that something new informs implementation of identified knowledge. The knowledge to action cycle does not specifically prescribe what needs to be done at each phase but provides guidance on what sorts of activities should be considered to promote uptake of research, making it flexible to be applied in various contexts to address various behaviors among any target population.

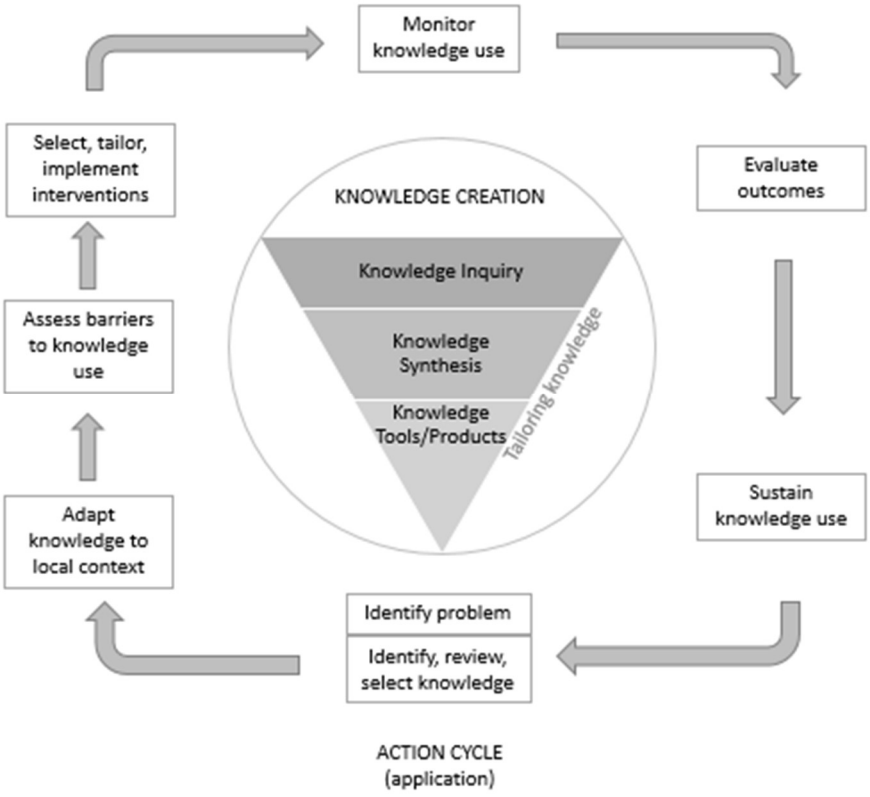

Figure 1: Knowledge to Action Cycle (Adapted from Graham et al., 2006)

Knowledge Funnel

The knowledge creation funnel is comprised of three components representing increasingly refined knowledge. The knowledge inquiry component represents basic research around a given topic or first generation knowledge. Knowledge synthesis (second generation knowledge), is an essential component of knowledge creation as described above. Knowledge tools and products (third generation knowledge) are the most distilled form of research knowledge within knowledge creation. Knowledge tools and products, ideally taking into account local needs and culture can include decision support technologies such as guidelines, algorithms, decision rules and patient decision aids. Unfortunately, even the best innovations do not implement themselves and the

existence of such tools and products is not enough to move them into practice. This is where the action cycle of the knowledge to action framework can provide guidance as to how to move knowledge into action.

The action cycle begins with the process of either: 1) identifying an issue or concern and looking for evidence to address the problem, or 2) by becoming aware of research findings, knowledge syntheses or practice guidelines and assessing whether or not current practice is in line with the new knowledge. With either approach, the key is understanding the magnitude of the know-do gap which can be used to help make decisions about whether to proceed and how.

Action Cycle

To help illustrate the action phases of the KTA cycle we will thread an example scenario through the action phases of the cycle, beginning with the identification of a know-do gap within community practice.

