DEVELOPMENT, IMPLEMENTATION AND EVALUATION OF A CULTURALLY GROUNDED DIABETES EDUCATIONAL TOOL FOR THE DINÉ (NAVAJO)

by

Jamie Wilson

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As members of the Dissertation Committee, we certify that we have read the dissertation prepared by: Jamie Wilson
titled: Development, Implementation and Evaluation of a Culturally Grounded Diabetes Educational Tool for the Diné (Navajo)
and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

Cynthia A Thomson
Date: Dec 10, 2020

Cynthia A Thomson

Samantha Sabo
Date: Dec 10, 2020

Samantha Sabo
Stephanie Russo Carroll

Stephanie Russo Carroll
Date: Jan 4, 2021

Michelle Kahn-John
Date: Jan 4, 2021

Michelle Kahn-John

Final approval and acceptance of this dissertation is contingent upon the candidate’s submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Cynthia A Thomson
Date: Dec 10, 2020

Cynthia A Thomson
Health Promotion Sciences
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DEDICATION

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ABSTRACT

BACKGROUND: American Indian and Alaskan Native (AIAN) populations experience disproportionately higher rates of type 2 diabetes and diabetes-related complications compared to other racial and ethnic groups in the United States (US). Studies have demonstrated that diabetes education can effectively improve self-care practices and metabolic control, thereby preventing or delaying the onset of diabetes-related complications. Since culture plays a significant role in decision-making and health, cultural adaptation of diabetes education has been at the forefront of combating diabetes in tribal communities. PURPOSE: The purpose of this dissertation was to investigate how a culturally adapted diabetes intervention affects diabetes outcomes among Diné people with type 2 diabetes. The study included the development, implementation and evaluation of a tribe-specific diabetes education curriculum called Diné Health (DH). METHODS: The first stage of the study consisted of conducting key informant interviews with Diné (Navajo) cultural experts and collaborating with community partners to develop a culturally grounded diabetes curriculum and intervention. The second stage used a mixed-methods semi-quasi experimental design to pilot the feasibility, acceptability and satisfaction of the DH among intervention and control participants; and to determine whether intervention participants, compared to controls, would demonstrate greater improvement in A1C. RESULTS: Key themes that emerged from the key informant interviews included the importance of discipline, positivity and mindfulness in the context of Hózhó, a Diné wellness philosophy; and were included in the DH intervention and offered in a tribal community. Thirty-four participants were enrolled in the intervention group and received the intervention and 34 controls were retrospectively selected for comparison of results to the standard program.
condition. Eighty-two percent of intervention participants attended a diabetes education
class and follow-up appointment, as did 82% of controls. Both groups showed statistically
significant improvement in mean A1C levels. No difference in between group reductions in
A1C were shown. There were no differences in satisfaction between intervention and control
participants. Satisfaction and acceptability of the DH curriculum was high. CONCLUSION:
Culturally enhanced diabetes education supported reductions in A1C levels equal to the
standard programming, but with a slightly greater change in A1C. This study demonstrated
how diabetes programs can work with local healers and cultural experts to develop and
implement culturally appropriate educational tools into clinical practice to improve patient
health outcomes.
CHAPTER 1: INTRODUCTION

Studies have demonstrated that diabetes education can effectively improve self-care practices and metabolic control, thereby preventing or delaying the onset of diabetes-related complications. Since culture plays a significant role in decision-making and health (Kahn-John et al., 2020), cultural adaptation of diabetes education has been at the forefront of combating diabetes in tribal communities (Armstrong, 2000; Bassett et al., 2012; Brandenburger et al., 2016; Carter et al., 1997; Carter, 1999; Centers for Disease Control and Prevention [CDC], 2014; Conti, 2006; Davis et al., 2011; DeBruyn et al., 2020; Gittelsohn et al., 2003; Griffin et al., 1999; Jiang et al., 2018; Joe & Young, 2014; Jones et al., 2020; Roubideaux et al., 2000; Satterfield et al., 2002; Satterfield et al., 2014; Scarton et al., 2019; Smith-Morris, 2006), but there is little in the scientific literature documenting how to culturally adapt diabetes education and evaluate its impacts in a tribal setting (DeBruyn et al., 2020). This dissertation seeks to understand how a culturally adapted diabetes intervention impacts health outcomes and satisfaction of Diné participants with diabetes. It includes the development, implementation and evaluation of a tribe-specific diabetes education curriculum called Diné Health (DH).

Background

The AIAN population has the highest prevalence of diabetes in the United States (American Diabetes Association [ADA], 2017) and are 2.6 times more likely to be diagnosed with diabetes than non-Hispanic Whites (National Diabetes Information Clearinghouse [NDIC], 2014). These trends tend to be consistent across tribal nations; AIANs are disproportionately affected by diabetes complications, such as vision loss, kidney failure, heart disease and amputation of extremities (Indian Health Service [IHS], 2012;
Centers for Disease Control and Prevention [CDC], 2003). There is evidence that social determinants of health (SDOH) (i.e. socioeconomic status, physical and neighborhood environment, food environment and social context) is associated with diabetes-related outcomes (Hill-Briggs et al., 2020). Poverty, less than a high school education, and food deserts are common across Indian Country and correlated with type 2 diabetes (DeBruyn et al., 2020; Hill-Briggs et al., 2020). Further, there are only 13 grocery stores on the Navajo Nation, which is the largest AIAN reservation (27,000 square miles), spans across four states and serves over 350,000 tribal members (Trevisi et al., 2020). Thus, cultural adaptations might be a positive step in addressing diabetes among AIANs.

Cultural Tailoring

In response to the growing diabetes epidemic in AIAN populations, diabetes education has been culturally tailored, defined as tailoring a health message which recognizes and reinforces a groups’ cultural values, beliefs and behaviors (Davis et al., 2011). Diabetes education has been tailored to accommodate distinct cultural and traditional knowledge held by 574 federally recognized tribes in the US, each with their own languages and cultural practices (IHS, 2020). Standard western approaches to diabetes management include nationally recognized guidance on diet and exercise, as well as medication management, diabetes education, regular check-ups, and ongoing support (CDC, 2016). The lack of individualized and culturally tailored diabetes education in AIAN populations has resulted in a “one size fits all” approach which incorporates cultural elements deemed relevant to the majority population (Davis et al., 2011). This standard approach to diabetes prevention inadvertently disregards the unique cultural nuances of education that may be required to prevent and manage diabetes among AIANs (Geana et al., 2012). Emerging
evidence suggests effective health education programs are the result of active engagement of AIAN community member and culture, which then ensure the integration of culturally relevant information and experiences (Davis et al., 2011; Geana et al., 2012; ADA, 2015) into tribal health programming.

Cultural Adaptation

Cultural adaptation is the modification of an evidence-based intervention (EBI) through the process of changing the curriculum’s language, culture, and context in a way that it is compatible with the client's cultural patterns, meanings, and values (Bernal et al., 2009). A number of diabetes management interventions have been developed for AIANs. Many of these interventions have included elements to enhance cultural competency and sensitivity, such as the use of AIAN languages, discussions of traditional foods, inclusion of AIAN art and use of exclusively AIAN education and intervention staff (Tabak et al., 2015). However, diabetes management programs for AIANs have primarily consisted of educational classes that have been designed to address the needs of various tribes and often lack tribe-specific cultural elements (Griffin et al., 2000) and tend to incorporate cultural elements deemed relevant to a broad and collective inter-tribal AIAN majority of program participants. While this pan-Indian approach may be meaningful and perhaps culturally relevant for some program participants, AIANs are culturally heterogeneous, and the broad application of selected cultural features may reduce the appeal and salience of diabetes interventions for many AIAN individuals.

Surface-level and Deep-level Cultural Adaptation

Resnicow defines surface-level adaptation as matching intervention materials and messages to the target population (e.g. visual content and language); and deep-level
adaptation as encompassing the target population’s beliefs, values, history and perceptions on health [e.g. metaphors, concepts, goals, methods, and philosophies] (Resnicow et al., 1999). There are three well-documented studies in the literature that highlighted approaches to cultural adaptations and curriculum development methods; the Native American Diabetes Project (NADP) developed the Strong in Body and Spirit, a diabetes education curriculum that incorporated AIAN traditions and stories from eight tribes in New Mexico (Carter et al., 1997; Carter, 1999; Griffin et al., 1999); the Centers for Disease Control and Prevention (CDC) Native Diabetes Wellness Program (NDWP) developed several diabetes-related curricula and programs for use in tribal schools and communities broadly, including the Eagle Books and the K–12 Diabetes Education in Tribal Schools (DETS) Health is Life in Balance curriculum; and the CDC Traditional Foods program (Francis et al., 2009; Satterfield et al., 2014). The projects employed community based participatory research (CBPR) and qualitative approaches in their studies and found that their culturally adapted products were effective e.g. the DETs curriculum was effective in increasing diabetes knowledge (Francis et al., 2009); and findings from the NADP revealed that co-developing diabetes education sessions was an important factor in participant satisfaction and retention in diabetes lifestyle education series. Such emergent research suggests that collaborating with community members can increase cultural relevance in diabetes education among AIAN communities. However, there was little in the literature that documents the cultural adaptation of diabetes programs; therefore, the extent to which adaptation alters a program’s impact remains unexplained.
Traditional Knowledge

Traditional and Indigenous knowledges, defined as Indigenous Peoples fundamental cultural beliefs and traditions, and cultural protective factors, defined as cultural identity and values, have contributed to the resilience and survival of Indigenous people and are still widely used among AIAN populations (Kahn-John & Koithan, 2015). For the Diné, cultural traditions and teachings are based on Hózhó, a wellness philosophy that provides guidelines for living a long healthy life [Saah Nagha Bikehozhoon] (Clark, 2009). Traditional healers hold this knowledge and share this wisdom to help their patients and communities remain in harmony, balance and good health (Kahn-John & Koithan, 2015). Healers are prominent individuals within their communities and are often highly respected by their patients and communities. Therefore, the healer-patient relationship presents an opportunity for culturally centered and community driven dialogue and prevention of diabetes among AIANs (Wilson et al., 2018). Partnering with Diné healers to identify key health messages for diabetes education is necessary to improve cultural relevance and increase the likelihood of identifying cultural protective factors (Chief et al., 2016; Wilson et al., 2018).

Guiding Theoretical Framework

Social Cognitive Theory (SCT)

SCT claims that there are three main factors that affect change in an individual: 1) self-efficacy, 2) goals, and 3) outcome expectancies (Rimer et al., 2005). SCT asserts that people learn from their own experiences and by observing others including family, friends, and the community (Rimer et al., 2005). Further, SCT explains that an individual’s level of self-efficacy and expectation about performing a behavior are important determinants for making a decision (Rimer et al., 2005).
Based on the SCT, the Diné Health (DH) supplemental curriculum will provide worksheets to increase self-efficacy and emotional coping. Self-efficacy will be increased by social persuasion, mastery and modeling of health sustaining fundamental Diné teachings. The cultural grounded health teachings will influence the participants’ attitudes and beliefs; and once participants adopt new behaviors, they will theoretically make changes in their environment by practicing self-care. Self-efficacy will be measured through a clinical assessment and goals worksheet.

*Hózhó Resilience Model (HRM)*

This study also utilized the HRM as a framework to guide the study design and methods. The HRM is based on the Diné Philosophy of Hózhó – the ultimate state of health and wellness (Kahn-John Dine & Koithan, 2015). Hózhó provides specific rules for a Diné person’s behavior and emphasizes order, balance, and harmony in everyday life (Kahn-John, 2016). The importance of order is reflected in a constant mindfulness and reverence with every thought, every word, and every step made in the journey of life (Kahn-John, 2010). The concepts of balance and harmony are parallel to the notion of holistic health which emphasizes that there is a connection between the mind, body and spirit of an individual (Chief et al., 2016; Kahn-John et al., 2020; Wilson et al., 2019) and for the Diné, there is an additional relationship with living elements i.e. water, air, earth and the cosmos (Kahn-John, 2010). This relationship with the elements is driven by respect, specifically having respect for plants, animals, and water. Based on the HRM, we used community-based participatory research (CBPR) and qualitative approaches to collect data and engage with the community.
Guiding Research Approach

Community-Based Participatory Research (CBPR)

CBPR in public health research is an approach that equitably involves community partners in all phases of research (Israel et al., 1998). The tenants of CBPR include: 1) Recognizes community as a unit of identity; 2) Builds on strengths and resources within the community; 3) Facilitates collaborative, equitable partnership in all phases of the research; 4) Integrates knowledge and action for mutual benefit of all partners; 5) Promotes co-learning and empowering process; 6) Occurs in a cyclical and iterative process that includes ongoing evaluation of successes and obstacles; 7) Addresses health from both positive and ecological perspectives; 8) Disseminates findings and knowledge gained to all partners; and 9) Involves a long-term process and commitment to sustainability (Israel et al., 1998; Wallerstein & Duran, 2010). This study used this approach to engage in qualitative research methods to guide the collaborative production of a cultural grounded educational tool.

Significance

This study aims to identify an effective health messaging strategy that has the potential to close the cultural gap between traditional knowledge and health. Cultural adaptation and tailoring are not new to tribal health programming and research, however, the specific details, the attention to ensuring respect to the AI communication and ways in which these adaptations and tailoring may take place are important to document for tribal health programming. A key strategy to increasing diabetes education attendance and retention rates for AIANs is to implement culturally grounded, tribe-specific curriculums into community-based health programs (Indian Health Service, 2014). Integrating tribe-specific cultural knowledge into DSME/S by employing existing Indigenous models and
methodologies to combat type 2 diabetes in tribal communities might be the next step in improving AI.

Such work can illuminate cultural relevance and may be important in identifying culturally related factors that influence engagement and completion as well as health outcomes for participants in AIAN diabetes education programs. AI tribal adaptations that robustly integrate cultural beliefs regarding health are essential, given that current DSME are largely based on scientific and Western knowledge systems. New approaches must be explored, better understood, tested and then disseminated for use across tribal communities and within tribal-lead health systems.

Specific Aims

The primary aims of this study are to: 1) develop a culturally grounded diabetes educational tool informed by Diné cultural experts and implement the educational tool into the existing diabetes education class; and 2) evaluate the educational tool. Aim 1 was explored using qualitative and CBPR approaches to collect data from cultural experts that was then used to inform the development of the culturally adapted educational tool. Aim 2 was explored using a mixed method approach utilizing a semi-quasi experiment of acceptability and effectiveness. Based on previous findings and literature, the following aims and hypotheses are posited:

Aim 1: Collaborate with Diné cultural experts to inform the development of a culturally grounded educational tool that incorporates traditional and cultural health and wellness teachings. Objective 1a: Establish a community advisory board (CAB) of Diné cultural experts and health educators to inform the project; key informant interviews with cultural experts to identify Diné traditional teachings Objective 1b: Conduct interviews with
the CAB on how to integrate Diné cultural and traditional teachings to achieve health and wellness; **Objective 1c:** Work with the CAB and community partners to create an educational tool for the diabetes program;

**Hypothesis 1:** The utilization of tribe-specific health messages in the DH intervention will result in greater patient engagement and satisfaction when compared to the control group.

**Aim 2:** Pilot test the acceptability and satisfaction among participants involved in the DH intervention compared to control participants who completed the standard intervention; **Objective 2a:** Implement a pilot utilizing the DH intervention with patients diagnosed with type 2 diabetes; **Objective 2b:** Evaluate participant satisfaction of the two diabetes programs by comparing responses of patients attending standard group DM education prior to the implementation of the adapted DH implementation with the participant satisfaction responses of those who attended the adapted DH education program; **Objective 2c:** A1C levels and self-care goals were only evaluated in the participants who participated in the adapted DH program;

**Hypothesis 2:** Intervention participants will achieve improved levels of A1C compared to control participants.

**Hypothesis 3:** Intervention participants will demonstrate higher satisfaction than control participants, based on self-reported surveys.
Dissertation Format and Overview

A three-manuscript option was selected for completion of this dissertation. The methodology for each of the above listed specific aims will be presented in the subsequent chapters and the aims are addressed in Chapters 2, 3, and 4 as individual manuscripts.

