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EXPLORING THE RELATIONSHIP BETWEEN SENSE OF COHERENCE AND HISTORICAL TRAUMA AMONG AMERICAN INDIAN YOUTH

William Evans, PhD, and Bret Davis, PhD

Abstract: Historical trauma has been associated with many health and social issues. However, there is little understanding of how American Indian (AI) youth cope with historical trauma. Sense of Coherence (SOC) provides a promising framework for studying the relationship between resiliency and historical trauma, as it is a theorized mechanism that helps individuals cope with ongoing stress. A multi-method study examining the potential relationship between SOC and historical trauma revealed that higher levels of SOC predicted fewer historical trauma-related symptoms and provided rich detail about how an AI youth sample conceptualized stress and coping. Implications and future directions are discussed.

INTRODUCTION

Historical trauma has long been a major social and health issue among American Indian (AI) tribes (Bassett, Buchwald, & Manson, 2014; Gone & Alcántra, 2007: Middlebrook, LeMaster, Beals, Novins, & Manson, 2001). Historical trauma is defined as the cumulative emotional and psychological wounding derived from massive group trauma experiences occurring over the course of the lifespan and across generations (Brave Heart & DeBruyn, 1998; Armenta, Whitbeck, & Habecker, 2016). Additionally, historical trauma has been associated with specific response features, which include but are not limited to depression, self-destructive behavior, suicidal ideation and attempts, anxiety, low self-esteem, and self-medicating to try and hide painful emotions (Brave Heart, 2003; Kirmayer, Gone, & Moses, 2014; Mohatt, Thomspon, Thai, & Thebes, 2014). AIs have to cope with the transgenerational trauma brought on by European colonization, which has stripped many AI tribes of their culture (Gone, 2013a; Zahran, et al. 2004). Historical trauma among AIs is due to unresolved grief that is thought to span generations and is caused by the loss of lives, culture, and land from European colonization (Brave Heart & DeBruyn, 1998; Crawford, 2014; Evans-Campbell, 2008; Mohatt et al., 2014). Brave Heart & DeBruyn (1998) asserted that historical trauma is exacerbated by racism, oppression of native peoples, and internal conflict among tribal members. This ongoing suffering has been linked to chronic substance abuse, physical and sexual abuse,

violence, and suicide ideation, attempts, and completions (Brave Heart et al., 2016; Gone, 2013a; Gone & Alcántara, 2007; Middlebrook et al., 2001). AI populations continue to struggle with the effects of colonization and historical injustices, including vanishing AI cultures and languages (Brave Heart & DeBruyn, 1998; Kirmayer, et al., 2014).

Historical trauma also has been linked to impaired AI well-being through the long-term disruption of families and communities, parenting interference from punitive institutional and governmental practices, a compromised emotional response, repeated physical and sexual abuse, loss of cultural and historical knowledge, and the systematic devaluing of Native identity (McLeigh, 2010; Kirmayer et al., 2014). Furthermore, historical trauma appears to have negatively impacted AI youth who have a high risk for health problems such as substance abuse, violence, mental illness, and suicide (Brockie, Dana-Saco, Wallen, Wilcox, & Campbell, 2015; Cheadle & Whitbeck, 2011; Whitbeck & Armenta, 2015; Whitbeck, Walls, & Welch, 2012). Many AI youth also are more likely to live in communities with higher rates of physical and mental health disparities and lower rates of educational attainment compared to the rest of the U.S. population (Fleischhacker, Roberts, Camplain, Evenson, & Gittelsohn, 2016; Faircloth & Tippeconic, 2010; Garrett et al., 2014; Gone & Trimble, 2012; Fryberg, Covarrubias, & Burrack, 2013; Sauder et al., 2017; Henson, Sabo, Trujillo, & Teufel-Shone, 2017). Given these social and health risks, it is important to understand how AI youth cope with historical trauma.

Background and Context

Our interest in examining historical trauma among AI youth was spurred from focus groups we conducted in 2012 with employees of a Tribal Clinic in the Western United States[1] as part of a program evaluation of the Tribe's suicide prevention efforts (Evans & Davis, 2013). One of the purposes of these focus groups was to gain a better understanding of obstacles that might prevent Tribal youth from engaging in help-seeking behaviors. Our discussion quickly turned to the topic of historical trauma. As we gently probed for information on the effects of historical trauma on tribal youth, our adult participants indicated that they felt that cultural erosion has had an adverse effect on their youths' self-esteem and behavior.

The consensus from these focus groups was that historical trauma was a major, yet little addressed, Tribal issue impacting local AI youth. Given these findings, we became interested in

[1] These focus group data, and all data from the primary mixed-method study, were collected at the same remote reservation located in the Western United States.

how historical trauma was impacting AI youth. This interest became the catalyst for the present study, where we sought to gain a better understanding of how AI youth conceptualize stress associated with historical trauma and how they cope. In this vein, we believe that Sense of Coherence (SOC[2]; Antonovsky, 1979) provides a promising framework for studying the relationship between resiliency and the stressors associated with historical trauma. In the next section we introduce the concept of Sense of Coherence, then we present the results of a multi-method study examining the relationship between SOC and AI youth's symptoms associated with historical trauma.

Sense of Coherence

Antonovksy (1979) presented Salutogenesis as a theoretical framework for examining how some people manage to thrive despite being exposed to ongoing stress. Salutogenesis is a strength-based framework of health promotion that emphasizes the resources people can develop and use to increase their individual and collective well-being (Mittelmark & Bauer, 2017). Unlike traditional models of health, which view healthiness as the lack of disease, Antonovsky asserted that health and disease were polar ends of a continuum and that individuals move along this continuum throughout their lives (Antonovksy, 1996; Mittelmark & Bauer, 2017). Antonovsky (1979) proposed the construct of SOC as the central component of the Salutogenic model to explain how adaptation to stress impacts health.

Antonovsky (1979, 1987) asserted that SOC is integral in helping move towards health; he theorized it as a mechanism that people rely upon to deal with ongoing stress by managing, comprehending, and creating meaning about life stressors. According to Antonovksy (1990), *manageability* refers to having the resources to cope with life's demands. An example of how manageability applies to AI youth is that they must face demands derived from cultural oppression, discrimination, and historical trauma (Yasui, Dishion, Stormshak, & Ball, 2015). Those with a high sense of manageability are less likely to feel as though they are victims of life events or that life has treated them unfairly (Antonovsky, 1987). *Comprehensibility* refers to a person's ability to view stressors as understandable, ordered, structured, and predictable, and *meaningfulness* refers to a person's ability to see life as a challenge worthy of engagement and investment. Individuals

[2] Although we acknowledge that this acronym is widely used to mean 'Systems of Care' in Indian Country, we retain this for use as 'Sense of Coherence' in this paper due to its long-standing use in the coping and resilience literatures.

with a high sense of comprehensibility see the world as consistent and structured, rather than raucous and chaotic, and when they do encounter surprises, they will view them as being orderable and explicable (Antonovksy, 1987). Additionally, Antonovsky described meaningfulness as the motivational element of SOC, in that individuals with a high sense of meaningfulness believe that when they encounter negative events (e.g., the death of a loved-one), they are willing to take up the challenge, be determined to seek meaning in the event, and do their best to overcome the event with dignity. Moreover, SOC is theorized as an orientation or attribute, in which a person with a higher SOC has generalized resistance resources (GRRs) to cope with stressors. GRRs are resources that an individual has at their disposal, which provides them with a set of life experiences that bolsters their ability to cope with stress, and contributes to the development of the individual's SOC (Antonovsky, 1987; Idan, Eriksson, & Al-Yagon, 2017). Those with more GRRs are thought to have a higher SOC and are thus more likely to be able to handle life's stressors than those with a low SOC (Antonovksy, 1987). Like Salutogenesis, Antonovksy conceptualized SOC as existing on a continuum, unlike the traditional pathogenic model, with higher SOC levels linked to healthiness and well-being.

Sense of Coherence has been supported by a rich literature of research. It has been associated with reduced mortality (Geulayov, Drory, Novikov, & Dankner, 2015) and higher levels of life satisfaction in adolescents (Moksnes, Lohre, & Espnes, 2012). Additional research by Mattisson, Horstmann, and Bogren (2014) found a negative correlation between SOC and depressive anxiety as well as psychotic disorders. SOC also has been shown to mediate the relationship between trauma and anxiety, social function, and loss of confidence, among Palestinian health providers (Veronese & Pepe, 2014). Similarly, research by Braun-Lewensohn, Sagy, and Roth (2011) found that SOC mediated the relationship between trauma from missile attacks and stress reactions of Israeli teenagers.

Bowman (1996, 1997) conducted the only known studies to date examining SOC among AIs and found that SOC was negatively associated with depression, anxiety, and physical symptoms; she also found evidence consistent with the idea that SOC can be developed and expressed through a variety of cultural paths. Additionally, Bowman found that AI and Anglo participants reported similar levels of SOC. To our knowledge, however, no studies have examined the potential role of SOC in mitigating symptoms associated with historical trauma among AI youth. Given that prior research has demonstrated that SOC is negatively associated with stress in AIs and adolescents, the current study sought to answer the following question: What is the

relationship between SOC and historical trauma among AI youth? To explore this question, a sequential, mixed-method, exploratory study was conducted by first administering an in-school survey to assess the relationship between SOC and historical trauma, followed by an art-based structured interview with AI youth from the same school to examine the phenomenological experiences of youth's stressors and coping strategies.

METHODS

In-school Survey Component

Consent Procedures and Participants

Permission to pursue this study was initially sought from the Reservation's Tribal Council. Approval for the study was obtained, but since the tribe did not have its own review board for human subject research, the Council requested that the researchers seek approval from the review board of their academic institution. The Tribal Council's resolution of approval, along with a letter of support from the principal of the tribal school, were included in the Institutional Review Board application. Human subjects' certification was obtained for all data collection procedures of this study. Initially, letters describing the study and consent/assent procedures were sent to the parents of all of the youth of this small tribal school ($N = 64$). This letter stated that only youth with signed and returned parent consent forms could participate in the study and that youth without parent consent (or who were not interested in participating) would be allowed to work on alternate schoolwork as assigned by their teacher during study data collection. Youth assent also was obtained prior to the survey and arts-based interview administration. These procedures resulted in 30 AI youth participating in the study from this tribal junior/high school on a remote reservation in the Western United States. All consent and assent forms indicated that only de-identified data, images, or quotes would be used for research or publication purposes. The gender ratio was even, and the ages of the participants ranged from 14 to 18 years, with a mean of 15.67.

Study Procedure

The survey was administered at the school during regularly scheduled English classes. The researchers explained the purpose of the study and asked students to sign the assent forms if they agreed to participate in the study. The participants then were asked to complete the survey, which took approximately 20-30 minutes to complete. Participants also were provided snacks and drinks

as incentives while they completed their survey. This same procedure was followed for the arts-based, structured interview study component.

Measures

Sense of Coherence. Sense of Coherence was measured using the SOC scale (Antonovsky, 1987). The SOC scale consists of 29 items, which are a series of semantic differential items on a seven-point scale, with anchoring phrases at each end. High scores indicated a strong SOC. The SOC scale is comprised of three subscales: comprehensibility, manageability, and meaningfulness, defined in the previous section. An account of the development of the SOC scale and its psychometric properties, revealing it to be reliable and valid, appears in Antonovsky's writings (1987, 1993). Antonovsky (1993) reported Cronbach's alphas ranging from .82 to .95 with an average of .91; the Cronbach's alpha for this study was .92. Example items are "Do you have the feeling that you are in an unfamiliar situation and don't know what to do?" (comprehensibility; 1= very often to 7 = very seldom or never), "Until now your life has had:" (meaningfulness; 1 = no clear goals or purpose at all to 7 = very clear goals and purpose), and "When you think of difficulties you are likely to face in important aspects of your life, do you have the feeling that:" (manageability; 1 = you will always succeed in overcoming difficulties to 7 = you won't succeed in overcoming difficulties). Although there is a shorter version of the SOC scale (SOC-13; Antonovsky, 1987), both versions have rarely been employed with AI youth. Therefore, we decided to use the original 29-item scale for this exploratory study to capture as many elements of the SOC construct as possible. In addition, the 29-item scale has historically displayed higher reliability than the SOC-13 (Antonovksy, 1993; Jakobsson, 2011).

Achenbach Youth Self-Report. The Achenbach Youth Self-Report for ages 11-18 (YSR; Achenbach & Rescorla, 2001) is a 112-item scale that broadly measures behavioral and emotional problems through items yielding a total problem score along with two broad-band scales (internalizing and externalizing), eight subscales, and six DSM scales. For this study, the total problems scale was used for analyses, which contains all 112 items. However, over two-thirds of participants skipped one item, which is open-ended. Given the systematic non-response of that one item, we decided to remove the item from the analysis. Achenbach & Rescorla (2001) reported good internal consistency for the total problems scale, with a test-retest reliability score of .87. Similarly, Braun-Lewensohn et al. (2009) used the total problems scale to examine well-being among Israeli youth exposed to missile attacks and reported an alpha of .91. Reliability of the YSR for this study was .94.