> While attending a workshop for continuing education for fitness professionals, a university recreation director heard a lecture on physical activity for PWDs. Without prior experience with or knowledge of disability health, he lacked awareness of disability as a health disparity population, which the literatures says is often overlooked in physical activity services. Yet there are numerous benefits to participating in physical activity for PWDs, including decreased depression, pain, and fatigue and increased fitness, strength, and quality of life (Kim et al., 2019; Nash, 2005; Tawashy, Eng, Lin, Tang, & Hung, 2008). Additionally, those with disability are at higher risk of developing

secondary conditions that can be prevented with healthy lifestyle behaviors, emphasizing the importance of physical activity for this population (Frith & Loprinzi, 2018; Garshick et al., 2005).

While the overall goal of the recreation program is to increase the health of all students, he realizes that inclusion of PWDs was not considered when planning services provided at the fitness center (know-do gap). The lecture presented physical activity guidelines for various disability populations that were similar to those he promotes for PWDs, however evidence of numerous barriers were presented that are unique to PWDs as they attempt to meet these guidelines. A tool presented at the training was the Guidelines, Recommendations and Adaptations Including Disability (GRAIDs) were presented as an evidence informed guide to making a fitness center accessible (Rimmer et al., 2014). This evidence-informed tool can be used to make the appropriate adaptations to include PWDs in physical activity efforts. After returning to the university, he is committed to identify the current state of serving students with disability and where he is able to make changes to how facility operates and offers its services to be more inclusive of PWDs.

Within the university, a public health researcher on campus recently completed an annual campus wide survey of health behaviors. The director partners with this researcher to identify the population of students with disability within this survey and find that it reflects low levels of physical activity as seen in the literature. With the commitment to improving the health of all students at the forefront and new knowledge of a know-do gap in how the fitness and recreation

center operates, the recreation director begins the process of implementing solutions to address the gap.

After identifying a problem and identifying the evidence that can address the problem, the next step was to adapt the evidence to the local context. It is important to determine what needs to be adapted, in what context(s) and how adaptation should occur.

Within our scenario, the identified problem is the physical inactivity among students with disabilities across the campus. Specific guidelines, adaptations, and suggestions for adapting physical activity to specifically meet the needs of individuals with mobility disability are discovered to address this issue. The knowledge identified includes exercise recommendations for individuals with various disabilities (Goosey-Tolfrey et al., 2018; Kim et al., 2019), Guidelines, Adaptations, and Recommendations Including Disability (GRAIDs) (Rimmer et al., 2014), and universal design standards that make the campus recreation center inclusive.

The barriers and facilitators to physical activity for individuals with mobility limitations have been studied by numerous groups. Reported barriers include inaccessible facilities, difficulties with transportation, medical instability, issues with social support (e.g., caregiver burden), inaccessible exercise equipment, and lack of trained professionals (Barclay et al., 2015; Buffart et al., 2009). To identify which of these barriers were most prevalent in their context, they decide to do an assessment of the current state of accessibility in and around the fitness and recreation center. The most appropriate instrument for their

purposes is the Community Health Inclusion Index (CHII) (Eisenberg et al., 2015). This assessment allowed them to identify where accessibility was lacking in the facility as well as the current state of the policies in the fitness center and the state of staff training around disability awareness. The assessment revealed a lack of awareness of the needs regarding the inclusion of PWDs, a lack of policies on inclusion training, and very few opportunities for PWDs to participate in physical activity using the current equipment and service offerings.

Once the knowledge that needs to be applied has been determined, and how and when it should be adapted, barriers and supports to knowledge use need to be assessed. Barriers and/or supports may be related to one or all of the following: the knowledge or innovation to be implemented, the potential adopters, the setting, or the implementation plan. This can be assessed through surveys, focus group interviews, or individual interviews with key informants. Reviewing the published literature on relevant barriers and supports can also be helpful. This step is extremely important to successful implementation because if these barriers and supports are not addressed, the likelihood of the knowledge being used effectively decreases.

In our scenario, the first barrier identified through the assessment as well as through the lecture that initially identified know-do gap is a general lack of awareness around disability and physical activity inclusion. This lack of awareness is not solely limited to the recreation center staff. Awareness must be supported and disseminated throughout the campus to raise awareness of inclusive changes. Steps should be taken to include disability in health promotion efforts and increase awareness of positive outcomes when engaging with physical

activity. Additionally, there is evidence around modeling of physical activity behaviors. Many of the health promotion videos and materials do not currently depict individuals of varying ability levels. Time and resources will be required for training and promotion materials. Simply making the changes without a plan to disseminate the knowledge and recruit for use of the services limits the potential reach of the knowledge, so this should also be discussed in the larger plan. Barriers resulting from the physical environment must also be addressed. Though compliance to various accessibility laws (e.g. the Americans with Disabilities Act) is required, actual useable accessibility must go beyond that. Often, the best way to identify if this is lacking is to ask stakeholders with lived experience to help identify which parts of the environment are most important to address and how they should be addressed.