Chapter two provides an overview of qualitative CBPR approaches and Indigenous research practices used to guide the development and implementation of culturally tailored tribe-specific educational model that has been informed by the Diné cultural teachings. Chapter three provides a step-by-step guide on applying Indigenous frameworks – HRM and the Diné Education Philosophy (DEP) – into tribal health programming. Chapter four provides the results of the culturally grounded intervention among DH participants’ glycemic control, satisfaction and acceptability of the DH. And finally, a final conclusion is offered to summarize the entire research process. The next section presents the three independent manuscripts that will each be independently submitted for publication as components of completion for this three-manuscript dissertation option.
CHAPTER 2: DEVELOPMENT OF AN AMERICAN INDIAN DIABETES EDUCATION CULTURAL SUPPLEMENT: A QUALITATIVE APPROACH

Abstract

Objective: The purpose of this study was to culturally enhance a diabetes education program for Diné (Navajo) community members with Type 2 diabetes. Though the recommendation to culturally adapt health education curricula was meant to improve health education for American Indians and Alaskan Natives (AIANs), it has inadvertently created a “one size fits all” approach. This approach does not properly address the need for tribe-specific cultural health messaging, defined as incorporating cultural elements deemed relevant to the population. Tribe-specific health information and programming, such as integrating Diné worldviews and Indigenous knowledge among Diné people as described here, are essential to creating a culturally relevant and effective and meaningful approach to disease self-management.

Methods: A conversation guide, based on the Hózhó Resilience Model – a Diné framework on healthy living, was used to engage key cultural experts in interviews about traditional stories and teachings regarding health and wellness. Three specific self-care behaviors relevant to Type 2 diabetes self-management were discussed: 1) healthy eating, 2) physical activity, and 3) healthy coping. Interviews were audio-recorded, transcribed and analyzed using a qualitative theme analysis method.

Results: Diné healers and cultural experts informed the development of an educational tool called Diné Health. Key themes that emerged from the data included the importance of discipline, positivity and mindfulness in the context of Hózhó.
Conclusion: Culturally safe and meaningful engagement with cultural leaders and the use of qualitative research methods can inform deep-level cultural adaptations essential to developing tribe-specific diabetes education programs. The approaches used here can guide the development, implementation, and testing of culturally informed health education for AIAN populations.

Introduction

Although diabetes prevention and control efforts have increased in American Indian and Alaskan Native (AIAN) communities, AIAN people continue to experience disproportionality higher rates of diabetes-related morbidity and mortality (CDC, 2003). Diabetes is the fourth leading cause of death for the Navajo Nation (Navajo Epidemiology Center [NEC], 2016), and is the seventh leading cause of death for the United States in general (US). The age-adjusted diabetes mortality rate for the Diné (Navajo) population is more than double (2.29 times higher) the US population rate (CDC, 2020a). Poor glucose management may lead to diabetes complications and premature death, including vision loss, kidney failure, heart disease, limb amputation, and death (CDC, 2020a; Jack et al., 2004; Powers et al., 2016). Promising approaches to diabetes management include nationally recognized guidance for self-care, medication management, diabetes education, regular check-ups, and ongoing support (American Association of Diabetes Educators [AADE], 2020). The purpose of this study was to culturally adapt a standard diabetes education program originally designed to broadly address DM education needs for AIAN populations collectively. This cultural adapted program is designed specifically for Diné community members diagnosed with type 2 diabetes.
Cultural adaptation has been defined broadly as a modification of an evidence-based intervention by changing the curriculum’s language and context in such a way that it is compatible with the client's cultural patterns, meanings, and values (Bernal et al., 2009). To some, cultural adaptation is achieved by making surface-level adaptation such as changing the visual content or by adding AIAN created artwork (Resnicow et al., 1999). Deep-level cultural adaptation, on the other hand, has deeper levels of meaningfulness and includes adapting the language, metaphors, content, concepts, goals, methods, and framework to meet the needs of Indigenous communities (Resnicow et al., 1999). To optimize the impact of diabetes education for AIAN populations, deep-level cultural adaptations must be considered (Tabak et al., 2015).

In 1997, in an effort to provide culturally competent health programs, Congress established the Special Diabetes Program for Indians (SDPI) to treat and prevent diabetes in AIAN communities (IHS, 2014). Currently 404 Indian Health Service (IHS), tribal and urban Indian health programs across the US receive SDPI funding (IHS, 2014). SDPI grantees recognize that culture and health are intertwined and inseparable concepts. They propose culturally adapted interventions are more acceptable, better understood, and more effective (IHS, 2011). For example, SDPI interventions that include AIAN language, traditional food demonstrations, and cultural activities (IHS, 2011) have demonstrated reduction in diabetes complications such as amputations and kidney failure (CDC, 2020b; IHS, 2014).

Despite well intentioned efforts to culturally adapt and tailor health education curricula, diabetes programs have inadvertently created a “one size fits all” adaptation approach to health education programs (Davis et al., 2011) that is commonly used to prevent
and manage diabetes among AIAN communities (Geana et al., 2012). Emergent research, however, suggests that AIAN community members prefer tailored and culturally adapted diabetes education programs that reflect their own cultures. The Native American Diabetes Project (NADP) conducted a participant satisfaction questionnaire regarding cultural competency with eight tribal communities (Griffin et al., 1999). Results revealed that community input in co-developing the diabetes education sessions was an important factor in participant satisfaction and retention in the diabetes education series (Griffin et al., 1999). Griffin et al. highlighted that storytelling, a traditional communication strategy, was recommended by participants as a way to communicate information and provide diabetes education (Griffin et al., 1999). Moreover, participants suggested that more culturally specific components, such as traditional foods, teachings and games could enhance participant satisfaction with educational sessions (Griffin et al., 1999). Roubideaux found that 95% of participants preferred diabetes education materials relevant to their specific tribe or culture (Roubideaux et al., 2000).

Several studies have shown a high prevalence of diabetes among the Diné to be high at 16.5% (Sugarman et al., 1992) and 22.9% for adults (Will et al., 1997) and an incidence rate of 2.78 per 1,000 for youth (Dabelea et al., 2009). Studies implicate the need for effective culturally relevant education for the Diné (Cunningham-Sabo et al., 2008; DeBruyn et al., 2020) however, none of the prior diabetes prevention projects included tailored, deep-level, tribe-specific health information or cultural enhancement of diabetes education that were designed specifically for Diné communities. Efforts to apply surface-level cultural adaptations to the standard AIAN diabetes education curriculum may further perpetuate high program drop-out and may have limited effectiveness in promoting optimal
diabetes self-management or glucose control in Diné communities. The purpose of this research was to use a community-based participatory research (CBPR) approach to engage Diné cultural experts and healers, to gain insights about cultural world views and Indigenous knowledge for the purpose of adapting an evidence-based diabetes management intervention for Diné adults diagnosed with Type 2 diabetes.

Methods

*Research Design*

This study used a CBPR approach (Israel et al., 1998) to engage qualitative research methods and guide the collaborative production of a cultural tool, herein called Diné Health (DH), to be used in diabetes education classes in a Diné community. The lead author, a Diné researcher, met with members of the Diabetes Program a year prior to seeking approval from University and Tribal institutional review boards before engaging in the study. The director of the program helped obtained letters of support for the study from relevant tribal leaders and organization and also co-presented at meetings such as the Navajo Nation Human Research Review Board (NNHRRB) meeting to inform key tribal stakeholders about the study aims and objectives. The lead author applied Indigenous health research practices and Diné values of k’é (i.e., personal conduct, traditional etiquette to establish kinship) to establish respect and build positive relationships with Diné leaders and community members (Chief et al., 2016; Wilson et al., 2019). The NNHRRB and the University of Arizona Institutional Review Board approved this study in August 2018. The data and findings from this study belong to the Navajo Nation.
Community Engagement

The lead author collaborated with community partners to protect and properly apply only approved aspects of sacred Indigenous knowledge of the Diné (Table 1). When working with AIAN communities, it’s important to recognize the aspects of protected and private cultural and traditional knowledge. Seeking consultation from cultural experts provides the opportunity to ensure that the research approach is ethical, culturally sensitive and does not disrespect, exploit or misinterpret cultural or traditional worldviews. It’s also important to maintain the privacy of the more sacred traditional and cultural knowledge such as traditional stories or ceremonial knowledge which may be restricted to be known only by traditional healers. Some AIAN communities prohibit the recording of traditional knowledge so, it’s important to seek the advice of cultural experts to safeguard the interpretation of research findings and to ensure the research approach is acceptable and respectful.

Establishing good rapport, including reciprocal learning between researcher and partner, with the diabetes program before the study began was an important first step in this study and in line with CBPR approach (Israel et al., 1998; Wallerstein & Duran, 2010). The purpose of the initial meeting (held in January of 2018) with the Diabetes Program director was to determine whether the program would like to collaborate in a research study. The program expressed a concern that there was minimal Diné culture in their existing diabetes education classes and only one AIAN health educator who offered classes in the Diné language one time per month. At the time of this study implementation, the diabetes program was in the process of curriculum development. Therefore, the curriculum adaptation proposed in this study presented an opportunity to contribute to the development of a meaningful and sustainable product for the diabetes program.
The lead author purposefully sought guidance and consultation from a Community Advisory Board (CAB) established to support the current programming efforts. The CAB members included community and organizational representatives selected by the community for their professional, cultural and local knowledge. Inclusion criteria for the CAB were: must be an (18 years of age or older), must be a member of the Diné Nation, must possess expertise in Diné culture or Diné health, and Diné ceremony/healing. The CAB served to ensure that the research study respected the Diné people and culture. Lastly, a working group was established to lend expertise and experience in curriculum development. The working group consisted of three diabetes educators from the program and the lead author and met 5 times over 6 months.

Table 1. *Community Partnerships and Roles in the DH Study*

<table>
<thead>
<tr>
<th>Members</th>
<th>Contacted/Participating</th>
<th>Role(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Program</td>
<td>1/1</td>
<td>• Program director helped gain approval for study</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Review DH drafts and materials monthly or as needed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Received training on DH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implement DH into diabetes education classes</td>
</tr>
<tr>
<td>Community Advisory Board</td>
<td>6/3</td>
<td>• Attend CAB meetings and/or provide feedback via email</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reviewed transcript excerpts from key informant interviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Approved cultural teachings and messages to be included in the DH</td>
</tr>
<tr>
<td>Diné Health Working Group</td>
<td>4/3</td>
<td>• Reviewed transcript excerpts from key informant interviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Selected approved cultural messages to be included in DH classes</td>
</tr>
<tr>
<td></td>
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<td>• Reviewed DH drafts</td>
</tr>
</tbody>
</table>
Theoretical Framework

This study utilized the Hózhó Resilience Model (HRM) as a framework to guide this study. The HRM is based on the Diné Philosophy of Hózhó – the ultimate state of health and wellness (Kahn-John Dine & Koithan, 2015). Hózhó provides specific rules for a Diné person’s behavior and emphasizes order, balance, and harmony in everyday life (Kahn-John, 2016). The importance of order is reflected in a constant mindfulness and reverence with every thought, every word, and every step made in the journey of life (Kahn-John, 2010). The concepts of balance and harmony are parallel to the notion of holistic health which emphasizes that there is a connection between the mind, body and spirit of an individual (Chief et al., 2016; Kahn-John et al., 2020; Wilson et al., 2019). For the Diné, there is an additional relationship with living elements i.e., water, air, earth and the cosmos (Kahn-John, 2010). This relationship with the elements is driven by respect, specifically respect for plants, animals, and water. For this study, we utilized the HRM domains and attributes (Table 1) to identify key cultural concepts of the Diné health protective traditional teachings that can influence the self-care behaviors of our DH participants.

Table 2. Hózhó Resilience Model Domains and Attributes

<table>
<thead>
<tr>
<th>Domains</th>
<th>Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmony (External factors)</td>
<td>Thinking – Remain positive in thought by practicing mindfulness</td>
</tr>
<tr>
<td>Respect (Internal factors)</td>
<td>Discipline – Remain respectful in all actions by having self-discipline</td>
</tr>
<tr>
<td>Spirituality (Existential factors)</td>
<td>Spirituality – Remain positive and harmonious through prayer</td>
</tr>
</tbody>
</table>
Balance Your Life with Diabetes Curriculum

The Balance Your Life with Diabetes (BYLD) curriculum focuses on Type 2 diabetes and self-care and is the standard curriculum used in diabetes programs across Indian Country, including the program in this study (IHS, 2014). The BYLD curriculum was culturally adapted by the IHS Division of Diabetes Treatment and Prevention program. The IHS encourages programs to adapt their program’s BYLD curriculum to reflect their participants culture, e.g., traditional food recipes, language, activities and traditional teachings (IHS, 2011). In some cases, however, program staff may not be familiar with the community’s culture and therefore have difficulty offering tribe-specific adaptations to the BYLD. To close this gap in knowledge, the study investigators partnered with a diabetes program with a goal to adapt their BYLD curriculum by adding Diné-specific, meaningful and relevant cultural teachings to the BYLD lessons: healthy eating, being active, and healthy coping (Table 3).

Table 3. Diné Health Supplemental Curriculum Content

<table>
<thead>
<tr>
<th>BYLD Curriculum</th>
<th>DH Supplemental Curriculum</th>
<th>Cultural enhancements based on Diné Traditional teachings</th>
</tr>
</thead>
</table>
| Healthy Eating  | Traditional Food Practices| • Message: T’óó bikinígo (translation- eating for sustenance and nourishment) Portion Control, Self-Discipline and Mindfulness  
• Audio Recording: Having good thoughts (mindfulness) while cooking  
• Worksheet(s): DH Mindfulness, DH Homemade Food and Meal Preparation |
| Being Active    | Establishing Discipline    | • Health Message: Diné teachings on self-discipline and livelihood  
• Audio Recording: T’aa hwo ajiteego (translation - being self-reliant and proactive) in your health  
• Worksheet(s): DH Discipline, DH Daily Routines |
| Healthy Coping | Thinking and Mindfulness   | • Health Message: Positive thinking and Mindfulness  
• Audio Recording: Holistic Health and Saah Nagha Bikehozhon (Living a long healthy life)  
• Worksheet(s): DH Goal Setting |
Cultural Expert Participation Selection and Interviews

Through a purposive sampling strategy, the lead author worked with leadership of a Diné healer association to identify well-respected healers and cultural experts who hold firsthand knowledge about the Diné traditional teachings and culture. The interview participants included five (n=5) tribal members that spoke Diné and English, were distinguished healers within their respective communities and each resided on the Navajo Nation. The interviews were 60 to 90 minutes long and were conducted in a location most convenient to the healer, either at a central location or the healer’s home. Data from the interviews informed the development of a tailored, tribe-specific educational tool for diabetes education – herein called Diné Health (DH). Each participant was provided a copy of the DH at the completion of the study. All participants provided informed consent and received an incentive to cover direct and indirect costs associated with participation in the study.

Interviews

Five in-depth interviews were conducted to elicit cultural health messages from the aforementioned Diné cultural experts. With consultation from a Diné researcher, the lead author developed a structured conversation guide (eight questions) to gather culturally grounded health messages regarding Hózhó. The questions asked about three diabetes self-management and education (DSME) self-care behaviors: 1) healthy eating, 2) physical activity and 3) healthy coping (AADE, 2020). Four questions focused on traditional food ways, self-discipline and mindfulness, e.g., “Based on Hózhó, what stories and teachings do you know about traditional food ways?” Two questions asked about physical activity and self-discipline, e.g., “Based on Hózhó, what stories and teachings do you know about being
disciplined in physical activity?” The last two questions were asked about the importance of positive thinking and health, e.g., “Based on Hózhó, what stories and teachings do you know about thinking positively? As Diné, how do we show our respect to food and our health?”

The CAB and diabetes working group reviewed the questions. The interviewer - a trained community researcher - is Diné who speaks, writes and understands the Diné language. Data from the interviews were audio recorded, transcribed verbatim and analyzed using a qualitative theme analysis method.

