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Historical Trauma, Food Insecurity and Glycemic Control

Efficacy of Historical Loss and Associated Symptoms Scale in
Measuring Level of Historical Trauma in a NA Population

by

Sunny Stone

A thesis

Submitted in partial fulfillment

of the requirements for the degree of

Master of Public Health in

the Department of Community and Public Health

Idaho State University

December 2015

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Historical Trauma, Food Insecurity and Glycemic Control

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of Sunny N. Stone find it satisfactory and recommend that it be accepted.

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October 23, 2014

Sunny Stone
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RE: Your application dated 10/21/2014 regarding study number 4154: Historical Trauma, Food Insecurity and Glycemic Control Among Type 2 Diabetic Shoshone-Bannock Tribal Members

Dear Ms. Stone:

Thank you for your response to requests from a prior review of your application for the new study listed above. Your response is eligible for expedited review under FDA and DHHS (OHRP) designation.

This is to confirm that your application is now fully approved. The protocol is approved through 10/23/2015.

You are granted permission to conduct your study as most recently described effective immediately. The study is subject to continuing review on or before 10/23/2015, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179; fax 208-282-4723; email: humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

Historical Trauma, Food Insecurity and Glycemic Control



Portland Area Institutional Review Board (PAIRB)



DATE: March 17, 2015

TO: Sunny Stone, BS, MPH(c)
FROM: Portland Area Indian Health Service IRB

PROJECT TITLE: [657395-2] Historical Trauma, Food Insecurity and Glycemic Control Among Type 2 Diabetic Shoshone-Bannock Tribal Members

REFERENCE #:

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED

APPROVAL DATE: March 13, 2015

EXPIRATION DATE: March 15, 2016

REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 2

Thank you for your submission of Amendment/Modification materials for this project. The Portland Area Indian Health Service IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this committee. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this committee.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of March 15, 2016.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

Historical Trauma, Food Insecurity and Glycemic Control

All approved research must comply with the NPAIHB and PAIHS policy of prior approval of research by the appropriate tribal government(s) or community board(s).

All publications from this project must comply with the NPAIHB and PAIHS policy on preparation of the manuscript or report about the research and its results, including review and approval by the appropriate tribal government(s) or community board(s) and this IRB.

We appreciate your interest in providing the benefits of health research to Northwest American Indian and Alaska Native individuals and communities and look forward to the results of this project. If there are any questions regarding this letter or your submission, please do not hesitate to contact the PAIRB Coordinator, Ms. Clarice Charging, at 503-416-3256 or by email at PAIRB@ihs.gov. The IRB Co-Chairs can be contacted directly at 503-416-3298 (Dr. Weiser, Co-Chair) or 503-414-7778 (Rena Gill, Co-Chair) or by email at PAIRB@ihs.gov.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Portland Area Indian Health Service IRB's records.

Acknowledgement Page

Thank you to my family for continued support through this adventure. The Fort Hall Business Council and Shoshone-Bannock people have my gratitude for making this study possible. I dedicate this work to those who persist.

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Abstract

EFFICACY OF HISTORICAL LOSS AND ASSOCIATED SYMPTOMS SCALE
IN MEASURING LEVEL OF HISTORICAL TRAUMA
IN A NA POPULATION

Thesis Abstract—Idaho State University (2015)

Type 2 diabetes is disproportionally prevalent in NA communities. The Historical Loss and Associated Symptoms Scale (HL&AS) was utilized to measure level of historical trauma among diabetic members of the Shoshone-Bannock Tribes in Fort Hall, Idaho. Results of the scale were used to determine if there was a significant association between the interaction of 3 variables: historical trauma, food insecurity, and glycemic control. There were no significant associations found between historical trauma, food insecurity and glycemic control. Overall historical trauma measure increasing probability of food insecurity was not significant, though significant findings were found when isolating individual questions and subscale from overall HL&AS. Results from this study suggest need for alternative tools to assess historical trauma among NA populations and effects on health disparities. The Adverse Childhood Experience scale, focusing events in childhood may be more effective in identifying presence of historical trauma outcomes in NA populations.

Chapter 1

Introduction

One of the four overarching goals of Healthy People 2020 is to “achieve health equity, eliminate disparities, and improve the health of all groups” (Department of Health and Human Services, 2012). Health equity and disparities are important to address in the prevention of type 2 diabetes (T2D) in the NA (NA) population. Prevalence for T2D among patients seen at the Not-too Gah-nee Indian Health Center in Fort Hall, Idaho is 2 times higher than the total United States (US) population and 1.5 times higher than Idaho population (Center for Disease Control and Prevention, 2010; Shoshone-Bannock Tribes, 2014). Mortality for T2D is 2.79 times higher among NAs in Idaho, than for non-Hispanic whites (Northwest Portland Area Indian Health Board, 2014).

The Department of Health and Human Services (HHS) lists several determinants of health, such as, genetic, social, individual, policy, and healthcare access, which are relevant in reducing disproportional risk of disease. Social determinants can affect health status of both individuals and groups (Department of Health and Human Services, 2012). Social determinants, such as, discrimination, socioeconomic status and food security have an effect on an individual’s ability to physically, emotionally and mentally thrive, which can negatively impact health (Department of Health and Human Services, 2012). Individual determinants, such as behavior, can also affect health leading to negative and positive outcomes (Department of Health and Human Services, 2012).

T2D is a negative health outcome linked to multiple determinants of health in racial/ethnic minorities (Center for Disease Control and Prevention, 2011). Overall US prevalence of diabetes for NAs is 16.1% (Center for Disease Control and Prevention, 2011)

compared to the population in Fort Hall of 12.2% (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014). Due to the high prevalence of diabetes NAs have become the focus of recent studies, which question whether the risk is genetic or social in nature (Hales & Barker, 2001; Duran & Duran, 1995; Sotero, 2006; Waadhwa, Buss, Entringer, & Swanson, 2009). Diet and exercise, which are individual behaviors, increase risk for developing T2D (Center for Disease Control and Prevention, 2010). However individual behaviors are affected by policy and access to resources, which have been identified as important factors in the prevention of T2D in the NA population (Department of Health and Human Services, 2012).

Multiple theories have been developed to explain the increased risk for diabetes among NAs. Some theories, such as the thrifty genotype hypothesis, postulate a genetic predisposition to diabetes (Neel, 1962; Hales & Barker, 2001). More recent research and theoretical constructs, such as thrifty phenotype hypothesis and the Developmental Origins of Health and Disease (DOHaD), focus on the environmental factors affecting developmental processes which in turn lead to long-term disease (Neel, 1962; Hales & Barker, 2001; Waadhwa, Buss, Entringer, & Swanson, 2009). The DOHaD hypothesis proposes environmental factors acting in early periods of development affect the way organisms cope with environmental influences later in life. There is evidence suggesting fetal malnutrition affects stress-mediating systems predisposing individuals to an increased risk of cardio metabolic disease later in life (Waadhwa, Buss, Entringer, & Swanson, 2009).

Malnutrition due to limited access to healthy foods (e.g. food insecurity) has been an inherent problem within the NA community. Reservation confinement, restricting access to traditional foods, particularly proteins, followed by assimilation into Anglo American culture created a period of starvation affecting generations of NAs followed by a mismatch in nutritional

availability after assimilation (Poupart, 2003; Brave Heart & DeBruyn, 1998; Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012; Churchill, 2004; Laraia, Siega-Riz, & Gundersen, 2010; Ma, et al., 2008; Mulligan, Hunley, Cole, & Long, 2004; Sahota, Knowler, & Looker, 2008; Smoaks, 2004; Thorton, 1987). Research has also shown glucose impairment during pregnancy, which is more common in NAs, can increase the risk for future glucose intolerance in both the mother and offspring (Casey, Szeto, Lensing, Bogle, & Weber, 2001). Past historical events such as stress, food insecurity, and forced assimilation (factors leading to historical trauma) endured by NAs likely have played a role in the increased risk of T2D.

History and cultural assimilation have drastically changed the present lifestyle, belief constructs, and health of NAs (Churchill, 2004). NA tribes have been victim to US government-sponsored programs of genocide, alienation, religious intolerance, forced removal from traditional homelands, and assimilation into American culture as a result of Westward expansion and Manifest Destiny (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004; Thorton, 1987; Churchill, 2004). Since first contact between NAs and Europeans, there have been many atrocities committed against the NAs (Poupart, 2003). The first documented genocide began with Christopher Columbus in 1492 (Tinker & Freeland, 2008). An estimated 8 million Taino people inhabited Espanola upon contact with Europeans, but by 1540 the indigenous population was eradicated (Tinker & Freeland, 2008). During the French and Indian War there was documentation of providing handkerchiefs and blankets to Native leaders as an act of biological warfare in 1763 (Gill, 2004).

The American Indian War is considered an ongoing campaign against NAs defending their rights to indigenous homelands (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). The wars began during colonization around 1622 and continued into the early 1900's (Boyer,

Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). During this campaign there was systematic, government-directed termination of native peoples (Poupart, 2003). Those who persisted were then relocated to reservations and later urban areas (Poupart, 2003). Assimilation into Anglo culture was the final goal in homogenizing the population (Poupart, 2003; Churchill, 2004). It began with boarding school during primary education in the late 1800 and continues today (Churchill, 2004). After graduation students were sent to trade skill colleges in urban areas as part of the Indian Relocation program (Churchill, 2004). Those who returned home to the reservations following their educational experience often had little knowledge of traditional language and culture (Churchill, 2004).

Historical loss is a term used to describe the process of forced assimilation of racial or ethnic groups (Brave Heart & DeBruyn, 1998; Duran & Duran, 1995; Gone, 2009; Klienman, 1988; Poupart, 2003; Sotero, 2006; Whitbeck, Adams, Hoyt, & Chen, 2004). Assimilation was attempted through education where NAs were removed from families and taken to boarding schools where students' long hair was cut students were renamed with Anglo names and prevented from practicing their culture or speaking their language by threat of severe punishment (Churchill, 2004). Historical trauma is the lasting result of this loss and is a term used to describe the process of post-traumatic stress disorder passed down from generation to generation, through parenting and societal processes (Bullock, 2005). Internalized oppression is the destruction of the social network of individuals or communities creating a loss of unity, cohesion and compassion (Poupart, 2003). If these terms were described as a disease process, historical loss would be likened to a pathogen, causing historical trauma, and internalized oppression is equivalent to the symptomatic response.

Historical trauma continues as a result of structural violence and social injustice (Duran & Duran, 1995; Brave Heart & DeBruyn, 1998; Poupart, 2003; Roubideaux, et al., 2004; Sotero, 2006; Waadhwa, Buss, Entringer, & Swanson, 2009; Whitbeck, Adams, Hoyt, & Chen, 2004). Today many tribal lands and funds continue to be managed by the Bureau of Indian Affairs under the US Department of the Interior, rather than by the sovereign NA nations or individuals. As a result, the US Supreme Court determined in the case *Cobell v. Salazar* the US government has long mismanaged these funds and lands (Civil Division, US Department of Justice, 1996).