Considering the specific context, the campus setting presents unique organizational barriers. There are often budget restrictions that limit the purchase of specialized equipment or new equipment. Therefore, adaptations to existing equipment and inexpensive changes will be the most appropriate For example, the United States Access Board suggests arranging fitness equipment to allow sufficient space to maneuver a wheelchair between machines (roughly 3 feet of space) ("Exercise Equipment and Machines—United States Access Board," n.d.). This is an inexpensive way to increase accessibility to existing equipment whereas the purchase of new equipment may be more limited until funds can be allocated for this purpose. However, a university setting also presents unique resources that can be used. For example, there are individuals

with expertise in various fields across the campus as well as a number of possible sources of data. Asking for assistance from public health, health professions, sociology or other related schools could lend support and expertise to evidence, implementation, and evaluation. Students may be able to provide assist with projects or training for class credits or internship hours.

The next phase in the KTA cycle is to identify, select or tailor implementation interventions. It is important in this step to identify the core components of the interventions to be implemented and ensure those remain constant. The tailoring can occur around how to insert those components in the most useable and sustainable way using the supports provided in the specific context and the addressing the specific barriers presented by that context. Additionally, when selecting interventions and action to take, stakeholder input is vital. This will encourage buy-in from those stakeholders as well as provide important information regarding the needs of the target populations.

In our scenario, the first group to seek input from is those on campus with a lived disability experience. Though the literature may identify the main evidence to be implemented, the 'how' within the specific context is best informed by those stakeholders. This group is also vital in prioritizing interventions and selecting those that will be best suited for the context and the specific population. The group prioritizes the need for informed staff and allied health professionals on campus. Additionally, they cite the lack of accessible equipment and provide suggestions for popular equipment to consider purchasing (e.g. arm ergometer and handcycle) and adaptions to current equipment (e.g. hand grips, spacing between machines to allow for space for an assistive device). Utilizing this feedback, the

following interventions are chosen to address the environment within the fitness center: 1) purchase an arm ergometer and select adaptations to current equipment, 2) rearrange existing fitness equipment to allow for space, and 3) train all fitness center staff on disability awareness and etiquette.

To raise awareness across campus, the first step to implementation is to select the specific individuals who should be included. In this context, the target is campus employees that may influence a student's decision to seek out physical activity opportunities (all recreation center staff, all university student health staff, individuals who run campus health campaigns, and those who lead new student orientations). A tour is given to these identified staff as well as a discussion of the benefits and the specific guidelines for PA for this population.

Once the chosen interventions have been implemented, the next phase is to monitor the use of that knowledge that is being implemented throughout the implementation process. This might involve assessing whether knowledge is being understood or being put into practice. By monitoring knowledge use and exploring the barriers and facilitators of knowledge uptake, action can be taken to refine the implementation of the intervention to overcome the barriers and strengthen the supports.

To monitor knowledge use in our scenario (e.g., are changes to become inclusive being used by the faculty and staff implementing them, are the new changes used by the larger university community with disabilities), the campus recreation director tracks the use of newly adapted equipment and participation by PWDs in the fitness center. A campus wide survey is also conducted to identify the awareness of newly adapted equipment and accessibility of the fitness center. In

the event that PWDs are not utilizing the facility, an assessment can be conducted to identify additional barriers experienced by the target population. It could be that a barrier was not addressed initially and an iterative process of evaluating and adapting can lead to more appropriate and desired programming. To assess the knowledge, awareness, and intentions of the campus employees who participated in the tour and discussion of disability and physical activity, an assessment immediately post-tour can help identify what those in attendance learned, if there are additional topics that should be discussed, and their comfort level or intentions of using that knowledge.