Historical Loss Associated Symptoms Scale. The Historical Loss Associated Symptoms Scale (Whitbeck, Adams, Hoyt, & Chen, 2004) is a 12-item scale that assesses the frequency of symptoms and emotional responses to loss (i.e., anger, shame, loss of sleep, etc.) associated with historical trauma. This scale contains two subscales, the anxiety/depression subscale, and the anger/avoidance subscale. Whitbeck et al. (2004) reported that the Historical Loss Associated Symptoms scale showed high internal consistency with a Cronbach's alpha of .89. Reliability for this study was .91 for the Historical Loss Associated Symptoms Scale, .83 for the Anxiety/depression subscale, and .85 for the Anger/avoidance subscale. The scale was measured on a 6-point scale ranging from 1 (Never) to 6 (Daily); we also included a "Does Not Apply" response. The measure was preceded by the following prompt: "Please think back to the losses you have experienced as a Native American. Please place an X under the response that best indicates how frequently you have experienced the following."

Results and Discussion

Regression analyses examined the relationship between SOC and symptoms associated with historical trauma, as well as SOC and participant responses on the total problems scale of the YSR. Results revealed that SOC predicted lower levels of symptoms associated with historical trauma and participants' response on the total problems scale (See Table 1). The results are consistent with Antonovsky's Salutogenesis theory, which posits that higher levels of SOC are associated with greater adaptation to stress, enhancing individuals' health. These results established a significant relationship between SOC and historical trauma within our AI youth sample. The next step was to understand how AI youth perceive stress and coping, and how these perceptions relate to the conceptual frameworks of historical trauma and SOC.

Table 1
Regression Results for SOC Predicting Historical Loss and Total Problem Score Outcomes

Model	R^2	b	SE
Historical Loss Symptoms	**.58**	**-1.10*** **	.19
Total Problems (YSR)	**.57**	**-2.3*** **	.04

Note. Bolded text with *** indicates a significant result ($p < .001$).

Art-based Interview Component

Next, we wanted to understand through stress and coping prompts if the historical trauma themes identified by Kirmayer, Simpson, and Cargo (2003) would emerge from this qualitative component with the youth. Although Kirmayer et al. (2003) were specifically applying their themes to a residential school experience, these themes are commonly cited throughout the historical trauma literature (e.g., Brave Heart & DeBruyn, 1998; Cross, 1986; Evans-Campbell, 2008; Gone, 2013a, 2013b; Hartman & Gone, 2016; Kirmayer et al., 2014; Whitbeck et al., 2004; Yasui et al., 2015). Kirmayer et al. (2003) identified six major consequences of historical trauma: 1) disruption of families and communities; 2) confusion of parenting with punitive institutional practices; 3) impaired emotional response; 4) repeated physical and sexual abuse; 5) loss of knowledge, language, and tradition; and 6) systematic devaluing of Native identity.

Therefore, we sought to understand specific stressors affecting AI youth and how they coped with these stressors in daily life. For this component, a qualitative art-based structured interview was administered to explore more deeply stress and SOC concepts among AI youth. The research question we sought to answer with this component of the study was: How do AI youth comprehend, manage, and find meaning from stressors so that they can better cope with ongoing life stress? To investigate this question, we used the art-based interview format as described by Huss, Sarid, and Cwikel (2010). Huss et al. (2010) developed this qualitative interview procedure to assess the phenomenological experiences of social workers working in a war zone situation. Huss et al.'s method allows participants to express their phenomenological experiences of stress and how they cope with that stress. Drawings and interview content then could be assessed for themes consistent with SOC and historical trauma conceptual frameworks.

Participants and Data Sources

Participants (n = 27) were AI youth attending the same junior/high school as the participants in the survey component. The sample consisted of 62% females, and the ages of the participants ranged from 14 to 18 years, with a mean of 16.8. The consent and assent procedures that were used for the survey component also were used for the arts-based component. The sources of data for this art-based component were comprised of the 54 images participants drew from the two prompts (outlined below) and the written explanations each participant included on the back

of each drawing. Additionally, the authors interviewed each participant so that they could elaborate on the meaning of their drawings.

Procedure. Each participant was asked to draw two images that are part of an arts-based interview format (Huss et al., 2010) and were offered snacks and drinks as incentives during this process. Participants drew the images using pencils, color markers, and white paper. The aim of both drawings was to symbolize how the youth defined and coped with stress, focusing on conceptualizations of comprehensibility, meaningfulness, and manageability. Specifically, participants were asked to draw using two prompts. The first prompt asked participants to draw a picture depicting a day-to-day stressful situation in their life. The participants were given 20 minutes to complete this drawing. Once the participants finished their drawings, they were asked to turn the paper over and write a few sentences explaining the image regarding the stressor and their stress reaction. This was followed by interviews with each participant to understand, provide clarity, and expand on the meaning of what they drew and wrote. The second prompt asked participants to draw a different scene depicting a very positive (good) day in their life. Follow-up prompts included: "What could make this day better" and "How does this help you cope with stress?" Participants were once again given 20 minutes to complete the drawings and were asked to describe what they drew on the back of the paper. Interviews with each participant again sought clarity and understanding of the meaning and content of the images.

Results and Discussion

Analysis of drawings followed the arts-based interview format from Huss et al. (2010) to identify themes related to the types of daily stress and coping strategies in the images. This process was iterative, with an initial thematic content analysis of the drawings, followed by an analysis using art diagnostic theories (Furth, 1998; Silver, 2001), with a focus on life stressors and coping, since these were our study variables of interest. Thus, our overall approach for this component was epistemological in that we sought to understand how our participants know and experience their world, particularly regarding stress/coping, which we believe are constructed and mediated through their culture (Twinning, Heller, Nussbaum, & Tsai, 2017). The drawings in this section are representative of the themes elicited from participants. We limited the number of drawings to protect the identity of participants who included elements that might identify them or the tribe and to address space limitations.

In terms of the **Stress** themes that emerged from the initial drawing prompt (day-to-day stressful situation), *Family Conflict*, *Loss*, *School Stress*, and *Isolation* were found to be the most

salient and consistent thematic content. For **Coping** themes (from the very positive/good day prompt), *AI Culture, Sports, Art and Music*, and *Family* emerged as the most prominent themes. Many participants included labels and descriptions as part of their drawings−often saying they did so because they were unsure of their artistic skill ("I'm no artist" and "I can't draw") and wanted to provide clarity of what they were depicting.

Cross Validity

Cross validity was assessed by having each author separately undertake the analyses and then reach consensus on the thematic content and by using the drawings and verbal explanations to endorse and validate each other. Themes from each of the two drawing prompts emerged through this iterative process. As thematic data was gathered, the researchers reviewed them for overlapping themes and finalized these themes according to the broad categories of stress and coping that related to each drawing prompt. Example drawings and their descriptions are provided for the themes of Stress and Coping that emerged from our analyses of the student images.

Stress. Themes that emerged from the stress prompt revealed familiar adolescent stressors of *Family Conflict* and *School*, but also *Isolation*—perhaps not surprising given the remote location of their home Reservation—and *Loss*, often related to broken homes through domestic violence, death, alcoholism, and relocation among family members. Below is a quote from a 16-year-old female reflecting school-related stress.

> Having to wake up really early in the morning is very stressful because you can't miss school, and if I do, my parents have to take me and that is over an hour drive one way. This is stressful on my family and myself. I always have to make up stuff at home that I missed at school…homework is stressful as well. Drama is also an issue at school—that is stressful.

The theme captured here is consistent with Kirmayer et al.'s (2003) theme of disruption of family and communities. The majority of the stress expressed appears to be associated with this participant's family living so far away from the Tribal school.

Many of the stress prompt images contained multiple themes; in Figure 1, a 15-year-old male has drawn an image of his step-father being taken away to prison by police for abusing his sister, reflecting both *Family Conflict* and *Loss*. He stated about the drawing, "I'm mixed up; happy he is gone, but I miss him." The comments here also are reflective of disruption of families and communities. In addition, the participant's mixed feelings about the event may also be suggestive

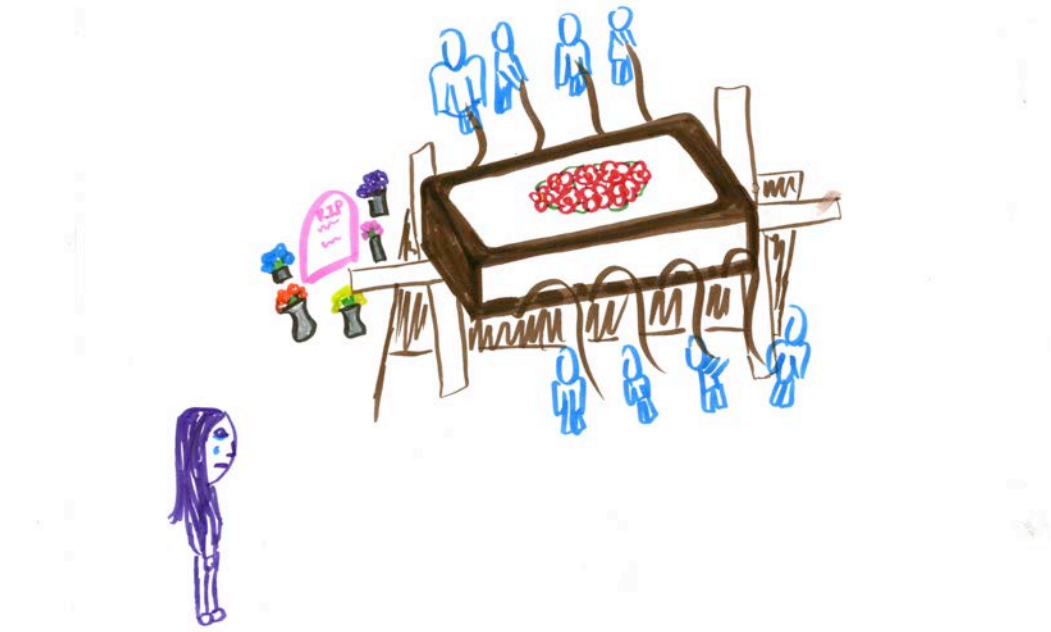
of impaired emotional response associated with attachment disruption due to losing a parent (Westen, Nakash, Thomas, & Bradley, 2006). Lastly, the comments here also indicated abuse was present in the home, consistent with previous theorization and research on historical trauma (Andersson & Ledogar, 2008; Brave Heart & DeBruyn, 1998; Elias et al., 2012; Evans-Campbell, 2008; Gone, 2013a).

Figure 1.

Isolation also emerged as a recurrent theme in the drawings, often linked to family and community disruption. For example, one participant, a 15-year-old female commented on her drawing in which she drew her family members geographically separated by the vast distances of the western U.S.—where many rural AIs reside in reservations. She said of her drawing: "I live with a friend. This picture represents my family. Some live very far away in other reservations. I'm separate from my mom, my dad, my grandma, 2 sisters, 3 brothers, and niece."

Loss, also associated with disruption of family, was a prominent stress theme reflected in numerous images, often due to the death of a family member. A 14-year-old female drew an image reflecting the loss of her cousin (see Figure 4): "My first cousin passed away at age 20 last week. I've always called him my brother, and we were very close. This is a picture of his funeral."

Figure 2.

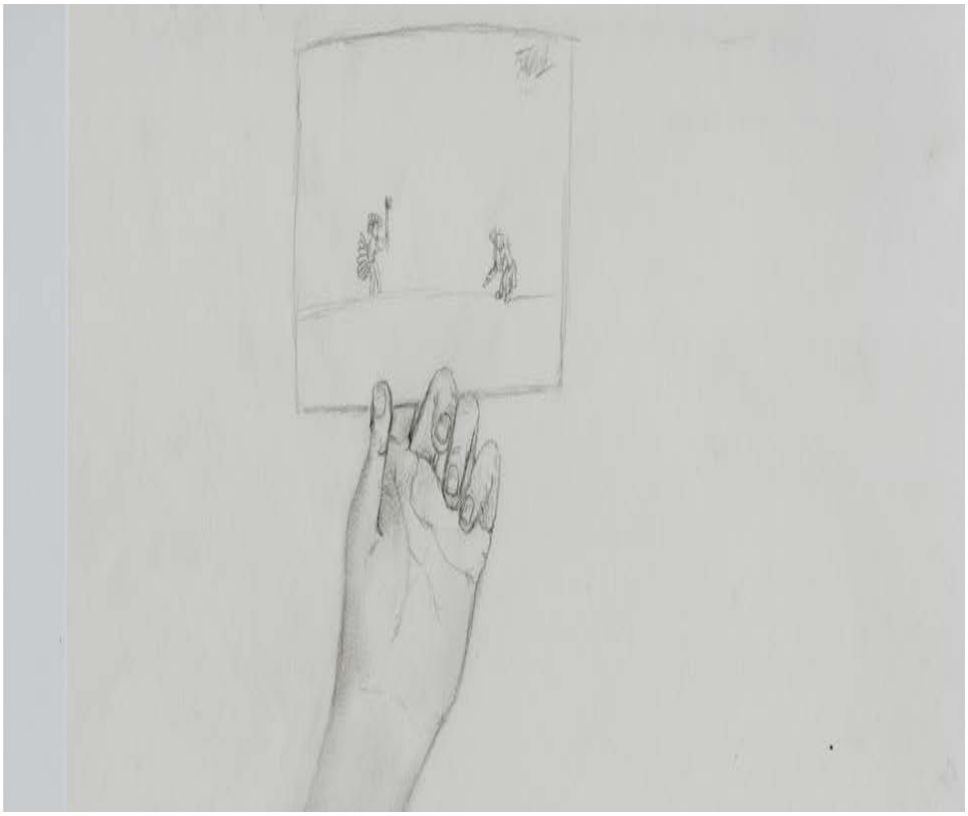


Coping. Themes from 'A good day' prompt included *AI Culture*, *Art and Music* (not directly related to AI Culture), *Sports,* and *Family*. *AI Culture* content (as most often represented by beading, dancing, music, and dress) was particularly salient, with images of AI dress and ceremonies prominent in many participants' drawings, which is consistent with Antonovsky's (1979) assertion that culture acts as a generalized resistance resource (GRR), helping people move toward health. A 15-year-old female stated that "dancing, listening to music, and shopping help stress go away." Her drawing is of herself dancing at a recent Pow Wow sponsored by the Tribe (see Figure 3). This participant's response is also consistent with the use of GRRs to make stress manageable Antonovsky, 1987).