Structural violence is a systematic constraint preventing individuals from gaining access to their full potential often including the inability to make choices to change status or potential (Farmer, Nizeye, Stulac, & Keshavjee, 2006). The perception NAs cannot manage their own land, money, and trusts are some examples of the experience of structural violence in modern society. Social injustice can be seen in the underfunded Indian Health Service (IHS) programs, educational attainment, and potential earnings of NAs compared to the US population. IHS provides medical care for tribal members of a federally recognized tribe and is a treaty obligation. For many NAs, IHS is the only source of medical care. The Affordable Care Act provides exemptions for NAs due to coverage through IHS.

Food insecurity has been associated with an increased risk of obesity, gestational diabetes, T2D, and higher Hemoglobin A1C, a measure of glycemic control in diabetic patients (Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012; Seligman, Bindman, Vittinghoff, Kanaya, & Kushel, 2007; Laraia, Siega-Riz, & Gundersen, 2010; Marjerrison, Cummings, Glanville, Kirk, & Ledwell, 2011). In addition to being associated with various diseases correlated with malnutrition, food insecurity is also utilized as a measure of structural violence in a population (Kent, 2009). Structural violence is closely tied to food insecurity, because those

who are prevented from gaining their full socioeconomic potential are more likely to suffer from food insecurity (Kent, 2009). Poverty rates among NAs according to the 2010 Census are twice as high compared to the general US population (US Census Bureau, 2011).

Statement of the Problem

At the Not-tsoo Gah-nee (Shoshoni phrase meaning is medicine house) IHS clinic in Fort Hall, Idaho the prevalence of T2D is 12.2%; this is nearly two times higher than the prevalence of T2D in the general US population (6.9%) and one and a half times higher than the prevalence of the disease among all race/ethnicities in Idaho (8%), (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014; Center for Disease Control and Prevention, 2010). Cultural assimilation has led to continued historical loss, historical trauma, and internalized oppression contributing to a disproportionately increased risk for morbidity and mortality in NA populations (Brave Heart & DeBruyn, 1998; Poupart, 2003; Churchill, 2004). According to the Indian Health Service, NAs live on average 4 fewer years than the general US population and have six and a half times higher death rate than the total population for alcoholism (552% higher), nearly three times the death rate for T2D (182% higher), nearly two and a half times the death rate for unintentional injuries (138% higher), nearly double the rate for homicide (83% higher), and suicide (74% higher) (Indian Health Service, 2013).

Historical trauma and historical loss are types of structural violence, which can lead to food insecurity in the subjugated population due to the mental, physical and emotional scarring (Brave Heart & DeBruyn, 1998). Food insecurity is also a measure of structural violence (Brave Heart & DeBruyn, 1998). Vulnerable populations are more likely to suffer from poverty and therefore have reduced access to food (Kent, 2009).

Historical events have led to a considerable amount of historical loss of culture, land, life, traditional food sources, and respect for NA people (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004; Brave Heart & DeBruyn, 1998; Churchill, 2004; Duran & Duran, 1995). Some historical events have also directly been related to food insecurity (Duran & Duran, 1995). The transfer of hunter-gather societies to reservations disconnected tribes from traditional hunting and harvesting lands leading to food insecurity and malnutrition (Poupart, 2003). Historical loss has also led to considerable amounts of stress, alcoholism and depression for NA people resulting in increased HbA1c (Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005; Herman, 1992). There is also evidence food insecurity has a negative impact on HbA1c for diabetics (Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012). Food insecurity and historical loss are both measures of social injustice for the NA population and would clarify the role of social injustice plays for diabetic NAs (Laraia, Siega-Riz, & Gundersen, 2010; Marjerrison, Cummings, Glanville, Kirk, & Ledwell, 2011; Marmont & Wilkinson, 2006).

Purpose of the Study

The purpose with this study is to examine the relationship between historical loss, food insecurity, and glycemic control in a group of NAs with T2D.

Research Aims

Aim 1: Test if historical loss is associated with food insecurity among NAs with T2D.

Hypothesis 1: NAs with T2D with higher scores on the Historical Losses Scale will have an increased risk of suffering from food insecurity.

Aim 2: Examine the association between historical loss and glycemic control among diabetic NAs with T2D.

Hypothesis 2: NAs with T2D with higher scores on the Historical Losses Scale will have higher HbA1c concentrations.

Aim 3: Evaluate the association between food insecurity and glycemic control among diabetic NAs with T2D.

Hypothesis 3: NAs with T2D who suffer from food insecurity will have higher HbA1c concentrations, as compared to those who do not suffer from food insecurity.

Significance of the Study

More information is needed to prevent and eliminate health disparities as outlined in Healthy People 2020 (Department of Health and Human Services, 2012). There is still a lack of sufficient quantitative evidence of the association between T2D and historical trauma (Brave Heart & DeBruyn, 1998; Poupart, 2003; Roubideaux, et al., 2004). This study utilized a validated scale for measurement of historical trauma among NAs and food insecurity was measured using

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a standard definition (Sotero, 2006; Kleinman, Murphy, Wieneke, Desmond, Schiff, & Gapinski, 2007). Learning the associations between HbA1c, food insecurity and historical loss could help us identify ways to target prevention and treatment of T2D in the NA population in Fort Hall. If HbA1c was found to be associated with food insecurity, eliminating food security in the community could be addressed as part of the prevention and treatment of T2D. Psychological methods could be incorporated into T2D prevention and care; talking groups could be established to discuss the intergenerational transfer of historical trauma and its relation to T2D or food insecurity. Finally, future researchers could replicate studies among other NA nations to determine systemic issues among Native populations.

Chapter 2

Introduction

Historical trauma and forced cultural assimilation have led to the conditions Native Americans (NA) people live in today (Churchill, 2004). NA tribes have been victim of government sponsored programs of genocide, alienation, religious intolerance, forced removal from traditional homelands, and assimilation into American culture as a result of Westward expansion (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004; Thorton, 1987; Churchill, 2004). Cultural assimilation into Anglo culture has led to historical loss, and internalized oppression, which contributes to an increased risk for illness in NA populations (Churchill, 2004; Brave Heart & DeBruyn, 1998; Poupart, 2003). Type 2 diabetes (T2D) is common in NA communities, including the Shoshone-Bannock people in Fort Hall, Idaho (Goforth-Parker, Haldane, Rusk-Keltner, Strickland, & Tom-Orme, 2002; Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014).

The Fort Hall Indian Reservation has high rates of poverty, especially among NAs (US Census, 2012). Poverty has been shown to be a risk factor for food insufficiency (Idaho Food Bank, 2013). Both poverty and food insecurity increase the risk of obesity and T2D (Casey, Szeto, Lensing, Bogle, & Weber, 2001; Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012; Laraia, Siega-Riz, & Gundersen, 2010; Mathematica Policy Research, 2012; Seligman, Bindman, Vittinghoff, Kanaya, & Kushel, 2007; Vozoris & Tarasuk, 2003).

Historical background

The Shoshone and Bannock people inhabited what is now known as Western North America (Shoshone-Bannock Tribes, 2012). Prior to reservation confinement the Shoshone and

Bannock people relied on hunting and gathering to obtain food and shelter (Shoshone-Bannock Tribes, 2012). The Shoshone and Bannock are two distinct tribes brought together by the US Government onto the Fort Hall Reservation (Shoshone-Bannock Tribes, 2012).

Genocide

The indigenous people across the United States (US), including the Bannock and Shoshone people, were subject to genocide through the direct killing by settlers and military forces, and starvation through the massacre of bison across North America (Brave Heart & DeBruyn, 1998; Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). Genocide was committed through direct warfare, massacre, starvation, and biological agents (Brave Heart & DeBruyn, 1998; Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004; Mulligan, Hunley, Cole, & Long, 2004). One example of genocide of the Shoshone people was the Bear River Massacre in 1863 where US troops and volunteers ambushed 250 Shoshone men, women and children during the early hours of the morning (University of Utah, 2014). Of the 250 killed 90 were women and children who the troops continued to kill and brutalize after the Shoshone warriors ran out of ammunition (University of Utah, 2014).

Reservation Confinement

Prior to reservation confinement Shoshone and Bannock people primarily ate fish, wild game, and plant life found throughout the geographical region of the Snake River basin (Shoshone-Bannock Tribes, 2012). Foods traditionally consumed were high in protein and micronutrients including: deer, elk, bison, moose, salmon, trout, camas root, pine nuts, berries, and other edible flora and fauna gathered from the geographical region (Shoshone-Bannock Tribes, 2012; Smoaks, 2004). Tribal members obtained food through broad hunting and gathering practices (Shoshone-Bannock Tribes, 2012; Smoaks, 2004).

Physical activities among the population were extensive prior to reservation confinement. Physical activity was required to obtain food, migrate to seasonal campsites, and for survival. Every part of traditional Shoshone and Bannock cultures required intense physical activity (Shoshone-Bannock Tribes, 2012).

Communities consisted of extended family members and other relations (Shoshone-Bannock Tribes, 2012; Churchill, 2004). Children were raised in a community setting and were taught through oral practices. Children learned through example of the community through situational and story-based lessons in relation to the environment.

In 1868, the treaty with the Eastern Shoshone and Bannock Indians established a reservation for the Bannock and Shoshone people in exchange for peace continued rights to land, hunting, and medical care (Treaty with the Eastern Shoshoni and Bannock, 1868). By executive order in 1867 the US government created the Fort Hall Reservation and brought the Shoshone and Bannock people together to inhabit the newly formed reservation (Shoshone-Bannock Tribes, 2012). In 1869, President Grant affirmed Fort Hall would be the home of the Shoshone and Bannock people (Shoshone-Bannock Tribes, 2012).

As part of the original treaty a summer reservation was promised on the Camas Prairie (Smoaks, 2004). The camas root, the namesake for the prairie, provided an essential food for the Shoshone people (Smoaks, 2004). However, white settlers began to inhabit the Camas Prairie and their pigs uprooted and fed on the sacred camas plant (Smoaks, 2004). When the Bannock people discovered their reservation had been settled, and the vital food source had been destroyed, skirmishes ensued (Smoaks, 2004).

The retaliation led US citizens to enlist government help in defending them from the native people, who were considered wards of the state, prompting the US government to send

soldiers to confine NA people to the reservation (Smoaks, 2004; Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). Confinement to the Fort Hall Reservation prevented Shoshone and Bannock people from hunting and gathering food from traditional locations (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). The Shoshone and Bannock (among many other tribes across the US) became dependent on the US government for food, though they had successfully gathered food themselves for thousands of years (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). When government sources did not bring the promised commodities NA communities starved (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004).

Assimilation

Life on reservations continued to be bleak. People lived in impoverished conditions, depending on the government for survival (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). Religious practices were banned (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). Many reservation residents were overcome by disease and starvation (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004).