Analysis

The lead author translated and transcribed audio recordings from Diné to English. To ensure accuracy and context, a consultant, who is Diné and holds cultural and linguistic knowledge, reviewed each of the transcripts. Although time-intensive, this process ensured complete and accurate transcripts. The lead author conducted deductive thematic analysis (Nowell et al., 2017), driven by the researcher’s theoretical interest in the context of the HRM and DSME. The aforementioned HRM domains served as the theme categories: harmony, respect and spirituality. The lead author read all transcripts independently while highlighting repetitive words and phrases which were coded as patterns. As a secondary step to review cultural alignment and interpretation and application of the HRM attributes in the DH, the lead study author also reviewed themes with the HRM developer. A thematic matrix was developed in Excel to organize and compare the themes and patterns from each transcript. This process helped the lead author identify common emergent themes and patterns. Once saturation -no new data - was reached, the lead author entered quotes into the Excel matrix. The themes identified in this by responses provided by the Diné cultural experts and healers were used to inform and guide the development of the DH (see Table 4).
Results

Four Diné male healers and 1 female cultural expert were interviewed for a total of 5 cultural expert and/or healer participants (n=5). Four participants were Diné healers knowledgeable about cultural teachings. One participant did not identify as a healer but was affiliated with the healer association as a cultural expert. Key themes from the data included the importance of the concepts and behaviors of discipline, positivity, and mindfulness - each attribute of Hózhó as outlined in the HRM, which were identified to be important aspects of wellness behaviors. When asked about health, participants discussed traditional Diné teachings and cultural activities that promote holistic health.

Participants also spoke about the importance and fundamental teachings of living in Hózhó, the ultimate state of health and wellness for the Diné. One healer explained, “As Diné we have a purpose for everything we do, so…we should think about what we put in our bodies and how we treat our bodies. How we think about things is important when we talk about Hózhó.”

Another healer said,

Hózhó means more than harmony, it is our whole life. We, the Diné, know what it means to live life in a good way. We’ve been instructed by our Holy People how to accomplish this…it requires a lot of hard work and discipline. It means to be healthy, happy, humble and be in harmony or balance with everything we encounter.
Table 4. *Themes from Key Informant Interviews*

<table>
<thead>
<tr>
<th>HRM Domains</th>
<th>Themes</th>
<th>Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmony</td>
<td>Relationship with food, family and culture</td>
<td>• Traditional food connects the Diné to Mother Earth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• T’óó bikiinígo (eating for sustenance and nourishment)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Diné custom to cook for all relatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Having good thoughts while cooking ceremonial food</td>
</tr>
<tr>
<td>Respect</td>
<td>Discipline and Health</td>
<td>• Engaging in physical activity shows self-discipline and strength</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• T’aa hwo ajiteego (being self-reliant and proactive)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Laziness is considered taboo in the Diné culture</td>
</tr>
<tr>
<td>Spirituality</td>
<td>Thinking and Mindfulness</td>
<td>• Thoughts can affect one’s health</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Belief in a holistic connection of Diné people’s mind, body, spirit to Mother Earth and all living things</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mindfulness is needed in all aspects of life</td>
</tr>
</tbody>
</table>

Three reoccurring culturally informed health promotion and self-management themes arose from the transcripts and were used to guide the development of DH:

Theme 1: *T’óó bikiinígo* (translation – eating just enough). Some messages were central to healthy eating, e.g., being mindful of portion sizes is important to prevent overindulgence and wastefulness. Overindulgence is not the traditional way of eating for the Diné. One healer said,

*T’óó bikiinígo* (translation – I eat just enough to get by, not too much). We eat food when we are hungry, not when we are craving something. We shouldn’t eat too much, we should eat just enough to sustain our bodies.

Wasting traditional food is disrespectful to the Diné people, it shows poor values. A healer explained,
Ceremonial food should not be wasted, doing so is considered disrespectful to the plants, the Earth and to our mother, Changing Woman, [a holy deity]. She [Changing Woman] put food here [on Earth] for us, her children. She left us teachings to live life in a respectful way, not to do things without having a purpose.

Further, participants discussed key practices around food preparation were discussed (e.g., praying and having good thoughts while cooking). “Eating food that has been made by the fire in a hogan is the best medicine, because homemade chiyaan (food) is made with prayer and good thoughts…so when you eat it, you should feel better,” said a Diné healer.

Theme 2: *T’aa hwo ajiteego*. (Translation – It is up to you to accomplish things in your life, no one is going to do it for you). For the Diné people, self-discipline is needed in every aspect of life from dawn to dusk (Kahn-John, 2010). One strict disciplinary teaching is to offer a morning prayer and run in the east direction. The Diné believe that when a person adheres to this teaching, the individual will be blessed with a good life, including good health and wellness. A Diné healer said,

*If you are disciplined, you won’t be lazy. This is t’aa hwo ajiteego. If you put your mind to something, you have to do it, it is up to you. We must have this type of mindset to have good things in life. This is the teaching of Hózhó.*

All participants emphasized that this teaching is essential to living in Hózhó; self-discipline is needed to establish good physical, mental, and spiritual health.

Theme 3: Role of mindfulness is fundamental to health and wellbeing in the Diné culture. The Diné are told to have strong respect of the self through discipline and mindfulness (Kahn-John, 2010). For the Diné, mindfulness means that all actions must have a purpose. They believe that the Holy People are watching over them, therefore they must carry
themselves in a mindful, positive and respectful manner. Negative thoughts and behaviors are strongly discouraged. Doing so brings disharmony and imbalance. A healer explained,

Ada akooznizin’go nijigha (translation - be mindful, have self-awareness and respect). Our people [the Diné] believe that a disciplined and positive mind keeps individuals from inviting Té’i’i (translation - poverty) into their lives. It [positive thinking] shields us from the negative things in life, it is our protection. Having this kind of mindset is Hózhó, so I encourage people to keep striving and you will get there.

Healers also explained the Diné belief in the holistic connection of the mind, body, spirit to Mother Earth and all living things i.e. plants, animals, the elements.

Program Adaptation

The DH working group met four times to review the findings from the study (Table 3) and helped select key health messages to be included in the diabetes education class. The lead author developed four DH worksheets based on the group’s selections. The DH worksheets were used as in-class handouts to supplement the BYLD PowerPoint, with the goal of adding more discussion around Diné culture and resilience to the BYLD. The CAB approved all DH materials with minor edits, e.g., Diné spelling and grammar.

The lead author provided a one-day training on the DH supplemental curriculum for the Diabetes Program staff. This training took place one month prior to the implementation of the DH. The lead author attended the first few classes to observe and take notes on the implementation of the DH. The lead author used an observational checklist to identify the limits of the DH. Based on the lead author’s notes and feedback from the health educators, several gaps to the DH were identified, such as the difficulty of reading the content written
in the Diné language and the need for more cultural context behind the health messages. The lead author audio recorded all words, phrases and health messages written in the Diné language. The audio clips were embedded into the PowerPoint presentations. Sample Diné phrases that were audio recorded include: 1) \textit{T'óó bikiinígo}, meaning to eat just enough to live and not to overindulge in food consumption and 2) \textit{T’aa hwo ajiteego}, meaning a person must rely on their own will and determination to achieve their goals. The DH was developed with the goal of utilizing culturally grounded teachings to teach patients with diabetes about diabetes self-care and management, thus enhancing the cultural relevancy of the current programming.

**Discussion**

A key strategy to increasing diabetes education attendance and retention rates for AIANs is to implement culturally grounded, tribe-specific curriculums into community-based health programs (IHS, 2014). The main findings of this study include (1) CBPR approaches are feasible to inform development and adaptation of health programs in AIAN communities and (2) Indigenous health research practices and qualitative methods can be applied to strengthen existing curriculum, as in this case, in the form of the DH supplemental curriculum.

Researchers used CBPR to ensure that the results of the study can be used for action and sustained by the community (Israel et al., 1998; Wallerstein & Duran, 2010). In this study, several steps were essential to ensure that the Diabetes Program could implement and sustain the DH. First, the lead author established a relationship with the program before writing the study proposal. Establishing a reciprocal relationship with the community early in research is important in CBPR, especially in tribal communities. The diabetes program
staff took initiative in all phases of the study by writing letters of support, attending leadership meetings, helping obtain IRB approvals from the university and tribe and co-developing the curriculum. Second, the lead author applied Indigenous health research practices and Diné values of k’é (i.e., personal conduct and kinship) to establish respect and build positive relationships with Diné leaders and community members (Chief et al., 2016; Wilson et al., 2019). Second, in addition to the program’s contribution in the curriculum development, other key stakeholders, such as cultural experts and healers were actively involved. The integration of the Diné healers’ and cultural expert’s Indigenous knowledge certified and validated the cultural rigor that was used to inform the adapted DH content. This process used in the development of the DH supplement curriculum exemplifies consideration and respect for the integration and inclusion of Indigenous knowledge for the purpose of gathering information in a culturally appropriate and meaningful way (Tribal Evaluation Institute [TEI], 2018).

Utilizing a qualitative approach to develop and inform a cultural curriculum is important for identifying health-protective and strength-based wisdom in AIAN communities. A qualitative voice enriches the curriculum and adds depth, richness, and meaning to the educational content. The Native American Diabetes Project (NADP) also used a qualitative approach to design culturally relevant education materials. In the NAPD, the community was an integral part of the project; they participated in the interviews, focus groups and community advisory board (Carter et al., 1997). A unique feature of our study was the rich cultural context and experience tribal scholars brought to the table. The Diné cultural experts’ and lead author’s cultural knowledge were imperative to understanding the depth and strength of the health messages. The qualitative approaches used in this study can
guide the development and implementation of culturally-based, tribe-specific health education model tailored for AIAN populations, which can then be implemented for the Diné individuals diagnosed and living with diabetes. Outcomes of culturally informed and adapted health promotion programs should be studied further for outcomes and effectiveness within each tribal community that receives an adapted curriculum.

The study has a few limitations. First, there were only a handful of key informant interviews conducted due to time constraints and competing commitments such as work, expectations of both professional careers, and/or commitments to patient appointments for healing ceremonies. Despite the recruitment of five participants (n=5), however, data saturation was achieved. Second, only one female participated in the key informant interviews. The Diné people are a matrilineal culture, therefore more insight from female healers could add to the curriculum, especially in regard to traditional food ways and healthy eating. Third, the community partners were not initially involved in the analysis of data, due to the training required to analyze qualitative data. In the hopes of mediating this limitation, the CAB and DH (many with expert cultural knowledge) working groups played vital roles in identifying culturally appropriate health messages for the curriculum.

A significant strength in this project was how the collective wealth and richness of authentic cultural knowledge shared by healers, CAB members and the diabetes program team members contributed to the study. Their willingness to share, learn and collaborate with the lead author on this study required additional work and time, but their dedication to properly honoring Indigenous health research was integral to developing a culturally grounded curriculum. This study could be used to guide the development and implementation of other culturally-based and tribe-specific health interventions for AIAN
populations. Most important, the robustly tailored program will need to be tested to determine the impact on program enrollment, engagement, recidivism, and clinically relevant health outcomes such as diabetes self-management and glucose control. Lastly, the DH is not meant to serve as an independent diabetes curriculum, it is a supplemental curriculum that should be used in conjunction with a standard diabetes education curriculum specifically for the Diné people. The CAB members felt strongly about keeping and integrating the DH supplement in the existing DM program because it added authenticity and meaningfulness that countered the existing predominantly western based or mainstream diabetes education program.

Conclusion

Culturally safe and meaningful engagement with cultural leaders, along with the use of qualitative research methods can inform deep-level cultural adaptations essential to developing robust diabetes education programs at the individual tribe level. Such work can illuminate cultural relevance and may be important in identifying culturally related factors that influence engagement and completion as well as health outcomes for participants in AIAN diabetes education programs. We recommend qualitative CBPR approaches and Indigenous research practices used here to guide the development and implementation of culturally tailored tribe-specific educational model that has been informed by the Diné cultural teachings.
CHAPTER 3: UTILIZING INDIGENOUS FRAMEWORKS – HÓZHÓ RESILIENCE MODEL AND DINÉ EDUCATION PHILOSOPHY IN DIABETES EDUCATION

Introduction

Diabetes education plays a vital role in diabetes prevention and self-management (AADE, 2020; Barrera et al., 2013; Carter et al., 1997; Diabetes Prevention Program Research Group [DPPRG], 2002; IHS, 2020). Diabetes self-management education and support (DSME/S) programs provide information on maintaining glycemic control and preventing diabetes complications by helping patients make informed decisions, practice self-care behaviors, problem solve, and seek support from their health educator (Jack et al., 2004; Powers et al., 2016). When applied in the general population of individuals living with diabetes, DSME/S has been shown to improve quality of life and health outcomes, e.g., reduces A1C and delays onset/advancement of diabetes complications, and diabetes-related emotional distress (Powers et al., 2016). Importantly, evidence also suggests that DSME/S programs that have been culturally adapted for tribes have been successful. Diabetes prevalence decreased from 15.4% in 2013 to 14.6% in 2017; reductions in diabetes-related mortality, kidney failure and diabetic eye disease and improvements in A1C have also been noted (IHS, 2014, 2020). These clear improvements can be attributed to the Special Diabetes Programs for Indians (SDPI), as well as the integration of Indigenous knowledge and culturally based health teachings in tribal health programming (DeBruyn et al., 2020; Indian Health Service, 2014; Satterfield D, 2014). In 1997, Congress established SDPI as a population-specific innovation for both treatment and prevention of diabetes in AI communities (IHS, 2014). Currently, 301 SDPI program sites - operated by tribes, Indian Health Service (IHS) and urban Indian organizations - provide access to culturally based diabetes prevention programs (IHS, 2020).
Select health programs across Indian Country have documented their efforts to develop, apply and disseminate culturally based health programing for AI populations. The “River of Hope,” is a well-documented timeline that depicts the progress of the CDC Native Diabetes Wellness Program (NDWP) from 1998 to 2013. It emphasizes the importance of culture and Indigenous methods, such as the use of traditional stories and talking circles, play in diabetes care and prevention (Satterfield, 2014). The success of culturally adapted programs, such as the NDWP and others (IHS, 2014; Satterfield, 2014), signals the increased need for initiatives that apply local cultural knowledge to adapt mainstream health programs for use in AI communities (Smith-Morris, 2006). Though well-intentioned, much of the current literature on cultural adaptation run a fine line of pan-Indian approaches (Wang-Schweig et al., 2014) and fails to acknowledge the importance of tribe-specific health promotion strategies for the reduction of diabetes prevalence in AI communities.

The next step in cultural adaptation is the development, implementation and evaluation of tribe-specific, cultural elements deemed relevant to individual tribal communities (Resnicow et al., 1999) and the implementation of cultural adaptations informed by relevant and deep-level cultural teachings (Tabak et al., 2015; Wang-Schweig et al., 2014). Given that current DSME/S are largely based on scientific and Western knowledge systems, AI tribal adaptations that robustly integrate cultural beliefs regarding health are essential. New approaches must be explored, tested, and disseminated for use across tribal communities and within tribal-lead health systems. The purpose of this article is to shine new light on an emerging diabetes education and care program that integrates a Diné (Navajo) specific cultural knowledge into DSME/S by applying specific Indigenous frameworks – the Hózhó Resilience Model (HRM) and Diné Education Philosophy (DEP).
Methods

About the Diné Health Study

In this article we will discuss the Diné Health (DH) study, to address the need for further culturally adapted diabetes education for the Navajo people. The DH was implemented in the aforementioned community diabetes program on the Navajo Nation. One of the aims was to develop a culturally adapted curriculum that specifically considers Diné cultural beliefs and practices in regard to health. First, the authors respectfully gathered appropriate Diné traditional teachings related to health and self-care were respectfully gathered from cultural experts to develop a supplemental curriculum. Qualitative methods and community-based participatory research (CBPR) approaches were employed to develop the DH. In this paper, we provide an overview of the step-by-step process on how to apply Indigenous health and wellness models in developing an adapted tribe specific DSME/S tools for tribal communities. Two Indigenous frameworks were used – the Hózhó Resilience Model (HRM) and Diné Education Philosophy (DEP).

Hózhó Resilience Model (HRM)

The HRM is a framework based on the Diné Philosophy of Hózhó – the ultimate state of health and wellness for the Diné people (Kahn-John Dine & Koithan, 2015). Wang-Schweig et al. (2014) recommends the use of frameworks and theories to help identify cultural factors at the deep structural level. Thus, the HRM framework was selected to help identify deep-level cultural teachings that influence behaviors of Diné people. The teachings of Hózhó convey specific rules for a Diné person’s behavior (thoughts, speech and actions), emphasizes order, balance, and harmony in everyday life (Kahn-John, 2016) and inspire individuals to achieve health and happiness (Kahn-John et al., 2020). Kahn-John defines this
type of knowledge as *cultural wisdom* or knowledge based on AI traditions and teachings that directly influences an individual’s beliefs and behaviors, including health, wellness and self-care practices (Kahn-John et al., 2020). For this article, we focus our discussion on the HRM domains and attributes (Table 5) that helped identify and categorize key health messages for diabetes self-care practices, e.g., healthy eating, being active, and healthy coping. Four curricular worksheets were developed using this framework: Having Mindfulness, Making Homemade Food – Meal Preparation, Discipline and Establishing Routines.

