



Prevention Research with Indigenous Communities to Expedite Dissemination and Implementation Efforts

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Abstract

Effectively translating evidence-based interventions into clinic and community settings is an increasing priority for health researchers. The successful dissemination and implementation (D&I) of interventions found efficacious ensures that major health funders such as the National Institutes of Health can demonstrate a return on investment in biomedical and behavioral research and that all populations receive maximum benefit from scientific discoveries. However, the products of research efficacy trials, the evidence-based interventions, are rarely designed with D&I in mind, rendering these interventions fundamentally misaligned with real-world settings. Further, while some evidence-based interventions have been successfully adapted for implementation in indigenous communities, few such examples have been published. Literature regarding the adoption and implementation of evidence-based interventions in indigenous communities is scarce, and the feasibility of scaling up successful interventions is poorly understood, potentially widening health disparities. The Intervention Research to Improve Native American Health (IRINAH) partners are generating efficacy data on community-responsive and engaged interventions that are also designed to facilitate D&I efforts, reducing the time between research to practice to benefit indigenous communities, should these interventions prove effective. In this manuscript, we provide an overview and key challenges of D&I science with indigenous communities. We then use IRINAH case studies to highlight strategies that IRINAH partners are using to plan for the scale-up and implementation of the studies. We conclude with recommendations to inform the next phase of IRINAH research efforts.

Keywords Indigenous · Health disparities · Community-based participatory research · Dissemination and implementation

Dissemination and implementation (D&I) research aims to identify and overcome barriers to the adoption and scale-up of evidence-based interventions. Dissemination is defined as the “targeted distribution of information and intervention materials to a specific public health or clinical practice audience,” and

implementation as “the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings” (National Institutes of Health 2016, p. 2). The field of D&I science emerged in response to a call by the Institute of Medicine to close the gap between advances made in scientific research and the translation of those advances into practice, emphasizing the need for evidence-based knowledge in health care delivery (Institute of Medicine 2001). The effective translation of evidence-based interventions into clinic and community settings ensures that all populations can receive maximum benefit from scientific discoveries.

The most commonly applied frameworks in D&I research are research-to-practice models which typically start with the researcher to “push” evidence-based interventions (EBIs) out to communities and clinics (Wandersman et al. 2008). However, EBIs are rarely designed with D&I in mind and are therefore often misaligned with real-world settings (Glasgow 2003). As a result, communities and health practitioners have increasingly called for practice-based models, such as the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework (Glasgow et al.

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1999). These frameworks are referred to as practice-based because they begin with the world of practice to determine what is needed in terms of scientific information, facilitating the integration of local knowledge to plan D&I efforts, and include community capacity building as a central tenet in addressing the gap between research and practice (Wandersman et al. 2008).

Studies supported as part of the National Institutes of Health (NIH)-funded Intervention Research to Improve Native American Health (IRINAH) initiative are generating important efficacy data regarding community-engaged and culturally centered prevention interventions in indigenous communities. While the studies are not designed as D&I research, IRINAH researchers are encouraged to plan for the sustainability of the interventions should they prove efficacious. Therefore, many IRINAH partnerships are anticipating challenges to D&I efforts within indigenous communities and aiming to lessen those challenges by planning for D&I efforts at the earliest stages of these efficacy trials, reducing the time between research to practice to benefit indigenous communities more expeditiously. We describe two studies that have been successfully disseminated and implemented with indigenous communities and identify key challenges to conducting D&I research with this population. We then present case study strategies that IRINAH partners are using to plan for the scale-up and implementation of these interventions. We conclude with recommendations to inform the next phase of IRINAH research efforts.

Dissemination and Implementation with Indigenous Communities

Research on the effective D&I of EBIs to indigenous communities is scarce. Few EBIs have been successfully implemented with indigenous populations (Dionne et al. 2009; Jernigan 2010; Kaholokula et al. 2014; Villanueva et al. 2007) and even fewer have been widely disseminated and implemented. As a result, the scientific literature regarding the adoption, implementation, and successful scaling up of EBIs within indigenous communities is virtually non-existent.