Figure 3.

The following drawing is by a 17-year-old male participant (see Figure 4). He states of his image, “Drawing and being creative, along with my Native American culture has helped me out with stress.” This also is a drawing representing a recent Pow Wow that the Tribe conducted. This drawing is congruent with Antonovsky’s (1987) view that culture is a resource for dealing with stress and improving well-being.

Figure 4.



Sports were a prominent coping theme in many of the images among both sexes. A 17-year-old female commented on her drawing of her swimming in the tribal lake, “I love to swim. It helps me a lot. Here I am swimming in our sacred lake. Softball is my favorite sport.” This participant’s comments exemplify one who is utilizing resources (i.e., swimming and softball) to make stress manageable (Antonovsky, 1987).

Figure 5 is from a 17-year-old female. In response to the prompt of ‘A good day,’ she stated, “Everything…I drew is a representation of all the things that I do to cope with stress…I’m a very out-going person, so it is easy for me to cope with stress. All I need is my family and friends, and I can overcome anything.” This statement is an example of Antonovsky’s (1987) view that people high in meaningfulness do not see themselves as victims and that they feel that life’s

challenges are worthy of engagement and that those high in comprehensibility view the world as orderly and predictable. As previously stated, many drawings combined several themes, and in this image, she has drawn cultural, artistic, and sports activities that she enjoys doing with her family and loved ones.

Figure 5.

GENERAL DISCUSSION

Our findings establish a link between SOC and reduced symptoms associated with historical trauma. Regression results revealed that those AI youth with higher levels of SOC reported fewer symptoms associated with historical trauma. These results are consistent with Salutogenesis theory, which posits that higher SOC helps individuals cope with life stressors (Antonovsky, 1979; 1987). SOC also predicted less endorsed problems on the Youth Self Report scale.

The arts-based interview results further elucidated this relationship and helped to underscore specifically how SOC is a means through which family, community, and culture can protect against the multi-generational stressors associated with historical trauma. Loss and

isolation were prominent themes associated with stressors among this sample of AI youth. Participants expressed loss and isolation in a variety of ways, such as loss of a loved one, geographical separation of family, and incarceration of a family member. These themes have been pronounced features of historical trauma, as cataloged by Brave Heart and DeBruyn (1998) and others (Crawford, 2014; Garrett et al., 2014; Whitbeck et al., 2004). Additionally, AI culture, practices, and family involvement emerged as major coping themes to address daily stress among participants, which is consistent with the SOC conceptual framework. Antonovsky (1987) argued that it was not possible to have deep-seated issues in a person's interpersonal relationships, inner feelings, major life activity (i.e., career), and existential issues (e.g., death, conflict, feelings of isolation) and maintain the ability to perceive the world as manageable, comprehensible, and meaningful. Our qualitative results suggest that culture is a resource that helps buffer the effects of historical trauma, potentially enhancing SOC among the AI youth in this study. This is consistent with the theoretical relationship between culture and SOC postulated by Antonovsky (1979; Benz, Bull, Mittelmark, & Vaandrager, 2014). Thus, taken together, present results provide preliminary evidence that SOC can protect against historical trauma and its symptoms, as well as increase coping with general adolescent problems among this AI sample.

Implications

Present findings lead to practical implications for addressing historical trauma among AI youth. First, results provide a potential framework for helping AI youth dealing with symptoms associated with historical trauma. Much of the historical trauma literature has documented the devastating effects on AI populations, and although mechanisms for addressing historical trauma have been developed (Brave Heart, 1998, 1999, 2000; Brave Heart, Chase, Elkins, & Altschul, 2011; Brave Heart, Elkins, Tafoya, Bird, & Salvador, 2012), to our knowledge, this study is the first to suggest and test SOC as a mechanism for addressing historical trauma. Second, our thematic exploration of stress and coping through a drawing activity suggests that cultural and familiar ties and coping are strongly connected among this sample of AI youth. Those youth with enhanced cultural and family ties may have a stronger SOC and could have more resources for dealing with stress.

This assertion makes sense in light of Brave Heart's argument that historical trauma is the result of AIs being stripped of their culture (Brave Heart & DeBruyn, 1998). Although there are many definitions of culture, most will likely agree that culture is a system of shared values, beliefs,

knowledge, attitudes, preferences, and skills (Mesoudi, 2011). In other words, culture provides a system of shared meaning that helps people feel part of the larger group. Humans are motivated to engage in meaningful relationships with others and derive emotional benefits when they have these meaningful relationships and experience negative emotional consequences when these relationships cannot be formed or maintained (Baumeister & Leary, 1995). Historical trauma may leave AI youth feeling lost and disconnected from their cultural roots, which could lead to the wide array of problems−including substance abuse, domestic violence, and even suicide−documented in the literature (Gone & Alcántra, 2007; Middlebrook et al., 2001).

Antonovsky argued that minorities (e.g., AIs) often can feel subjugated to hostile powers outside of their control and are thus under ongoing stress due to a lack of power to do anything about it (Benz et al., 2014). This is consistent with Brave Heart and DeBruyn's (1998) argument that historical trauma is the result of racism and oppression of Native peoples. As AIs lost control of their culture and way of life, these losses led to a number of social problems (Brave Heart & DeBruyn, 1998). Thus, the loss of culture and resultant intergenerational stress is a central component in historical trauma; these linkages and our present findings need further study and replication with larger samples.

Antonovsky asserted that culture could be an asset, which individuals can use as a lens to understand and cope with stress (Benz et al., 2014). He asserted that culture acts as a GRR, which provides its members with ready answers that provide clarity and stability (Antonovsky, 1979). Antonovsky (1987) further wrote that culture provides the resources and life experiences to perceive life as comprehensible, meaningful, and manageable. He asserted that culture contributes to comprehensibility by sending people consistent messages, furnishes people with the necessary tools to adapt to cultural social norms making life manageable, and provides meaning by giving people a place in the world. In other words, culture provides a sense of belonging, which has been associated with positive emotional outcomes (Baumeister & Leary, 1995). Thus, it may be that SOC reduces symptoms of historical trauma by helping Native youth connect or re-connect with culture, fostering a sense of belonging. This line of reasoning offers direction for youth development and interventionist programming with AI youth that aims to increase resilience and health promotion. For example, the tribe from which our sample came from has developed a digital storytelling program, in which participants create short videos telling a story. Many of these stories capture the individual's personal struggles, often tied to historical trauma, and how their connection to their cultural heritage helps them deal with their stressors. While there is currently

no data examining the effect of these videos on tribal members' general well-being, our findings indicate that this type of programming has the potential to increase the well-being of the producers and viewers of these videos. Correspondingly, many of the coping images from our study contain aspects of cultural involvement and rituals—such participation likely solidifies cultural ties that may increase overall manageability, comprehensibility, and meaningfulness.

Another pathway in which SOC may enhance AI youth's sense of belonging is by countering the effects of thwarted belongingness. Thwarted belongingness has been associated with feelings of alienation from friends, family, society, and other valued social circles within one's culture (Ribiero & Joiner, 2009). A lack of connection to local tribal culture among many AIs (in conjunction with isolation from broader American society) may be partly responsible for feelings of alienation. Our results suggest that AI youth with a higher SOC may utilize culture to connect with their tribal roots to facilitate their need to belong, which in turn may provide positive emotional benefits that allow these youth to thrive despite ongoing developmental, family, and cultural stress. A promising topic of future investigation is the relationship among SOC, thwarted belongingness, and historical trauma.

Finally, mental health professionals can directly use the results of this study as a guide for developing culturally sensitive treatments for AI clients suffering from symptoms associated with historical trauma. The theoretical underpinnings of SOC can provide direction for individualized treatments that are culturally appropriate and help individuals become more equipped to comprehend, manage, and find meaning in their daily struggles.

Limitations and Future Directions

Our mixed methods results have provided a preliminary understanding of the relationship between SOC and historical trauma. As mentioned previously, quantitative results revealed that higher levels of SOC predicted decreased symptoms associated with historical trauma. Additionally, these results showed that participants with a higher SOC reported fewer behavioral and health issues.

Qualitative results provide rich detail about how the AI youth in our sample conceptualize stress and coping and extend our understanding of the relationship between SOC and historical trauma. Much of the thematic content of our participants' images directly corresponded to Kirmayer's framework (McLeigh, 2010) of impacts from historical trauma. For example, Figure 1 illustrates disruption of families and repeated abuse, but the participant's statement "I'm mixed

up; happy he is gone, but I miss him" also reveals impaired emotional response and struggle. In a similar vein, our 'good day' prompt elicited responses that were consistent with Antonovsky's assertion that SOC and GRRs operate together to help people move toward health. The youth in this study named several examples of GRRs they use on a daily basis such as cultural practices, listening to music, participating in sports, and being artistically creative, to name a few.

This current study has limitations beyond the routine cautions regarding correlational data from cross-sectional studies. First, our small sample came from a single tribe, which limits the generalizability of our findings. Despite this, our preliminary results are encouraging and justify future research. Although our data do not allow us to make causal inferences, future studies employing longitudinal designs can help address this limitation and also provide a better understanding of the SOC-historical trauma relationship over time. Our analyses also did not examine the role of potential covariates or moderators, which might impact the relationship between SOC and historical trauma. These could include age, social support, involvement with the tribe, and the level of connection with the participants' Native culture. These are topics of future investigation.

Finally, while the present study was well rooted in Antonovsky's Sense of Coherence framework, more work needs to be done on expanding this theoretical model. Specifically, further investigation of the model is needed to specify the precise cognitive, emotional, and behavioral mechanisms underlying SOC. One potential means for expanding this model is to examine the role of culture as a GRR. Exploring GRRs would not only extend current findings but also would allow further modeling of the SOC-historical trauma relationship and the generation of new hypotheses. Examining the role of GRRs also extends the SOC literature by testing the theoretical function of GRRs, which to our knowledge has not yet been done.

CONCLUSION

This multi-method study has provided preliminary evidence for the ameliorating effect of Sense of Coherence on historical trauma. The youth in our study illustrated a rich qualitative perspective on stressors that are consistent with conceptualizations of historical trauma and on coping that align with the SOC theoretical framework, together providing a clearer understanding of how SOC can help address ongoing stress associated with historical trauma. Furthermore, our findings provide direction for working with AI youth who are suffering from symptoms associated

with historical trauma. Results also reveal a connection among SOC, coping, and culture—providing indirect support for the benefits of GRRs among Native youth. Our combined results suggest that culture and family may play a key role in helping AI youth develop and maintain a strong Sense of Coherence, increasing their resiliency to stress and helping them move toward health.

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AUTHOR INFORMATION

Dr. Williams Evans is a Professor of Education and Human Development at the University of Nevada in Reno, NV. His research interests include youth development, program evaluation, and resiliency modeling.

Dr. Bret Davis is an instructor in the Department of Human Development and Family Studies at the University of Nevada in Reno, NV. His research interests include romantic relationships, health, uncertainty management, and social cognition.

Correspondence concerning this article should be addressed to William Evans, Human Development and Family Studies, University of Nevada, Reno 1665 N. Virginia St., Mailstop 0281, Reno, NV, 89557. E-mail: wevans@unr.edu.

CONCEPTUALIZING SCHOOL BELONGINGNESS IN NATIVE YOUTH: FACTOR ANALYSIS OF THE PSYCHOLOGICAL SENSE OF SCHOOL MEMBERSHIP SCALE

Shadab Fatima Hussain, BS, Benjamin W. Domingue, PhD, Teresa LaFromboise, PhD, and Nidia Ruedas-Gracia, MA

Abstract: The Psychological Sense of School Membership (PSSM) scale is widely used to measure school belongingness among adolescents. However, previous studies identify inconsistencies in factor structures across different populations. The factor structure of the PSSM has yet to be examined with American Indian/Alaska Native (AI/AN) youth, a population of keen interest given reports of their educational and health disparities, and the potential of belongingness as a protective factor against risk behaviors. Thus, this study examined the factor structure of the PSSM in two samples of AI adolescents (N = 349). The two main aims of this study were to 1) determine if a comparable factor structure exists between the two AI groups and 2) examine the factor structure of the PSSM for use in AI/AN populations. Randomization analysis was used to test research aim one, and exploratory factor analysis was used to test research aim two. Analyses revealed that comparable factor structures existed based on responses from the two AI groups. Analyses also identified two factors: school identification/peer support and connection with teachers. Moreover, negatively worded statements were found to be unreliable and were removed from the final scale, reducing the PSSM to 13 items. Findings from this study will assist researchers and clinicians with assessing sense of school belongingness in AI/AN adolescents and with appropriately interpreting aspects of belongingness for this population.