Effective implementation requires careful evaluation. Through evaluation, one can determine the impact of the intervention: how successful it was in affecting outcomes at the individuals, organizational and community levels. It is also important to try to capture any unintended impacts of implementation, both positive and negative.

Successful outcomes on the individual level in our scenario would be to increase PA among students and faculty/staff with disability. This can be measured through self-reported physical activity which can be collected via questionnaire during an annual campus wide survey. If staff and resources are available, this data collection can occur more often. Because guidelines exist for PA, two indicators can be used to determine success including a general increase in PA reported and if reported PA meets the recommendations. It is also important to measure the success of the different approaches to increased accessibility that were implemented in the fitness center. This includes the equipment adaptations and the awareness raising among staff, other university

employees, and students on campus. To measure the success of the equipment adaptations, a monitoring system in which an employee periodically gathers observational data is put in place to identify if the equipment is being used. To measure changes in awareness, a brief survey is given before and after the tour to measure disability awareness and intentions to promote PA for PWDs. This same survey can be given periodically to measure if this knowledge is sustained.

The final phase of the action cycle addresses sustainability. Although presented last, sustainability issues should be considered from the very beginning of an implementation process and at each action phase. There is little point designing knowledge to action processes that are unlikely to be maintained. Evaluation of knowledge use and the lasting impact should be ongoing as a measure of sustainability. This ongoing monitoring can determine how long the skills/knowledge are maintained at an individual or organizational level or whether an additional intervention may be required. It can also indicate whether staff continue to adhere to the innovation and whether the desired impacts are persisting.

Sustainability was considered in our scenario. Ongoing in-services for the fitness center staff have been scheduled quarterly, encouraging consistent knowledge use and will encourage continued learning of new evidence regarding physical activity for PWDs. Due to the buy-in resulting from the director leading the effort, a policy was established that included training of any new employee in disability awareness, etiquette, and inclusive physical activity practices. Policies were also created outlining the maintenance of adapted equipment. The establishment of policies also encourages sustainability because if the director were to leave his

position, the policy would remain. Monitoring and evaluation of both knowledge use (process evaluation) and outcomes encourages consistent practice among staff and tangible measurements of success. This allows for further tailoring if needed or continuation if outcomes are achieved. Collecting data on outcomes of student health and program use can also demonstrate effectiveness to higher level of leadership at the university. Being in a university setting also allows for unique partnerships that are vital for success. No implementer works in a silo, nor should they. Utilizing partners with different viewpoints, skill sets, and expertise means that more views were considered during implementation, increasing the likelihood that varying needs were incorporated into the changes implemented.

Conclusions

The Knowledge to Action cycle is a step-by-step guide to addressing know-do gaps in a community setting using evidence-based interventions in local contexts. Research continues to advance to incorporate innovative interventions for numerous populations. Practitioners, researchers, and public health professionals have a responsibility to translate research into practice to positively affect the health outcomes. The first apparent know-do gap to be addressed is the recognition of PWDs as a health disparity population. This points to a need for professionals working in disciplines related to health promotion to better understand the inequities facing this population and systematically identify ways to address this disparity and promote healthy behaviors, such as physical activity, according to the available evidence. The KTA framework provides guidance for adapting research from the context of a controlled setting into a

practice or community setting in a way that is digestible for any professional. Individual practitioners can adapt this knowledge to their specific contexts moving research into the hands of those who need it most. The more the KTA framework is utilized in practice, the faster we can move research into practice and reduce the health disparities among PWDs.

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CONCLUSIONS

People with disabilities make up a large segment of the population within the United States and this will only continue to increase as more Americans age into a disability. It is crucial that PWDs are included in health promotion efforts to improve health outcomes among this population, recognize and address the health disparities felt by this population, and become more inclusive to all Americans in accessing community-based health promotion. In order to affect population health for PWDs, policy, systems, and environmental (PSE) changes must be inclusive of PWDs. This requires the those implementing inclusive PSE changes to be supported in their implementation efforts. Implementation behavior is affected by capabilities, motivations, and opportunities available to the implementer in order to successfully carryout the implementation of inclusive PSE changes.