Two studies, the Stanford Chronic Disease Self-Management Study and the Diabetes Prevention Program (DPP), are among the few EBIs that have been widely disseminated and implemented with indigenous populations. The Stanford Chronic Disease Self-Management program is one of the most widely used patient self-management models in the world (Lorig et al. 2001). The program was implemented with a small group of indigenous participants in an urban Indian Health clinic to assess the cultural acceptability of the program content. Though health outcomes were not assessed as part of the study, participants reported increases in physical

activity and improvements in self-rated health (Jernigan 2010).

The NIH funded a randomized trial of the Stanford Diabetes Self-Management program and included 110 indigenous participants (15% of the total sample size). Intervention participants saw improvements in A1C, patient activation, and self-efficacy compared with usual care control participants (Lorig et al. 2010; Jernigan and Lorig 2011). These programs, now accredited by the American Diabetes Association, are regularly offered by over 50 urban, tribal, and Indian Health Service facilities across the USA (<https://www.selfmanagementresource.com/programs/find-a-workshop/>). While no published manuscripts have described the D&I of this study across indigenous communities, its wide dissemination is evidence of its successful translation into practice.

The Diabetes Prevention Program (DPP), also an NIH-funded study, was the first in the USA to show that a lifestyle intervention could reduce the incidence of type 2 diabetes in a diverse, high-risk population (Knowler et al. 2002) with lifestyle intervention or metformin. The original randomized controlled trial, which included indigenous participants, achieved a 58% reduction in diabetes incidence (Knowler et al. 2002). Since the original DPP study, the DPP lifestyle intervention has been disseminated and implemented by the federally funded Special Diabetes Program for Indians. As part of this program, between 2004 and 2010, urban, tribal, and Indian Health Service facilities implemented the DPP across 110 indigenous communities with a total of 2553 participants. The program was successful; participants achieved markedly lower rates of diabetes incidence compared with a placebo group (Jiang et al. 2013).

The DPP was culturally adapted for Native Hawaiians as part of the PILI ‘Ohana Project (PILI is an acronym for Partnerships to Improve Lifestyle Interventions; PILI ‘Ohana in Hawaiian literally means “close knit family”). This 3-month adapted intervention, which included a 6-month family and community component for longer term weight loss maintenance, led to significant weight loss and improvements in blood pressure, physical functioning, physical activity levels, and fat consumption (Kaholokula et al. 2014). The PILI ‘Ohana Project was continuously funded by the NIH for 11 years. In the last 3 years of the PILI ‘Ohana Project, the Office of Hawaiian Affairs and the Hawaii Medical Service Association Foundation provided additional funding to support the D&I of the PILI ‘Ohana Project to other communities across Hawaii.

The lessons learned from the D&I of the DPP in indigenous communities are only beginning to be published (Jiang et al. 2013). However, researchers have already identified several key characteristics that contributed to the successful translation of the DPP. First, a community-based participatory research (CBPR) orientation was used throughout all phases of

the translation process. During a year of planning, researchers provided local health program/organizations, tribal leaders, and community stakeholders with technical assistance and the opportunity to collaboratively develop the activities and evaluation method. This collaborative relationship also helped with the completion of the local approval processes. Additionally, the D&I efforts supported a “structured flexibility,” providing participating programs with the highly structured 16-lesson DPP curriculum while also allowing for local adaptations (e.g., incorporating local traditional foods and languages) (Jiang et al. 2013). Overall, findings strongly support this collaborative D&I process as researchers were extremely successful in translating the DPP across a wide range of indigenous communities.

Challenges to Dissemination and Implementation Science with Indigenous Communities

A primary challenge in D&I efforts with indigenous communities is determining what constitutes an EBI. Interventions are considered evidence based through the Western scientific method of systematic measurement, observation, and experimentation. In indigenous communities, while aspects of the scientific method, such as observation, are used to acquire knowledge, there are also many other ways of acquiring knowledge. Cultural knowledge, for example, is passed down orally, through storytelling or formal apprenticeship, from one generation to the next. Acquiring this knowledge is partly based on faith (i.e., faith in your inner self, elders, ancestors, and spirituality) and experiential learning in real-world settings (Cochran et al. 2008). An ancient Hawaiian proverb, *Ma ka hana ka 'ike*, translates as “knowledge is acquired by doing” (Pukui 1983), which illustrates the importance of experiential learning to indigenous peoples. Consequently, EBIs developed in dominant culture settings do not always translate to indigenous settings, especially if culturally supported interventions, including indigenous theories and context, are excluded from the research (Dutta 2007; Persaud and Mamdani 2006). Indeed, many studies acknowledge how important it is for indigenous communities to integrate evidence-based treatments with traditional practices (Dickerson et al. 2012a; Venner et al. 2007).