INTRODUCTION

In recent years, a number of articles have emerged showing the positive association of belongingness with academic engagement and psychological well-being. Many of these articles draw from influential theories in psychology. For example, according to Bronfenbrenner's model of ecological development, the individual is influenced by and interacts with many different "systems" of the environment, including family, friends, schools, and society (Bronfenbrenner,

1977). This model emphasizes connectedness and engagement with others as important facets of human development. A number of additional psychological theories link connectedness to identity development as well. For example, Ryan and Deci (2000) theorize autonomy, competence, and relatedness as three fundamental psychological needs contributing to one's motivation and increased psychological well-being. Additionally, biculturalism theory proposes certain skills, such as social groundedness (appreciation for one's place within an ecological environment in order to effectively transition between and operate within two cultures), to promote positive psychological development (LaFromboise, Coleman, & Gerton, 1993).

For children and adolescents, the school setting is an important context in which to experience connectedness with others – particularly peers and teachers. Previous research has conceptualized the ideal school as a community of caring that fosters students' sense of belongingness – having positive and supportive interpersonal relationships – and commitment to others in their community (Battistich, Solomon, Watson, & Schaps, 1997; Noddings, 1988; Osterman, 2000). Caring communities are those that meet students' necessary psychological needs of autonomy, competence, and relatedness. Such communities also uphold values such as fairness, equality, and responsibility for others – values related to belongingness (Battistich et al., 1997; Johnson, 2009; Ryan & Deci, 2000). Schools that promote a sense of belongingness in students are more likely to have students who are committed to their studies and who do not drop out of school. Additionally, students with a high sense of belongingness are more likely to exhibit fewer emotional and behavioral problems and less likely to be involved in risky behaviors, such as bullying or substance use (Bond et al., 2007; Georgiades, Boyle, & Fife, 2012). Previous research has reviewed the benefits of school belongingness for different cultural groups in the United States and similarly found that belongingness was positively related to educational outcomes such as academic motivation, academic engagement, and educational aspirations (e.g., Anderman & Anderman, 1999; Davis, Chang, Andrzejewski, & Poirier, 2014; Reyes, Brackett, Rivers, White, & Salovey, 2012; Uwah, McMahon, & Furlow, 2008).

Cultivating school belongingness can be beneficial to address the current overall academic performance of American Indian/Alaska Native (AI/AN) students. According to the National Center for Education Statistics, eighth grade AI/AN students have the highest rates of absenteeism among racial/ethnic minority students in the United States (Freeman & Fox, 2005). Additionally, these students are disproportionately placed in special education programs and lag behind White and Asian/Pacific Islander students in reading skills (Brayboy & Makka, 2015). Considering the

positive relation between school belongingness and educational outcomes, and the relatively low educational performance of many AI/AN youth, it is important to examine belongingness in this population. However, to our knowledge there has only been one study examining this construct in Native American youth (Covarrubias & Fryberg, 2015). Thus, more information about the benefits of sense of school belongingness with AI/AN youth is needed.

Administering the Psychological Sense of School Membership (PSSM) scale may aid in understanding experiences of school belongingness with AI/AN populations. The PSSM is used frequently in research with adolescents measuring school belongingness. However, this scale has not yet been used with AI/AN youth populations. As illustrated by previous research, it is important to validate a psychological scale if distributed to a different cultural group than the one upon which it was developed. Results from a scale that has differential validity between groups can produce biased and incorrect interpretations. So, validating scales with different cultural groups through examination of its factor structure is integral in the measurement of the same underlying constructs with distinct populations. Understanding the factor structure – the correlation between the survey items − of the PSSM will help reveal which latent constructs of belongingness within the PSSM are important to address in this population.

Thus, utilizing data from two reservation schools, this study aimed to determine the factor structure of the PSSM when administered to AI youth within these settings. As there is variability among the 562 federally recognized tribes in the United States in traditions, customs, and organization of social and ecological relationships, we aimed to test for measurement invariance between the two AI populations before conducting an exploratory factor analysis of the PSSM for both populations together. We believe that results from this preliminary investigation will determine whether previous factor structures found for the PSSM can be applicable to AI/AN youth or if there is a unique factor structure to consider.

Culturally Specific Risk Factors in AI/AN Adolescents

Given the relational orientation of most AI/AN communities (e.g., close ties within extended families), research focusing on belongingness is especially warranted for AI/AN adolescents. Community connectedness – or belongingness – is emphasized as an important cultural value among AI/AN groups (Smith, Cech, Metz, Huntoon, & Moyer, 2014) and has been found to be a protective factor against substance use and suicide for AI/AN populations, particularly youth (Hill, 2009; Mohatt, Fok, Burket, Henry, & Allen, 2011; Napoli, Marsiglia, &

Kulis, 2003). Examining the impact of belongingness in AI/AN individuals is integral to the development of effective recommendations for schools (Covarrubias & Fryberg, 2015) and mental health services (O'Keefe et al., 2014; Schultz et al., 2016) dedicated to serving AI/AN populations.

Although the aspirations of AI/AN adolescents to attend college have increased over the years, college-going goals are not reflected in their performance. AI/AN adolescents have a much lower graduation rate from high school (44.1%) than the graduation rate from high school (69%) of all students in the United States (Faircloth & Tippeconic, 2010). This incongruity between intent and performance can be attributed to inadequate funding for school programs, biased standardized testing, barriers to culturally-sustaining pedagogy, and low expectations from teachers and counselors (Brayboy & Makka, 2015; Wilcox, 2015). Additionally, AI/AN adolescents face increased risk factors detrimental to their health and psychological development, particularly historical trauma, which other adolescents in the United States may not encounter (Brockie, Dana-Sacco, Wallen, Wilcox, & Campbell, 2015; Sarche & Spicer, 2008; Whitbeck, Yu, Johnson, Hoyt, & Walls, 2008). Historical trauma is conceptualized as "a collective complex trauma inflicted on a group of people who share a specific group identity or affiliation − ethnicity, nationality, and religious affiliation" (Evans-Campbell, 2008, p. 320). This trauma – initiated by numerous destructive assaults on AI/AN communities throughout past centuries – is experienced by the community as a whole and is transmitted across generations. Examples of contemporary events exacerbating historical trauma in AI/AN communities include assaults on the individual, such as racial slurs, iconic sports mascots, and other limited contemporary identity representations (Fryberg, Covarrubias, & Burack, 2018), and assaults on the community, such as inaccurate coverage of AI/ANs in U.S. history textbooks (Loewen, 2007).

The most known assault on the individual in terms of school belongingness was the forced relocation of AI/AN children into boarding schools designed to assimilate them into mainstream American society (Archuleta, Child, & Lomawaima, 2000). Other incidents associated with schooling include teachers interrogating children about their families' engagement in traditional spiritual practices prior to passage of the Indian Religious Freedom Act (P.L. 95-341) which did not occur until 1978. Such discovery led to children being removed from their families and parents being displaced onto other reservations or settlements far from their own. Today AI/AN parents and scholars are increasingly concerned about the colonization of AI/AN children's minds in schools that abide by national, rather than AI/AN, standards of knowledge acquisition (Medin &

Bang, 2017). These cases illustrate how historical trauma is transmitted through schooling, which can play a role in students' sense of belongingness within their school communities.

Research has revealed that detrimental effects of trauma occur at individual (e.g., psychological symptoms, guilt, post-traumatic stress disorder [PTSD]), family (e.g., impaired family communication), and community (e.g., loss of language, loss of cultural traditions) levels (Evans-Campbell, 2008). Although there is no direct linkage made to community-level effects, AI/AN scholars suggest that there is indeed a connection between historical trauma and social malfunctions that occur in their communities (Evans-Campbell, 2008; Walls & Whitbeck, 2012). For example, children raised by AI/AN individuals who were forced to attend residential schools away from their communities were more likely to exhibit symptoms of general anxiety disorder, PTSD, and suicidal thoughts (Brave Heart & DeBruyn, 1998; Evans-Campbell, Walters, Pearson, & Campbell, 2012).

According to Brave Heart and DeBruyn (1998), survivor child's complex is experienced by many children whose parents attended government or mission-run AI/AN boarding schools. Those who attended boarding school were deprived of ongoing socialization within an extended family based upon community connectedness and belongingness and thus, were denied the ability to raise their children with AI/AN traditional values and child rearing practices. Furthermore, children of boarding school survivors who may be affected by depression or suicidal thoughts feel they cannot share these struggles with their parents, as their pain is incomparable to their parents' suffering due to the intergenerational effects of historical trauma. Thus, children of boarding school survivors feel guilt that can lead to a decreased sense of belongingness, which could impact academic motivation and achievement. Given the low graduation rates of AI/AN high school students in the United States compared to the national average, research on belongingness is crucial. To this end, psychometrically and culturally valid measures of belongingness with AI/AN populations need to be determined.

Psychological Sense of School Membership Scale

While belongingness was previously defined as generally having positive and supportive interpersonal relationships, Goodenow defines a students' sense of belongingness as "the extent to which students feel personally accepted, respected, included, and supported by others in the school social environment" (Goodenow, 1993b, p. 80). Belongingness encompasses the relationships that peers, teachers, and schools have with students, emphasizing the importance of belongingness on

students' development. Recent studies provide support for aspects of sense of belongingness in school that can be linked to numerous positive educational and psychological outcomes such as achievement motivation (Goodenow, 1993a; Nelson & DeBacker, 2008), cognitive engagement (Walker & Greene, 2009), self-efficacy (Kia-Keating & Ellis, 2007), and psychological well-being (Van Ryzin, Gravely, & Roseth, 2009). Moreover, students with a high sense of school belongingness and high perceived teacher support report a greater interest in learning and greater ease in communicating with teachers (Johnson, 2009). Thus, the reliable positive effect of sense of belongingness on primary and secondary students' educational, psychological, and social outcomes emphasizes its integral role in a student's development. Vaz et al. (2015) recommend that schools begin to foster a sense of belongingness in primary school, as it could influence the sense of belongingness a student feels in secondary school.

Goodenow (1993b) developed the PSSM scale in order to address then-recent recommendations of education advisory boards (Carnegie Council Task Force on the Education of Young Adolescents, 1989), emphasizing the importance of caring in an educational context. Items were developed based on previous research focusing on belongingness and school membership. Originally 42 items, the PSSM was shortened to 28 items and administered to students in both urban and suburban schools to determine applicability in diverse settings. After testing the items in three different middle/junior high schools, the scale was shortened to 18 items. Results revealed high internal consistency variability across the three studies (ranging from .77 to .88) and positive significant correlations with other psychological and educational measures, such as academic motivation and expectancy to succeed in school.

Following the development of the PSSM, the scale has been widely used in research measuring sense of belongingness in schools. In a 2011 study examining the latent structure of the PSSM, it was found that only 4 out of 27 studies examined the latent factor structure of the PSSM with primary and secondary school students (You, Ritchey, Furlong, Shochet, & Boman, 2011). In the first factor analysis study of the PSSM, Hagborg (1994) administered the scale to a small group of White, middle-class students from one middle school and one high school. A principal-components analysis revealed that the PSSM consisted of three factors: *belongingness*, *rejection,* and *acceptance*. However, only a small number of items loaded on the *rejection* and *acceptance* factors, with 11 of the items loading on the *belongingness* factor. Thus, Hagborg concluded that the multidimensional model of the PSSM is limited in its application.

Subsequent research painted a more complex picture of the measurement properties of the PSSM. The multidimensional model of a Chinese-translated version of the PSSM was tested by Cheung and Hui (2003) with a large group of Mainland Chinese immigrant and local Hong Kong primary school students. Two factors were extracted from a principal components analysis: *school belonging* and *feeling of rejection*. Similar to Hagborg (1994), a majority of the items loaded onto the *school belonging* factor, while five of the items, which consisted of the reverse-coded questions, loaded onto the *feeling of rejection* factor. However, contrary to Hagborg (1994), there were no cross-loadings of items in this two-factor model, supporting the multidimensionality of the scale. Although the negatively worded items consisted of their own factor, the authors attributed this finding to the conceptual differences between feelings of belongingness and feelings of rejection.

The first of the factor analysis studies to closely examine the latent structure of the PSSM through both exploratory and confirmatory factor analysis was conducted by You et al. (2011) with a large group of Australian high school students. Confirmatory factor analysis revealed that the best fit was a three-factor model, similar to Hagborg (1994), wherein only 12 of the original 18 items remained due to measurement error. The three factors were *caring relationships, acceptance,* and *rejection.* Thus, this study supported the PSSM's use as a multidimensional instrument.

Following You et al. (2011), an in-depth examination of possible method effects regarding the negatively worded items was examined. Ye and Wallace (2014) conducted an exploratory and confirmatory factor analysis of the PSSM on a large group of ethnically diverse high school students in Pennsylvania. Results revealed a method effect occurring as a result of the negatively worded items, which influenced the results of the factor analysis to place the negatively worded items into its own factor. This method effect could explain similar findings in past studies in which the negatively worded items were placed in a factor measuring feelings of rejection (Cheung & Hui, 2003; You et al., 2011). Previous research suggests that this effect could be caused by dispositional factors such as personality and response style set (DiStefano & Motl, 2006; Motl & DiStefano, 2002; Wong, Rindfleisch, & Burroughs, 2003). After controlling for these method effects, a 15-item scale was retained and supported a multidimensional, three-factor model consisting of the following factors: *identification and participation in school*, *perception of fitting in among peers,* and *generalized connection to teachers.*

Notably, these studies have been inconsistent in identifying a similar factor structure for the PSSM, suggesting that latent factors loaded from one group of participants cannot be generalized

to another group, thus not achieving measurement invariance (Milfont & Fischer, 2015). However, the majority of studies supported the PSSM as a multidimensional instrument and emphasized that survey items with measurement error should not be distributed to participants.