In the late 1800's, an assimilation and social welfare policy was conceptualized by Captain Richard H. Pratt Superintendent and founder of the Carlisle Indian School (National Conference on Social Welfare, 1892). In a paper Captain Pratt read at the Nineteenth Annual Conference of Charities and Correction (1892) he states "A great general has said that the only good Indian is a dead one...in a sense, I agree with the sentiment, but only in this: that all the Indian there is in the race should be dead. Kill the Indian in him, and save the man" (National Conference on Social Welfare, 1892). Thus generations of boarding school policy resulted, focusing on assimilation of NA people into Anglo culture (Poupart, 2003; Brave Heart & DeBruyn, 1998; Gone, 2009; Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004).

Many NA parents began to send children to boarding schools away from the reservations, which were stricken with poverty and hopelessness (Poupart, 2003). Other children were taken from their families forcibly (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). Once in school the children's hair was cut, traditional language, clothing, and practices were forbidden, students were taught English and required to speak it at all times, and religious practices were replaced by Christianity (Brave Heart & DeBruyn, 1998; Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). Many boarding schools were plagued with abuse: emotional, physical, and sexual (Poupart, 2003; Brave Heart & DeBruyn, 1998; Gone, 2009; Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). There are many stories of abuse by priests, nuns or employees of the various types of boarding schools (Gone, 2009).

Practices of boarding schools led to the deterioration of the community culture (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). Many who returned home to reservations could no longer speak their native language or practice traditional lifestyle, due to psychological conditioning associated with non-Anglo behaviors resulting in severe punishment (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). Shoshone and Bannock communities no longer raised children; instead boarding schools provided the rearing of several generations (Poupart, 2003). Parenting practices and traditional practices were lost in these generations raised in boarding school, and parents from these generations became known as "unparented parents" (Poupart, 2003; Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004).

After boarding school students were given an option to attend trade school and be relocated to urban areas (Brave Heart & DeBruyn, 1998). Relocation had a tremendous effect on many tribal nations, whose young adults had been siphoned to urban areas leaving reservations as homes of the elderly and destitute (Brave Heart & DeBruyn, 1998). There were few economic

opportunities to be found on the reservation, so many tribal members accepted the offer to continue education and move to large urban areas across the US (Brave Heart & DeBruyn, 1998).

Historical Loss

Historical trauma or loss is the psychological and emotional response to intergenerational loss, violence, and trauma (Brave Heart & DeBruyn, 1998). Internalized oppression is a result of historical trauma and loss and is a self-destructive behavior causing systematic destruction of one's social system, which results in a lack of connectedness (Poupart, 2003). In addition to self-destruction there is a learned inability to initiate and reciprocate support and love (Poupart, 2003; Brave Heart & DeBruyn, 1998). Illnesses related to internalized oppression include: depression, anxiety, alcoholism, and drug abuse (Brave Heart & DeBruyn, 1998). Social issues include violence (assault, homicide), emotional, physical, and sexual abuse (Brave Heart & DeBruyn, 1998). Illness and social issues resulting from internalized oppression can reduce the ability to function within the constructs of society, obtain and maintain gainful employment (Brave Heart & DeBruyn, 1998).

Historical trauma has been studied in the Jewish population among children of Holocaust survivors. However, there is a distinctive difference between the trauma experienced throughout the Holocaust and experiences of NAs (Whitbeck, Adams, Hoyt, & Chen, 2004). Holocaust events are confined to a single period in the 1930s and 1940s, whereas NAs experienced genocide as a continuation of events starting with the arrival of European settlers well into the late 1800s; followed by racism, loss of land and culture, which persists today (Whitbeck, Adams, Hoyt, & Chen, 2004). Therefore, Whitbeck *et al* created and validated a measurement tool called

the Historical Loss and Associated Symptoms Scale (HL&AS) to be utilized in NA populations (Whitbeck, Adams, Hoyt, & Chen, 2004).

Population

The Fort Hall Indian Reservation is located in Southeast Idaho between the cities of Pocatello, Blackfoot, and American Falls (Shoshone-Bannock Tribes, 2014). There are currently 5,681 enrolled Shoshone-Bannock Tribal members; around four thousand reside on the reservation (Shoshone-Bannock Tribes, 2014). The majority of tribal members, of federally recognized tribes, who live on or near the reservation utilize health care at the Not-tsoo Gah-nee Indian Health Clinic, especially those without access to health insurance.

Poverty

Poverty is a very relevant issue in Indian Country and Fort Hall is no exception (US Census Bureau, 2011). While the Shoshone-Bannock Tribes are one of the largest employers in Bingham County, Shoshone-Bannock Tribal members still have high levels of poverty and unemployment (Boise State Public Radio, 2014; US Census, 2012). Of those living on the Fort Hall Indian Reservation 23.3% of those who defined themselves as American Indian or Alaska Native lived in households below poverty; more than two and a half times poverty of the white population in Fort Hall (9.5%) (US Census, 2012). Of those living in Fort Hall only 4% are above the age of 65, while 72.7% of households received some type of cash assistance or Social Security Income in the last 12 months (US Census, 2012). Education status is as follows: 51.4% have less than a high school education, 11.3% have a high school diploma, and 23.8% have some college or an associate's degree (US Census, 2012). Among households 39.8% have no workers supporting their family (US Census, 2012).

Food Insecurity

Poverty is closely related to food insecurity (Idaho Food Bank, 2013). Individuals living in poverty are likely to be food insecure, however food insecurity often happens to families who live at 185% of poverty (Idaho Food Bank, 2013). NA children suffer from twice as much food insecurity, T2D, and obesity as children from the general US population (Mathematica Policy Research, 2012). Food insecurity has been associated with the development of diabetes, and poor glycemic control, which can lead to reduced quality of life and longevity (Seligman, Bindman, Vittinghoff, Kanaya, & Kushel, 2007; Mathematica Policy Research, 2012; Casey, Szeto, Lensing, Bogle, & Weber, 2001; Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012; Laraia, Siega-Riz, & Gundersen, 2010; Vozoris & Tarasuk, 2003).

Disease Status

Currently throughout the US T2D rates among NAs are generally double the US population (Indian Health Services, 2012), in some communities the prevalence of T2D in the adult population even higher (Roubideaux, et al., 2004). Kidney disease among NA people is 1.9 times higher than the total US population (Indian Health Services, 2012). Risk for stroke, heart disease, and death from heart disease is 2-4 times higher among people with diabetes than the rest of the US population (Indian Health Services, 2012). In Fort Hall 12.2% of patients treated at the IHS clinic are diabetic (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014); more than double the national prevalence and nearly double Idaho prevalence (Center for Disease Control and Prevention, 2013; Center for Disease Control and Prevention, 2010; Shoshone-Bannock Tribes, 2014; Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014).

NAs often experience the multi-morbidity of alcohol abuse, depression and T2D known as TriADD (Tann, Yabiku, Okamoto, & Yanow, 2007). There is a positive correlation between T2D and depression and alcohol abuse (Sahota, Knowler, & Looker, 2008; Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005; Tann, Yabiku, Okamoto, & Yanow, 2007). Diabetics are twice as likely to be diagnosed with depression and the symptoms of depression are positively related to the worsening diabetic symptoms (Tann, Yabiku, Okamoto, & Yanow, 2007). Co-morbidities increase the risk of T2D complications and reduce ability to manage the disease (Tann, Yabiku, Okamoto, & Yanow, 2007; Sahota, Knowler, & Looker, 2008; Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005). A positive correlation between increased HbA1c levels and a state of depression has been observed among Pima Indians (Sahota, Knowler, & Looker, 2008). NAs also have an increased rate of diabetic nephropathy and end-stage renal disease (Young, Maynard, & Boyko, 2003). Twenty-nine percent of patients with diabetes in Fort Hall have an active diagnosis of depression with 89% being screened for the illness (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014). Alcohol and depression also have a tremendous impact on T2D (Tann, Yabiku, Okamoto, & Yanow, 2007). Excessive alcohol intake increases risk of developing diabetes, impairs glucose tolerance and alcoholism and depression are also co-morbid diseases (Tann, Yabiku, Okamoto, & Yanow, 2007).

Glycemic Control

Glycemic Control is vital to the quality of life and prevention of complications for diabetics (American Diabetes Association, 2014). According to the American Diabetes Association HbA1c, a measure of average blood glucose over a three month period, should be below or around 7% mmol/L for optimal outcome (American Diabetes Association, 2014). Continuous high blood glucose can result in neuropathy, retinopathy, renal disease, and

cardiovascular disease (American Diabetes Association, 2014). Optimal glycemic control can reduce diabetic complications and promote longevity and quality of life (American Diabetes Association, 2014).

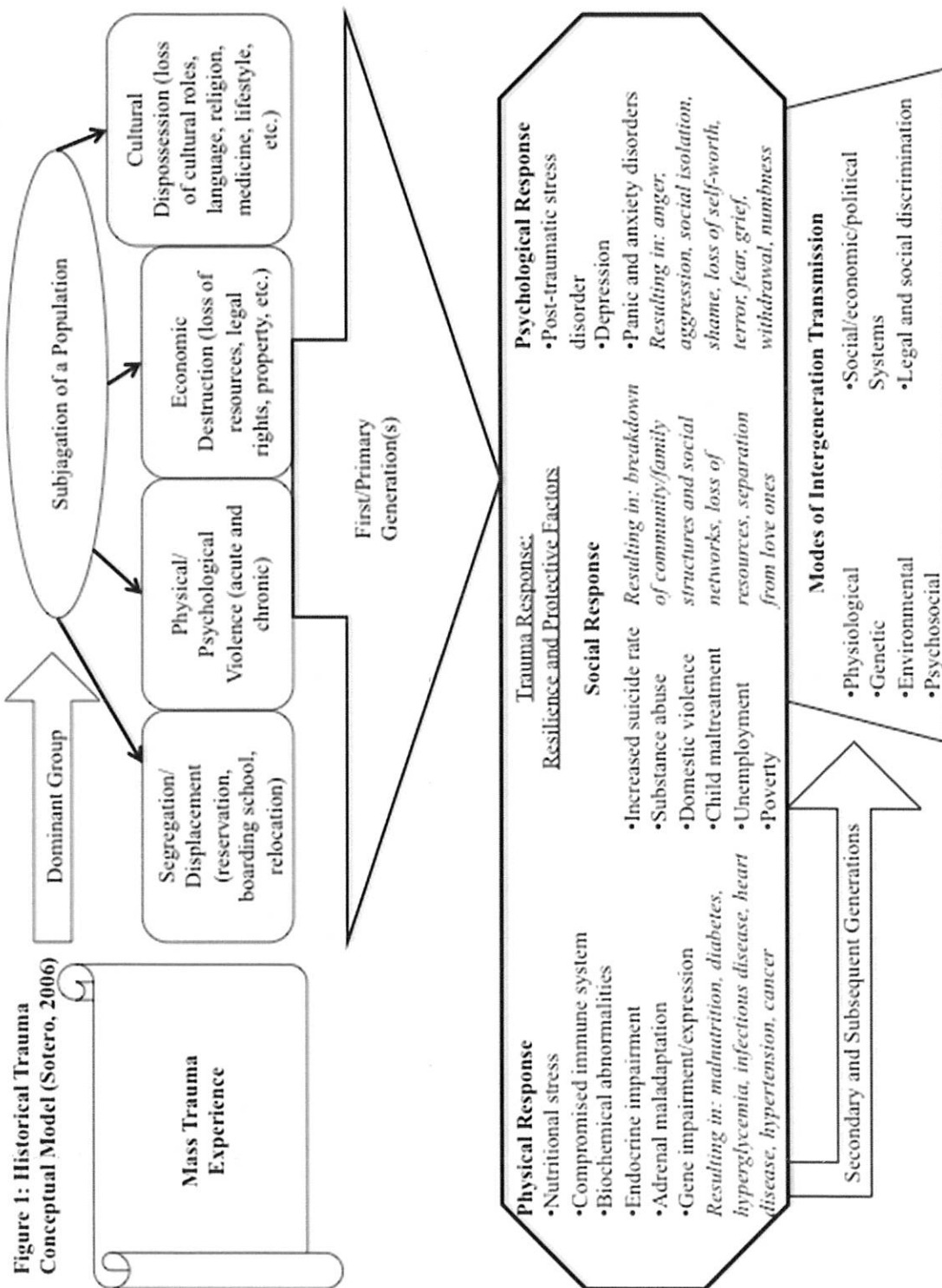
Historical Loss, Food Insecurity and Glycemic Control