Another challenge is the significant geographic, cultural, and political diversity that exists across indigenous communities. More than 550 federally recognized indigenous nations have their own government structures and policymaking processes. In order to plan for the broad scale-up and dissemination of an effective intervention, researchers must equip indigenous health, government, and economic leaders with the data that they need to implement the interventions over time. Researchers are often unfamiliar with the contexts of

indigenous communities and lack relationships with or even access to indigenous leaders, hindering the dissemination process (Jernigan et al. 2014).

Finally, ensuring the sustainability of interventions in indigenous communities is an essential part of fostering long-lasting health outcomes but remains a challenge. One reason for this is the mismatch between the implementation demands of EBIs and the existing contexts and capacities of many indigenous communities. Indeed, of the limited efficacy studies that do show success, nearly 40% of them end when the study funding ends (Savaya et al. 2008). This can result in disillusionment and an unwillingness on the part of communities to participate in intervention trials in the first place.

The following IRINAH case studies address several challenges to D&I efforts within indigenous communities and describe the methods the IRINAH researchers and partners employed to plan for D&I as part of these health promotion and disease prevention efficacy trials. The case studies are selected examples from the earliest rounds of IRINAH studies, beginning in 2013 and 2014, so as to provide as much information as possible.

Case Studies

The KāHOLO Project

Kāhōlo is a common dance step in hula, the traditional dance of form of Hawai‘i. The HOLO in Kāhōlo is also an acronym for Hula Optimizing Lifestyle Outcomes. The investigators on the KāHOLO project used two primary strategies in preparing to move quickly from an efficacy trial to D&I efforts (Kaholokula et al. 2017a, b). First, they used a culturally accepted and widely available form of physical activity—hula—as the core intervention component to prevent cardiovascular disease in Native Hawaiians with hypertension. Second, they actively engaged the hula community throughout Hawai‘i as part of the intervention development and implementation to develop capacity for D&I efforts to include public policy activities (Look et al. 2014).

Traditionally associated with healing but condemned by Christian missionaries and later through legislative acts (Kaholokula et al. 2009), hula remains a popular and culturally acceptable practice among Native Hawaiians. Hula meets the national guidelines for moderate to intense levels of physical activity (Usagawa et al. 2014), and it has been found effective in reducing systolic blood pressure and improving social functioning (Kaholokula et al. 2017a, b). The KāHOLO project partners selected hula for the IRINAH study because it offered several key advantages: hula is a culturally acceptable form of exercise that is woven into the community context in which behavior change operates. This eliminated the need for cultural adaptation and additional testing to examine

effectiveness, saving time and money. Moreover, hula promotes social cohesion, cultural values, and connectedness to the natural world and place, all of which are likely to expedite D&I. Hula is also accessible, low cost, and does not require specialized staff. The DPP, for example, required a heavy investment in resources (e.g., health educators, health care providers) and certification from the Centers for Disease Control and Prevention in order to be eligible for reimbursement. Although the DPP was successful, the lack of resources threatened the sustainability of the program in many settings (Jiang et al. 2013). In contrast, culturally based programs such as hula are often readily available and based on accepted practices (Look et al. 2014).

The PILI ‘Ohana Project partnership, in its D&I of the DPP, used the community-to-community mentoring (CCM) model. This model, rooted in CBPR principles, has also been utilized in the KāHOLO project to plan for D&I efforts. The CCM is a collaborative approach to developing a network of indigenous communities and developing capacity within those communities to effectively adopt, implement, and sustain interventions shown to work for their communities (Delafield et al. 2016). A unique aspect of the CCM is that it places community partners who have worked side by side with academic partners during the intervention development and testing phase at the forefront of D&I efforts and utilizes the efficiency of indigenous informal networks of communication as a resource to leverage dissemination efforts. This model honors the capacity already built through long-standing community-academic partnerships and also recognizes that new communities are at different “readiness” levels for implementing interventions.