The PSSM has been used to assess a student's perception of belonging in their school environment in a number of cultural groups other than AI/ANs (Goodenow, 1993b). Recent studies have found belongingness to be related to positive outcomes for adolescents from a variety of different cultural backgrounds, such as Hong Kong and Mainland Chinese primary school students, Latino secondary school students in the United States, and African American secondary school students (Adelabu, 2007; Cheung & Hui, 2003; Sánchez, Colón, & Esparza, 2005; Uwah et al., 2008). Results from these studies reveal belongingness to be associated with feeling encouraged to participate in class, motivation, effort, and academic achievement. Due to the unique cultural context of AI/AN communities, it is not immediately obvious if the PSSM would have the same validity with this sample. One study examined this issue (Malik & LaFromboise, 2014) and found that belongingness was negatively correlated with suicidal ideation. However, an examination of the latent structure of the PSSM has not been conducted with AI/AN adolescents. The current examination of the factor structure will extend upon past research with the PSSM and determine whether a unidimensional model or multidimensional model of belongingness is appropriate for this population.

Study Aims and Hypothesis

Research suggests that a sense of belongingness in secondary schools is crucial (Osterman, 2000), yet measurements of such belonging may depend upon cultural context. This study aimed to further examine the factor structure of the PSSM (Goodenow, 1993b) and test the conditions for validity of this scale in AI secondary school students. The present study will extend upon previous analyses of the factor structure of the PSSM by conducting an exploratory factor analysis (EFA) in two samples of AI adolescents. As research on the PSSM with AI/AN populations is sparse, we decided that an EFA would be a more appropriate analysis than a confirmatory factor analysis. The aims of this study are to determine if measurement invariance holds in the PSSM across the two groups (Aim 1) in order to examine the factor structure of the PSSM for use in AI/AN adolescent populations through EFA (Aim 2). If measurement invariance holds, then the two groups will be examined together for Aim 2. Based on differential findings from previous studies analyzing the factor structure of the PSSM in middle school and high school students across different cultural

groups, we hypothesize that 1) the PSSM will have a common multidimensional structure for the two AI groups, but 2) the factor structure of the PSSM will be different for the study sample compared to groups studied previously with the PSSM (e.g., Cheung & Hui, 2003; Hagborg, 1994; Ye & Wallace, 2014).

METHODS

The participants in this study consist of middle school, reservation-dwelling students from one tribe (Group 1) and high school, reservation-dwelling students from two tribes that reside together in a different reservation community (Group 2). Data collection occurred in each school at separate times. The analysis for this study is based on students' responses to the Psychological Sense of School Membership (PSSM) scale. Before conducting the exploratory factor analysis, we conducted a measurement invariance test to determine whether the two groups could be analyzed together. The test determined no significant difference in underlying factor structure between the two student groups, so we conducted an exploratory factor analysis combining the two groups.

Participants and Procedures

Group 1

A total of 129 middle school students (68.1% participation rate) attending a tribally-controlled school in a Southwestern reservation participated in the study. The reservation holds a population of 6,343 and is located approximately 150 miles away from a major metropolitan area. Participants were between the ages of 11-16 years (M = 12.9, SD = 1.24) and were 52% female. In terms of grade level, 55 (44%) were in sixth grade, 17 (14%) were in seventh grade, and 53 (42%) were in eighth grade. Participants were not asked to identify their ethnicity since all students responding to the survey were tribal members.

All students attending the school were invited to participate in the study through letters sent home to parents/guardians, and recruitment was continued through personal outreach to parents/guardians by school staff and designated community substance abuse prevention service providers, all of whom were tribal members. To ensure quality of recruitment, all outreach recruiters met with the principal investigator to understand the purpose of the study and to collectively determine the proper protocol for requesting parent/guardian consent during home visits. Students who assented and their parent/guardian consented were compensated $10 for

completing a 30-45-minute paper and pencil survey. The survey was administered in the school cafeteria and the school library. Prior to responding, students received instructions from survey administrators. The survey consisted of the PSSM, Mastery Resilience Scale for Children and Adolescents (Prince-Embry, 2007), Hopelessness Scale for Children (Spirito, Williams, Stark, & Hart, 1988), Reynolds Adolescent Depression Scale-2 (Reynolds, 2008), Suicidal Ideation Questionnaire (Reynolds, 1988), and Historical Life Events Inventory (Novins, Beals, Roberts, & Manson, 1999). The University Institutional Review Board approved all procedures, and the Tribal Council passed a resolution supporting the study.

Group 2

A total of 220 high school students attending a tribally-controlled school in a Northern reservation participated in the study. The reservation holds a population of approximately 5,815 people and is located approximately 170 miles away from a metropolitan area. Participants were between the ages of 14-19 years (M = 15.9, SD = 1.36) and were 52% female. In terms of grade level, 64 (30%) were in ninth grade, 39 (18%) were in tenth grade, 55 (25%) were in eleventh grade, 60 (27%) were in twelfth grade, and two participants did not report their grade level. Students were able to check more than one ethnicity for their ethnic identification. Of the students participating, 213 (97%) identified as AI/AN, 20 (9%) identified as White, 12 (5%) identified as African American, 4 (2%) identified as Native Hawaiian/Pacific Islander, 3 (1%) identified as Hispanic, and 7 (3%) identified as "Other." Most students (99%) reported English was spoken in their home.

All students attending the school were invited to participate in the study through letters sent home and through notices placed in the tribal newspaper. Teachers taking part in an advisory program at the school distributed information about the study to students during their advisory class period. These advisory teachers also served as survey administrators. Students who assented were entered in a lottery for $5 and $10 gift cards for participating in the study. To ensure quality data collection, the school guidance counselor explained the purpose of the survey to teacher advisers, distributed survey administration guidelines, and followed up with advisers to make sure that the survey had been administered successfully. Prior to responding, students were read instructions by survey administrators. The paper and pencil survey took between 40-45 minutes to complete and consisted of the PSSM and the *High School Survey of Student Engagement by the Center for Evaluation and Education Policy* (HSSSE; Yazzie-Mintz, 2007).

The University Institutional Review Board and the Tribal Research Committee approved all procedures.

Psychological Sense of School Membership Scale (PSSM)

The PSSM is an 18-item measure designed to assess sense of school belongingness in adolescents (Goodenow, 1993b). Participants were asked to read each item and indicate how much the item describes what they think on a 5-point Likert scale from 1 *(Not at all true)* to 5 *(Completely true)*. Example items include, "I feel like a real part of this school," "I am included in a lot of activities at school," and "Teachers here respect me." Five of these items are negatively worded, so the items were reverse-coded to indicate a stronger sense of belongingness. See Table 1 for descriptive statistics of PSSM items for both AI groups and for both groups' data combined. The alpha coefficient for the PSSM in this study for both groups was .81.

Table 1
Item Descriptive Statistics

	Group 1		Group 2		Both Groups	
Item Number	*M*	*SD*	*M*	*SD*	*M*	*SD*
PSSM1	3.30	1.11	2.96	1.15	3.16	1.13
PSSM2	3.40	1.12	3.10	1.42	3.27	1.33
PSSM3 (RC)	2.12	1.14	2.21	1.15	2.83	1.42
PSSM4	2.73	1.07	2.59	1.04	2.67	1.08
PSSM5	2.90	1.14	2.85	1.04	2.92	1.11
PSSM6 (RC)	2.23	1.46	2.30	1.30	2.86	1.51
PSSM7	3.30	1.46	3.57	1.36	3.52	1.39
PSSM8	3.57	1.12	3.56	1.09	3.59	1.13
PSSM9 (RC)	1.87	1.06	2.01	1.11	2.75	1.49
PSSM10	2.91	1.40	2.84	1.34	2.88	1.37
PSSM11	3.48	1.20	3.30	1.23	3.36	1.25
PSSM12 (RC)	2.78	1.31	2.81	1.32	2.96	1.34
PSSM13	3.55	1.31	3.26	1.22	3.33	1.27
PSSM14	3.67	1.22	3.48	1.13	3.54	1.22
PSSM15	3.83	1.22	3.78	1.04	3.82	1.09
PSSM16 (RC)	2.50	1.50	2.24	1.34	2.71	1.52
PSSM17	3.22	1.31	3.30	1.21	3.33	1.26
PSSM18	3.59	1.18	3.63	1.07	3.63	1.14
Total	54.93	9.19	60.47	11.96	58.83	11.43

Note. PSSM = Psychological Sense of School Membership; RC = reverse-coded; Group 1 *N* = 120; Group 2 *N* = 229; Both groups *N* = 349.

Analysis Strategy

Missing data for students in Group 1 were addressed through listwise deletion – data from four students were removed from the sample. Of the responses we received, there was no missing data for students in Group 2. In order to examine whether measurement invariance holds across the two groups, we computed unrotated factor analyses separately in each group (based on three factors). We computed correlations between the factor loadings for the two groups across all three factors. We then computed similar correlations produced from 5,000 random assignments of student to either group and considered the percentile of the true correlations in the distribution formed by the correlations resulting from random assignment. This is a version of a Fischer exact test (Athey & Imbens, 2017) to assess whether there were systematic differences in the factor loadings between the two groups as compared to hypothetical groups wherein assignment is truly random.

In order to examine Aim 2, we considered correlational analyses to examine relations between each item of the PSSM. Exploratory factor analysis (EFA) using principal-components factor analysis (method used to extract underlying factors) followed by oblimin oblique rotation was used in order to examine the factor structure of the PSSM. This rotation method was used in previous studies conducting factor analysis on the PSSM and allows for underlying factors to be correlated (Ye & Wallace, 2014). For examination of the method effect associated with the negatively worded items, average inter-item correlations were conducted. While results support the multidimensionality of the PSSM, Clark and Watson (1995) explain that examination of reliability indicators of the unidimensional model of the scale does not establish the scale as only unidimensional, and these analyses can instead provide valuable information regarding the internal consistency of a multidimensional scale.

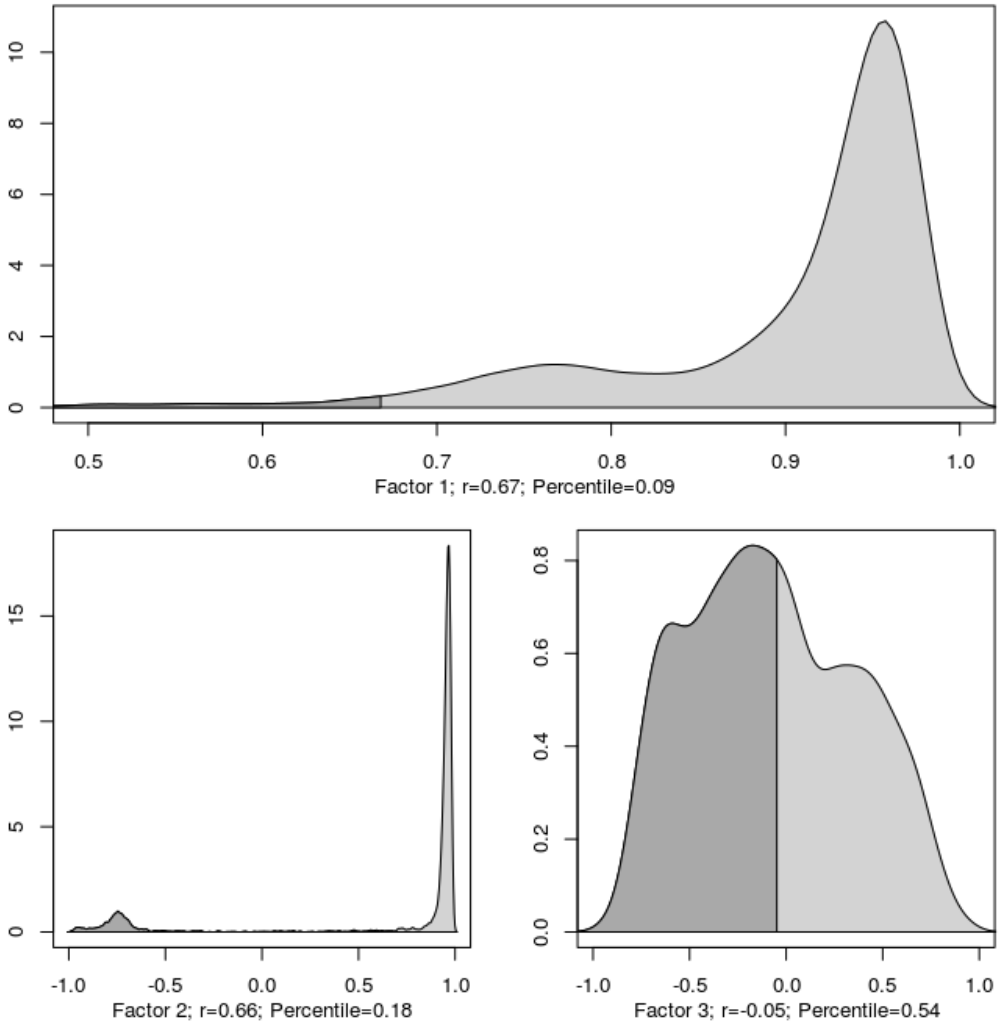
RESULTS

Aim 1

Evidence from the randomization analysis suggests that measurement is roughly invariant across the two groups (Figure 1). Correlations on the first factor were somewhat lower than the typical correlation produced from random group assignment, but nearly a tenth of the random group assignments produced smaller correlations. We observed some instability in the correlations of the second factor in random group assignment (the distribution is

bimodal) which challenged simple interpretation of the observed coefficient. For the third factor, the observed correlation was entirely consistent with random assignment. Given the limited sample size, we were underpowered to detect small variations in measurement across the two groups. However, our findings did not suggest that there are large variations in measurement across the two groups.