In the Historical Model Conceptual Theory it is postulated the multi-generational effects of historical trauma result in the breakdown of physical, social, and psychological protections (Sotero, 2006). The mass trauma experience is structural in nature and impacts a large portion of the subjugate population (Sotero, 2006). The dominate population produces an environment, policies, or laws which segregate, displace, cause physical or emotional violence, destruction of economic systems and culture of the subjugate population (Sotero, 2006). This is experienced in one or many generations and creates deleterious responses among those who experience it (Sotero, 2006).

Over time the systematic infliction of violence is reduced or ceases; however, there can be intergenerational transfer of trauma response to subsequent generations causing a continuation of trauma response in the population (Sotero, 2006). Physical, social and psychological responses to historical trauma and loss have lasting impacts on the population (Brave Heart & DeBruyn, 1998; Duran & Duran, 1995; Poupart, 2003; Sotero, 2006; Whitbeck, Adams, Hoyt, & Chen, 2004). Primary generations often suffer from posttraumatic stress disorder, anxiety, depression, increased morbidity, HIV risk, alcoholism, and drug abuse (see figure 1) (Tann, Yabiku, Okamoto, & Yanow, 2007).

Education and socioeconomic status have an inverse association with depression and existence of co-morbidities in minority populations, especially in NAs (Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005). It is unclear if depression increases the risk of T2D, or

inversely, if T2D increases the risk for depression (Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005); however poor psychosocial health reduces a patient's ability to maintain blood-glucose levels (Sahota, Knowler, & Looker, 2008).



Conclusion

Historical trauma, food insecurity and glycemic control are important in the treatment of T2D. NAs have survived initial contact with European settlers, while enduring, genocide, reservation confinement and assimilation policies. However, the population still suffers from structural violence as evidenced by the continued rate of poverty food insufficiency. Food insufficiency and poverty are related to the development of T2D and are important in achieving proper glycemic control to reduce diabetic complications. This study analyzed associations between these variables in the Shoshone-Bannock people.

Chapter 3

Overview of the Study

The goal of this study was to identify the association between three variables and their relationship with type 2 diabetes (T2D). One goal of Healthy People 2020 is to eliminate inequities in health (Department of Health and Human Services, 2012). Native Americans (NA) suffer from an increased risk of T2D, historical trauma, and food insecurity than the total United States (US) population (Hales & Barker, 2001; Duran & Duran, 1995; Sotero, 2006). This study examined the interaction of environment's impact on T2D.

Research Aims

Aim 1: Test if historical loss is associated with food insecurity among NAs with T2D.

Hypothesis 1: NAs with T2D with higher scores on the Historical Losses Scale will have an increased risk of suffering from food insecurity.

Aim 2: Examine the association between historical loss and glycemic control among diabetic NAs with T2D.

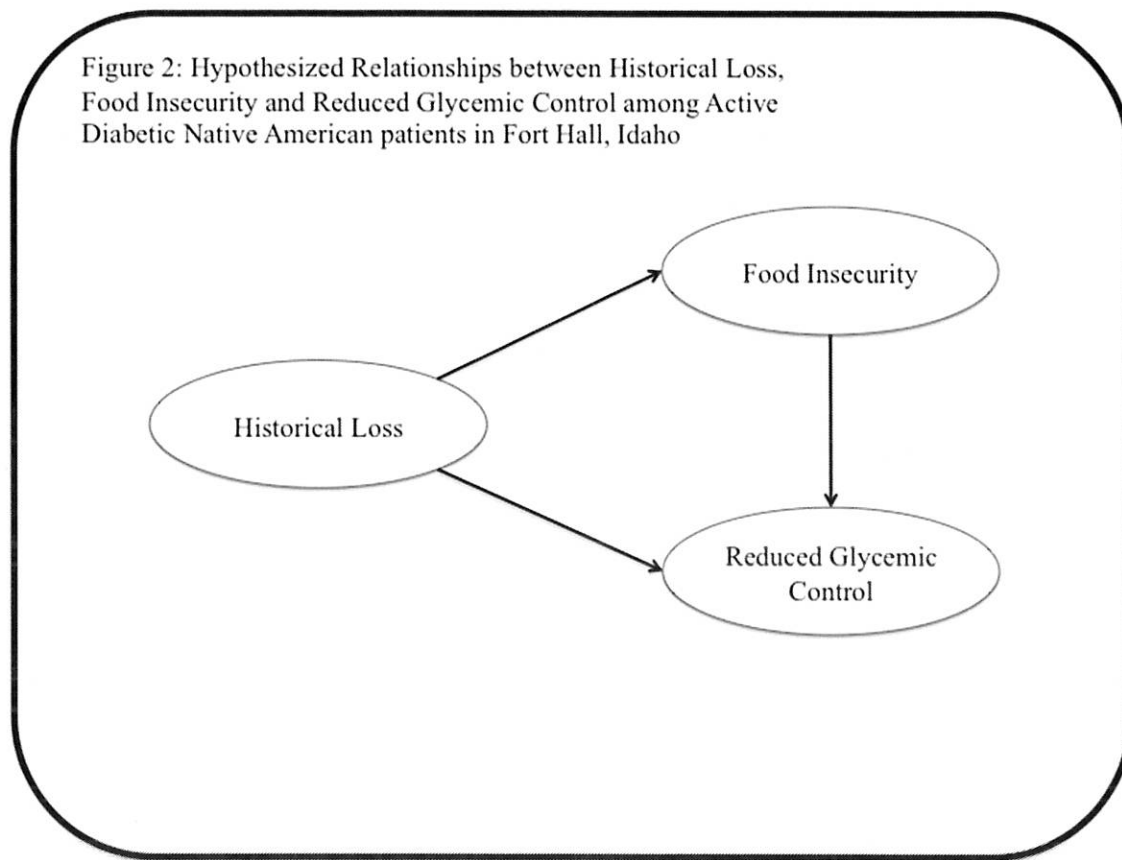
Hypothesis 2: NAs with T2D with higher scores on the Historical Losses Scale will have higher HbA1c concentrations.

Aim 3: Evaluate the association between food insecurity and glycemic control among diabetic NAs with T2D.

Hypothesis 3: NAs with T2D who suffer from food insecurity will have higher HbA1c concentrations, as compared to those who do not suffer from food insecurity.

The three variables in the study were historical loss, food insecurity and reduced glycemic control which is measured utilizing a laboratory blood test determining an average

blood sugar over three months; the test is called HbA1c (see figure 2).



Description of Setting

The Fort Hall Indian Health Service (IHS) Not-tsoo Gah-nee Clinic provides primary medical care for all NAs with federally recognized tribal affiliation. The 5,681 enrolled Shoshone-Bannock tribal members are the primary population utilizing the clinic due to proximity of the clinic and the Shoshone-Bannock Tribal membership. The Not-tsoo Gah-nee Clinic is located centrally on the 544,000-acre rural Fort Hall Indian Reservation in Southeast Idaho (Shoshone-Bannock Tribes, 2014).

Like many rural communities the Fort Hall Indian Reservation has a higher rate of poverty than the smaller surrounding communities. Poverty rates among the NA population

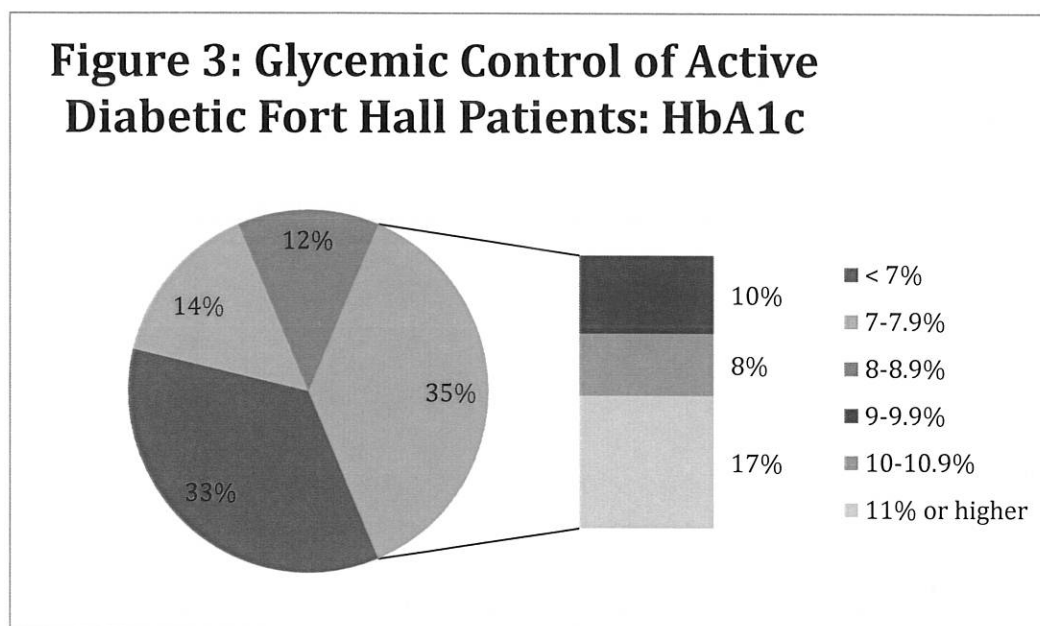
living on the Fort Hall Indian Reservation is more than twice that of the non-Hispanic, Caucasian population in the same region (US Census, 2012). Nationally, NA children suffer from nearly twice as much food insecurity (23% compared to 15%), T2D (1.7% compared to 0.4%), and obesity (21% compared to 14%) as children from the general US population (Mathematica Policy Research, 2012).