The PILI ‘Ohana Project partnership worked with Native Hawaiian communities to disseminate and implement their culturally adapted DPP program in over 30 community-based organizations across all major islands in Hawai‘i and in parts of the continental USA. The KāHOLO Project leveraged both the formal and informal networks of this CCM, which includes active participation by kumu hula (hula masters and keeper of this cultural knowledge), to conduct hula workshops to help community-based organizations understand CBPR and to use hula for health promotion. These capacity-building efforts allowed for the integration of D&I efforts into the particular community, clinic, or organizational settings in advance. The hula workshops also mobilized the hula community for advocacy in promoting the hula intervention for D&I.

The unique combination of using a culturally and contextually appropriate intervention—hula, within an infrastructure developed to implement the DPP—is already showing great promise as a model for D&I in other indigenous communities. For example, a Native Hawaiian Health Task Force with some of its members being community partners from PILI ‘Ohana Project and the KāHOLO Project was convened to provide policy recommendations to Hawai‘i’s legislature (Senate

Resolution 60, S.D. 1). One of the recommendations that emerged was for medical insurers to reimburse for culturally based physical activities (Recommendation 15). The task force is requesting an expansion of insurance company benefits to include traditional Native Hawaiian practices with health benefits, such as hula and canoe paddling, by covering membership costs similar to covering gym memberships. The passing of this type of legislation further ensures the sustainability of culturally based prevention programming that has undergone rigorous scientific evaluation.

The MICUNAY Study

The MICUNAY study (Motivational Interviewing and Culture for Urban Native American Youth) aimed to prevent and address alcohol or other drug use (AOD) among indigenous youth and adults in urban areas. The investigators on the MICUNAY study addressed the lack of evidence-based treatment or best practices for D&I within urban indigenous populations. Approximately 70% of indigenous people reside in urban areas (Norris et al. 2012). However, it is difficult to conduct an intervention that will reach all segments of this population as urban indigenous people are spread out across many different areas and may not live close to health clinics or programs. Through an intensive CBPR process, MICUNAY researchers worked closely with several indigenous community plans for D&I efforts.

The MICUNAY program was created after a yearlong process in which the members of two urban communities in Northern and Southern California—elders, parents, providers, parents, and adolescents—worked together to develop a multilevel intervention that addressed AOD use and identify traditional practices that would most effectively teach youth about their culture, and that would be feasible to complete within a workshop setting. In addition, focus groups identified challenges that adolescents faced concerning alcohol and drug use and what information would be most important for them to discuss to help them make healthy choices.

The intervention provided community-level programming for everyone in the community and individual programming for indigenous youth delivered in a group setting (Dickerson et al. 2016). Previous work has underscored the emphasis that indigenous communities place on both tradition and evidence-based practices to address AOD use (Dickerson et al. 2012b). In response to this, MICUNAY was specifically developed to integrate cultural practices with an evidence-based practice: motivational interviewing (MI) (Miller and Rollnick 2012). Previous work has shown that MI closely mirrors indigenous traditions and is culturally appropriate among indigenous adults (Venner et al. 2007; Walker and Bigelow 2015; Gilder et al. 2011).

The MICUNAY researchers worked collaboratively with these urban communities to integrate traditional values and

practices with evidence-based intervention strategies in order to expedite the study's D&I. Feedback from the urban communities was incorporated into both the community-level intervention and the adolescent group workshops. Specifically, before implementation in each city, researchers worked collaboratively with respected indigenous leaders in that community to determine the best way to bring the program into that community. For example, researchers created recruitment flyers using backgrounds relevant to that community (e.g., in one community a picture of a special tree that everyone knew in a park where events were often held was used), researchers worked with leaders to plan events in each community that would be well received given the needs of each community, and researchers paid people from each community to help provide food at these events (e.g., at one event, members made buffalo stew; at another event, members made special chili and corn bread). Overall, the discussions the researchers had in these different communities shed light on some of the unique challenges that urban indigenous people face, including being disconnected from their culture, struggles around pan-tribal (e.g., identifying with being indigenous) versus tribe-specific identity (e.g., identifying with specific customs of one's tribe), and culture clashes between indigenous belief sets or cultural practices and beliefs and behaviors expressed in schools or other mainstream institutions. These communities also called attention to the protective effects of indigenous identity and how identity could be emphasized in an evidence-based intervention (Brown et al. 2016).