Table 5. *Hózhó Resilience Model*

<table>
<thead>
<tr>
<th>Domains</th>
<th>HRM Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmony (External factors)</td>
<td>Thinking – Remain positive in thoughts by practicing mindfulness and intentionality, allowing positive thoughts to guide healthy actions</td>
</tr>
<tr>
<td>Respect (Internal factors)</td>
<td>Discipline – Remain respectful to self by having self-discipline in all actions</td>
</tr>
<tr>
<td>Spirituality (Existential factors)</td>
<td>Spirituality – Remain positive and harmonious in thoughts and actions through prayer or spiritual practices</td>
</tr>
</tbody>
</table>

_Diné Education Philosophy (DEP)_

The DEP is an Indigenous framework developed by Diné College, a tribal college on the Navajo Nation. The DEP framework was developed to culturally ground their programs and to improve student learning experiences by providing cultural knowledge and cultural philosophy in the classroom (Garrison, 2007). The DEP model is based on traditional Diné fundamental teachings and values, including Są’ah Naaghá Bik’eh Hózhóon (SNBH). This philosophical statement that describes “the Diné traditional living system, which places human life in harmony with the natural world and the universe. The philosophy provides
principles both for protection from the imperfections in life and for the development of well-
being.” (Garrison, 2007). The DEP model utilizes a traditional Diné four directions
framework, and each direction is associated with four key words (Table 6). This model is
used in several degree programs at Diné College, including the Bachelor of Science in
Public Health Program (BSPH). The BSPH program applies this model in the classroom by
teaching their students about the cultural teachings behind each key word and the practical
application in their academic work, including assignments and research. The DEP model is
central to the BSPH program because of its cultural significance to the health and well-being
of Diné people.

Table 6. Diné Education Philosophy

<table>
<thead>
<tr>
<th>Direction</th>
<th>Key word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>Nitsáhákees</td>
<td>Thinking and/or assessing</td>
</tr>
<tr>
<td>South</td>
<td>Nahat’á</td>
<td>Planning and/or action</td>
</tr>
<tr>
<td>West</td>
<td>Iiná</td>
<td>Living and/or implementation</td>
</tr>
<tr>
<td>North</td>
<td>Sihasin</td>
<td>Fulfillment and/or evaluation</td>
</tr>
</tbody>
</table>

Adaptation Process

Understanding the current DSME/S programming is a critical component when
designing health promotion programs. In this example, we examine the process for adapting
the Balance Your Life with Diabetes (BYLD) curriculum offered by the Diabetes Program
on the Navajo Nation. Participants with diabetes have the option of attending a class
delivered in the English or Navajo language. Taught by a team of health educators
comprised of clinical nurse assistants, pharmacists, and dieticians, the class offered in the
Navajo language is led by one fluent Diné speaker; other classes are led by non-Native staff.
Participants who attend the class are required to complete several self-assessment forms,
pre-post surveys, and biometric assessments. Participants are also required to attend their follow-up appointment with a health educator. The existing locally adapted BYLD curriculum does promote Diné (Navajo) traditional foods when providing education on food selection and preparation demonstrations, including the Diné traditional food staples of corn, beans and squash. Though this program provides a nice example of a culturally adapted program, the program staff were interested in evolving their program to include even greater and more tailored cultural adaption.

Based on the key culturally based health messages identified from key informant interviews with Diné cultural experts, the lead author and Diabetes Program staff developed four curricular worksheets, PowerPoint slides, audio recordings and an instructional guide to create the DH supplement. The goal of the DH supplement was to add Diné-specific cultural teachings about self-care, diabetes self-management and resilience into the diabetes education class as a mechanism that would aid in connecting with patients in a more meaningful way. The worksheets were used as in-class handouts to supplement the BYLD topics on healthy eating, being active and healthy coping. The lead author audio recorded all words, phrases and health messages written in the Diné language. The audio clips, with words expressed in the Diné language were embedded into the PowerPoint presentations. Sample Diné phrases that were audio recorded include: 1) T’óó bikiínígo, meaning to eat just enough to live and not to overindulge in food consumption and 2) T’aa hwo ajiteego, meaning a person must rely on their own will and determination to achieve their goals. The community advisory board approved all DH materials with minor edits to Diné spelling and grammar.
Table 7. Cultural Adaptation Process Overview

<table>
<thead>
<tr>
<th>Topic</th>
<th>Original Diabetes Curriculum (ADA)</th>
<th>Existing BYLD Curriculum</th>
<th>DH Supplemental Curriculum</th>
<th>HRM &amp; DEP Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic 1</td>
<td>Healthy Eating</td>
<td>Language, My Native Plate, traditional food demonstration</td>
<td>Diné-specific cultural teachings added to the BYLD curriculum in the form of audio recordings, PPT slides and worksheets</td>
<td>T’óó bikiinígo (translation- eating for sustenance and nourishment), self-discipline and mindfulness while eating</td>
</tr>
<tr>
<td>Topic 2</td>
<td>Being Active</td>
<td>Language</td>
<td>Diné-specific cultural teachings added to the BYLD curriculum in the form of audio recordings, PPT slides and worksheets</td>
<td>Diné teachings on self-discipline, resilience and livelihood</td>
</tr>
<tr>
<td>Topic 3</td>
<td>Healthy Coping</td>
<td>Language</td>
<td>Diné-specific cultural teachings added to the BYLD curriculum in the form of audio recordings, PPT slides and worksheets</td>
<td>Positive thinking and mindfulness in day-to-day self-care</td>
</tr>
</tbody>
</table>

1. American Diabetes Association (ADA)

Discussion

Application of Indigenous Frameworks in Health Education

Seven steps were used to develop the DH supplemental curriculum. These are discussed below. Steps one-three are based on tenants of community based participatory research (Teufel-Shone et al., 2006) and are considered best practice when working with tribal communities. Steps four-seven describe Indigenous ways of knowing and research paradigms of HRM and DEP.
1. **Step 1 – Get to know the community, by understanding their strengths and community assets, build a relationship and let them determine the focus of the project.** The lead author is Diné and possesses community (insider) and academic (outsider) knowledge. She collaborated with her hometown Diabetes Program to develop the DH supplemental curriculum. She has worked with this organization for 5 years on other projects related to diabetes. The lead author used her social and cultural capital to secure a meeting with the diabetes program director and these pre-existing relationships were critical for setting the stage for the collaboration and the ongoing relationship between the program (community) and researcher (university). At the initial meeting, the director expressed interest in adapting the existing BYLD classes to include more cultural components into the existing diabetes education classes. The lead author and the Diabetes Program Director reaffirmed a reciprocal and trusting relationship early in the project; this allowed natural and safe exchange and sharing of knowledge. The lead author, the program director and diabetes program staff took turns in leadership roles, depending on their expertise and experience and the task at hand. The lead author introduced the concepts of Indigenous methodology and deep-level cultural teachings, such as Diné traditional teachings, stories and philosophies, and the program director was on board. The program director, whom is not AI, allowed the lead author to manage data collection because of the lead author’s cultural knowledge. However, the director and the diabetes program staff shared responsibilities related to dissemination and implementation of the DH. For example, the program director determined how the DH material would be integrated into the diabetes education class while the program staff provided input on how to improve the worksheets and slides. Health educators and other program staff’
were instrumental in decision-making, implementing the DH, and evaluating the DH. The lead author valued staff input for program sustainability and ensured that ownership of the DH remained with the program. This step exemplifies a truly integrative, collaborative and inclusive approach to the development of a culturally informed and tribe specific tailoring of a public health education curriculum for AIs.

2. **Step 2 – Gain community and tribal support and approval before developing, implementing, and disseminating any cultural tools in tribal communities.** In tribal communities, local community approval is required before submitting any research proposals to the tribal and University Institutional Review Boards (IRB). University IRB approval is required before seeking approval from the Navajo Human Research Review Board (NHRRB). The lead author and program director attended several community and organizational meetings to present the study proposal and request a letter of support or tribal resolution from various local tribal health organizations and stakeholders (Community Health Department, Executive Committee, and Leadership Committees), Diné Chapters, Western Navajo Agency Council and the Diné Hataalii Association. The lead author submitted the study proposal, tribal resolutions and letters of support to the University IRB. Upon University IRB approval, the study proposal, study material, tribal resolutions, letters of support and University IRB approval letter were submitted to the NHRRB. The process of obtaining community support and IRB approvals took eight months. Throughout this time, the lead author regularly communicated with the Diabetes Program to plan and prepare for the study. Social and cultural capital (Joe & Young, 2014; N. Teufel-Shone, 2014) including the use of k’e (Diné kinship) and language,
were essential to engaging with the various community based tribal stakeholders, obtaining approvals and navigating the IHS and Navajo Nation departments.

3. **Step 3 – Establish a Community Advisory Board (CAB) to contribute to your project in a meaningful way, not as a means to meet community participation requirements.**

   The CAB should consist of tribal members and cultural experts and/or healers to oversee, offer cultural consultation and expertise and to approve any research or educational material. The CAB in this study was established in the initial phases of the project and members were identified by the community. CAB members were selected for their cultural knowledge and expertise. Two of the four members were cultural advisors at their places of employment, the third CAB member was a former Diné cultural teacher and fourth CAB member is an active community member that regularly attends Chapter meetings. Meetings were structured on a monthly basis and email exchanges occurred more frequently during the DH development. Agenda items, such as DH drafts and other documents were sent two weeks prior to any meetings, which took place in-person or via phone. Decisions on DH were made by group consensus and consensus was required for cultural content and to ensure authenticity, respect and accuracy of the content, e.g., traditional Diné stories and teachings. A total of five meetings were held during the development of the DH, one of which required group consensus on translation and was resolved. This stage is sometimes a very difficult aspect of engaging in research with tribal communities. The trust component is a critical piece in working with tribal communities, especially when data collection involves Indigenous knowledge. The trust building process takes time and researcher must follow proper tribal cultural engagement
etiquette and the knowledge gained through the use of CABs may require extra levels of protection during the research process.

4. **Step 4 – Seek guidance from experts to gain a deeper understanding of the development and application of any Indigenous framework in research and practice.** The lead author sought guidance and mentorship from the author of the HRM, Michelle Kahn-John, prior to developing the DH curriculum. Kahn-John, a co-author on this article, reviewed the interpretation and application of the HRM in the DH curriculum development to ensure accuracy and interpretation. Further, the lead author met with a cultural expert from Diné College to understand the cultural significance of the DEP and how it is applied in a cultural setting, such as a healing ceremony. Additionally, the lead author has worked with the Diné College BSPH program for the past four years during which she has applied the DEP in teaching, program evaluation and research.

5. **Step 5 – Establish a working group or task force that consists of community partners and experts, such as program staff, CAB members, cultural experts, elders and healers to focus on the development of the cultural tool.** A DH working group was established to co-develop and review DH drafts. The act of bringing together a team of relevant experts enriches the project and provides multidimensional insight and perspective to the content and the process. The group consisted of health educators, the program director and the lead author. Cultural experts, healers and CAB members were invited to join the DH working group, but none could commit to the time required for curriculum development. The group met five times during the developmental phases and six times during the implementation phases of the DH. The initial meetings were held to review the health messages and stories gathered from the cultural expert and healer interviews and has
been described in more detail in Chapter 2. The group selected key health messages that aligned with the BYLD’s self-care lessons i.e. healthy eating, physical activity and healthy coping. Suggestions from the workgroup were integrated and a second draft was developed by the lead author based on the group’s discussion and submitted to the group and the CAB. Subsequent drafts were reviewed, revised and submitted using the same process.

6. **Step 6 – Apply the Indigenous frameworks in a meaningful, engaging and respectful way.** The HRM domains of harmony, respect and spirituality served as the theme categories for the DH curriculum and informed the selection of teachings based on self-care actions (healthy eating, being physically active, and healthy coping). For instance, under the domain respect, it is a Diné teaching that a person must be respectful in all their actions, which requires consistency in practices of self-discipline. These actions include speaking, thinking, being physically active, cleaning, cooking, eating, maintaining livestock, and caring for the land and their homes, etc. This Diné teaching of respect and self-discipline was integrated by guiding the development of the DH Discipline and Routines worksheet (Appendix A). The DH Routines Worksheets were designed to have the program participants read the worksheet excerpt on self-discipline and the accompanying health message, then the participant completed the template and establishes a routine for their day. The template includes self-care actions that are covered in the class, e.g., healthy coping, monitoring, being active, reducing risks, taking medication, healthy eating, and problem solving and each was intentionally integrated into DH to reinforce self-care behaviors in a culturally relevant way.
In alignment with the DEP, the DH Goal Setting (DHGS) and DH Mindfulness (DHM) worksheets were developed and were congruent with the Diné four direction and phase of life teachings. In the DHGS worksheet, questions were developed to help participants set a goal(s) and remain mindful as they engaged in their self-care activities (Figure 1). Participants completed step 1 (*Nitsahakees* [thinking] phase) and step 2 (*Nahata* [planning] phase) on the DHGS worksheet (Appendix B) at the conclusion of the BYLD class. Participants set goal(s) using the SMART Model, in which goals are written using the following criteria, Specific, Measurable, Achievable, Realistic and Time-bound (SMART). Subsequently, participants completed the *Iina* (living) phase by logging their progress before their follow-up appointment. Lastly, participants attended their follow-up appointment with their health educator. This is called the *Sihasin* (assuring) phase where the participant reflected on his/her goal(s), discussed any challenges or barriers and thinks about ways to improve their plan. Health educators used a motivational interviewing approach, a non-judgmental way of listening and reflecting on the participant’s thoughts to help participants set their goals. Based on that discussion, a new goal(s) is set and/or a new plan is developed. The DEP model and the underlying traditional teachings are complex and have much in-depth detail affiliated with each component of the DEP model. A brief overview of the DEP is presented here although, please note that a traditional comprehension of these concepts and models may be integrated by each participant uniquely depending upon their level of cultural understanding of these traditional teachings. This is an important consideration when integrating traditional AI teachings, or frameworks into prevention programs.
7. **Step 7 – Ensure that the educational tools belong to the tribe and/or community programs and can be sustained in tribal community-based programs without academic partners.** The DH curriculum, including all the material and worksheets belong to the Diabetes Program and Navajo Nation; ownership is indicative of meaningful community participation, investment, control (In Smith-Morris, 2006) and connection. When working with tribal communities, it is important to gain community buy-in for sustainability of the research products and outcomes. We recommend that academic partners apply true CBPR approaches i.e. the community decides the focus of the project prior to submitting any research proposals and grant applications and/or providing technical support for community programs if they would like to take the lead on the study. This approach allows the community to develop and sustain the project once the study ends. Further, it is important to consider asset-based approaches that focus on strengths of the community as opposed to deficit-based models that focus on problems.
Too often, research has been stigmatized in tribal communities as focusing on problems (e.g. documenting diabetes prevalence) and leaving communities to fend for themselves without assisting the community in addressing the study’s findings (e.g. technical assistance on a grant application or providing workshops for grant writing, etc.) or providing a meaningful product to the community (e.g. educational materials, equipment for digital storytelling, etc.). Lastly, another reason for letting the community take the lead is cultural fidelity, delivery of a cultural intervention that adheres to the original protocol, especially when Indigenous knowledge is used. However, in this case, the diabetes program was run by both AI and non-AIs, therefore, it was important to train and observe the implementation of a culturally informed intervention and such a process required additional time and training.

These steps offer an exemplar of the application or integration of Indigenous frameworks into a public health intervention program in a Diné community. We recommend using similar steps when working with tribal communities and applying Indigenous frameworks into health programming, however, additional steps may be needed depending on tribal etiquette and protocols.