The papers in this dissertation set out to better identify the determinants of the implementation behaviors towards implementing inclusive PSE changes within a community context as part of the Reaching People with Disabilities through Healthy Communities project. Paper 1 describes themes from interviews with 10 community coaches regarding their experiences with barriers and facilitators to implementation. When categorized into domains of behavior change, it was evident that the opportunities to implement inclusive PSE changes acted as the most influential domain. In communities where the environmental context and resources and social influences were reported to support implementation of inclusive PSE changes, the community coaches

felt that these supports facilitated the process of implementation. In contrast, communities where this was not present identified the lack of support, both social and through resources, as a barrier to proceeding with implementation.

The self-reported data from the same coaches in paper 2 also identified that the environment played a role in how they felt about implementing inclusive PSE changes. Coaches reported being capable and motivated to implement PSE changes, and were less inclined to agree that they had the financial, social, and contextual support to implement PSE changes. None of these domains individually actually correlated with reported PSE changes that they were able to implement.

In light of the perceived effects of the environmental context related to implementation of inclusive changes, systematically thinking through how to navigate that environment to create opportunities can assist in facilitating inclusive changes. The Knowledge-to-Action framework can help walk though important steps of knowledge translation in specific contexts that can support the implementation of inclusive changes.

Overall, continued support of implementers' capabilities and motivations to implement inclusive PSE changes is import to the work of creating more inclusive communities. In addition, future research should identify ways to better navigate the environmental context to support implementation of inclusive PSEs. Building relationships with key community stakeholders, increasing general community awareness of the needs of disability, and garnering buy-in from champions within the community can help facilitate these opportunities. Researchers and funding agencies should also consider applying resources to these efforts to improve the population health of PWDs.

Creating opportunities to implement inclusive changes within the community is a step towards mitigating the health disparities faced by PWDs by the environment.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL FORMS

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Office of the Institutional Review Board for Human Use

470 Administration Building
701 20th Street South
Birmingham, AL 35294-0104
205.934.3789 | Fax 205.934.1301 | irb@uab.edu

APPROVAL LETTER

TO: Herman, Cassandra

FROM: University of Alabama at Birmingham Institutional Review Board
Federalwide Assurance # FWA00005960
IORG Registration # IRB00000196 (IRB 01)
IORG Registration # IRB00000726 (IRB 02)

DATE: 06-Aug-2018

RE: IRB-300001985
Implementation Behaviors of DHC Community Coaches and State Experts

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The IRB reviewed and approved the Initial Application submitted on 01-Aug-2018 for the above referenced project. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services.

Type of Review: Exempt (Category 2)
Determination: Approved
Approval Date: 06-Aug-2018
Approval Period: No Continuing Review

Documents Included in Review:

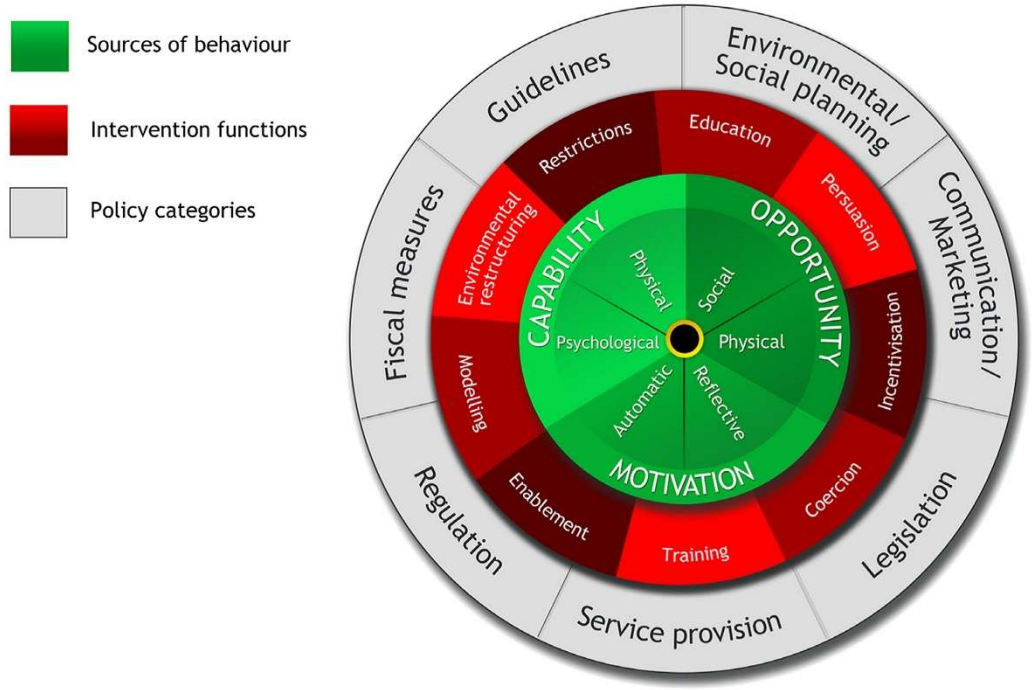
- infosheet.clean.180731
- surveyquest.clean.180731
- exempt.clean.180731