Figure 1. Correlations from true group assignment (vertical line) compared to estimated distribution of 5,000 random group assignments. Percentile shows proportion of distribution to left of vertical line.



Aim 2

Exploratory Factor Analysis (EFA)

After combining the two groups into one sample, an EFA was performed using principal-component factor analysis followed by an oblimin rotation to extract latent factors. See Table 2 for EFA results. Based on statistical criteria, three factors were extracted with the

following eigenvalues (and percentage of variance explained): 5.23 (29.1%), 2.88 (16%), and 2.88 (16%). All of the items loaded onto one of the three factors with a value above .30. Based on previous theoretical analysis, we identified the three factors *school identification/peer support* (Factor 1), *negative perception* (Factor 2), and *connection to teachers* (Factor 3). Table 3 displays the correlations among the three factors. Notably, all five of the reverse-coded items (PSSM3, PSSM6, PSSM9, PSSM12, PSSM16) loaded strongly onto Factor 2. This analysis also revealed a poor model fit, χ^2 (153) = 2351.71, p <. 001.

Table 2
Factor Loadings of the Three-Factor Measurement Model in EFA

Item	Description	Factor 1	Factor 2	Factor 3
PSSM1	I feel like a real part of this school.	**0.66**	-0.08	0.05
PSSM2	People here notice when I am good at something.	**0.70**	-0.12	-0.04
PSSM3	It is hard for people like me to be accepted here. (RC)	-0.003	**0.79**	0.05
PSSM4	Other students in this school take my opinion seriously.	**0.51**	-0.03	0.21
PSSM5	Most teachers at this school are interested in me.	0.29	-0.06	**0.65**
PSSM6	Sometimes I feel as if I don't belong here. (RC)	-0.02	**0.87**	0.02
PSSM7	There's at least one teacher or adult in this school I can talk to if I have a problem.	-0.11	0.05	**0.81**
PSSM8	People at this school are friendly to me.	**0.65**	0.09	0.11
PSSM9	Teachers here are not interested in people like me. (RC)	0.08	**0.79**	-0.13
PSSM10	I am included in lots of activities at this school.	**0.62**	0.01	0.02
PSSM11	I am treated with as much respect as other students.	**0.61**	0.02	0.17
PSSM12	I feel very different from most other students here. (RC)	0.11	**0.66**	-0.02
PSSM13	I can really be myself at this school.	**0.68**	0.02	0.17
PSSM14	The teachers here respect me.	**0.32**	-0.02	**0.62**
PSSM15	People here know I can do work.	**0.64**	0,01	0,02
PSSM16	I wish I were in a different school. (RC)	-0.16	**0.64**	0.12
PSSM17	I feel proud of belonging to this school.	**0.61**	0.02	0.17
PSSM18	Other students here like me the way I am.	**0.83**	0.04	-0.19

Note. PSSM = Psychological Sense of School Membership; RC = reverse-coded; Factor loadings > 0.30 are bolded.

This finding is similar to results of factor analyses examined in previous studies which conceptualize negative perception of belongingness, or rejection, as a distinct construct separate from school identification or acceptance (Cheung & Hui, 2003; Hagborg, 1994; You et al., 2011). However, recent findings by Ye and Wallace (2014) suggested that there may be a method effect associated with the negatively worded items in the PSSM. Unlike previous studies, where the negatively worded items cross-loaded onto multiple factors, the factor

loadings of the negatively worded items loaded highly solely onto the method effect factor. Thus, further analysis of this possible method effect was conducted through examination of the Cronbach's alpha coefficient and average inter-item correlations between the three factors extracted, all 18 items of the PSSM, and the 13 positively worded items of the PSSM.

Table 3
Correlations Among Latent Factors in Three-Factor Model of EFA

Factors	1. School identification/peer support	2. Method effect	3. Connection to teachers
1	---		
2	-0.04	---	
3	0.57***	0.07	---

Note. N = 349.
***p < .001.

As revealed in Table 3, the *negative perception* factor was not correlated with the other factors, which is suggestive of a method effect. See Table 4 for alpha coefficients and average inter-item correlations for each factor and the full scale. The sub-scales and two different models of the total scale demonstrated moderate to high reliability. Of particular interest are the average inter-item correlation value of the method effect factor and the change in the alpha coefficients and average inter-item correlation value from the 18-item model to the 13-item model with the positively worded items only. According to Clark and Watson (1995), the value of the average inter-item correlation should be around .15 – .50. If the value is too high, an "attenuation paradox" may occur, suggesting the redundancy of the items and a possible negative impact on the validity of the scale. Based on this attenuation effect, the items in Factor 2 were not reliable for meaningful analyses. Additionally, when removing the negatively worded items, the alpha coefficient for the whole scale increased from .81 to .88, and the inter-item correlation value increased from .32 to .55.

Table 4
Alpha Coefficient and Average Inter-Item Correlations for each Factor, and the 18-Item and 13-Item Unidimensional Model of the PSSM

Factor/Model	α	Average Inter-Item Correlation
Factor 1 (identification/peer support)	.88	.58
Factor 2 (negative perception/method effect)	.81	.98
Factor 3 (connection to teachers)	.65	.60
18-item model	.81	.32
13-item model (positively worded items only)	.88	.55

Note. PSSM = Psychological Sense of School Membership.

Based on the analyses of the reliability indicators, the negatively worded items were removed from the sample, and an additional EFA was performed with the remaining 13 items. There were two items (PSSM5 and PSSM14) that cross-loaded onto both factors but loaded highly on the second factor, so the items were kept in the final model. Results revealed that two factors were extracted with the following values (and percentage of variance explained): 5.31 (41%) and 2.82 (22%), and the model revealed a relatively better fit to the study data than the previous three-factor model including the reverse coded items, χ^2 (78) = 1699.62, $p <$ .001. See Table 5 for factor loadings of the two-factor model. We identify the factors as *school identification/peer support* (Factor 1) and *connection to teachers* (Factor 2).

Table 5
Factor Loadings of the Two-Factor Measurement Model in EFA Excluding Reverse Coded Items

Item	Description	Factor 1	Factor 2
PSSM1	I feel like a real part of this school.	**0.72**	-0.03
PSSM2	People here notice when I am good at something.	**0.74**	-0.10
PSSM4	Other students in this school take my opinion seriously.	**0.53**	0.19
PSSM5	Most teachers at this school are interested in me.	**0.31**	**0.62**
PSSM7	There's at least one teacher or adult in this school I can talk to if I have a problem.	-0.13	**0.85**
PSSM8	People at this school are friendly to me.	**0.63**	0.13
PSSM10	I am included in lots of activities at this school.	**0.63**	-0.003
PSSM11	I am treated with as much respect as other students.	**0.62**	0.15
PSSM13	I can really be myself at this school.	**0.68**	0.06
PSSM14	The teachers here respect me.	**0.32**	**0.56**
PSSM15	People here know I can do work.	**0.62**	0,04
PSSM17	I feel proud of belonging to this school.	**0.62**	0.13
PSSM18	Other students here like me the way I am.	**0.79**	-0.15

Note. PSSM = Psychological Sense of School Membership; Factor loadings > 0.30 are bolded.

DISCUSSION

The aims of the present study were to test for measurement invariance between two AI groups and analyze the factor structure of the Psychological Sense of School Membership (PSSM) scale in these two groups. This study was the first to examine the factor structure of the PSSM of two AI adolescent groups, a population of interest due to educational and health disparities and their cultural emphasis on collective values and balanced relationships as a potential protective factor against these problems. Based on our analyses, measurement

invariance holds in the PSSM between the two AI groups. As in previous work, the identified latent factors align with past research supporting a multidimensional model of sense of school belongingness (e.g., Cheung & Hui, 2003; Ye & Wallace, 2014; You et al., 2011), supporting the study hypotheses. Exploratory factor analysis also revealed a method effect occurring due to the negatively worded items, a finding replicated from Ye and Wallace (2014). Removal of items in the factor caused by the method effect resulted in a better model fit to the data and a clear, 13-item, two-factor solution of the PSSM for the AI groups. The two factors are *school identification/peer support* and *connection to teachers.*

The resulting factor structure is partially similar to previous studies. Findings from this study will be compared with Ye and Wallace (2014), as the method effect of the negatively worded items was also examined. The *connection to teachers* factor is similar to the *generalized connection to teachers* factor in Ye and Wallace (2014) except for the exclusion of the negatively worded item in this study (PSSM9 "Teachers here are not interested in people like me"). In Ye and Wallace (2014), PSSM9 loaded on the *generalized connection to teachers* factor more than the method effect factor. Here, it only loaded highly on the method effect factor. All negatively worded items had this same characteristic; thus, we removed all of the five negatively worded items from the final 13-item pool because they did not cross-load onto any other factors.

The second factor in the current study, *school identification/peer support* is a combination of the *identification and participation in school* factor and the *perception of fitting in among peers* factor in Ye and Wallace (2014). This finding makes intuitive sense in regards to AI adolescents because of cultural values emphasizing social inclusion. The perception of acceptance by teachers and peers including receiving attention from them has been found to foster resilience and support academic engagement and school belonging in adolescents (Kiefer, Alley, & Ellerbrock, 2015; Osterman, 2000). Thus, for AI adolescents who value social inclusion, forming relationships in school may play a key role in developing connections with others.

Results from this study support findings from previous literature asserting that the PSSM is a multidimensional measure and should be interpreted based on different factors, rather than the sum of the total items. Additionally, study findings further emphasize the importance of verifying factor structures of measures before interpretation, particularly in cultural groups different from groups in the initial scale development procedures. The PSSM is a useful measure for teachers and administrators who serve AI/AN students. Along with acting as a tool to assess

potential mental health issues or academic disengagement in students, it could also increase educators' understanding of students' relational engagement with their peers and teachers. This understanding will facilitate teacher effectiveness in managing the socioemotional needs of students, potentially benefitting students' academic engagement and performance.

Limitations and Future Directions

There is one main limitation to note for this study. We were underpowered to detect small amounts of measurement variation between the two AI groups. Our analysis revealed that there were not large variations of the factor structure between the two groups, but we were unable to rule out the possibility of small variations. Future research can examine this question of measurement invariance by verifying the factor structure of the PSSM in AI/AN groups with larger samples to increase power and opportunity for finer analyses. Another path for future research in the examination of the occurrence of method effects due to negatively worded items could be to assess whether the selection of these items vary across different ethnic groups or primary language of participants. DiStefano and Motl (2006) suggest that certain aspects of personality and response style may be associated with method effects related to negatively worded items. Thus, future research can examine other possible dispositional factors of this method effect that may be related to cultural orientation (Wong et al., 2003).

Lastly, previous research has recommended alternatives to utilizing negatively worded items. Typically, these items have been included in surveys to control for *acquiescence bias*, the tendency for a respondent to agree with most of the items. In his examination of negative word stems and response options, Barnette (2000) suggests that usage of negatively worded items has a minimal effect on controlling for acquiescence bias and can instead pose problems for internal consistency and factor structure. In his study, one version of a survey using both positively and negatively worded items resulted in a lower alpha coefficient as compared to another version of a survey using only positively worded items. This result has also been replicated in recent studies examining effects of negatively worded items (Roszkowski & Soven, 2010; Sliter & Zickar, 2014).

Barnette (2000) goes on to note that the usage of bidirectional response options ("strongly agree" to "strongly disagree" and "strongly disagree" to "strongly agree") increased the alpha coefficient and was a reliable marker of acquiescence bias. Thus, in surveys using Likert-response scales, altering the directionality of half of the responses of the survey, and

distributing the survey with only positively worded items can best improve the overall reliability of the scale while controlling for acquiescence bias. This method may also improve measurement invariance of a scale across different cultural groups (Wong et al., 2003), which is particularly important if the construct measured may have significant social, educational, and clinical significance for a particular population, such as sense of school belongingness for AI/AN adolescents.