Conclusion

In summary, we provide a 7-step framework for developing an educational supplemental tool for diabetes education. Cultural adaptation and tailoring are not new to tribal health programming and research, however, the specific details, the attention to ensuring respect to the AI communication and ways in which these adaptations and tailoring may take place are important to document for tribal health programming. Integrating tribe-specific cultural knowledge into DSME/S by employing existing Indigenous models and
methodologies to reduce type 2 diabetes in tribal communities might be the next step in improving AI. In addition, exemplars of culturally adapted health promotion programs and detailed narrative descriptions on how these integration steps occur validates the critical significance of Indigenous health promotion models and reminds stakeholders of the importance of these frameworks in AI health promotion programs and agendas. We recommend the use of CBPR and social and cultural capital when working with tribal communities.
Abstract

Purpose: The purpose of this pilot study was to determine whether participants involved in a culturally enhanced diabetes education intervention, compared to controls, would demonstrate greater improvement in A1C and to test the effectiveness and acceptability of the culturally adapted intervention.

Methods: Thirty-four participants were enrolled in the Diné Health (DH) intervention group and attended a 6-hour culturally enhanced class designed for Diné patients with type 2 diabetes and participated in a follow-up appointment. Thirty-four controls were retrospectively selected for comparison of results to the standard program condition. A1C was measured at baseline and follow-up. All other data were collected by self-administered surveys.

Results: Eighty-two percent of intervention and control participants attended a diabetes education class and follow-up appointment. Both groups showed statistically significant improvement in mean A1C levels. Mean A1C level decreased from 9.19% to 8.09% and from 9.22% to 8.16% for intervention and the comparison groups, respectively. No difference in between group reductions in A1C were shown. There were no differences in satisfaction between intervention and control participants. Satisfaction and acceptability of the DH curriculum was high. More than 50% of the participants met their goals.

Conclusion: Culturally enhanced diabetes education supported reductions in A1C levels equal to the standard programming, but with a slightly greater change in A1C. Future studies should examine tribe-specific cultural adaptations to enhance DSMES. This study provides and exemplar of how existing diabetes programs can consult and collaborate with local
healers and cultural experts to develop successful diabetes programs and implement culturally informed and adapted educational tools into clinical practice to improve patient health outcomes.

Introduction

American Indian and Alaskan Native (AIAN) populations experience disproportionately higher rates of type 2 diabetes and diabetes-related complications compared to other racial and ethnic groups in the United States (CDC, 2020). Several studies have shown the prevalence of diabetes among the Diné (Navajo) to be high at 16.5% for adults in one study (Sugarman et al., 1992) and 22.9% for adults in another study (Will et al., 1997). The incidence rate among youth is estimated to be 2.78 per 1,000 (Dabelea et al., 2009). The age-adjusted mortality for diabetes is 2.29 times higher for the Diné when compared to the US population (NEC, 2016). Not only is diabetes a serious public health problem for tribal communities, but the complications of diabetes can cause more suffering than the disease itself such as limb amputation, kidney failure and death (Jack et al., 2004; Powers et al., 2016).

Landmark studies have established that diabetes education can effectively improve self-care practices and metabolic control, thereby preventing or delaying the onset of diabetes-related complications (DPPRG, 2002). Diabetes Self-Management Education and Support (DSMES) services, defined as “the ongoing process of facilitating the knowledge, skills, and ability necessary for diabetes self-care” (Funnell et al., 2010), have been at the heart of the fight against this lifelong disease. DSMES has been effective at improving health outcomes for the overall population, but more can be done for AIAN populations (Satterfield, Burd, Valdez, Hosey, & Shield, 2002). Tribal members, leaders and physicians
have recommended that culture should be incorporated into health education programming to increase program effectiveness (Roubideaux et al., 2000; Satterfield, DeBruyn, Francis, & Allen, 2014; Scarton et al., 2019; Warne, 2005) because culture plays a significant role in decision-making for AIANs (Kahn-John et al., 2020); thus, cultural tailoring has been at the forefront of improving health education programs for AIANs (Armstrong, 2000; Bassett et al., 2012; Brandenburger et al., 2016; Carter et al., 1997; Carter, 1999; CDC, 2014; Conti, 2006; Davis et al., 2011; DeBruyn et al., 2020; Gittelsohn et al., 2003; Griffin et al., 1999; Jiang et al., 2018; Joe & Young, 2014; Joneset al., 2020; Roubideaux et al., 2000; Satterfield et al., 2002; Satterfield et al., 2014; Scarton et al., 2019; Smith-Morris, 2006). A number of diabetes management and prevention interventions have been successfully developed for AIANs, including the Native American Diabetes Project (NADP) (Carter et al., 1997; Carter, 1999; Griffin et al., 1999; Smith-Morris, 2006), Native Diabetes Wellness Program (NDWP) (Satterfield et al., 2014) and the Special Diabetes Program for Indians Diabetes Prevention (SDPI) Program (Jiang et al., 2018); and have included elements to enhance cultural competency and sensitivity, such as the use of AIAN languages, discussions and activities around traditional foods, inclusion of AIAN art and use of exclusively AIAN staff. It has also been documented that tribal communities prefer tribe-specific cultural teachings, defined as cultural elements deemed relevant to one tribe, in their health programming (Griffin et al., 1999; Scarton et al., 2019; Tabak et al., 2015) instead of pan-Indian material. Further, culturally targeted interventions are more likely to reduce A1C, a metric of diabetes control, in ethnic minority populations diagnosed with type 2 diabetes than standard interventions (Lagisetty et al., 2017; Nam et al., 2012). Such emergent research suggests that more investigation is needed to understand how tribe-specific cultural tailoring of diabetes
self-management and education affects patient health and diabetes program satisfaction outcomes.

Some argue that surface-level cultural tailoring, e.g., matching intervention materials and messages to the target population (Castro et al., 2010; Resnicow et al., 1999), is not as meaningful to AIANs participants (Griffin et al., 1999) and risks of cultural stereotyping as compared to deep-level cultural tailoring which encompasses the target population’s beliefs, values, history and perceptions on health (Lagisetty et al., 2017; Resnicow et al., 1999; Smith-Morris, 2006). AIANs are culturally heterogeneous, each with their own language and cultural beliefs. The broad application of selected cultural features may reduce the appeal and salience of diabetes interventions for many AIAN individuals at the individual tribe level. Thereby, the purpose of this study was to examine the impact of the Diné Health (DH) intervention, a culturally enhanced diabetes education class designed specifically for the Diné tribe and explore the impact of DH on patient satisfaction, acceptability and health outcomes of Diné patients with type 2 diabetes. It is important for health programs and diabetes educators to understand the how AIAN culture impacts diabetes self-care and management and how use of cultural in health promotion programs may offer an opportunity to provide the best care.

Study Hypotheses

1. Participants receiving the DH would demonstrate greater improvements in A1C at follow-up compared to participants in the control group.

2. Participants receiving the DH, compared with control, would demonstrate higher satisfaction rates.
Methods

Study Setting

This study took place on the Navajo Nation and received institutional review board (IRB) approval from the Navajo Human Research Review Board (NNR18.313) and the University of Arizona. The local Diabetes Program that participated in this study serves 8 communities on the Navajo Nation, with a population size of approximately 32,000 and a majority (92%) identify as American Indian. A Community Advisory Board (CAB) was established to oversee, offer expert consultation and support for the study and ensure that the research study respected the Diné people and culture. The CAB members included community and organizational representatives and each member was selected by the community for their professional, cultural and local knowledge. The initial meeting (held in January of 2018) with the diabetes program confirmed the program’s concern that there was minimal Diné culture in their existing diabetes education class and their program had one AIAN health educator. Therefore, the purpose of this study was to integrate more Diné cultural components into the existing diabetes education class and pilot the curriculum in the community. This article will describe the findings of the pilot testing of the newly developed, community-informed DH curriculum.

Theoretical Framework

The social cognitive theory (SCT) postulates that there are three factors that affect the likelihood that a person will change a health behavior: 1) self-efficacy, 2) goals, and 3) outcome expectations (Rimer et al., 2005). Based on the SCT, the Diné Health (DH) supplemental curriculum will provide worksheets to increase self-efficacy and emotional coping. Self-efficacy will be increased by social persuasion, mastery and modeling of health
sustaining fundamental Diné teachings. The cultural grounded health teachings will influence the participants’ attitudes and beliefs; and once participants adopt new behaviors, they will theoretically make changes in their environment by practicing self-care. Self-efficacy will be measured through a clinical assessment and goals worksheet.

Study Design

This study employed a community based participatory research (CBPR) and mixed methods design. CBPR emphasizes community engagement throughout all phases of a research study (Wallerstein & Duran, 2010) and is recommended when working with tribal communities (Teufel-Shone et al., 2006). A mixed methods design allows researchers to collect qualitative and quantitative data to enhance the richness of the data. The overall study had two aims. For aim 1, qualitative data were gathered to inform the development of a culturally grounded diabetes education tool called the Diné Health (DH) Supplemental Curriculum based on key informant interviews with cultural experts and Diné healers. The second aim was to pilot test the DH curriculum using a quasi-experimental design (intervention without randomization) with assignment of participants in an intervention or comparison group. Qualitative and quantitative data were collected to measure the effectiveness of the DH curriculum on participant health and program satisfaction outcomes.

Diné Health Intervention

As in the standard class, called the Balance Your Life with Diabetes (BYLD), the goal of the DH intervention was to facilitate good self-care practices, improve A1C levels and reduce diabetes-related complications through diabetes education. The DH curriculum was culturally enhanced i.e. tribe-specific cultural teachings based on the Hózhó Resilience Model (HRM) (Kahn-John, 2016) were added to the following BYLD lessons, healthy
eating, being active, and healthy coping (Table 8). The DH class was delivered in a one-day 6-hour intensive education class that covered 7 lessons (including diabetes basics, monitoring, reducing risks, taking medications, healthy coping, healthy eating, problem solving) and was taught by dieticians and health educators. The DH content was supplemented by individual follow-up appointments that used a culturally adapted worksheet based on an Indigenous philosophy to personalize goals and address barriers to achieving participant goals.

Table 8. Diné Health Supplemental Curriculum Content

<table>
<thead>
<tr>
<th>BYLD Curriculum</th>
<th>DH Supplemental Curriculum</th>
<th>Cultural enhancements based on Diné Traditional Teachings:</th>
</tr>
</thead>
</table>
| Healthy Eating  | Traditional Food Practices | • Health Message: T’óó bikiinígo (translation- eating for sustenance and nourishment) Portion Control, Self-Discipline and Mindfulness  
• Audio Recording: Having good thoughts (mindfulness) while cooking  
• Worksheet(s): DH Mindfulness, DH Homemade Food and Meal Preparation |
| Being Active    | Establishing Discipline    | • Health Message: Diné teachings on self-discipline and livelihood  
• Audio Recording: T’aa hwo ajiteego (translation - being self-reliant and proactive) in your health  
• Worksheet(s): DH Discipline, DH Daily Routines |
| Healthy Coping  | Thinking and Mindfulness   | • Health Message: Positive thinking and mindfulness  
• Audio Recording: Holistic Health and Saah Nagha Bikehozhon (Living a long healthy life)  
• Worksheet(s): DH Goal Setting |
Recruitment

This study took place from May 2019 to May 2020. The Diabetes Program posted flyers in their department and provided study information to participants prior to the implementation of the DH. Participants were recruited from an ongoing diabetes education class. Participants were enrolled in the intervention group if they were referred to take a diabetes education class between May 2019 and January 2020, were diagnosed with type 2 diabetes, at least 18 years old, and a tribal member. There were no other inclusion or exclusion criteria. For the comparison group, participants were retrospectively selected if they had attended the standard class between November 2018 and April 2019, were diagnosed with type 2 diabetes, at were least 18 years old, and a tribal member.

Figure 2. Flow chart for the DH study
**Sample**

Thirty-four (n=34) participants were enrolled in the study and prospectively assigned to the DH intervention arm based on eligibility criteria and three people declined to participate in the study (Figure 2). Six intervention participants were lost to follow-up for unknown reasons and one participant’s age was missing from the data. The average participant in the intervention group was 55 years old ($SD = 12$). Seventeen participants identified as female and 17 participants identified as male. Intervention participants’ age ranged from 28 to 83 years old with the largest percentage (42%) of participants between the ages of 56-70 years (Table 9). Most intervention participants (47%) attended college or a trade school. A systematic sampling method was used to select participants that were eligible for the control group. Thirty-four (N=34) participants were retrospectively assigned to the control group and six were lost to follow-up for unknown reasons. Twenty-six participants identified as female; six participants identified as male. The average participant in the control group was 61 years old ($SD = 13$). Control participants’ age ranged from 37 to 89 and a majority (50%) of participants were between the ages of 56-70 years.

**Table 9. Participant characteristics by study group**

<table>
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<th>Demographic</th>
<th>Intervention Group</th>
<th>Control Group (If applicable)</th>
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18(6)
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<tr>
<th>Education Level</th>
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<td>Some High School</td>
<td>100(34)</td>
<td>Clinical staff (nurse and phlebotomist) measured participant A1C, BMI, and blood pressure were measured at baseline and at their follow-up appointment (3-6 months). DH intervention participants completed a 27-item self-assessment form, 8-item DH satisfaction survey, and a 5-item DH goals worksheet. The 27-item self-assessment form included questions about; demographic questions; diabetes knowledge; self-care practices; and attitudes about diabetes and comorbidities. The DH survey included 8 acceptability statements; participants were asked to indicate whether: the DH class was useful; the DH class helped them understand diabetes; the DH class felt tailored to them; the DH class offered them meaningful cultural teachings; the DH class empowered them; the DH class motivated them to change; they feel confident their health behaviors would improve; they would recommend the DH to others (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree); and one satisfaction statement; participants were asked to indicate whether: they were satisfied with the DH class (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree). The 5-item DH goals worksheet included setting specific, measurable, achievable, realistic, and time-bound (SMART) goals using the Diné Education Philosophy (DEP) model (Garrison, 2007). Data for control participants were retroactively extracted from the</td>
</tr>
<tr>
<td>High School Diploma</td>
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<td>Some College/Trade School</td>
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</table>
diabetes program’s quarterly reports, including de-identified initial and follow-up A1C, BMI and blood pressure.

Additionally, satisfaction surveys were administered at the end of each diabetes education class. The satisfaction survey included 11 statements; participants were asked to indicate whether: it was easy to get an appointment; the staff were courteous and respectful; their educator was helpful; their cultural values on health were presented; the education materials were useful; there was enough time to address their concerns; they set a lifestyle goal; the room was comfortable; they were scheduled for a follow-up visit; they would recommend the program to others; they would prefer a group class to specify a time (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree). Satisfaction surveys from late 2018 and early 2019 (prior to the DH study) were used to estimate reported satisfaction with the diabetes education class in the control group, which were then evaluated in relation to reported satisfaction in the DH intervention group at the end of this pilot study.

Procedures

At the beginning of the DH class, trained clinical staff administered a clinical assessment of intervention participants. Participants rotated through several stations including, a blood glucose station, A1C station, blood pressure station, height and weight station, and DH study consenting station. At the consenting station, a trained researcher discussed the study, answered questions, attained consent and informed participants that consent was not required to attend the class. Participants also completed a self-assessment form administered by health educators. Once all assessments and forms were completed, participants attended the 6-hour intensive education class. At the conclusion of the class, participants completed the DH self-care goals worksheet, DH survey and were scheduled for
a single follow-up appointment that occurred anywhere between 3-6 months. At follow-up, participants received health education on their challenges and other areas of interest (e.g. meal planning, portion control, monitoring, etc.), discussed their goal(s) and completed an A1C test. Health educators noted whether the participant’s goal(s) were achieved.

*Statistical Analysis*

The intervention was evaluated using both quantitative and qualitative data. Univariate and bivariate analysis, including descriptive statistics, prevalence, means, and chi-square ($\chi^2$) were calculated for all variables of interest including, participant demographics, metabolic control, satisfaction, self-care practices, attitudes about diabetes and goal(s). Participants were divided into two groups: 1) participants having good glycemic control, defined as having an A1C of less than 7% (Jones et al., 2020) and 2) participants having poor glycemic control, defined as having an A1C of 7% or greater (Jones et al., 2020). Paired t-tests were calculated for the DH group’s initial and follow-up A1C and control group’s initial and follow-up A1C. A paired t-test was calculated for the difference of initial A1C and follow-up A1C for the intervention and control group. Participants with missing data required to run the tests were excluded from the analysis. All analyses were done using both actual data collected and intent-to-treat methodology, i.e., substituting last acquired data for missing data. Qualitative data from the self-assessment form and DH goals worksheet were analyzed using a deductive thematic analysis method and code book.