APPENDIX B

THE BEHAVIOR CHANGE WHEEL AND INTERVENTION/POLICY FUNCTIONS

THE BEHAVIOR CHANGE WHEEL AND INTERVENTION/POLICY FUNCTIONS

All information below (figure and definitions) directly from Michie et al 2011 to be used for recommendations to address barriers and facilitators of PSE implementation.



Definitions of interventions and policies

Interventions	**Definition**	**Examples**
Education	Increasing knowledge or understanding	Providing information to promote healthy eating
Persuasion	Using communication to induce positive or negative feelings or stimulate action	Using imagery to motivate increases in physical activity
Incentivisation	Creating expectation of reward	Using prize draws to induce attempts to stop smoking
Coercion	Creating expectation of punishment or cost	Raising the financial cost to reduce excessive alcohol consumption

Interventions	Definition	Examples
Training	Imparting skills	Advanced driver training to increase safe driving
Restriction	Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the opportunity to engage in competing behaviours)	Prohibiting sales of solvents to people under 18 to reduce use for intoxication
Environmental restructuring	Changing the physical or social context	Providing on-screen prompts for GPs to ask about smoking behaviour
Modelling	Providing an example for people to aspire to or imitate	Using TV drama scenes involving safe-sex practices to increase condom use
Enablement	Increasing means/reducing barriers to increase capability or opportunity[1]	Behavioural support for smoking cessation, medication for cognitive deficits, surgery to reduce obesity, prostheses to promote physical activity
Policies		
Communication/marketing	Using print, electronic, telephonic or broadcast media	Conducting mass media campaigns
Guidelines	Creating documents that recommend or mandate practice. This includes all changes to service provision	Producing and disseminating treatment protocols
Fiscal	Using the tax system to reduce or increase the financial cost	Increasing duty or increasing anti-smuggling activities

Interventions	Definition	Examples
Regulation	Establishing rules or principles of behaviour or practice	Establishing voluntary agreements on advertising
Legislation	Making or changing laws	Prohibiting sale or use
Environmental/social planning	Designing and/or controlling the physical or social environment	Using town planning
Service provision	Delivering a service	Establishing support services in workplaces, communities etc.

APPENDIX C

SEMI-STRUCTURED INTERVIEW GUIDE FOR STATE EXPERT INTERVIEWS

SEMI-STRUCTURED INTERVIEW GUIDE FOR STATE EXPERT INTERVIEWS

Welcome

Welcome and thank you for your participation in the DHC project and this interview. I am Casey Herman and I am a PhD student at the University of Alabama at Birmingham and I work with NCHPAD at Lakeshore Foundation.

The purpose of this interview is to understand your experience with the DHC project. As the state expert, you acted as an extension of the national partner technical assistance team and provide state-specific support. We want to better understand your experiences with the project, the 6 phase model, and the perceptions of your participation in the project overall.

Housekeeping and ground rules

We will be audio recording this session so that we can make sure to capture all of your responses. To maintain confidentiality, these tapes will be kept among researchers and key personnel involved in the project.

Please keep in mind that your participation in this interview is voluntary and you can stop at any time you would like.

It is important to remember that there are no wrong answers. We want to know about your experience with the model and your perception of your role and duties as the state expert.

Explanation of process

I will be asking a series of questions and may follow up on your responses with some prompts to find out more information about your answers. Feel free to ask additional or clarifying questions and provide additional responses if new information comes to mind throughout the discussion. If you need to take a break, just let me know.