Population

The focus of this study was active diabetic patients, enrolled in the Shoshone-Bannock Tribes, receiving care at the Not-tsoo Gah-nee clinic. Patients were determined to be active if their primary diabetic care was received in the last year. Patients seen within the last calendar year who were documented as visiting from out of town (with primary care elsewhere), receiving dialysis, or only acute care were considered transient patients and were not included as active patients. Patients were considered inactive if they have not been seen in the last calendar year or were deceased.

Each year data is collected from active patients from the previous calendar year utilizing information collected in the IHS electronic health record (EHR). The data collected is utilized to improve care and provide information to the granting agency, Department of Health and Human Services-IHS, for the Special Diabetes Program for Indians Grant. According to the 2014 Audit Outcomes and Audit Report for 2014 the prevalence of diabetes in the population is 12.2% (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014). Over 99% of diabetes cases are T2D (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014). Glycemic control of the diabetic population is broken down into the following groups in the IHS Care and Outcomes Audit Report for 2014: less than 7%, 7-7.9%, 8-8.9%, 9-9.9%, 10-10.9%, 11% or higher (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014).

However, if the groups are broken down into four larger groups: optimal control (<7%), controlled (7-7.9%), moderately controlled (8-8.9%) and uncontrolled (9% or higher) the information presented can be more easily identified categorically by how well blood glucose is controlled. The graph below (figure 3) provides a visual representation of glycemic control in the community (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014). One third of patients had optimal glycemic control, less than a third of patients had moderate control, and more than one third had uncontrolled blood glucose (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014).



Selection of study participants

The principal investigator (PI) or other interviewer attempted to contact all active T2D patients over the age of 18 on the Diabetes Management System (DMS) registry by phone. The interviewer only had access to the list of patients meeting study criteria in an Excel file saved in the Tribal Health and Human Services servers in a password protected file. The Diabetes Grant Coordinator (also study PI) provided an updated DMS registry utilizing the Resource and Patient

Management System (RPMS), which collects data from patient's electronic health record.

Patients included in the registry and study lived both on and off the Fort Hall Reservation. For patients to be considered active they must have had at least one medical appointment related to diabetes in the last 12-month period. Patients were not excluded for co-morbidities and were enrolled members of the Shoshone-Bannock Tribes. The Excel file was exported from the DMS at the beginning of the study and was not updated throughout the term of the study. It was expected that around twenty percent of the nearly 501 patients would respond to the telephone interview. If a patient did not answer, the interviewer did not leave a message. The study required between 50 and 80 participants (for 800 total population) to reach an Alpha of 0.05%, 80% power with a 10-15% variance (Heinrich Heine Universität, 2010-2013). The power calculation was done using G-Power Software (Heinrich Heine Universität, 2010-2013).

During the phone conversation the patient was asked if they would like to participate in a survey. If so, the interviewer read an informed consent statement to the patient and received verbal consent (Appendix A). If the patient agreed to participate in the survey, they were asked survey questions utilizing the phone script sheet and answers were collected utilizing the sheet. The interviewer entered the randomized number and date in the appropriate locations on the form. Information on the form was utilized to determine the last HbA1c, within the last 12-month period, from the EHR. Data was saved and stored on a HIPAA secure Tribal Health and Human Services server, which is firewall and password protected. Access to the data was only provided through the information technology manager to the PI/interviewer.

Data Collection and Analysis

During phone surveys, historical trauma data was collected utilizing the Historical Losses and Associated Symptoms Scales (HL&AS) (Whitbeck, Adams, Hoyt, & Chen, 2004). The

HL&AS have been utilized to conceptualize and measure historical trauma in NA populations (see appendix A) (Whitbeck, Adams, Hoyt, & Chen, 2004). The scale was developed to quantitatively analyze the severity of historical loss, specifically among NA populations (Whitbeck, Adams, Hoyt, & Chen, 2004). Wording from the original survey was not changed as to allow for comparison of results in future research. Historical trauma is not isolated to NA populations and has also been studied among Holocaust survivors, however the triggers and pervasiveness in the populations differ (Whitbeck, Adams, Hoyt, & Chen, 2004). Therefore, Whitbeck, et. al. developed and tested a measurement tool specific to NA populations (Whitbeck, Adams, Hoyt, & Chen, 2004).

Phone surveys collected food insecurity data utilizing a slightly modified single-question screening tool to detect food insecurity developed by Kleinman et. al. (see appendix A) (Kleinman, Murphy, Wieneke, Desmond, Schiff, & Gapinski, 2007). The screening question was developed for use by medical staff in a community health center and results of the tool found 83% sensitivity and 80% specificity (Kleinman, Murphy, Wieneke, Desmond, Schiff, & Gapinski, 2007). The survey tool asks for recall of the past month, which has been modified to three months for the purpose of this study due to the three-month range of the HbA1c (American Diabetes Association, 2014).

Due to the pooled nature of the Shoshone and Bannock tribes on the Fort Hall Indian Reservation data was also collected on tribal self-identification to determine if there was a difference based on tribal self-identification. A master list of potential participants was created with randomized numbers to de-identify patient data. Interviewer name, date of interview, random participant number, educational attainment, most recent HbA1c, gender, and age were included on the survey (US Census Bureau, 2010). The date of service for laboratory test was

also included on survey for verification of validity. If there was no HbA1c for the subject in the last 12-month period, the survey was not included in the data analysis.

Analysis

Differing statistical methods were used to analyze the association between the three variables of interest: historical loss, food insecurity and glycemic control. To reduce occurrence for confounding factors analyses controlled for tribal affiliation, gender, age, and highest education attained. Analysis of the possible association between historical loss and food insecurity among NAs with T2D was conducted using logistic regression because food insecurity is a dichotomous dependent variable. Glycemic control is a continuous variable making linear regression an appropriate analytical approach for the final two possible associations being studied--historical loss and glycemic control, and food insecurity and glycemic control.

Ethical Considerations

NA populations are considered a sensitive population due to the minority status, but research for the population is vital due to differences in life experience by this population. Prior to the commencement of this study approval was sought from the Fort Hall Business Council, Shoshone-Bannock governing body (see Appendix B), Tribal Health and Human Services Director and Chief Executive Officer of the IHS Clinic in Fort Hall, Idaho (see Appendix C). Study methods and proposal were reviewed and approved by Indian Health Services, Northwest Portland Area Indian Health Board Internal Review Board and Idaho State University Human Subjects Committee. The PI conducted interviews after completion of Health Insurance Portability and Accountability Act (HIPAA), Privacy Act, Tribal Health and Human Services

(THHS) orientation and CITI training. Verbal informed consent was given prior to gathering data (see Appendix A). There was a risk of patients reliving historical events when asked questions in the survey. The interviewer made known that the patient could discontinue the interview at any time and had contact information for Shoshone-Bannock Tribal Health and Human Services Counseling and Family Services available for patients experiencing any mental health symptoms.

All data collected for this study is considered property of the Shoshone-Bannock THHS. Data was recorded on electronic forms and saved on the THHS server; which is HIPAA and Privacy Act compliant, password protected, and only accessible by the Diabetes Grant Coordinator (PI) and the THHS Information Technology (IT) Manager who is required to access and create the folder. Health Record Number was replaced with an random assigned number saved on a electronic master list, which was saved in the password protected folder within HIPAA/Privacy Act compliant server master list file. Upon successful completion of the study the master list was destroyed and de-identified data was stored indefinitely as property of the Shoshone-Bannock Tribe. All THHS staff including IT and the PI/Diabetes Grant Coordinator completed HIPAA, Privacy Act, and computer security training. Results reported in this study was aggregated without any personal identification of individuals who participated in the study.

Chapter 4

Journal Article

Efficacy of Historical Loss and Associated Symptoms Scale in Measuring Level of Historical Trauma in a Native American Population

Background

The Department of Health and Human Services (HHS) lists several determinants of health, such as, genetic, social, individual, policy, and healthcare access, which are relevant in reducing disproportional risk of disease. Social determinants can affect health status of both individuals and groups (Department of Health and Human Services, 2012). Social determinants, such as, discrimination, socioeconomic status and food security have an effect on an individual's ability to physically, emotionally and mentally thrive, which can negatively impact health (Department of Health and Human Services, 2012). Individual determinants, such as behavior, can also affect health leading to negative and positive outcomes (Department of Health and Human Services, 2012).

Type 2 diabetes (T2D) is a negative health outcome linked to multiple determinants of health in racial/ethnic minorities (Centers for Disease Control and Prevention, 2011). Overall United States (US) prevalence of diabetes for Native Americans (NA) is 16.1% (Center for Disease Control and Prevention, 2011) compared to the population in Fort Hall of 12.2% (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014). Diabetes prevalence among NAs in Fort Hall is nearly two times higher than total US prevalence (6.9%) and one and a half times higher than total prevalence in Idaho (8%) (Indian Health Service, Shoshone-Bannock Tribes Diabetes Project, 2014; Center for Disease Control and Prevention, 2010). Due to the high prevalence of T2D, NAs have become the focus of recent studies, which question whether the

risk is genetic or social in nature (Hales & Barker, 2001; Duran & Duran, 1995; Sotero, 2006; Waadhwa, Buss, Entringer, & Swanson, 2009). Diet and exercise, which are individual behaviors affected by policy and access to resources, play an important role in the development of T2D among individuals regardless of race/ethnicity, but policy and access to healthcare have been identified as important factors in the prevention of T2D in the NA population (Department of Health and Human Services, 2012).

Multiple theories have been developed to explain the increased risk for diabetes among NAs. Some theories, such as the thrifty genotype hypothesis, postulate a genetic predisposition to diabetes (Neel, 1962; Hales & Barker, 2001). More recent research and theoretical constructs, such as thrifty phenotype hypothesis and the Developmental Origins of Health and Disease (DOHaD), focus on the environmental factors affecting developmental processes, which in turn lead to long-term disease (Neel, 1962; Hales & Barker, 2001; Waadhwa, Buss, Entringer, & Swanson, 2009). The DOHaD hypothesis proposes environmental factors acting in early periods of development effect the way organisms cope with environmental influences later in life. There is evidence suggesting fetal malnutrition affects stress-mediating systems predisposing individuals to an increased risk of cardio metabolic disease later in life (Waadhwa, Buss, Entringer, & Swanson, 2009).