**Results**

Ten DH classes were held between May 2019 and January 2020. There were more females in the control group (88%) compared to the intervention group (50%). Sixty percent (60%) of participants in the control group had poor control of their blood glucose compared
to 17% among intervention participants. Half of the controls were over 60 years old and a quarter of intervention participants were over 60 years old.

1. *Metabolic Control*

Intervention participants had an A1C level of 9.19% (SD = 2.3) and control participants had an A1C level of 9.22% (SD = 2.6) at baseline. Both the intervention and control groups showed significant declines in A1C from preintervention to postintervention (9.19% to 8.09% for the intervention participants, p=0.015 versus 9.22 to 8.16% for the control participants, p=0.002) (Table 10). Thirty-two percent of participants in the intervention group achieved an A1C below 7% postintervention, as compared to 39% of the control participants at follow-up. Among those with poor control, we saw similar results in A1C improvement (75% for intervention participants and 71% for control participants, p=0.79). The change in the mean A1C from the initial visit to the follow-up was not significant (-1.10 for intervention participants versus -1.06 for control participants, p=0.43) (Table 3). Seventy-eight percent of participants in the intervention group experienced improvement in their A1C levels from preintervention to postintervention as compared with 72% of the control participants (Table 10).

Table 10. *Participant A1C Levels at Baseline and Follow-up*

<table>
<thead>
<tr>
<th></th>
<th>Intervention Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>Mean(SD)</td>
</tr>
<tr>
<td><strong>Initial A1C</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Controla</td>
<td>100(34)</td>
<td>9.19(2.3)</td>
</tr>
<tr>
<td>Poor Controlb</td>
<td>24(8)</td>
<td>9.19(2.3)</td>
</tr>
<tr>
<td><strong>Poor Controlb</strong></td>
<td>76(26)</td>
<td></td>
</tr>
<tr>
<td><strong>Follow-up A1C</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Controla</td>
<td>100(34)</td>
<td>8.09(1.95)</td>
</tr>
<tr>
<td>Poor Controlb</td>
<td>32(11)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>68(23)</td>
<td></td>
</tr>
</tbody>
</table>
1. Analyzed with actual data; 2. Intent-to-treat methodology; a. Good Control is defined as an A1C % of less than 7.0; b. Poor Control is defined as an A1C % of 7.0 and above.

Table 11. *Pilot Study Outcomes*

<table>
<thead>
<tr>
<th></th>
<th>Intervention Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>Mean Change</td>
<td>% Improved</td>
</tr>
<tr>
<td>34</td>
<td>-1.10</td>
<td>78.00</td>
</tr>
</tbody>
</table>

Pearson Chi-square p=0.63; 1. Analyzed with actual data; 2. Intent-to-treat methodology

2. *Satisfaction Survey*

Forty-two (n=42) of participants completed the satisfaction survey. Participants who attended a diabetes education class from October 2018 to April 2019 were assigned to the control group (n=19). Participants who attended a class from May 2019 to October 2019 were assigned to the intervention group (n=23). One participant from the intervention group did not respond to the questions regarding culture and classroom materials, thus was excluded from the analysis on those items. There were no significant differences with any statements between intervention and control participants including: politeness and competence of staff in addressing their concerns, helping them set a goal(s) and scheduling follow-up visits; length of their appointment; likability of the room; likelihood of recommending the class to others; and preference of class (individual or group). The proportion of participants who ‘Agreed’ or ‘Strongly Agreed’ to these items by group, intervention or control, are shown in Figure 2. Most participants either agreed that the education materials were useful (100% for the control group and 95% for the intervention group) and that their cultural values on health were presented adequately in the class [89% for the control group and 86% for the intervention group] (Figure 4).
Figure 3. Percentage of Control and Intervention participants who agreed with each of the acceptability items

Figure 4. Percentage of participant responses to the question on culture

My cultural values on health were presented.
3. **Self-Assessment**

The 27-item self-assessment form included demographic questions, diabetes knowledge, self-care practices, and attitudes about diabetes. Of the 34 individuals in the intervention group, thirty (88%) completed the self-assessment form.

Knowledge was measured using four questions related to disease diagnosis, metabolic control, and disease complications. About 68.66% of participants had good knowledge scores. Forty-two percent (n=30) of participants know about metabolic control. In fact, 80% of participants know that diabetes can be prevented and 83% knew that diabetes complications can be prevented.

Self-care was evaluated using four questions regarding the participants intention to practice preventive measures such as exercising or eating healthy food and monitoring blood glucose. Most of participants (83%) stated that they do regular exercise. However, fewer participants (60%) reported checking their blood glucose level regularly. About 30% of participants drank sugary sweetened beverage daily, e.g., soda, tea with sugar, coffee with sugar and/or creamer. More than half (62%) of the participants indicated they have not made efforts towards their self-care.

Three questions sought to assess participants’ attitudes toward diabetes. More than half (53%) of participants expressed that they felt afraid, worried and sad about living with diabetes; 37% stated that they felt guilty and angry; and 10% said they felt okay. Half of the participants believed that they will get sick despite their self-care measures and self-management. Over half (57%) of the participants expressed that self-care practices such as, healthy eating, exercising and blood glucose monitoring, were the hardest part of living with
diabetes; and 43% of the participants stated that the negative effects of diabetes, e.g. adverse side-effects and complications, were the hardest part of living with diabetes.

4. **DH Goal(s) Worksheet**

Participants were asked to set one or two self-care goals that are SMART (Specific, Measurable, Achievable, Realistic, and Time-bound) goals using the DEP model. Three themes were identified: exercise more often, eat healthier, and monitor blood glucose regularly. Sixty-six percent (n=23) of participants aimed to exercise or engage in some type of physical activity more often, e.g. including, walking, running, biking, tending livestock, or strength training for goal #1. Thirty-one percent (n=11) of participants stated that they would like to eat healthier food, consume smaller portions and drink less sugary sweetened beverages. One participant set a goal to monitor his/her blood glucose every morning and after dinner every day for the next month. For goal #2, participants wanted to exercise (48%), eat healthier (43%) and monitor their blood glucose (10%) on a regular basis. More than half of the participants (63%) met at least one of their goals.

5. **Diné Health Survey Questionnaire**

Thirty-four intervention participants completed the 9-item DH survey. Participant acceptability and satisfaction with the DH intervention were high, with most subjects expressing that the DH class was useful, culturally tailored and offered them meaningful cultural teachings (Table 12). Most participants indicated that the DH class helped them understand diabetes and has empowered them to make changes to improve their health. Almost all participants (97%) also indicated that they were satisfied with the DH class and would recommend the class to others.
Discussion

A culturally enhanced health promotion and self-management intervention designed for the Diné was piloted in a community on the Navajo Nation. The study results showed no difference in change in A1C among participants over time, indicating that both approaches are effective in diabetes management. However, more intervention participants experienced improvement in A1C than control participants. There was no difference in satisfaction among participants. Both groups reported high satisfaction of the programs. Participant acceptability with the Diné Health curriculum were high. All participants strongly agreed
that the DH class offered them meaningful cultural teachings to help them manage their diabetes.

Similar to other studies (Carter et al., 1997; Carter, 1999; Griffin et al., 1999; IHS, 2011, 2014, 2020), tribal participants were highly satisfied with the cultural adaptation in the diabetes program was high among tribal participants. We found three well-documented studies in the literature that highlighted their cultural adaptations and curriculum development methods: (1) the NADP developed the *Strong in Body and Spirit*, a diabetes education curriculum that incorporated AIAN traditions and stories from eight tribes in New Mexico (Carter et al., 1997; Carter, 1999; Griffin et al., 1999); (2) the CDC NDWP developed several diabetes-related curricula and programs for use in tribal schools and communities broadly, including the *Eagle Books* and the K–12 Diabetes Education in Tribal Schools (DETS) *Health is Life in Balance* curriculum; (3) and the CDC Traditional Foods program (Francis et al., 2009; Satterfield et al., 2014). Similar to our study, these projects employed CBPR and qualitative approaches in their studies. They also found that their culturally adapted products were effective e.g. the DETs curriculum was effective in increasing diabetes knowledge (Francis et al., 2009). Our study was unique in three ways; 1) the DH curriculum was designed specifically for the Diné tribe and was informed by prominent healers and/or cultural experts, 2) the curriculum development was guided by a fundamental wellness framework and educational philosophy specific to the Diné and 3) diabetes self-management was evaluated using biometric assessments including A1C in addition to other assessments.

This study demonstrated that a culturally adapted diabetes education program can improve health outcomes of people living with diabetes, including reductions in A1C,
without losing the effects of the original intervention. Research has shown that for every percentage point decrease in A1C (e.g. 9 to 8%), there were reductions in diabetes-related deaths and myocardial infarctions (American Diabetes Association, 2002). No prior work measured the impact of culturally adapted programs on A1C in a tribal community or it was not documented in scientific literature. However, there were several study limitations. The study design was flawed, the sampling method of the control group was not ideal and produced an overrepresentation of females, participants should have been matched by age and gender to strengthen the study sample. Another study limitation is that the forms and surveys were administered once; data was not available for comparison due to only one point of data collection, which limited the longitudinal insights on the long-term outcomes associated of DH on the intervention group health outcomes. Outcomes measured in other studies could be considered for future DH interventions (e.g. A1C 1-year post-intervention, weight loss, diabetes knowledge etc.).

This study had several strengths. First, this study adds to the growing evidence base in support of culturally enhanced, tribe-specific diabetes education programs. Not only did we find that culturally enhanced diabetes education improves A1C, but we also noted that the intervention participants rated the tribe-specific cultural components to be acceptable and meaningful. This study documented the development, implementation and evaluation of a culturally enhanced diabetes education tool for a tribal community. Prior to this study, there was no clear pathway for collecting deep-level Indigenous knowledge prior to this study. The methodology used in this study can serve as a model for tribes to create or adapt their own health programs and curricula. The findings from this study provides essential
information needed to replicate this study on a larger scale to test longer term A1C improvements among Diné patients.

Conclusion

Culturally enhanced diabetes education supported reductions in A1C levels equal to the standard programming, but with a slightly greater change in A1C. Future studies should implement tribe-specific cultural adaptations to enhance DSMES. This study demonstrated how diabetes programs can collaborate with local healers and cultural experts to develop and implement meaningful and culturally adapted educational tools, informed by local cultural knowledge as a method to improve health promotion and prevention efforts, enhance the quality of clinical practice and improve patient health outcomes. Diabetes programs are encouraged to consider culturally adaptation of diabetes education to increase cultural relevance and meaningfulness and improve patient health outcomes when working with AIAN communities.
CHAPTER 5: OVERALL CONCLUSION

Summary of Results

The purpose of this community based participatory, mixed methods study guided by Indigenous knowledge frameworks and worldviews was to investigate how a culturally adapted diabetes intervention effects diabetes outcomes among Diné people with type 2 diabetes.

Development of a Culturally Grounded Diabetes Educational Tool. This study demonstrated how diabetes programs can work with local healers and cultural experts to develop and implement culturally adapted educational tools into clinical practice to improve patient health outcomes. Key themes that emerged from the key informant interviews included the importance of discipline, positivity and mindfulness in the context of Hózhó, a Diné wellness philosophy; and were included in the DH curriculum.

Implementation of the Diné Health Supplemental Curriculum. The DH curriculum is a supplemental educational tool intended to be used with an existing diabetes education curriculum and was implemented between May 2019 and May 2020. Diabetes program staff completed a training on the DH prior to implementing the curriculum into the diabetes education classes. Thirty-four participants received the DH intervention, and each attended a 6-hour diabetes education that utilized the DH curriculum.

Evaluation of the DH intervention. Study participants attended a diabetes education class, underwent clinical assessments, completed self-assessments and surveys and attended a follow-up appointment. The aforementioned assessments and surveys were used to evaluate the DH intervention. Thirty-four participants were enrolled in the intervention and 34 participants were retrospectively assigned to the control group. Results showed that the
culturally enhanced diabetes education supported reductions in A1C levels equal to the standard programming, but with a slightly greater change in A1C. Eighty-two percent of intervention participants attended a diabetes education class and follow-up appointment, as did 82% of controls. Both groups showed statistically significant improvement in mean A1C levels. No difference in between group reductions in A1C were shown. There were no differences in satisfaction between intervention and control participants. Satisfaction and acceptability of the DH curriculum was high.

Future Directions and Recommendations

The findings of this dissertation can be used to inform future public health practice, policy and research. In general, the findings of this dissertation provide valuable insight that can be used to strengthen the argument that more innovative and culturally meaningful work can be done to address diabetes in tribal communities.

Practice. This study highlights the need for taking cultural adaptations further than changing surface-level content (Davis et al., 2011; Satterfield, 2014). Tribal health programs have the opportunity to make deep-level adaptations because they have access to the cultural capital and can collaborate with local cultural experts; thus, tribal health programs should consider collaborating with their communities to inform the development of culturally grounded curricula or adaptation of existing curricula. Further, Indigenous frameworks should be activated to help guide curriculum development. Currently, IHS encourages their SDPI grantees to culturally adapt their curricula, however, there are little to no resources regarding how to culturally adapt diabetes education curricula (IHS, 2020). Based on the evidence, there is a need for tribe-specific cultural adaptations in tribal health programming (Davis et al., 2011; Griffin et al., 2010; Satterfield, 2014; Tabak et al., 2015), some key
recommendations to IHS and CDC include: 1) Encourage deep-level and tribe-specific cultural adaptations into health programming; 2) Leverage local resources when gathering Indigenous knowledge; 3) Document and publish cultural adaptations; and 4) Establish a special task group that can provide tribal programs support in culturally adapting their curricula.

Policy. State and federal public health policies should encourage tribal programs to culturally adapt EBIs and best practice models to meet the needs of tribal communities (e.g. inclusion of Indigenous wellness models and cultural teachings in place of existing guidelines that do not match the community’s values). This study demonstrated that a culturally adapted diabetes intervention did not decrease the effect of the evidence-based curriculum. Too often, cultural adaptations are not pursued because of the fidelity-adaptation dilemma based on assumptions and the argument that programs should adhere to the intervention’s procedures as designed for participants to reap the benefits of the intervention (Castro et al., 2010). Structural changes in tribal health care are needed at the national and federal level. Though the World Health Organization (WHO) Traditional Medicine Strategy Report highlights the need for establishing traditional and complementary medicine (T&CM) policies in health agencies (WHO, 2013), federal funding agencies require the use of EBIs in health programming despite the WHO’s recommendations. The WHO’s strategic objectives include: 1) to build the knowledge base for active management of T&CM through appropriate national policies; 2) to strengthen quality assurance, safety, proper use and effectiveness of T&CM by regulating products, practices and practitioners; 3) to promote universal health coverage by integrating T&CM services appropriately into health service delivery and self-health care (WHO, 2013). In addition to these objectives, key
recommendations for AIAN populations include: 1) Each tribe should develop their own policies in regards to how Indigenous knowledge is gathered and used in a health setting; 2) Tribes should control the regulation of products, practices and practitioners; 3) States, federal and national agencies should encourage tribes to utilize Indigenous knowledge in health programming.

Research. There is an opportunity to expand this study to women with gestational diabetes. Currently, 120 women are diagnosed with gestational diabetes every year in one hospital on the Navajo Nation. Further investigation of cultural adaptation for this specific population is important for maternal and child health in Diné communities. Additionally, the DH intervention was tested in one site on the Navajo Nation and future investigations could be conducted in other Navajo IHS settings with several suggested improvements to the study design. Future work should utilize culturally adapted study measures to provide a more thorough examination of self-care behaviors of the participants, including reporting goal achievement based on Indigenous frameworks and Indigenous definitions of health and wellness. Further, studies are limited in the documentation of their cultural adaptations and too often cultural adaptations are underreported and undocumented a recommendation is to expand upon the adaptations in more detail (Davis et al., 2011; DeBruyn et al., 2020). Key recommendations include: 1) Explore the use of more Indigenous frameworks across the entire research process (consent, CAB recruitment, participant recruitment, measurement, analysis, interpretation of results, use of tribal language and phrases in the interpretation of findings); 2) Explore the use of culturally defined wellness concepts, meaningful phrases and utilize these “cultural” concepts and definitions in health promotion work or in clinical practice; 3) Culturally adapt the AIAN health promotion frameworks to meet the needs of
specific tribes; 4) Tribe specific tailoring of Indigenous models needs to occur to meet the unique needs of each tribe and to be meaningful and relevant to each tribe; 5) Modify research timeframes for research conducted with tribal communities because of the unique and elaborate tribal community engagement that often needs to occur to establish trust and rapport between community and researcher team.