REACH

1) How do you think the PSE changes affect how organizations address people with disabilities?
    a. What types of organizations does this include?
    b. Access?
    c. Reach?
    d. Inclusion?
2) What was the population you were trying to reach with your PSE?
3) How much of your state's population of people with disabilities do you expect the PSE to affect?

4) Are the counties included in the project representative of the population of people with disabilities statewide?
    a. If not, how does it differ?

EFFECTIVENESS:

1) How effective do you think the PSEs will be in improving access?
2) And how about for increasing health behaviors?
    a. What behaviors?
    b. What do you think makes the PSEs in your state effective?
3) Did you have any unexpected outcomes of implementation?

Objective 2 – Examine how communities used the model

IMPLEMENTATION

1) What do you think worked well for the NACDD 6 phase model?
    a. Was one phase easier to implement than the others?
        i. Why?
        ii. Existing partnerships/collaborations?
        iii. Community differences?
2) What didn't work well?
    a. Why not?
    b. What could have improved this aspect of the model?

Objective 3 – Identify barriers and supports that influenced the implementation of PSE changes

ADOPTION

1) Questions relating to progress reports: State specific technical assistance questions
    a. What aspects of technical assistance were essential to you for PSE implementation? To communities?
2) What aspects of technical assistance were easiest to supply to your communities?
    a. Why?
3) Which ones were the most difficult?

a. Why?

Objective 4 – Examine changes in capacity of organizations participating in the DHC project

1) What factors do you think contributed to organizations feeling capable of implementing PSEs?
    a. Technical assistance?
    b. Personnel?
    c. Were there changes in feelings of capability? If so, what lead to these changes?
2) What barriers came up during the project and how were they overcome?
    a. Were you able to stick to the timeline? If not, what delayed your project?
3) What kept organizations engaged and active in the project?

<u>MAINTENANCE</u>

1) Do you think PSE changes are sustainable?
    a. If yes, why?
    b. If no, what would be needed for sustainability that is not currently available?
    c. If not, are their parts of the change that are sustainable and other parts that are not sustainable?
2) Do you think coalitions will be able to sustain their efforts going forward? How?
    a. Do the coalitions or organizations plan to continue to utilize the tools provided by the project?

APPENDIX D

SEMI-STRUCTURED INTERVIEW GUIDE FOR COMMUNITY COACH INTERVIEWS

SEMI-STRUCTURED INTERVIEW GUIDE FOR COMMUNITY COACH INTERVIEWS

Welcome

Welcome and thank you for your participation in the DHC project and this interview. I am Casey Herman and I am a PhD student at the University of Alabama at Birmingham and I work with NCHPAD at Lakeshore Foundation.

The purpose of this interview is to understand your experience with the DHC project. As the community coaches, you initiated the planning and implementation of inclusive policy, systems, and environmental changes in your community. We want to better understand your experiences with the project, the multi-phased approach to healthy community change and the perceptions of your participation in the project overall.

Housekeeping and ground rules

We will be audio recording this session so that we can make sure to capture all of your responses. To maintain confidentiality, these tapes will be kept among researchers and key personnel involved in the project.

It is important to remember that there are no wrong answers. We want to know about your experience with the model and your perception of your role and duties as the community coach.

Explanation of process

I will be asking a series of questions and may follow up on your responses with some prompts to find out more information about your answers. Feel free to ask additional or clarifying questions and provide additional responses if new information comes to mind throughout the discussion. If you need to take a break, just let me know.

Objective 2 – Examine how communities used the model

IMPLEMENTATION

1) Think about the steps or phases that were part of the community change process. This includes commitment, assessment (CHII), planning & prioritizing (developing the CAPS, using the GRAIDs), implementation (putting the CAP into action). What do you think worked well for the NACDD phased approach to healthy community change?
    a. Was one phase easier to implement than the others?
        i. Why?
        ii. Existing partnerships/collaborations?
        iii. Community differences?
2) What didn't work well?

a. Why not?

b. What could have improved this aspect of the model?

3) Would you recommend the use of the CHII? The GRAIDs?

a. Why or why not?

b. What suggestions would you make to improve the usability of these tools?