Malnutrition due to limited access to healthy foods (e.g. food insecurity) has been an inherent problem within the NA community. Reservation confinement, restricting access to traditional foods, particularly proteins, followed by assimilation into Anglo culture created a period of starvation affecting generations of NAs followed by a mismatch in nutritional availability after assimilation (Poupart, 2003; Brave Heart & DeBruyn, 1998; Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012; Churchill, 2004; Laraia, Siega-Riz, & Gundersen, 2010;

Ma, et al., 2008; Mulligan, Hunley, Cole, & Long, 2004; Sahota, Knowler, & Looker, 2008; Smoaks, 2004; Thorton, 1987). Research has also shown glucose impairment during pregnancy, which is more common in NAs, can increase the risk for future glucose intolerance in both the mother and offspring (Casey, Szeto, Lensing, Bogle, & Weber, 2001). Past historical events such as stress, food insecurity, and forced assimilation (factors leading to historical trauma) endured by NAs likely have played a role in the increased risk of T2D.

Historical Trauma. History and cultural assimilation have drastically changed the present lifestyle, belief constructs, and health of NAs (Churchill, 2004). NA tribes have been victim to US government-sponsored programs of genocide, alienation, religious intolerance, forced removal from traditional homelands, and assimilation into American culture as a result of Westward expansion and Manifest Destiny (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004; Thorton, 1987; Churchill, 2004). Since first contact between NAs and Europeans, there have been many atrocities committed against NA populations (Poupart, 2003). The first documented genocide began with Christopher Columbus in 1492 (Tinker & Freeland, 2008). An estimated 8 million Taino inhabited Espanola, but by 1540 the indigenous population was eradicated from the island (Tinker & Freeland, 2008). During the French and Indian War there is documentation of providing handkerchiefs and blankets to Native leaders as an act of biological warfare in 1763 (Gill, 2004).

The American Indian war is considered an ongoing campaign against NAs defending their rights to traditional homelands (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). The wars began during colonization around 1622 and continued into the early 1900's (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004). During this campaign there was systematic, government-directed termination of indigenous peoples (Poupart, 2003). Those who persisted

were then relocated to reservations, and later, urban areas (Poupart, 2003). Assimilation into Anglo culture was the final goal in homogenizing the population (Poupart, 2003; Churchill, 2004). It began with voluntary and forced boarding school attendance during primary education in the late 1800's (Churchill, 2004). After graduation students were sent to trade skill colleges in urban areas as part of the Indian Relocation Program (Churchill, 2004). Those who returned home to the reservations following their experience often had little knowledge of traditional language and culture (Churchill, 2004).

Historical loss is a term used to describe the process of forced assimilation of racial or ethnic groups (Brave Heart & DeBruyn, 1998; Duran & Duran, 1995; Gone, 2009; Klienman, 1988; Poupart, 2003; Sotero, 2006; Whitbeck, Adams, Hoyt, & Chen, 2004). Assimilation was attempted through educational boarding schools; NAs from differing cultures were removed from families and taken to boarding schools where students were forced to cut their long hair and take an Anglo name (Churchill, 2004). Students were prevented from practicing traditional culture and language by threat of severe corporal punishment (Churchill, 2004). Historical trauma is the lasting result of this loss and is a term used to describe the process of post-traumatic stress disorder passed down from generation to generation, through parenting and societal processes (Bullock, 2005). Internalized oppression is the destruction of the social network of individuals or communities creating a loss of unity, cohesion, and compassion (Poupart, 2003). If these terms were described as a disease process, historical loss would be likened to a pathogen, causing historical trauma, and internalized oppression is equivalent to the symptomatic response.

Historical trauma continues as a result of structural violence and social injustice (Duran & Duran, 1995; Brave Heart & DeBruyn, 1998; Poupart, 2003; Roubideaux, et al., 2004; Sotero,

2006; Waadhwa, Buss, Entringer, & Swanson, 2009; Whitbeck, Adams, Hoyt, & Chen, 2004). Structural violence is a systematic constraint preventing individuals from gaining access to their full potential often including the inability to make choices to change status or potential (Farmer, Nizeye, Stulac, & Keshavjee, 2006). Lands and funds of NA populations continue to be managed by the Bureau of Indian Affairs under the US Department of the Interior, rather than by the sovereign NA nations or individuals. As a result, the US Supreme Court determined in the case *Cobell v. Salazar* the US government has long mismanaged these funds and lands; further evidence of structural violence faced in NA communities (Civil Division, US Department of Justice, 1996). Social injustice can be seen in underfunded IHS programs, educational attainment, and potential earnings of NAs compared to the US population. For many NAs, IHS is the only source of medical care (the Affordable Care Act provides exemptions for NAs due to current coverage through IHS).

Food Insecurity. Historical events have led to a considerable amount of historical loss of culture, land, life, traditional food sources, and respect for NA people (Boyer, Slark, Kett, Salisbury, Stikoff, & Woloch, 2004; Brave Heart & DeBruyn, 1998; Churchill, 2004; Duran & Duran, 1995). Some historical events have also directly been related to food insecurity (Duran & Duran, 1995). The transfer of hunter-gather societies to reservations disconnected tribes from traditional hunting and harvesting lands leading to food insecurity (Poupart, 2003). Historical loss has also led to considerable amounts of stress, alcoholism and depression for NA people resulting in increased Hemoglobin A1c (HbA1c), a measure of average blood glucose over time (Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005; Herman, 1992).

Food insecurity has been associated with an increased risk of obesity, gestational diabetes, T2D and higher HbA1C (Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012;

Seligman, Bindman, Vittinghoff, Kanaya, & Kushel, 2007; Laraia, Siega-Riz, & Gundersen, 2010; Marjerrison, Cummings, Glanville, Kirk, & Ledwell, 2011). There is also evidence food insecurity has a negative impact on HbA1c for patients with diabetes (Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012). Food insecurity and historical loss are both measures of social injustice for the NA population and would clarify the role of social injustice plays for diabetic NAs (Laraia, Siega-Riz, & Gundersen, 2010; Marjerrison, Cummings, Glanville, Kirk, & Ledwell, 2011; Marmont & Wilkinson, 2006). Poverty rates among NAs according to the 2010 Census are twice as high compared to the general US population (US Census Bureau, 2011).

Glycemic Control. Glycemic Control is vital to the quality of life and prevention of complications for diabetics (American Diabetes Association, 2014). According to the American Diabetes Association HbA1c, a measure of average blood glucose over a three month period, should be below or around 7% mmol/L for optimal outcome (American Diabetes Association, 2014). Continuous high blood glucose can result in neuropathy, retinopathy, renal disease, and cardiovascular disease (American Diabetes Association, 2014). Optimal glycemic control can reduce diabetic complications and promote longevity and quality of life (American Diabetes Association, 2014).

Although food insecurity and poor glycemic control have a profound impact on negative health outcomes associated with T2D, evidence on the role of historical trauma in the development of the disease remains limited (Brave Heart & DeBruyn, 1998; Poupart, 2003; Roubideaux, et al., 2004). The purpose of this study was to provide a preliminary examination of the relationship between historical loss, food insecurity, and glycemic control in a group of NAs with T2D.

Research Aims

Aim 1: Test if historical loss is associated with food insecurity among NAs with T2D.

Hypothesis 1: NAs with T2D with higher scores on the Historical Losses Scale will have increased risk of suffering from food insecurity.

Aim 2: Examine the association between historical loss and glycemic control among diabetic NAs with T2D.

Hypothesis 2: NAs with T2D with higher scores on the Historical Losses Scale will have higher HbA1c concentrations.

Aim 3: Evaluate the association between food insecurity and glycemic control among diabetic NAs with T2D.

Hypothesis 3: NAs with T2D who suffer from food insecurity will have higher HbA1c concentrations, as compared to those who do not suffer from food insecurity.

Methods

Sample and Participants. The focus of this study was Shoshone-Bannock Tribal members, 18 years or older, who had been diagnosed with T2D and were active patients receiving care at the Not-tsoo Gah-nee Clinic. Patients were determined to be active if their primary diabetes care had received in the last year. Patients seen within the last calendar year who were documented as visiting from out of town (with primary care elsewhere), receiving dialysis, or only acute care were considered transient patients and were not included as active patients. Patients were considered inactive if they have not been seen in the last calendar year or were deceased. For this study of the 501 patients in the study sample 76 responded to the survey.

Recruitment of Participants. The principal investigator (PI) attempted to contact all eligible 501 patients, who met sample criteria, by phone. If a patient did not answer, the interviewer did not leave a message.

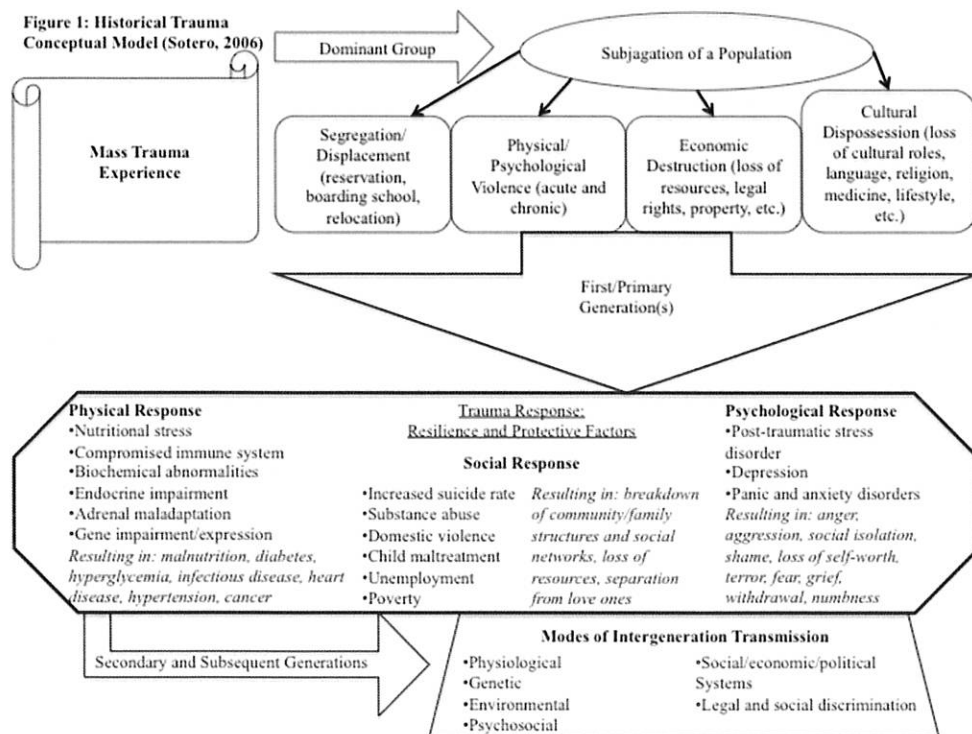
Conceptual Model

In the Historical Model Conceptual Theory it is postulated that the multi-generational effects of historical trauma result in the breakdown of physical, social and psychological protections (Sotero, 2006). The mass trauma experience is structural in nature and impacts a large portion of the subjugate population (Sotero, 2006). The dominate population produces an environment, policies or laws that segregate, displace, cause physical or emotional violence, destruction of economic systems and culture of the subjugate population (Sotero, 2006). This is experienced in one or many generations and creates deleterious responses among those who experience it (Sotero, 2006).