As a whole, this work expands the understanding of how programs can successfully adapt their health education curriculums, based on tribe-specific traditional teachings, and not lose program effect on the health outcomes of participants. This study offers a significant contribution to the scientific literature by offering an exemplar and by documenting the pathway to developing culturally adapted diabetes education for use in tribal health promotion programs in AIAN communities.
Date: August 16, 2018
Principal Investigator: Jamie Wilson
Protocol Number: 1808852002
Protocol Title: Exploring Dine (Navajo) Health Messages and Diabetes Education
Determination: Approved
Expiration Date: August 15, 2023

Documents Reviewed Concurrently:
- Data Collection Tools: BYLD Class 3rd Quarter FY18.xlsx
- Data Collection Tools: BYLD Satisfaction Survey.docx
- Data Collection Tools: Dine Health Survey 7.18.18.docx
- Data Collection Tools: HRM Conversation Guide.docx
- Data Collection Tools: PAID_problem_areas_in_diabetes_questionnaire.pdf
- HSPP Forms/Correspondence: JamieWilson_NewAppforHR(Dine-Navajo)_8.14.18.pdf
- HSPP Forms/Correspondence: JW appendix_vul_pop_2-2_y2018.pdf
- HSPP Forms/Correspondence: list_of_research_personnel_JW 8.14.18.pdf
- Informed Consent/PHI Forms: Key Informant Interview Consent Form 8.14.18.jw.doc
- Other Approvals and Authorizations: TCRHCC Resolution Jamie Wilson.pdf

Regulatory Determinations/Comments:
- The project is not federally funded or supported and has been deemed to be no more than minimal risk.
- The project listed is required to update the HSPP on the status of the research in 5 years. A reminder notice will be sent 60 days prior to the expiration noted to submit a ‘Project Update’ form.

This project has been reviewed and approved by an IRB Chair or designee.
- The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #0004218).
- All research procedures should be conducted according to the approved protocol and the policies and guidance of the IRB.
- The Principal Investigator should notify the IRB immediately of any proposed changes that affect the protocol and report any unanticipated problems involving risks to participants or others. Please refer to Guidance Investigators Responsibility after IRB Approval, Reporting Local Information and Minimal Risk or Exempt Research.
- All documents referenced in this submission have been reviewed and approved. Documents are filed with the HSPP Office.
APPENDIX B. DINÉ HEALTH: DISCIPLINE AND ROUTINES WORKSHEET
**Diné Teaching: Discipline**

For the Diné people, self-discipline is needed in every aspect of life from dawn to dusk (Kahn-John, 2010). At dawn, one strict disciplinary teaching is to wake up before the sun rises. The Diné believe the Holy People are around before dawn, therefore one should offer corn pollen and a prayer and then begin their morning run in the east direction. When a person adheres to this teaching every morning, the Holy People will notice and bless the individual with a good life, including good health and wellness. This teaching is essential to living in Hózhó, it is needed to establish physical, mental, and spiritual discipline.

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**Health Message**

"T’áá hwó ájít’éego,” it is up to you to accomplish things in your life, no one is going to do it for you. If you are disciplined, you won’t be lazy. If you think positive, you will believe that you can do it. You must have this type of mindset if you want to live in Hózhó.” – Cultural Advisor

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**Instructions:** Use this teaching to help improve your self-care behaviors. Similar to the teaching above, establish a routine around your self-care behaviors and goals.

---

<table>
<thead>
<tr>
<th>Time</th>
<th>Type of Activity or Meal/Snack</th>
<th>Notes</th>
<th>Self-Care Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 am</td>
<td>Morning Prayer</td>
<td></td>
<td>Healthy Coping</td>
</tr>
<tr>
<td>6:35 am</td>
<td>Check Blood Sugar</td>
<td>Fasting Blood Sugar #:</td>
<td>Monitoring</td>
</tr>
<tr>
<td>6:40 - 7:00 am</td>
<td>Walking or Running</td>
<td></td>
<td>Being Active</td>
</tr>
<tr>
<td>7:00 am</td>
<td>Get Ready</td>
<td>Check my feet</td>
<td>Reducing Risks</td>
</tr>
<tr>
<td>7:30 am</td>
<td>Medication</td>
<td>Take Metformin</td>
<td>Taking Medication</td>
</tr>
<tr>
<td>7:30 am</td>
<td>Breakfast</td>
<td>2 boiled eggs, 1 toast, 1 cup coffee</td>
<td>Healthy Eating</td>
</tr>
<tr>
<td>7:45 am</td>
<td>Pack for Work</td>
<td>Pack tablets in case of emergencies</td>
<td>Problem-Solving</td>
</tr>
</tbody>
</table>
Diné Health Goal Setting Worksheet

Use the Diné Education Philosophy model to help you decide how you will improve your health. If your goal is to improve your A1c or lose weight, think about what changes you could make to achieve your goal.

1. Nitsáhákees Thinking Phase - Write down your goal(s):
   
   Goal #1) ____________________________________________
   
   Goal #2) ____________________________________________
   
2. Nahat’á Planning Phase
   Think about how you will achieve your goal:
   o Decide how much/long you are going to do it?
   o When are you going to do it?
   o How often will you do it?
   
   Goal #1) ____________________________________________
   
   Goal #2) ____________________________________________

Please save steps #3 and #4 until your follow-up appointment.

3. Iniá (Life) – Put your plans into action.
   o Tip: Keep track of your goals in your journal or phone.
   o Record the following information: goal, date, time

   [ ] Goal #1) ____________________________________________
   
   [ ] Goal #2) ____________________________________________

3. Sihasin Reflection Phase – Reflect on your plan during your follow-up appointment.
   o Did you have any challenges or barriers in meeting your goals? If so, how will you change your plan in order to meet your goals?

   ____________________________________________________________
   
   ____________________________________________________________
   
   ____________________________________________________________
APPENDIX D: MANUSCRIPT 1

Development of an American Indian Diabetes Education Cultural Supplement: A Qualitative Approach

Paper will be submitted to the Journal of Transcultural Nursing
Development of an American Indian Diabetes Education Cultural Supplement: A Qualitative Approach

Journal of Transcultural Nursing

Abstract word count: 147
Manuscript word count: 4332
References word count: 1064
Number of references: 33
Abstract (150 word limit): 147

Introduction: Tribe-specific health information and programming are essential to creating a culturally relevant and effective and meaningful approach to disease self-management. The purpose of this study was to culturally enhance a diabetes education program for Diné (Navajo) community members with Type 2 diabetes.

Methodology: Key informant interviews were conducted with Diné healers to identify Diné traditional teachings around diabetes self-management. Interviews were audio-recorded, transcribed and analyzed using a qualitative theme analysis method.

Results: Key themes included the importance of discipline, positivity and mindfulness in the context of Hózhó. Diné healers informed the development of an educational tool called Diné Health.

Discussion: Culturally safe and meaningful engagement with cultural leaders and the use of qualitative research methods can inform deep-level cultural adaptations essential to developing tribe-specific diabetes education programs. The approaches used here can guide the development, implementation, and testing of culturally informed health education for AIAN populations.
Introduction

Although diabetes prevention and control efforts have increased in American Indian and Alaskan Native (AIAN) communities, AIAN people continue to experience disproportionality higher rates of diabetes-related morbidity and mortality (CDC, 2003). Diabetes is the fourth leading cause of death for the Navajo Nation (Navajo Epidemiology Center [NEC], 2016), and is the seventh leading cause of death for the United States in general (US). The age-adjusted diabetes mortality rate for the Diné population is more than double (2.29 times higher) the US population rate (CDC, 2020a). Poor glucose management may lead to diabetes complications and premature death, including vision loss, kidney failure, heart disease, limb amputation, and death (CDC, 2020a; Jack et al., 2004; Powers et al., 2016). Promising approaches to diabetes management include nationally recognized guidance for self-care, medication management, diabetes education, regular check-ups, and ongoing support (American Association of Diabetes Educators [AADE], 2020). The purpose of this study was to culturally adapt a standard diabetes education program originally designed to broadly address DM education needs for AIAN populations collectively. This cultural adapted program is designed specifically for Diné community members diagnosed with type 2 diabetes.

Cultural adaptation has been defined broadly as a modification of an evidence-based intervention by changing the curriculum’s language and context in such a way that it is compatible with the client's cultural patterns, meanings, and values (Bernal et al., 2009). To some, cultural adaptation is achieved by making surface-level adaptation such as changing the visual content or by adding AIAN created artwork (Resnicow et al., 1999). Deep-level cultural adaptation, on the other hand, has deeper levels of meaningfulness and includes
adapting the language, metaphors, content, concepts, goals, methods, and framework to meet the needs of Indigenous communities (Resnicow et al., 1999). To optimize the impact of diabetes education for AIAN populations, deep-level cultural adaptations must be considered (Tabak et al., 2015).

In 1997, in an effort to provide culturally competent health programs, Congress established the Special Diabetes Program for Indians (SDPI) to treat and prevent diabetes in AIAN communities (IHS, 2014). Currently 404 Indian Health Service (IHS), tribal and urban Indian health programs across the US receive SDPI funding (IHS, 2014). SDPI grantees recognize that culture and health are intertwined and inseparable concepts. They propose culturally adapted interventions are more acceptable, better understood, and more effective (IHS, 2011). For example, SDPI interventions that include AIAN language, traditional food demonstrations, and cultural activities (IHS, 2011) have demonstrated reduction in diabetes complications such as amputations and kidney failure (CDC, 2020b; IHS, 2014).

Despite well intentioned efforts to culturally adapt and tailor health education curricula, diabetes programs have inadvertently created a “one size fits all” adaptation approach to health education programs (Davis et al., 2011) that is commonly used to prevent and manage diabetes among AIAN communities (Geana et al., 2012). Emergent research, however, suggests that AIAN community members prefer tailored and culturally adapted diabetes education programs that reflect their own cultures. The Native American Diabetes Project (NADP) conducted a participant satisfaction questionnaire regarding cultural competency with eight tribal communities (Griffin et al., 1999). Results revealed that community input in co-developing the diabetes education sessions was an important factor
in participant satisfaction and retention in the diabetes education series (Griffin et al., 1999). Griffin et al. highlighted that storytelling, a traditional communication strategy, was recommended by participants as a way to communicate information and provide diabetes education (Griffin et al., 1999). Moreover, participants suggested that more culturally specific components, such as traditional foods, teachings and games could enhance participant satisfaction with educational sessions (Griffin et al., 1999). Roubideaux found that 95% of participants preferred diabetes education materials relevant to their specific tribe or culture (Roubideaux et al., 2000).

Several studies have shown a high prevalence of diabetes among the Diné to be high at 16.5% (Sugarman et al., 1992) and 22.9% for adults (Will et al., 1997) and an incidence rate of 2.78 per 1,000 for youth (Dabelea et al., 2009). Studies implicate the need for effective culturally relevant education for the Diné (Cunningham-Sabo et al., 2008; DeBruyn et al., 2020) however, none of the prior diabetes prevention projects included tailored, deep-level, tribe-specific health information or cultural enhancement of diabetes education that were designed specifically for Diné communities. Efforts to apply surface-level cultural adaptations to the standard AIAN diabetes education curriculum may further perpetuate high program drop-out and may have limited effectiveness in promoting optimal diabetes self-management or glucose control in Diné communities. The purpose of this research was to use a community-based participatory research (CBPR) approach to engage Diné cultural experts and healers, to gain insights about cultural world views and Indigenous knowledge for the purpose of adapting an evidence-based diabetes management intervention for Diné adults diagnosed with Type 2 diabetes.

Methods
Research Design

This study used a CBPR approach (Israel et al., 1998) to engage qualitative research methods and guide the collaborative production of a cultural tool, herein called Diné Health (DH), to be used in diabetes education classes in a Diné community. The lead author, a Diné researcher, met with members of the Diabetes Program a year prior to seeking approval from University and Tribal institutional review boards before engaging in the study. The director of the program helped obtained letters of support for the study from relevant tribal leaders and organization and also co-presented at meetings such as the Navajo Nation Human Research Review Board (NNHRRB) meeting to inform key tribal stakeholders about the study aims and objectives. The lead author applied Indigenous health research practices and Diné values of k’é (i.e., personal conduct, traditional etiquette to establish kinship) to establish respect and build positive relationships with Diné leaders and community members (Chief et al., 2016; Wilson et al., 2019). The NNHRRB and the University of Arizona Institutional Review Board approved this study in August 2018. The data and findings from this study belong to the Navajo Nation.

Community Engagement

The lead author collaborated with community partners to protect and properly apply only approved aspects of sacred Indigenous knowledge of the Diné (Table 1). When working with AIAN communities, it’s important to recognize the aspects of protected and private cultural and traditional knowledge. Seeking consultation from cultural experts provides the opportunity to ensure that the research approach is ethical, culturally sensitive and does not disrespectful, exploit or misinterpret cultural or traditional worldviews. It’s also important to maintain the privacy of the more sacred traditional and cultural knowledge such
as traditional stories or ceremonial knowledge which may be restricted to be known only by traditional healers. Some AIAN communities prohibit the recording of traditional knowledge so, it’s important to seek the advice of cultural experts to safeguard the interpretation of research findings and to ensure the research approach is acceptable and respectful.

Establishing good rapport, including reciprocal learning between researcher and partner, with the diabetes program before the study began was an important first step in this study and in line with CBPR approach (Israel et al., 1998; Wallerstein & Duran, 2010). The purpose of the initial meeting (held in January of 2018) with the Diabetes Program director was to determine whether the program would like to collaborate in a research study. The program expressed a concern that there was minimal Diné culture in their existing diabetes education classes and only one AIAN health educator who offered classes in the Diné language one time per month. At the time of this study implementation, the diabetes program was in the process of curriculum development. Therefore, the curriculum adaptation proposed in this study presented an opportunity to contribute to the development of a meaningful and sustainable product for the diabetes program.

The lead author purposefully sought guidance and consultation from a Community Advisory Board (CAB) established to support the current programming efforts. The CAB members included community and organizational representatives selected by the community for their professional, cultural and local knowledge. Inclusion criteria for the CAB were: must be an (18 years of age or older), must be a member of the Diné Nation, must possess expertise in Diné culture or Diné health, and Diné ceremony/healing. The CAB served to ensure that the research study respected the Diné people and culture. Lastly, a working group was established to lend expertise and experience in curriculum development. The
working group consisted of three diabetes educators from the program and the lead author and met 5 times over 6 months.

Theoretical Framework

This study utilized the Hózhó Resilience Model (HRM) as a framework to guide this study. The HRM is based on the Diné Philosophy of Hózhó – the ultimate state of health and wellness (Kahn-John Dine & Koithan, 2015). Hózhó provides specific rules for a Diné person’s behavior and emphasizes order, balance, and harmony in everyday life (Kahn-John, 2016). The importance of order is reflected in a constant mindfulness and reverence with every thought, every word, and every step made in the journey of life (Kahn-John, 2010). The concepts of balance and harmony are parallel to the notion of holistic health which emphasizes that there is a connection between the mind, body and spirit of an individual (Chief et al., 2016; Kahn-John et al., 2020; Wilson et al., 2019). For the Diné, there is an additional relationship with living elements i.e., water, air, earth and the cosmos (Kahn-John, 2010). This relationship with the elements is driven by respect, specifically respect for plants, animals, and water. For this study, we utilized the HRM domains and attributes (Table 1) to identify key cultural concepts of the Diné health protective traditional teachings that can influence the self-care behaviors of our DH participants.

Balance Your Life with Diabetes Curriculum

The Balance Your Life with Diabetes (BYLD) curriculum focuses on Type 2 diabetes and self-care and is the standard curriculum used in diabetes programs across Indian Country, including the program in this study (IHS, 2014). The BYLD curriculum was culturally adapted by the IHS Division of Diabetes Treatment and Prevention program. The IHS encourages programs to adapt their program’s BYLD curriculum to reflect their...
participants culture, e.g., traditional food recipes, language, activities and traditional teachings (IHS, 2011). In some cases, however, program staff may not be familiar with the community’s culture and therefore have difficulty offering tribe-specific adaptations to the BYLD. To close this gap in knowledge, the study investigators partnered with a diabetes program with a goal to adapt their BYLD curriculum by adding Diné-specific, meaningful and relevant cultural teachings to the BYLD lessons: healthy eating, being active, and healthy coping (Table 3).