Objective 1 – Determine the implementation, reach, and effectiveness of PSE changes

REACH

1) How do you think the PSE changes affect how organizations address people with disabilities?

a. What types of organizations does this include?

b. Access?

c. Reach?

d. Inclusion?

EFFECTIVENESS:

1) How effective do you think the PSEs will be in improving access?

2) And how about for increasing health behaviors?

a. What behaviors?

b. What do you think makes the PSEs in your community effective?

3) Did you have any unexpected outcomes of implementation?

Objective 3 – Identify barriers and supports that influenced the implementation of PSE changes

ADOPTION

1) How valuable did you find the technical assistance from state experts? NACDD? NCHPAD?

2) What were the most beneficial aspects of TA?

a. Why?

3) Did you feel you were provided all the resources and networking you needed to implement your PSEs?

4) Was there anything you feel like you weren't provided that you needed/would have liked to have?

INSERT COMMUNITY SPECIFIC PSE QUESTIONS

Next I'd like to ask you about your community coalition

5) What types of individuals (what sectors) were represented on your coalition?

i. INSERT COMMUNNITY SPECIFIC COALITION QUESTIONS

b. Are there additional people groups you wish you had included on your coalition?

Objective 4 – Examine changes in capacity of organizations participating in the DHC project

1) What factors do you think contributed to organizations feeling capable of implementing PSEs?

   a. Were there changes in capacity for making changes? If so, what lead to these changes?

   b. What factors did you find were necessary for organizations to have in place to be "ready to change"?

2) What kept organizations engaged and active in the project?

3) What barriers came up during the project and how were they overcome?

4) Were you able to stick to the timeline? If not, what delayed your project?

<u>MAINTENANCE</u>

1) Do you think the PSE changes you implemented are sustainable?

   a. If yes, why?

   b. If no, what would be needed for sustainability that is not currently available?

   c. If not, are their parts of the change that are sustainable and other parts that are not sustainable?

2) Do you think your coalition will be able to sustain its efforts going forward? How?

Is there anything else you would like to say?

APPENDIX E

TDF QUESTIONNAIRE OF IMPLEMENTATION BEHAVIORS

TDF QUESTIONNAIRE OF IMPLEMENTATION BEHAVIORS

Q1: Which DHC site did you work with? _____

Please respond to the following questions on a scale of 1 to 7 (strongly disagree to strongly agree)

	Questions (Adapted from Huijg 2014)
1	I am aware of the objectives of inclusive PSE changes
2	I know the objectives of inclusive PSE changes
3	I am familiar with the objectives of inclusive PSE changes
4	I am aware of how to implement inclusive PSE changes within my community
5	I have been trained how to implement inclusive PSE changes within my community
6	I have the skills to implement inclusive PSE changes within my community
7	I have practiced implementing inclusive PSE changes within my community
8	Implementing inclusive PSE changes within my community is part of my work as a public health or disability health professional
9	As a public health or disability health professional, it is my job to implement inclusive PSE changes within my community
10	It is my responsibility as a public health or disability health professional to implement inclusive PSE changes within my community
11	Implementing inclusive PSE changes within my community is consistent with my profession
12	I am confident that I can implement inclusive PSE changes within my community even when the community is not motivated
13	I am confident that I can implement inclusive PSE changes within my community even when there is little time
14	I am confident that if I wanted, I could implement inclusive PSE changes within my community
15	With regard to implementing inclusive PSE changes within my community in uncertain times, I usually expect the best
16	With regard to implementing inclusive PSE changes within my community, I'm always optimistic about the future
17	If I implement inclusive PSE changes within my community it will benefit public health
18	If I implement inclusive PSE changes within my community it will have disadvantages for my relationship with the community
19	I will definitely continue to implement inclusive PSE changes within the community in the next year
20	I intend to implement inclusive PSE changes within the community in the next year
21	How strong is your intention to implement inclusive PSE changes within your community in the next year?
22	Within the socio-political context there is sufficient financial support (e.g., from local authorities, insurance companies, the government) for inclusive PSE changes
23	Within the socio-political context there are good networks between parties involved in inclusive PSE changes
24	Most people who are important to me think that I should implement inclusive PSE changes in the community.
25	Most people whose opinion I value would approve me of implementing inclusive PSE changes in the community.