Over time the systematic infliction of violence is reduced or ceases; however, there can be intergenerational transfer of trauma response to subsequent generations causing a continuation of trauma response in the population (Sotero, 2006). Physical, social and psychological responses to historical trauma and loss have lasting impacts on the population (Brave Heart & DeBruyn, 1998; Duran & Duran, 1995; Poupart, 2003; Sotero, 2006; Whitbeck, Adams, Hoyt, & Chen, 2004). In the primary generations often suffer from posttraumatic stress disorder, anxiety, depression, an increased prevalence of morbidity, HIV risk, alcohol, and drug abuse (Tann, Yabiku, Okamoto, & Yanow, 2007). See Figure 2.

Education and socioeconomic status have an inverse association with depression and existence of co-morbidities in minority populations, especially in Native Americans (Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005). It is unclear if depression increases the risk of T2D

or T2D increases the risk for depression (Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005); however poor psychosocial health reduces a patient's ability to maintain blood-glucose levels (Sahota, Knowler, & Looker, 2008).



Study Variables

Historical Trauma Scale. Historical trauma is not isolated to NA populations and has also been studied among Holocaust survivors, however the triggers and pervasiveness in the populations differ (Whitbeck, Adams, Hoyt, & Chen, 2004). Therefore, Whitbeck and colleagues developed and tested a measurement tool specific to NA populations (see appendix A) (Whitbeck, Adams, Hoyt, & Chen, 2004). The HL&AS is a 7-point Likert scale measuring frequency of thoughts and feelings using two subscales, historical losses and associated symptoms, with response options ranging from 0 to 6 with 0 equal to don't know or refused, 1

equal to never, 2 equal to yearly or at special times/seldom, 3 equal to monthly/sometimes, 4 equal to weekly/often, 5 equal to daily/always, 6 equal to several times a day. Each subscale of the HL&AS has 12 questions. The historical losses subscale measures the frequency of thoughts related to historical losses. The associated symptoms subscale measures the frequency of feelings associated with thoughts identified in the historical losses subscale. The scale was developed to quantitatively analyze the severity of historical loss, specifically among a NA population (Whitbeck, Adams, Hoyt, & Chen, 2004). Wording from the original survey was not changed as to allow for comparison of results in future research. Higher scores on the HL&AS indicated more frequent thoughts or feelings related to historical loss. All survey questions were completed for each study participant.

Food Insecurity. Food Insecurity data was collected utilizing a slightly modified single-question screening tool to detect food insecurity developed by Kleinman colleagues (Kleinman, Murphy, Wieneke, Desmond, Schiff, & Gapinski, 2007). The screening question was developed for use in medical settings and results of the tool found 83% sensitivity and 80% specificity (Kleinman, Murphy, Wieneke, Desmond, Schiff, & Gapinski, 2007). The survey tool asked for recall of the past month, which was modified to three months for the purpose of this study to coincide with the three-month range of the HbA1c (American Diabetes Association, 2014). Study participants were asked: “In the past 3 months, was there any day when you or anyone in your family went hungry because you didn’t have enough money for food?”

Glycemic Control. According to the American Diabetes Association, HbA1c, a measure of average blood glucose over a three-month period, is the standard diagnostic and treatment tool to determine risk for deleterious health outcomes (American Diabetes Association, 2014). After the completion of the survey the most recent HbA1c data was attained using laboratory

information in the EHR. The date of service for laboratory test was also included on the survey for verification of validity. All participants had a current HbA1c in the last 12-month period. HbA1c was divided into 4 categories: optimal control ($<7\%$), controlled ($7-7.9\%$), moderately controlled ($8-8.9\%$) and uncontrolled (9% or higher).

Sociodemographic Measures. Due to the pooled nature of two tribes, Shoshone and Bannock, on the Fort Hall Indian Reservation data was also collected on tribal self-identification to control for difference based on tribal self-identification. Educational attainment was included on the survey with the following options: less than high school, some high school, high school graduate/GED, associate degree, bachelor degree, master degree, professional degree, doctorate degree, retired, or disability (US Census Bureau, 2010). Gender and age were obtained from the EHR. Tribal self-identification, and educational attainment were gathered from respondents.

Statistical Analysis. The study required between 50 and 80 participants to reach an Alpha of 0.05%, 80% power with a 10-15% variance. The power calculation was done using G-Power Software (Heinrich Heine Universität, 2010-2013). Data was collected and entered into an Excel spreadsheet. Individuals in the study population were given randomized numeric identifiers to protect participant identify. Data was saved in a password protected folder file in a HIPAA and Privacy Act compliant server at Fort Hall IHS Service Area.

All data was analyzed using JMP software (SAS Institute Inc., 1989-2015). A t-test was used to compare respondent group to non-respondent group utilizing variables in the EHR including: age, gender and HbA1c. The relationship between historical trauma and food insecurity was analyzed using nominal logistic regression. Historical trauma and food insecurity relationships with HbA1c were analyzed using ordinal logistic regression. Multivariate analysis

controlled for possible confounding factors including: age, gender, educational level, and self-identified tribal affiliation.

Results

Contact was attempted with 501 eligible patients. Of those who were contacted, 60 chose not to participate and data was collected for 76. Respondent and non-respondent characteristics were similar in nature and were not significantly different. Respondent and non-respondent mean age was 55 years. More females were in the respondent group compared to the non-respondent group, though the difference was not determined to be significant. HbA1c was similar among respondent and non-respondent groups.

Sociodemographics of Respondents. Additional sociodemographic data was collected for the respondents during the survey process (see table 1). The majority of respondents (80%) identified as both Shoshone and Bannock, while 17% identified as Shoshone and 2% identified as Bannock. Education level varied among respondents. Most respondents (37%) were high school graduates or received a GED, 22% had some college education, 17% received an associates or trade degree, 12% completed some high school, 9% received a bachelors degree, 1% obtained a masters degree, and 1% a doctorate degree. No respondents reported less than an 8th grade education or professional degree. The majority of the respondents were food secure, while 18% reported food insecurity in the last three-month period.

Table 1: *Characteristics of Study Respondents*

<u>Variable</u>	<u>Respondents (n=76)</u>
Age	
Mean	55
Range	31-85
Gender	
Male	38%
Female	62%
HbA1c	
Mean	8.47

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Range	5.33-14
Self-Identified Tribal Affiliation	
Shoshone-Bannock	80%
Shoshone	17%
Bannock	3%
Educational Level	
Some high School or less	12%
High School Graduate/GED	37%
Some College	22%
Associates Degree	17%
Bachelors Degree	9%
Masters, Professional or Doctorate Degree	2%

Historical Trauma and Food Insecurity. After controlling for sociodemographic variables, the relationships between study variables are shown in tables 2 through 4. Historical trauma as a contributing factor to food insecurity was analyzed using nominal logistic regression. Food insecurity was not significantly associated with HbA1c using ordinal regression with a P-value of 0.6033 (see table 2) HL&AS was associated with HbA1c using ordinal logistic regression with a P-value of 0.3406 (see tables 3). There was no significant association found between historical trauma and food insecurity using the HL&AS with a P-value of 0.5456 (see table 4).

Table 2

Analysis of food insecurity association with glycemic control

	<i>B</i>	P-value
Food Insecurity → Glycemic Control	0.2701	0.6033

Table 3

Analysis of association between historical loss and glycemic control

	<i>B</i>	P-value
Historical Trauma Total Score → Glycemic Control	-0.0370	0.3406

The mean HL&AS score was 61 with a standard deviation of 17.5. Eighteen percent of respondents screened positive for food insecurity. Mean HbA1c among respondents was 8.47 with a range of 5.33-14. Although there were no significant associations between Historical Trauma and HbA1c, or Food Insecurity and HbA1c, there were significant associations between individual questions or subscales within the HL&AS and food insecurity; there was a significant association between the following questions and food insecurity: loss of land; loss of our people through early death, uncomfortable around white people when you think of these losses, feel isolated or distant from other people when you think of these losses (see table 4). Between the two subscales, only the total score of the associated symptoms subscale focused feelings had significant association with food insecurity.

Table 4

Analysis association between Historical Trauma by Subscale and Questions on Food Insecurity

	B	P-value
Historical Losses Scale		
1. Loss of our land	20.29	<0.0001*
2. Loss of our language	-8.58	0.9997
3. Losing our traditional spiritual ways	-7.88	0.9998
4. The loss of families ties because of boarding schools	-12.28	0.6596
5. The loss of families from the reservation to government relocation	-20.79	0.9636
6. The of self-respect from poor treatment by government officials	-14.78	0.9455
7. The loss of trust in whites from broken treaties	-4.85	0.9998
8. Losing our culture	10.27	0.9950
9. The losses from the effects of alcoholism on our people	18.64	0.9859
10. Loss of respect by our children and our grandchildren for elders	7.34	0.9988
11. Loss of our people through early death	38.53	<0.0001*
12. Loss of respect by our children for traditional ways	1.40	0.999
Historical Losses Subscale Total	0.0731	0.0566
Associated Symptoms Scale		
1. Sadness or depression	-16.46	0.4307
2. Anger	-7.48	0.9996
3. Anxiety or nervousness	13.58	0.9775
4. Uncomfortable around white people when you think of these losses	-22.59	<0.0001*
5. Shame when you think of these losses	-9.51	0.9753
6. A loss of concentration	28.43	0.9867
7. Feel isolated or distant from other people when you think of these	-50.37	<0.0001*

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losses		
8. A loss of sleep	5.62	0.9999
9. Rage	40.49	0.3125
10. Fearful or distrust the intention of white people	20.82	0.9996
11. Feel like it is happening again	8.87	0.9996
12. Feel like avoiding places or people that remind you of these losses	2.05	0.9998
Associated Symptoms Subscale Total	- 0.1831	0.0015*
Total Scale	- 0.0120	0.5456

Chapter 5

Discussion

This study found no significant association between historical trauma and food insecurity or glycemic control. Overall measure of historical trauma increasing probability of food insecurity was not significant, though there were significant findings when isolating individual questions and associated symptoms subscale from the overall HL&AS. Results of this study differ from those that were found in the literature. Multiple studies have found decreased glycemic control in populations with food insecurity (Seligman, Bindman, Vittinghoff, Kanaya, & Kushel, 2007; Mathematica Policy Research, 2012; Casey, Szeto, Lensing, Bogle, & Weber, 2001; Castillo, Ramsey, Yu, Ricks, Courville, & Summer, 2012; Laraia, Siega-Riz, & Gundersen, 2010; Vozoris & Tarasuk, 2003).

Although this study did not find that historical trauma was associated with food insecurity or glycemic control, the HL&AS has been used by other researchers as a measure of historical trauma. Results from other studies utilizing the measure have found significant associations between historical trauma and health behaviors or outcomes. One study among native populations in the Northern Midwest and nearby Canada found a correlation between alcohol abuse, perceived discrimination, and historical loss using the HL&AS (Whitbeck, Chen, Hoyt, & Adams, 2004).