The process of designing MICUNAY while also preparing for D&I highlighted the importance of having people from within each indigenous community receive training to implement the program so that parents and adolescents would feel more comfortable participating in the program. Thus, in addition to training on program content, training for each facilitator also focused on a collaborative discussion on how to best recruit adolescents and implement the program in that city to make sure community members were comfortable with both the recruitment process and the program. Taking the time across these different levels to ensure that recruitment and programming were culturally and developmentally relevant for these urban indigenous youth was an important component that contributed to the successful implementation of this multilevel AOD prevention intervention. These steps were particularly important for indigenous communities due to the long history of institutionalized racism against indigenous peoples (Blue Bird Jernigan et al. 2015). Given that the intervention content was a good "fit" for these communities, youth and parents were excited to be part of the project, which led to both high recruitment and retention rates of youth in the program.

The researchers hoped to recruit 200 indigenous adolescents. In order to do this, they worked with their community advisory board and their collaborator, Sacred Path Indigenous

Wellness Center, to utilize their informal networks of communication with community leaders to find urban communities that had a population of indigenous adolescents and were interested in providing additional resources to their community. The researchers worked with a total of 10 different urban communities across the state of California. In addition, as part of the D&I activities embedded within the study, the researchers provided training in MI to all of the organizations and program facilitators in each of the communities so that they could continue to disseminate the program to their youth after the trial finished if they chose to do so. Many of the MICUNAY facilitators lived in these communities and were invested in learning the program and MI. To date, several of the facilitators have continued to deliver the MICUNAY program in their community, and the researchers have helped them by providing materials. Thus, this CBPR approach provided an important opportunity to learn by doing while also using the scientific method to gather evidence of feasibility and implementation through training, coaching, and feedback.

The THRIVE Study

The Tribal Health and Resilience in Vulnerable Environments (THRIVE) study is a randomized control trial that implemented "healthy makeovers" in tribally owned and operated convenience stores across the Chickasaw Nation and Choctaw Nation of Oklahoma. The goal of the study was to increase access to and intake of healthier foods, including fresh vegetables and fruits, and to reduce food insecurity among tribal citizens (Blue Bird Jernigan et al. 2017). The intervention component of the study was recently completed, and data are now being analyzed.

Guided by a CBPR approach, the study randomized eight stores (four intervention and four control) and adapted and localized evidence-based healthy retail strategies recommended by the Centers for Disease Control and Prevention and the Institute of Medicine for implementation in the intervention stores: increasing the number of healthy products, lowering prices, promoting the healthy products, and changing store design and layout. The study tracked a cohort of 1640 shoppers to assess changes in food and beverage intake, self-efficacy, self-rated health, perceived nutrition environment, and (for participants shopping at the intervention stores) exposure to the intervention. Store-level measures included weekly sales data and biweekly process evaluation assessments that documented placement, promotion, pricing, and availability of selected products in order to track intervention fidelity.

The RE-AIM framework was selected to guide intervention efforts for THRIVE because it allowed for the simultaneous planning of the intervention and its dissemination, implementation, and sustainability (Glasgow et al. 1999). While the components of the RE-AIM framework—reach, efficacy, adoption, implementation, and maintenance—were outlined

within the study design, the data needed to assess the RE-AIM components required, from the earliest planning phase of the study, diverse tribal health, commerce, and government sectors engaging in an intensive participatory research process.

Neither the university researchers nor the tribal health planners had ever worked with the tribal government and commerce sectors directly. The RE-AIM framework provided a “structured flexibility” that included task-oriented objectives. Simultaneously, the participatory, engaged research orientation allowed for local adaptations and relationship building. The process proved essential for identifying and accessing data that were needed to assess both efficacy and long-term planning for dissemination.

For example, assessing the reach of the intervention was originally limited to measuring the number and percent of the study cohort who shopped at the study stores at various frequencies (i.e., at least three or more times per week). However, working collaboratively, tribal government, commerce, and health sectors expanded the assessment of reach to include setting-level reach (i.e., the percentage of indigenous people potentially exposed to the store interventions based on store and tribal census data) and the representativeness of those living within 10 miles of the stores to all indigenous people living within both Nations. These data supported the planning of the efficacy trial as well as the D&I of the interventions upon the study’s conclusion.