**Cultural Expert Participation Selection and Interviews**

Through a purposive sampling strategy, the lead author worked with leadership of a Diné healer association to identify well-respected healers and cultural experts who hold firsthand knowledge about the Diné traditional teachings and culture. The interview participants included five (n=5) tribal members that spoke Diné and English, were distinguished healers within their respective communities and each resided on the Navajo Nation. The interviews were 60 to 90 minutes long and were conducted in a location most convenient to the healer, either at a central location or the healer’s home. Data from the interviews informed the development of a tailored, tribe-specific educational tool for diabetes education – herein called Diné Health (DH). Each participant was provided a copy of the DH at the completion of the study. All participants provided informed consent and received an incentive to cover direct and indirect costs associated with participation in the study.

**Interviews**

Five in-depth interviews were conducted to elicit cultural health messages from the aforementioned Diné cultural experts. With consultation from a Diné researcher, the lead
author developed a structured conversation guide (eight questions) to gather culturally
grounded health messages regarding Hózhó. The questions asked about three diabetes self-
management and education (DSME) self-care behaviors: 1) healthy eating, 2) physical
activity and 3) healthy coping (AADE, 2020). Four questions focused on traditional food
ways, self-discipline and mindfulness, e.g., “Based on Hózhó, what stories and teachings do
you know about traditional food ways?” Two questions asked about physical activity and
self-discipline, e.g., “Based on Hózhó, what stories and teachings do you know about being
disciplined in physical activity?” The last two questions were asked about the importance of
positive thinking and health, e.g., “Based on Hózhó, what stories and teachings do you know
about thinking positively? As Diné, how do we show our respect to food and our health?”
The CAB and diabetes working group reviewed the questions. The interviewer - a trained
community researcher - is Diné who speaks, writes and understands the Diné language. Data
from the interviews were audio recorded, transcribed verbatim and analyzed using a
qualitative theme analysis method.
Analysis

The lead author translated and transcribed audio recordings from Diné to English. To
ensure accuracy and context, a consultant, who is Diné and holds cultural and linguistic
knowledge, reviewed each of the transcripts. Although time-intensive, this process ensured
complete and accurate transcripts. The lead author conducted deductive thematic analysis
(Nowell et al., 2017), driven by the researcher’s theoretical interest in the context of the
HRM and DSME. The aforementioned HRM domains served as the theme categories:
harmony, respect and spirituality. The lead author read all transcripts independently while
highlighting repetitive words and phrases which were coded as patterns. As a secondary step
to review cultural alignment and interpretation and application of the HRM attributes in the DH, the lead study author also reviewed themes with the HRM developer. A thematic matrix was developed in Excel to organize and compare the themes and patterns from each transcript. This process helped the lead author identify common emergent themes and patterns. Once saturation -no new data - was reached, the lead author entered quotes into the Excel matrix. The themes identified in this by responses provided by the Diné cultural experts and healers were used to inform and guide the development of the DH (see Table 4).

Results

Four Diné male healers and 1 female cultural expert were interviewed for a total of 5 cultural expert and/or healer participants (n=5). Four participants were Diné healers knowledgeable about cultural teachings. One participant did not identify as a healer but was affiliated with the healer association as a cultural expert. Key themes from the data included the importance of the concepts and behaviors of discipline, positivity, and mindfulness - each attribute of Hózhó as outlined in the HRM, which were identified to be important aspects of wellness behaviors. When asked about health, participants discussed traditional Diné teachings and cultural activities that promote holistic health.

Participants also spoke about the importance and fundamental teachings of living in Hózhó, the ultimate state of health and wellness for the Diné. One healer explained, “As Diné we have a purpose for everything we do, so…we should think about what we put in our bodies and how we treat our bodies. How we think about things is important when we talk about Hózhó.”

Another healer said,
Hózhó means more than harmony, it is our whole life. We, the Diné, know what it means to live life in a good way. We’ve been instructed by our Holy People how to accomplish this…it requires a lot of hard work and discipline. It means to be healthy, happy, humble and be in harmony or balance with everything we encounter.

Three reoccurring culturally informed health promotion and self-management themes arose from the transcripts and were used to guide the development of DH:

Theme 1: T’óó bikiinígo (translation – eating just enough). Some messages were central to healthy eating, e.g., being mindful of portion sizes is important to prevent overindulgence and wastefulness. Overindulgence is not the traditional way of eating for the Diné. One healer said,

*T’óó bikiinígo* (translation – I eat just enough to get by, not too much). We eat food when we are hungry, not when we are craving something. We shouldn’t eat too much, we should eat just enough to sustain our bodies.

Wasting traditional food is disrespectful to the Diné people, it shows poor values. A healer explained,

Ceremonial food should not be wasted, doing so is considered disrespectful to the plants, the Earth and to our mother, Changing Woman, [a holy deity]. She [Changing Woman] put food here [on Earth] for us, her children. She left us teachings to live life in a respectful way, not to do things without having a purpose.

Further, participants discussed key practices around food preparation were discussed (e.g., praying and having good thoughts while cooking). “Eating food that has been made by the fire in a hogan is the best medicine, because homemade chiyaan (food) is made with prayer and good thoughts…so when you eat it, you should feel better,” said a Diné healer.
Theme 2: T’aa hwo ajiteego. (Translation – It is up to you to accomplish things in your life, no one is going to do it for you). For the Diné people, self-discipline is needed in every aspect of life from dawn to dusk (Kahn-John, 2010). One strict disciplinary teaching is to offer a morning prayer and run in the east direction. The Diné believe that when a person adheres to this teaching, the individual will be blessed with a good life, including good health and wellness. A Diné healer said,

If you are disciplined, you won’t be lazy. This is t’aa hwo ajiteego. If you put your mind to something, you have to do it, it is up to you. We must have this type of mindset to have good things in life. This is the teaching of Hózhó.

All participants emphasized that this teaching is essential to living in Hózhó; self-discipline is needed to establish good physical, mental, and spiritual health.

Theme 3: Role of mindfulness is fundamental to health and wellbeing in the Diné culture.

The Diné are told to have strong respect of the self through discipline and mindfulness (Kahn-John, 2010). For the Diné, mindfulness means that all actions must have a purpose. They believe that the Holy People are watching over them, therefore they must carry themselves in a mindful, positive and respectful manner. Negative thoughts and behaviors are strongly discouraged. Doing so brings disharmony and imbalance. A healer explained,

Ada akooznizin’go njigha (translation - be mindful, have self-awareness and respect). Our people [the Diné] believe that a disciplined and positive mind keeps individuals from inviting Té’i’i (translation - poverty) into their lives. It [positive thinking] shields us from the negative things in life, it is our protection. Having this kind of mindset is Hózhó, so I encourage people to keep striving and you will get there.
Healers also explained the Diné belief in the holistic connection of the mind, body, spirit to Mother Earth and all living things i.e. plants, animals, the elements.

Program Adaptation

The DH working group met four times to review the findings from the study (Table 3) and helped select key health messages to be included in the diabetes education class. The lead author developed four DH worksheets based on the group’s selections. The DH worksheets were used as in-class handouts to supplement the BYLD PowerPoint, with the goal of adding more discussion around Diné culture and resilience to the BYLD. The CAB approved all DH materials with minor edits, e.g., Diné spelling and grammar.

The lead author provided a one-day training on the DH supplemental curriculum for the Diabetes Program staff. This training took place one month prior to the implementation of the DH. The lead author attended the first few classes to observe and take notes on the implementation of the DH. The lead author used an observational checklist to identify the limits of the DH. Based on the lead author’s notes and feedback from the health educators, several gaps to the DH were identified, such as the difficulty of reading the content written in the Diné language and the need for more cultural context behind the health messages. The lead author audio recorded all words, phrases and health messages written in the Diné language. The audio clips were embedded into the PowerPoint presentations. Sample Diné phrases that were audio recorded include: 1) T’óó bikiinígo, meaning to eat just enough to live and not to overindulge in food consumption and 2) T’aa hwo ajiteego, meaning a person must rely on their own will and determination to achieve their goals. The DH was developed with the goal of utilizing culturally grounded teachings to teach patients with diabetes about
diabetes self-care and management, thus enhancing the cultural relevancy of the current programming.

Discussion

A key strategy to increasing diabetes education attendance and retention rates for AIANs is to implement culturally grounded, tribe-specific curriculums into community-based health programs (IHS, 2014). The main findings of this study include (1) CBPR approaches are feasible to inform development and adaptation of health programs in AIAN communities and (2) Indigenous health research practices and qualitative methods can be applied to strengthen existing curriculum, as in this case, in the form of the DH supplemental curriculum.

Researchers used CBPR to ensure that the results of the study can be used for action and sustained by the community (Israel et al., 1998; Wallerstein & Duran, 2010). In this study, several steps were essential to ensure that the Diabetes Program could implement and sustain the DH. First, the lead author established a relationship with the program before writing the study proposal. Establishing a reciprocal relationship with the community early in research is important in CBPR, especially in tribal communities. The diabetes program staff took initiative in all phases of the study by writing letters of support, attending leadership meetings, helping obtain IRB approvals from the university and tribe and co-developing the curriculum. Second, the lead author applied Indigenous health research practices and Diné values of k’é (i.e., personal conduct and kinship) to establish respect and build positive relationships with Diné leaders and community members (Chief et al., 2016; Wilson et al., 2019). Second, in addition to the program’s contribution in the curriculum development, other key stakeholders, such as cultural experts and healers were actively
involved. The integration of the Diné healers’ and cultural expert’s Indigenous knowledge certified and validated the cultural rigor that was used to inform the adapted DH content. This process used in the development of the DH supplement curriculum exemplifies consideration and respect for the integration and inclusion of Indigenous knowledge for the purpose of gathering information in a culturally appropriate and meaningful way (Tribal Evaluation Institute [TEI], 2018).

Utilizing a qualitative approach to develop and inform a cultural curriculum is important for identifying health-protective and strength-based wisdom in AIAN communities. A qualitative voice enriches the curriculum and adds depth, richness, and meaning to the educational content. The Native American Diabetes Project (NADP) also used a qualitative approach to design culturally relevant education materials. In the NAPD, the community was an integral part of the project; they participated in the interviews, focus groups and community advisory board (Carter et al., 1997). A unique feature of our study was the rich cultural context and experience tribal scholars brought to the table. The Diné cultural experts’ and lead author’s cultural knowledge were imperative to understanding the depth and strength of the health messages. The qualitative approaches used in this study can guide the development and implementation of culturally-based, tribe-specific health education model tailored for AIAN populations, which can then be implemented for the Diné individuals diagnosed and living with diabetes. Outcomes of culturally informed and adapted health promotion programs should be studied further for outcomes and effectiveness within each tribal community that receives an adapted curriculum.

The study has a few limitations. First, there were only a handful of key informant interviews conducted due to time constraints and competing commitments such as work,
expectations of both professional careers, and/or commitments to patient appointments for healing ceremonies. Despite the recruitment of five participants (n=5), however, data saturation was achieved. Second, only one female participated in the key informant interviews. The Diné people are a matrilineal culture, therefore more insight from female healers could add to the curriculum, especially in regard to traditional food ways and healthy eating. Third, the community partners were not initially involved in the analysis of data, due to the training required to analyze qualitative data. In the hopes of mediating this limitation, the CAB and DH (many with expert cultural knowledge) working groups played vital roles in identifying culturally appropriate health messages for the curriculum.

A significant strength in this project was how the collective wealth and richness of authentic cultural knowledge shared by healers, CAB members and the diabetes program team members contributed to the study. Their willingness to share, learn and collaborate with the lead author on this study required additional work and time, but their dedication to properly honoring Indigenous health research was integral to developing a culturally grounded curriculum. This study could be used to guide the development and implementation of other culturally-based and tribe-specific health interventions for AIAN populations. Most important, the robustly tailored program will need to be tested to determine the impact on program enrollment, engagement, recidivism, and clinically relevant health outcomes such as diabetes self-management and glucose control. Lastly, the DH is not meant to serve as an independent diabetes curriculum, it is a supplemental curriculum that should be used in conjunction with a standard diabetes education curriculum specifically for the Diné people. The CAB members felt strongly about keeping and integrating the DH supplement in the existing DM program because it added authenticity
and meaningfulness that countered the existing predominantly western based or mainstream diabetes education program.

Conclusion

Culturally safe and meaningful engagement with cultural leaders, along with the use of qualitative research methods can inform deep-level cultural adaptations essential to developing robust diabetes education programs at the individual tribe level. Such work can illuminate cultural relevance and may be important in identifying culturally related factors that influence engagement and completion as well as health outcomes for participants in AIAN diabetes education programs. We recommend qualitative CBPR approaches and Indigenous research practices used here to guide the development and implementation of culturally tailored tribe-specific educational model that has been informed by the Diné cultural teachings.
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Table 1. Community Partnerships and Roles in the DH Study

<table>
<thead>
<tr>
<th>Members</th>
<th>Contacted/Participating</th>
<th>Role(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Program</td>
<td>1/1</td>
<td>• Program director helped gain approval for study</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Review DH drafts and materials monthly or as needed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Received training on DH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implement DH into diabetes education classes</td>
</tr>
<tr>
<td>Community Advisory Board</td>
<td>6/3</td>
<td>• Attend CAB meetings and/or provide feedback via email</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reviewed transcript excerpts from key informant interviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Approved cultural teachings and messages to be included in the DH</td>
</tr>
<tr>
<td>Diné Health Working Group</td>
<td>4/3</td>
<td>• Reviewed transcript excerpts from key informant interviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Selected approved cultural messages to be included in DH classes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reviewed DH drafts</td>
</tr>
</tbody>
</table>

Table 2. Hózhó Resilience Model Domains and Attributes

<table>
<thead>
<tr>
<th>Domains</th>
<th>Attribute</th>
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</thead>
<tbody>
<tr>
<td>Harmony (External factors)</td>
<td>Thinking – Remain positive in thought by practicing mindfulness</td>
</tr>
<tr>
<td>Respect (Internal factors)</td>
<td>Discipline – Remain respectful in all actions by having self-discipline</td>
</tr>
<tr>
<td>Spirituality (Existential factors)</td>
<td>Spirituality – Remain positive and harmonious through prayer</td>
</tr>
</tbody>
</table>
Table 3. *Diné Health Supplemental Curriculum Content*

<table>
<thead>
<tr>
<th>BYLD Curriculum</th>
<th>DH Supplemental Curriculum</th>
<th>Cultural enhancements based on Diné Traditional Teachings</th>
</tr>
</thead>
</table>
| Healthy Eating   | Traditional Food Practices | • Message: T’óó bikiinígo (translation - eating for sustenance and nourishment) Portion Control, Self-Discipline and Mindfulness  
• Audio Recording: Having good thoughts (mindfulness) while cooking  
• Worksheet(s): DH Mindfulness, DH Homemade Food and Meal Preparation |
| Being Active     | Establishing Discipline    | • Health Message: Diné teachings on self-discipline and livelihood  
• Audio Recording: T’aa hwo ajiteego (translation - being self-reliant and proactive) in your health  
• Worksheet(s): DH Discipline, DH Daily Routines |
| Healthy Coping   | Thinking and Mindfulness   | • Health Message: Positive thinking and Mindfulness  
• Audio Recording: Holistic Health and Saah Nagha Bikehozo’ohn (Living a long healthy life)  
• Worksheet(s): DH Goal Setting |

Table 4. *Themes from Key Informant Interviews*

<table>
<thead>
<tr>
<th>HRM Domains</th>
<th>Themes</th>
<th>Patterns</th>
</tr>
</thead>
</table>
| Harmony     | Relationship with food, family and culture | • Traditional food connects the Diné to Mother Earth  
• T’óó bikiinígo (eating for sustenance and nourishment)  
• Diné custom to cook for all relatives  
• Having good thoughts while cooking ceremonial food |
| Respect     | Discipline and Health | • Engaging in physical activity shows self-discipline and strength  
• T’aa hwo ajiteego (being self-reliant and proactive)  
• Laziness is considered taboo in the Diné culture |
| Spirituality | Thinking and Mindfulness | • Thoughts can affect one’s health  
• Belief in a holistic connection of Diné people’s mind, body, spirit to Mother Earth and all living things  
• Mindfulness is needed in all aspects of life |
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