CONCLUSION

This study aimed to examine the factor structure of the Psychological Sense of School Membership (PSSM) Scale in two groups of AI adolescents. Considering the unique situational and environmental factors to which AI/AN adolescents are exposed, interventions and recommendations developed for this population should be culturally relevant. For example, the American Indian Life Skills (AILS) curriculum is a culturally supported intervention developed to reduce suicidal ideation in AI/AN adolescents through targeting of factors most relevant to this population, such as self-regulation, communication skills, and peer and community support (LaFromboise, 1996). Interventions that target variables specific to certain populations are needed to address group-specific concerns (Goldston et al., 2008; LaFromboise & Hussain, 2015); however, reliable measurement is needed to ensure reasonable inference. As emphasized previously, AI/AN adolescents highly value sense of belongingness. Aspects of belongingness are found to be negatively correlated with suicidal ideation and attempts (Whitlock, Wyman, & Moore, 2014) and directly and indirectly influence academic performance (Wang & Holcombe, 2010). Thus, a measure of belongingness that has reasonable measurement properties in this group is desirable. Based on these preliminary results, future research on belongingness with AI/AN youth should utilize the recommended 13-item version of the PSSM found in this study. However, it would be important to verify the factor structure of the PSSM in future research with AI/AN youth. Interpreting the PSSM using the factor structure discovered in this study will be useful for targeting which aspects of belongingness are related to positive psychological outcomes. Additionally, information obtained from this psychometrically valid measure can guide the development of interventions that promote the positive development of AI/AN adolescents.

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AUTHOR INFORMATION

Shadab Fatima Hussain is 5th year PhD candidate at the Stanford Graduate School of Education in Stanford, CA. Dr. Benjamin W. Domingue is an assistant professor at the Stanford Graduate School of Education. Dr. Teresa LaFromboise is a professor at the Stanford Graduate School of Education. Nidia Ruedas-Gracia is a 4th year PhD candidate at the Stanford Graduate School of Education.

FEASIBILITY OF A SYSTEMS APPROACH TO TREAT COMMERCIAL TOBACCO DEPENDENCE WITHIN AMERICAN INDIAN HEALTH CLINICS

Brandie Buckless, MPH, Kristine Rhodes, MPH, Meggan McCann, MPH,
Bruce Christiansen, PhD, Jean Forster, PhD, MPH, and Anne Joseph, MD, MPH

Abstract: American Indians and Alaska Natives (AI/ANs) have the highest smoking prevalence, smoking-related disease, and mortality rates of any racial or ethnic group. Three AI health clinics in Minnesota implemented an evidence-based tobacco dependence treatment intervention that included provider education and customized clinical system tools. A baseline assessment of each clinic facility guided the focus of the intervention and tailored the clinical system tools. Clinic staff were assessed with pre/post-training evaluations and annual assessments. Results indicated self-reported improvements in the rate of identifying smoking status (57% to 89%), documenting smoking status (from 60% to 80%), and providing evidence-based treatments such as pharmacotherapy (from 36% to 78%).

INTRODUCTION

Over the past 50 years, the prevalence of cigarette smoking has decreased dramatically in the United States from 43% to 15.1% (Jamal et al., 2016; U.S. Department of Health and Human Services [USDHHS], 2014). Unfortunately, this progress has not been equal across all subpopulations. American Indians and Alaska Natives (AI/ANs),[1] in particular, continue to smoke at a higher rate than any other racial or ethnic group in the U.S. with a 31.8% current cigarette smoking rate estimate among adults in 2016 (Jamal et al., 2018). Very high smoking rates also characterize AI/AN youth, ages 12-17, whose smoking rate is 13.6% compared to 10.2% for non-Hispanic whites (Garrett, Dube, Winder, & Caraballo, 2013) and AI/AN pregnant women, who report smoking during their last trimester more than any other racial group (26.0% vs. 14.3% for whites; Tong, Jones, Dietz, D'Angelo, & Bombard, 2009).

[1] While most national datasets include samples of AI/ANs together, regional studies and interventions may target American Indians (AIs) only, such as the pilot study being described in this article. Both AI/AN and AI terms are used in this article to specify when appropriate.

Nationally aggregated data, however, fails to paint an accurate picture of the smoking prevalence in this population. Previous research has shown significant regional variation in cigarette smoking rates among AI adults, with highest rates in the Northern Plains (54%; Eichner, Wang, Zhang, Lee, & Welty, 2010) and lowest in the Southwest region (30.5%; Forster et al., 2016; Steele, Cardinez, Richardson, Tom-Orme, & Shaw, 2008). Included in the Northern Plains region, Minnesota's first statewide tribal tobacco use prevalence study (reported in 2013) revealed a 59% current cigarette smoking rate among AI adults, higher than any other racial or ethnic group in Minnesota, and more than four times the statewide adult cigarette smoking prevalence of 14.4% (ClearWay Minnesota & Minnesota Department of Health, 2015; Forster & Skjefte, 2013).

High cigarette smoking rates go hand-in-hand with higher prevalence of smoking-related disease and death. AI/ANs have substantially higher rates of lung cancer incidence and mortality (Foote, Strickland, Lucas-Pipkorn, Williamson, & Lamers, 2016; Plescia, Henley, Pate, Underwood, & Rhodes, 2014), as well as higher mortality rates for all the leading causes of smoking-related death (e.g., heart disease, cancer, stroke, chronic lung disease, and diabetes) compared to the general U.S. population (Great Lakes Inter-Tribal Epidemiology Center, 2011; Mowery et al., 2015; Zhang et al., 2015). Cancer incidence and mortality rates for AIs in Minnesota are twice the rate of AIs across the United States (Minnesota Cancer Surveillance System, 2012). These tremendous smoking-related health inequities experienced within the population makes reducing cigarette smoking an essential public health priority.

The relationship between AIs and tobacco is complex. For many AI tribes, traditional tobacco has held a central role in spirituality, ceremonies, and healing for generations. Tobacco that is used for cultural purposes, often a mixture of various plants and herbs gathered from the local environment, is different than the manufactured, commercial tobacco found in cigarettes that are sold in stores (Great Lakes Inter-Tribal Epidemiology Center, 2013). Unfortunately, the relationship between AIs and tobacco has been greatly influenced over the years by federal assimilation policies. These policies have resulted in a loss of culture regarding some traditional ceremonies and practices, ultimately contributing to an increased use of commercial tobacco in place of traditional tobacco (Goodkind et al., 2011). In addition, this population has long been targeted by the tobacco industry (Americans for Nonsmokers Rights & American Cancer Society, 2016; Campaign for Tobacco-Free Kids, 2018; USDHHS, 2014). There are many tribally-led efforts to reclaim and promote the traditional use of tobacco that is not consistent with commercial tobacco use and dependence (Boudreau et al., 2016). Literature on tobacco control efforts in this population suggest the need to understand and

acknowledge the role of traditional tobacco, as well as the fundamental difference between traditional and commercial tobacco when implementing interventions to address commercial tobacco dependence (D'Silva, Schillo, Sandman, Leonard, & Boyle, 2011; Daley et al., 2010; Filippi et al., 2013; Gryczynski et al., 2010; Margalit et al., 2013).

Studies examining tobacco and cessation beliefs in AI/AN communities have found that many current smokers would like to quit (Burgess et al., 2007; Forster & Skjefte, 2013; Forster, Rhodes, Poupart, Baker, & Davey, 2007; Fu et al., 2014). In the 2010-2012 Minnesota American Indian Adult Tobacco Survey, almost two-thirds (62%) of current AI adult smokers reported they would like to quit, and 50% reported that they tried to quit at least once in the previous year (Forster & Skjefte, 2013). Unfortunately, success in quitting remains lower than among other groups. Nationally, AI/ANs have lower quit ratios (i.e., the percentage of ever smokers who had quit smoking) compared to the general population (48.2% and 55.1%, respectively; USDHHS, 2014), demonstrating a need for better strategies to promote successful quit attempts. One reason why AI/ANs may be less successful in their quit attempts is limited awareness of effective forms of pharmacotherapy to aid smoking cessation (Daley et al., 2011).

Evidence of rigorously tested tobacco cessation interventions to reduce cigarette smoking in this population is limited. One intervention that has been well researched and documented is a culturally tailored smoking cessation program for AIs called All Nations Breath of Life. In a randomized trial, study participants receiving the intervention were given nine in-person group cessation sessions over a six-month period. The sessions were led by an AI facilitator and included brief telephone support calls between group sessions, culturally tailored materials, and cessation medications. Participants in the control group received nine individual cessation sessions over a six-month period (two in-person and seven by telephone) from a non-AI facilitator, non-tailored materials, and cessation medications. Results found statistically significant differences in self-reported intention-to-treat point prevalence abstinence rates at six months (20.1% in the intervention group and 12.0% in the control group; Choi et al., 2016). Another randomized control trial tested a culturally tailored treatment for AI smokers using counseling and varenicline, and reported a 20% abstinence rate at 6 months (Smith et al., 2014). A culturally tailored text messaging-based smoking cessation intervention for AI smokers is currently being tested in a randomized, single-blinded control trial in collaboration with state quit lines ("American Indians STOp smoking by Mobile Phone [AI STOMP]," 2015). Results from this study have yet to be published.

Clinical Health Care Services as Optimal Intervention Setting

According to the Minnesota American Indian Adult Tobacco Survey, 74% of current cigarette smokers have seen a health care provider in the past year. This presents an exceptional opportunity to assist patients who are willing to make a quit attempt by applying an existing national guideline with substantial evidence of the effectiveness of addressing tobacco use at every health care visit. The Public Health Service Clinical Practice Guideline *Treating Tobacco Use and Dependence: 2008 Update* (USPHS guideline; Fiore et al., 2008) provides a framework for physicians to systematically address patients' tobacco dependence, recommending the use of the 5A's model as a method to ensure every patient is *Asked* about their current tobacco use, *Advised* to quit, *Assessed* for readiness to quit, *Assisted* in their quit attempt, and provided *Arrangements* for follow-up. The USPHS guideline also promotes the use of various tobacco interventions in clinical care settings, including the use of cessation medications, brief counseling by a provider, promoting the use of state or national quit lines, supplying provider trainings, and more intensive cessation counseling and support for patients. Subsequent population-based patient research on the effectiveness of the USPHS guideline has demonstrated the efficacy of these systematic interventions in treating tobacco dependence (Land et al., 2012). There is a knowledge gap, however, about the efficacy of the 5A's approach in health care settings that predominantly serve AIs.

Despite the existing USPHS guideline, many patients, including AI/ANs, report that they do not receive interventions from their provider during health care visits. This provides evidence that integration of these interventions into standards of care is lacking (Quinn et al., 2005; Rigotti, 2011; Stevens et al., 2005; Thorndike, Rigotti, Stafford, & Singer, 1998). While 95% of current AI smokers in Minnesota report they have seen a health care provider in the past year and were asked by their provider if they smoke, far fewer report being advised to quit (76%), recommended cessation prescriptions (39%), provided self-help materials (31%), referred to a cessation program (30%), or offered follow-up (22%; Forster & Skjefte, 2013). These data demonstrate a need to assess the feasibility of efforts designed to increase the provision of the 5A's in an AI clinical care setting.

The American Indian Systems for Tobacco Addiction Treatment (STAT) pilot study partnered with three clinics that primarily serve AIs in Minnesota. The goal of STAT was to systematically integrate tobacco dependence intervention into every health care visit based on the 5A's model. The intervention focused on two evidence-based strategies: 1) health care provider

training (Payne et al., 2014; Verbiest et al., 2014) and 2) the provision of customized clinical system tools to encourage and support clinic staff involvement in assessing patients' tobacco use status and treating tobacco dependence (Clayman, Gulbrandsen, & Morris, 2017; Holt, Thorogood, & Griffiths, 2012; Marcy, Skelly, Shiffman, & Flynn, 2005; Solberg, Maciosek, Edwards, Khanchandani, & Goodman, 2006). This pilot study only targeted interventions to address the use of commercial tobacco (typically cigarettes), as opposed to traditional tobacco (using tobacco as part of ceremonial activities, for example). The distinction between commercial and traditional tobacco was relevant to the educational materials presented to study participants (see Table 2, for example). Unless described as traditional tobacco, "tobacco" in this article refers to commercial tobacco.

The specific aims of the study were to: 1) assess baseline provider use of the 5A's and clinic system policies to address tobacco dependence, 2) develop and implement a tailored intervention consisting of provider education and customized clinical tools designed to increase provider use of the 5A's, and 3) evaluate the feasibility and outcomes of the intervention.

METHODS

Clinic Recruitment

The leadership of all 10 tribal, Indian Health Service (IHS), and urban clinics serving primarily AIs in Minnesota were mailed an invitation to participate in this study. The letter emphasized the aims of the research and highlighted the benefits of participation, which included support in meeting the Centers for Medicare and Medicaid Services "Meaningful Use" standards (Blumenthal & Tavenner, 2010), an annual stipend to the clinic, and CME credit for staff participation in on-site trainings. Six clinics responded with letters of interest to participate in the study. There were no obvious differences between the six clinics that agreed to participate and four clinics that did not. The pilot nature of the study restricted clinic inclusion to a convenience sample of three clinics that included differences in size and urban versus rural location: one urban clinic (Clinic A), one large tribal clinic (Clinic B), and one small tribal clinic (Clinic C). While each clinic receives funds from IHS, none of them are IHS clinics. Two clinics are run by tribal authorities on tribal land, while the third is run by a community agency as a Federally Qualified Health Center (FQHC) and designated as an AI clinic. Each participating clinic used an electronic health record (EHR) system, although the EHR platform varied across clinics. Typically, staff in

the clinics are not AI. The tenure of staff within the clinics ranged from months to decades. All clinics comply with federal and statewide tobacco regulations. There are tribal-specific smoke free air policies for most buildings and additional protections from secondhand smoke in businesses such as private, tribally licensed day care centers, and foster homes. IRB review and approval for the study was obtained from the University of Minnesota Human Research Protection Program and the Indian Health Service National IRB.