Similarly, researchers aimed to assess effectiveness of the intervention among cohort participants by measuring self-reported purchasing and intake of healthy food items and the percentage of the cohort who reported that their purchase was influenced by the promotion, pricing, and placement strategies. Commerce leaders not intrinsically motivated to plan a randomized health trial were, however, interested in using pricing and signage preference data collected as part of the trial in order to boost overall sales. Therefore, health researchers were granted access to store sales data to assess setting-level effectiveness by tracking the number and percentage of intervention foods sold per unit of time. Implementation of the intervention was also assessed by store-specific process evaluation measures and pre- and post-quantitative scores for each store. Access to store-level data provided valuable information on factors influencing study adoption across the eight tribal stores and will inform future D&I efforts across all of the tribal stores should the study prove efficacious.

The collaborative relationship that was formed ultimately resulted in tribal commerce leaders co-developing all aspects of the study, including tailoring the store assessment tools, identifying and preparing the foods for taste tests, and designing study promotional signage. Through these efforts, the commerce leaders greatly enhanced the external validity of the evidence-based healthy retail strategies and augmented self-reported survey data with objective store-level measures

including food costs and sales. These data were identified by government leaders as critical to the scale-up of THRIVE retail strategies across more than 30 tribal stores and support tribal leaders in integrating more solid health impact data as a foundation for evidence-based policy formulation.

Conclusions and Recommendations

The KāHOLO, MICUNAY, and THRIVE studies illustrate how prevention studies integrating indigenous knowledge and scientific methods of inquiry are preparing for the scale-up and implementation of these studies into practice. Several recommendations for D&I research with indigenous communities are offered here based on the common elements of each featured study, such as capacity building, use of CBPR approaches to contextualize the prevention strategies so that they are culturally and developmentally appropriate, and ensuring indigenous voices are prioritized throughout the research. These recommendations may also be used to inform future NIH funding opportunities as well as broadly generalized to funding agencies beyond the NIH.

Expand Use of Practice-Based Frameworks that Build Capacity and Allow for Flexibility

Practice-based frameworks, such as RE-AIM, can enhance external validity, increase use of research findings, and enable greater implementation, adaptation, and dissemination to new settings, with higher potential for sustainability (Glasgow 2003). These types of frameworks allow for the kind of structured flexibility that is supporting D&I planning with each of the three studies, KāHOLO, MICUNAY, and THRIVE, and was successful in the D&I of the DPP (Jiang et al. 2013). These models can incorporate indigenous ways of knowing as well as strategically utilize scientific evidence.

Use a Community-Based Participatory Research Orientation

Another important opportunity when working with indigenous communities is to employ a CBPR orientation. Effectively engaging in D&I research that translates scientific discoveries into real-world settings requires approaches that are rooted in CBPR principles and indigenous values and aspirations while at the same time emphasizing community capacity building and collaboration. Employing a CBPR orientation can strengthen the quality of research during every step of the research process, including D&I. Indeed, the case studies that are presented highlight the value of CBPR in and of itself as an example of “learning by doing.” Research that explores and expands the role of a CBPR orientation in D&I

research will likely support indigenous communities in benefiting more equitably from scientific discoveries.

Enhancing Sustainability in the Community

Another important component is helping communities sustain programming, which can be done in a number of ways. The KāHOLO study provides an excellent example of leveraging existing community knowledge, systems, and practices to enhance sustainability, from its selection of the traditional hula activity to the D&I of this activity through the informal networks of the Native Hawaiian community.

In addition, sharing aggregate data on the issues in a specific community may help organizations obtain funding for different types of programming. Training people within community organizations on evidence-based practice can also increase sustainability of programming. The MICUNAY project received feedback across all of the partnering communities that the training in MI has helped community organizations feel better prepared in providing other services to their community members. Thus, boosting capacity as part of the work can increase the chances that programs will be maintained and successful.

The THRIVE study also provides examples of opportunities when working with tribal governments that may not be available within the US general population in terms of planning for sustainability. Specifically, the political structures of both the Chickasaw and Choctaw Nations are designed to support the common good of all citizens. As health is considered important to the common good of all citizens, government and commerce leaders supported the THRIVE intervention and allowed its implementation throughout the tribal stores. Such comprehensive access to a wide array of stores across dozens of counties would be unlikely in individually owned stores outside of sovereign Nations and supported the planning for long-term sustainability of healthy food access.