In another study Whitbeck and colleagues found significant increases in depressive symptoms in NA adolescent teens in remote communities in the Northern Midwest and Canada and found that remote location increased the effect of historical loss (Whitbeck, Walls, Johnson, Morrisseau, & McDougall, 2009). Location of the population affected the results of this study, so isolation from outside communities may increase the internalizing effect of historical loss

(Whitbeck, Walls, Johnson, Morrisseau, & McDougall, 2009). The study also included coping and confounding factors such as family warmth and supportiveness, financial strain, child guardian, perceived discrimination, and stressful life events (Whitbeck, Walls, Johnson, Morrisseau, & McDougall, 2009).

Results from the current study may be explained by cultural differences in the NA tribe included in the study and policies that impact access to medications. Although the HL&AS tool has been used with other NA tribes, the tool may not be appropriate for use with the Shoshone-Bannock population. The culture and experiences of the NA tribes populations in other studies were likely different than that of the Shoshone-Bannock population (Whitbeck, Chen, Hoyt, & Adams, 2004). Availability of medications to patients receiving care at the Not-tsoo Gah-nee clinic could reduce the effect of food insecurity on glycemic control in the population because financial decisions are not necessary for the procurement of medication. This may result in food insecure patients who have good glycemic control due to their use of diabetes medications but further research is needed to determine the variation of results from other populations.

Strengths and Limitations.

This study had several limitations. For instance phone surveys will only reach a portion of the population as a portion of the population will not have up-to-date contact information or will not have a telephone. This could lead to selection bias. Those without phones were more likely to be low income and therefore have higher rates of food insecurity, poorer glycemic control, and greater historical loss. However, telephone surveys were the most efficient way to collect data from the population. Mail out surveys were considered for this study, however low income populations are also associated with low literacy groups and there was expected to be a lower response rate and HbA1c linkage to the data in surveys could be affected in other members

of the household were also diabetic causing error in results. Finally, in person survey was also considered, however there would be considerable staff time involved and a low response rate due to the logistics of an in person interview.

HbA1c measure is also limited to an average of the last three months of glycemic control (American Diabetes Association, 2014). This does not give a larger picture of glycemic control over time (American Diabetes Association, 2014). However, data for diabetic complications is difficult to obtain as the majority of care for complications is provided by outside medical providers through referral process. Therefore, in this study, HbA1c is the best alternative to characterize glycemic control.

Self-reporting surveys are susceptible to inaccuracy due to the individual recall required to answer. Individuals with higher levels of distrust for the US government, the scientific community and individuals of Caucasian decent may be less likely to participate in the survey or answer truthfully to questions therein. In working in the NA community I have experienced this type of distrust. Having phone surveys can reduce some apprehension on the part of the participant; talking to someone who is a voice on the other end of the phone verses an individual of differing race or political association.

Though there were some significant results in the study there are limitations to the HL&AS. The HL&AS has a high respondent burden. The HL&AS focuses on past traumatic events and associated feelings. The scale was the longest portion of the survey and participants often needed questions in this section repeated during the survey. The HL&AS was the most time consuming and least comprehended portion of the survey. Phone survey interviews lasted anywhere from seven minutes to 90 minutes. A shorter scale to measure the effect of historical trauma would reduce the length of the interviews considerably. Self-reporting in a study is often

a factor in surveys. In the context of this survey, self-reporting in the HL&AS could affect the sensitivity of the survey tool due to possible desensitization and somatization of thoughts and feelings in the population. As a known individual in the community and a non-tribal member there could be reluctance to answer more sensitive questions with candor.

The HL&AS focused on the frequency of thought about historical losses and the feelings caused by those losses. Throughout the course of this study many respondents stated they do not think about past events, though they may still have an effect on the mental health of the individual. Depression and other mental health issues can also be under reported due to desensitization in the community as a result ongoing trauma and cultural propensity of the somatization of thoughts and feelings (Office of the Surgeon General (US); Center for Mental Health Services (US); National Institute of Mental Health (US), 2001). An individual blocking thoughts of historical loss and desensitization or somatization of feelings related to those thoughts could impact the sensitivity on the HL&AS.

Desensitization has been shown in several studies in youth and adolescents, but little research is published for the effects on adults in communities with high rates of violence and oppression (Mrug & Windle, 2010; Gaylord-Harden, Cunningham, & Zelencik, 2011). Gaylord-Harden and colleagues found up to a moderate level of violence experienced by youth depressive symptoms increased, however when violence increases past a moderate level depressive symptoms actually decrease with desensitization to violence (Gaylord-Harden, Cunningham, & Zelencik, 2011). Additionally, expression of feelings could lead to increased victimization and therefore leads to a learned response to decrease expression, which could lead to underreported data related to feelings (Gaylord-Harden, Cunningham, & Zelencik, 2011). Mrug and Windle found an increase in delinquency in youth exposed to community violence rather than depressive

symptoms (Mrug & Windle, 2010). Communities with increased exposure to violence and oppression are more likely to have underreported symptoms of depression, which could effect the collection of data on thoughts and feelings associated with historical losses (Mrug & Windle, 2010; Gaylord-Harden, Cunningham, & Zelencik, 2011).

The perception, understanding, and expression of thoughts and feelings in NA communities may differ from Euro-American explanatory styles. Reickmann and colleagues found depression and other mental illness is often associated with spiritual imbalance in Navajo adolescents (Reickmann, Wadsworth, & Deyhle, 2004). Minority adolescents are more likely to report stress as somatic symptoms than middle-class counterparts (Reynolds, O'Koon, Papademetriou, Szczygiel, & Grant, 2001; White & Farrell, 2006). The Surgeon General's report states many NAs belief systems and life ways focus on a physical manifestation of feelings and individuals are more likely to have physical manifestations of psychological processes, which could reduce the affect measured by the HL&AS (Office of the Surgeon General (US); Center for Mental Health Services (US); National Institute of Mental Health (US), 2001). The somatic expression of stress and mental health issues can reduce the sensitivity of the HL&AS due to the focus on feelings rather than physical manifestation.

Much of the HL&AS focuses on thoughts and feelings, which may reduce the reliability of the scale in NA population health studies. As a result, the Adverse Childhood Experience scale (ACE), which focuses on events experienced in childhood rather than thoughts and feelings, may be more effective in identifying the presence of historical trauma outcomes in NA populations. ACE is a more simplified survey tool, consisting of ten questions, which could reduce response burden, decrease interview time, and increase response rates. ACE focuses on adverse events such as abuse, neglect, alcohol and drug use witnessed and experienced in

formative youth years. An increase of the amount of traumatic events identified in the survey increases the ACE Likert score for the respondent. ACE was developed for the general population; therefore, comparisons could be made between NA populations and other racial or ethnic groups. Because of the association between adverse childhood experience and the development of type 2 diabetes in adulthood, ACE may also be a more appropriate measure of the impact of individual trauma on disease. (Lynch, Waite, & Davey, 2013). Meta-analysis of ACE and risk for T2D found there was a significant increase in T2D risk for those with adverse childhood experiences (Huang, et al., 2015). Including ACE as a measure of the effects of historical trauma in NA populations could help to further clarify relationships of variables.

Conclusion Although there were no significant associations among the primary variables identified in the study, health disparities among NAs populations continue to be a significant barrier for the US. Identifying factors impacting and influencing these disparities can lead to prevention and intervention efforts, which are culturally appropriate. Utilization of alternative measures, such as ACE, to identify the impact of historical trauma, and structural violence experienced by the population is important to determine factors influencing health disparities among NAs. Due to the belief in the interactive aspects of physical, mental, emotional, and spiritual health among the population further population research is necessary to determine the associations and health outcomes in NA populations.

Appendix A
Survey Guide

Informed Consent

“Hello, is (patient’s name) available?”

(If pt speaking/available,) “This is (interviewer’s name and position) from the Shoshone-Bannock Tribes’ Diabetes Project. I would like to ask you a series of questions related to diabetes to be used in a thesis study to improve understanding of diabetes. The study is exploring the relationship between type 2 diabetes, blood sugar control, food insecurity and historical trauma. Questions from this survey and data from your health record at IHS will be used in this study including: age, gender and most recent HbA1c laboratory results. Information gathered in this study will be analyzed and presented as part of a thesis requirement for Idaho State University. The principle investigator, Sunny Stone, works both with the Tribal Health and Human Services Diabetes Project and is studying at ISU. Participating in this study will not provide individual benefit and is separate from and will not affect the care you receive from Tribal Health and Human Services programs or Indian Health Services. This study will not provide any information that can identify you as an individual and your individual answers will be protected as personal health information. The Fort Hall Business Council has approved this study through resolution number 2014-1055. The study is being conducted with written support from Indian Health Service Fort Hall Service Area and Shoshone-Bannock Tribal Health and Human Services. If you have questions about the research study you may contact the Primary Investigator, Sunny Stone, at (208) 478-4039. If you have concerns about your rights as a participant, please contact Thomas Weiser, MD, MPH, at 1-877-664-0604. Dr. Weiser is Co-Chair of the Portland Area Indian Health Service Institutional Review Board, which has reviewed this project. You can discontinue this survey at any time. Do you have a few minutes to participate?

☐ Yes ☐ No

Gender: Male	Age:	HbA1c:
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Survey Date: Interviewer: De-identified patient number:

Which tribe do you most closely identify with? Shoshone-Bannock What is the highest level of education attained? Doctorate degree

In the past 3 months, was there any day when you or anyone in your family went hungry because you didn’t have enough money for food?
Refused

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Historical Losses Scale (Whitbeck, Adams, Hoyt, & Chen, 2004): "I am going to ask you about how often you think about different losses. Please answer by stating how often you think about the subject using the following categories: never, yearly/special times, monthly weekly, daily, several times a day."							
	Several Times a Day (6)	Daily (5)	Weekly (4)	Monthly (3)	Yearly or Special Times (2)	Never (1)	Don't Know/Refused (0)
1. Loss of our land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Loss of our language	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Losing our traditional spiritual ways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The loss of families ties because of boarding schools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The loss of families from the reservation to government relocation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. The of self-respect from poor treatment by government officials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. The loss of trust in whites from broken treaties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Losing our culture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. The losses from the effects of alcoholism on our people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Loss of respect by our children and our grandchildren for elders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Loss of our people through early death	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Loss of respect by our children for traditional ways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Historical Losses Associated Symptoms Scale (Whitbeck, Adams, Hoyt, & Chen, 2004): "Now I would like to ask you about how you feel when you think of these losses. I will state a feeling and you can respond, never, seldom, sometimes, often, or always."						
Feeling	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)	Don't Know/Refused (0)
1. Sadness or depression	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Anger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Anxiety or nervousness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Uncomfortable around white people when you think of these losses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Shame when you think of these losses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. A loss of concentration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Feel isolated or distant from other people when you think of these losses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. A loss of sleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Rage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Fearful or distrust the intention of white people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Feel like it is happening again	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Feel like avoiding places or people that remind you of these losses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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