Emphasize External Validity in Efficacy Trials

Efficacy studies and randomized controlled trials, which focus on internal validity, do not provide the knowledge necessary for translating and disseminating interventions to real-world settings with high variability in culture, context, and levels of acceptance (Wallerstein and Duran 2010; Glasgow 2003). In a comprehensive review of the implementation literature, Fixsen et al. (2005) found that although evidence-based interventions have core elements (i.e., underlying principles or best practices), they need to be flexible in applying these to the organizational, cultural, and policy differences of different settings.

Ensuring that the lessons learned from research and the application of evidence-based tools and approaches are relevant to the promotion of health is largely underexamined. The

NIH roadmap and policy documents from public health agencies and voluntary and professional organizations have identified a lack of uptake of scientific findings by clinical and community practitioners to improve health and reduce health disparities. Consequently, NIH has elevated the importance of translational research and has identified issues of context and external validity as central to the problem of the utilization of evidenced-based practices (nihroadmap.nih.gov).

To better balance internal and external validity issues in efficacy trials will require less stringent inclusion criteria (e.g., allowing for co-morbidity), greater diversity in participants (e.g., more indigenous participants), diverse settings for implementation (e.g., clinical and non-clinical settings), capacity-building activities (e.g., training community members as interventionists), and greater involvement by stakeholders (e.g., CBPR approach). Although internal validity will be compromised, it will allow for greater external validity thereby expediting D&I. The benefits of such efficacy trials will be greater applicability across diverse populations and settings, greater acceptance and relevance across different communities, and thus greater sustainability. Most relevant to indigenous communities are ensuring acceptance and relevance of prevention measures to ensure their uptake, which requires their involvement in all stages of research as well as integration of their cultural values, practices, and aspirations. This will ensure shared benefits between investigators and indigenous communities as well as added value to the research endeavor.

Prioritize and Support Presentations and Publications from Community Members: the Voices of Implementation Science

An important but underutilized and often undervalued area of expertise in D&I science is that of the indigenous community members and health planners themselves, many of whom are highly skilled intervention scientists, particularly in the areas of cultural adaptation and implementation. These individuals often know what steps to take to implement successful community-based interventions, but they rarely publish within the scientific literature or attend scientific conferences (Jernigan et al. 2014). Furthermore, health planners and community members also understand how to work with the appropriate tribal internal review and research review boards—an essential component of intervention science with indigenous communities and a process that is often poorly understood by outside academics.

The D&I of successful interventions depends on the expertise of community members who often know best how to translate research into practice within their own communities. Academic researchers working with indigenous populations are increasingly recognizing this and including community members and health planners on scientific conference

committees and as conference panelists and keynote speakers who have valuable knowledge to share widely with indigenous and non-indigenous audiences alike. Community members and health planners are provided discounts on conference registration fees and scholarships to attend scientific conferences in efforts to reduce barriers to participation. This positive trend must continue and expand. Researchers must also actively seek out and make use of social media, indigenous leadership forums, and indigenous peer-to-peer models, such as the CCM used in KāHOLO, for disseminating information. These efforts will bridge communication gaps between community and academic knowledge. Academics must actively co-publish with community partners interested in expanding the perspectives represented in the scientific literature and similarly scientific journals must broaden their formats to include and prioritize community knowledge toward the shared goal of health equity. As the field of D&I science continues to evolve, traditional forums dominated by university-based academic researchers must make greater room for community knowledge as a valuable resource in translating scientific findings into practice.

The IRINAH network is at the forefront of both intervention science with indigenous communities as well as the D&I of culturally appropriate interventions across these diverse communities (Blue Bird Jernigan et al. 2015). Greater practitioner and community engagement are crucial to the success of these interventions. Planning for D&I must begin simultaneously with intervention planning and must equip tribal leadership with the necessary data to inform the scale-up and implementation of successful interventions. Funding of these efforts must continue until the disparities are eliminated. Indeed, for the scale-up of effective interventions to have an impact on population health, D&I research must have an explicit focus on the elimination of health disparities in order to ensure all segments of the population receive maximum benefit from scientific discoveries (Brownson et al. 2012; National Research Council and Institute of Medicine (Ed.) 2009). Such an achievement will require the types of national initiatives as seen in other countries, including Australia, New Zealand, and Canada, all of which have made serious investments to “close the gap” on health disparities experienced by the indigenous populations of these countries (Blue Bird Jernigan et al. 2015).

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The studies referenced in this article did not include animals.

Informed Consent Informed consent was obtained from all individual participants included in these studies.

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