Intervention Components

The intervention consisted of three phases, varying in length between six and 12 months, and began with provider training. Phase One included provider education training that was co-facilitated by study staff and a member of the local health staff, both trained instructors to deliver the "Basic Tobacco Intervention Skills Certification for Native Communities" curriculum, developed by the IHS Tobacco Control Task Force in partnership with the University of Arizona HealthCare Partnership (University of Arizona HealthCare Partnership, 2017). The content of the training included understanding the health consequences of commercial tobacco, tobacco dependence treatment, tobacco and culture, the 5A's model for cessation interventions, follow-up interventions, motivational interviewing, and targeted role-play. All staff with direct patient contact in the medical clinic, public health/community health, pharmacy, dental, and behavioral health departments were invited to attend. The initial four-hour training was delivered at each clinic during the first year of the study and followed up annually by one-hour booster sessions on topics identified by clinic staff. The follow-up booster sessions (Phase Two and Three) included presentations from University of Minnesota faculty on findings from the Minnesota American Indian Adult Tobacco Survey, updates on cessation pharmacotherapy options, and a presentation by an AI healer on bridging Western and traditional medicine. A healthy meal and CME credit was provided at each training. All study staff that interacted with clinic staff during the intervention were AIs.

STAT provided each clinic with a menu of clinical system tools, such as tobacco dependence screening prompts and reminders, patient education and awareness materials, shared decision-making tools, and improved referral systems. Clinics were encouraged to form a working group with members from all positions within the clinic that actively participate in the treatment of tobacco dependence. The membership of the working groups varied by clinic, but generally included representation from clinicians, nurses, smoking cessation counselors, pharmacists, EHR

specialists, and sometimes other departments, such as dental and behavioral health. These internal work groups were encouraged to discuss clinic priorities and review and make the selection of tools from the provided menu.

Assessments

Figure 1 (see Appendix) illustrates the phases of the intervention, the length of time that was spent in each phase, and the assessments that were administered. A situational analysis was conducted at study baseline, using an assessment adapted from the Maine Health Center for Tobacco Independence *Practice Profile: Patient Structure and Patient Panel Data* form (Partnership for a Tobacco Free Maine, 2008). This assessment provided insights into the current clinical cessation practices, available resources, and use of the EHR system to collect and report tobacco use treatment activities. It also served as a tool to highlight needs for tailoring the intervention at each clinic.

Evaluation surveys were administered to all clinic staff following STAT trainings. These assessed changes in self-efficacy to meet the training objectives and intent to change behaviors. Further data collection included annual assessments completed by clinicians and nurses to capture knowledge of the 5A's and self-reported behavior change regarding treating tobacco dependence.

Study staff documented additional activities that occurred at each clinic throughout the study by attending clinic meetings and update calls, holding conversations with clinic staff during trainings, and by making observations while on-site.

Descriptive statistics, primarily frequencies and percentages, were used to characterize the data. As a small sample, pilot study, making comparisons between groups using inferential statistics was inappropriate due to low power.

RESULTS

Clinic Descriptions

Table 1 describes the three participating STAT study clinics including setting type, number of primary medical providers, number of unique patients with outpatient visits, and percent of patients who identify as AI. All participating clinics operated medical, dental, behavioral, laboratory, and community health services. Two of the clinics also offered on-site pharmacy. One

of the clinics included optometry, telemedicine, and traditional healing services. The percentage of total patients who were AI served in these clinics ranged from 46-91%.

Table 1
Clinic Settings

AI Health Clinic	Type of Clinic	# Primary Care Medical Providers	# of Unique Patients with Visits in 2014	% Patient Population American Indian
Clinic A	Urban	6	2,473	46%
Clinic B	Large Tribal	5	2,685	87%
Clinic C	Small Tribal	4	1,676	91%

Baseline Facility Assessment

At baseline, none of the clinics had a mission statement, written goals, policies, or a standard required tobacco cessation intervention specifically related to treating patient tobacco dependence. At baseline, two clinics reported that tobacco dependence was addressed and documented with patients at every visit. Nurses at all three clinics were responsible for asking about and documenting patients' smoking status. None of the clinics could describe the prevalence of tobacco use among adult patients in their clinic, and none reported that their clinicians were systematically using the 5A's of the USPHS guideline (Fiore et al., 2008). One clinic reported that clinicians delivered brief tobacco interventions with patients, while the other two clinics reported they were not sure how often this occurred. Two clinics reported that they sometimes recommended telephone counseling to patients, and one clinic occasionally referred patients to tobacco cessation programs outside of the clinic and faxed referrals to telephone quit lines. None of the clinics had a policy requiring clinic staff to be trained in tobacco cessation or a process for providing feedback to staff about their provision of tobacco dependence treatment.

Training Evaluations

A total of 24 of 32 (75%) providers and nurses and 12 additional clinic staff attended the Phase One training, 26 of 32 (81%) providers and nurses and 13 additional clinic staff attended the Phase Two training, and 24 of 32 (75%) providers and nurses and nine additional clinic staff attended the final Phase Three training. Only staff who had direct contact with patients were asked to complete training evaluations. Immediately after the training, clinic staff were asked to rate themselves with a five-point Likert scale on the extent to which they could meet the identified

training objectives, their self-perceived knowledge change, and their intention to change behaviors. Across all three trainings, 37% of staff respondents rated themselves as knowledgeable on the topics (at least a 4 on a 5-point scale) before the trainings. After the trainings, 90% rated themselves as knowledgeable. Seventy-four percent of staff respondents felt confident they could put this new knowledge into action and 88% felt it was likely they would change their behaviors as a result of the trainings. Further findings from the post-training evaluations are highlighted in Table 2.

Table 2
Post-training Staff Confidence in Ability to Meet USPHS Guideline Recommendations

Basic Tobacco Intervention Skills Training (Phase One)	**Not at all 1**	**A little 2**	**Somewhat 3**	**Mostly 4**	**Completely 5**	**Total (*n*)**
Identify the core elements of The Integrated 5A's Model	0	0	4 (13%)	8 (27%)	18 (60%)	30
Practice the Integrated 5A's Model intervention with people who are willing and unwilling to quit	0	0	4 (14%)	11 (38%)	14 (48%)	29
Utilize the six basic elements of a Quit Plan	0	0	2 (7%)	13 (43%)	15 (50%)	30
Identify relapse and relapse prevention strategies	0	0	7 (23%)	8 (27%)	15 (50%)	30
Deliver an intervention for relapse	0	0	8 (27%)	10 (33%)	12 (40%)	30
Distinguish between traditional and commercial tobacco use	0	0	2 (7%)	8 (28%)	19 (66%)	29
Document your smoking cessation interventions	0	1 (3%)	6 (20%)	7 (23%)	16 (53%)	30
Looking back, how would you rate your knowledge of the subject before the training?	0	5 (17%)	14 (47%)	4 (13%)	7 (23%)	30
How likely is it that you will change your practice behavior as a result of this conference?	0	1 (3%)	3 (10%)	7 (23%)	19 (63%)	30
Tobacco Use Prevalence and Cessation Pharmacotherapy Training (Phase Two)	**Not at all 1**	**A little 2**	**Somewhat 3**	**Mostly 4**	**Completely 5**	**Total (*n*)**
Identify the prevalence of cigarette smoking and differences by age for American Indian adults	0	0	1 (4%)	12 (44%)	14 (52%)	27

continued on next page

Table 2 Continued
Post-training Staff Confidence in Ability to Meet USPHS Guideline Recommendations

Tobacco Use Prevalence and Cessation Pharmacotherapy Training (Phase Two)	**Not at all 1**	**A little 2**	**Somewhat 3**	**Mostly 4**	**Completely 5**	**Total (*n*)**
Describe the rate of quitting cigarettes and some barriers to quitting among American Indians	0	0	3 (11%)	11 (41%)	13 (48%)	27
Implement action steps to reduce the prevalence of cigarette smoking among American Indians	0	1 (4%)	2 (8%)	12 (48%)	10 (40%)	25
Prescribe and counsel patients on the current FDA approved pharmacotherapy options for treating tobacco dependence	0	1 (4%)	5 (20%)	7 (28%)	12 (48%)	25
Distinguish between pharmacotherapy methods for tobacco dependence by understanding the various side effects, recommended use, cautions/warnings and other factors when prescribing or counseling patients on medication effectiveness and adherence	0	0	6 (24%)	8 (32%)	11 (44%)	25
Looking back, how would you rate your knowledge of the subject before the training?	1 (3%)	7 (18%)	15 (38%)	13 (33%)	3 (8%)	39
Now that you have attended the training, how do you rate your knowledge of the subject?	0	0	1 (3%)	27 (69%)	10 (26%)	38
How likely is it that you will change your practice behavior as a result of this conference?	0	0	1 (3%)	23 (59%)	14 (36%)	38
Bridging Western and Traditional Medicine for Tobacco Addiction Treatment Training (Phase Three)	**Not at all 1**	**A little 2**	**Somewhat 3**	**Mostly 4**	**Completely 5**	**Total (*n*)**
Characterize the history and traditional tobacco teachings and uses among American Indians in MN.	0	3 (13%)	3 (13%)	8 (33%)	10 (42%)	24
Identify ways in which traditional medicine can be used to overcome commercial tobacco addiction.	2 (9%)	4 (17%)	5 (22%)	3 (13%)	9 (39%)	23
Looking back, how would you rate your knowledge of the subject before the training?	2 (8%)	2 (8%)	13 (52%)	8 (32%)	0	25
Now that you have attended the training, how do you rate your knowledge of the subject?	0	0	4 (16%)	15 (60%)	6 (24%)	25
How likely is it that you will change your practice behavior as a result of this conference?	0	1 (4%)	5 (20%)	13 (52%)	6 (24%)	25

Clinic Tools

Clinic tools were developed in response to the needs and priorities identified by each clinic's internal working group. In this way, each clinic developed a sense of ownership over the project. Clinic staff expressed interest in patient education tools that also served as reminders to provide brief tobacco dependence interventions to all patients at each visit. Eye-catching print materials were prominently placed in the clinic waiting areas to remind patients that someone would be asking about their cigarette smoking and offering assistance with quitting. The patient resources were designed to capture and reflect the reality of AI community members by including culturally-tailored imagery and messaging. They also included detailed information to encourage shared decision-making between patient and clinician (Cohen, 2017) by providing information for the patient to assess their level of tobacco dependence and learn details of pharmacotherapy options in the clinic exam rooms.

Once a tool was identified and developed for one clinic, it was made available to all three clinics. Each clinic reviewed and co-developed the following clinic tools: 1) poster with the FDA-approved smoking cessation pharmacotherapy options (see Figure 2 in Appendix); 2) table tents with the abbreviated Fagerstrom Nicotine Dependence Test (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991; see Figure 3 in Appendix); 3) notecards with customized flow chart of the 5A's model (see Figure 4 in Appendix); 4) retractable banners for the clinic lobby (see Figure 5 in Appendix); and 5) culturally-targeted patient education materials, including posters with traditional tobacco use messages and Strength to Quit pocket guides (IHS & University of Arizona HealthCare Partnership, 2009). Clinics were also given the option to feature looped feeds of the CDC's "Tips from Former Smokers" campaign (CDC, 2013) for clinic lobby TV monitors, although only one clinic utilized this.

Developing Infrastructure to Address Tobacco Use: Challenges and Successes

Outcomes from the intervention were specific to each clinic, reflecting the clinic setting, environment, staff capacity, and readiness to change. Debriefing telephone interviews conducted at the end of the project identified the unique successes and challenges during implementation of the intervention (see Table 3).

Table 3
Examples of Clinic Challenges/Clinic Successes

Challenges

- It made more economic sense for one clinic that received flat-rate reimbursements for each clinic visit to encourage tobacco dependent patients to schedule an additional visit for cessation on another date, rather than intervening during the regular medical visit.
- Without an EHR specialist on staff, needed improvements to the EHR system for the most up-to-date tobacco screen prompts and documentation were stalled.
- Clinics and tobacco cessation programs occasionally had limited communication, which reduced their ability to provide comprehensive services for tobacco dependent patients.
- Clinics with a small staff size and full workloads created barriers and time constraints to fully implement EHR and clinic policy changes.

Successes

- Nurses developed scripts to advise smokers to quit and assist patients to access intensive counseling through the tobacco cessation program.
- Clinics improved their EHR-based clinician reminders and prompts to follow the 5A's by highlighting patients' tobacco status at the top of vital sheets.
- Clinics identified the need to update the EHR to the most recent tobacco screen template in order to streamline documentation.
- Customized cessation program referral forms with culturally-relevant imagery were created for clinic exam rooms and improved prescription and referral processes were developed with external pharmacy partners.
- Clinics identified the need to establish consistent, clinic-wide policies and procedures, such as screening for cigarette smoking status at every visit and ensuring the dental department staff were trained in the 5A's and provided their own customized flow charts for exam rooms.
- Clinic staff improved their knowledge of and enhanced communication with the tobacco cessation program, including establishing EHR access for the tobacco cessation counselor to receive direct referrals from clinic providers and document cessation activities directly in patients' medical charts.
- One clinic created a new policy, through support from tribal leadership, to provide cessation medication to all patients interested in quitting, regardless of insurance.

Annual Assessments of Staff

Nurses and providers (i.e., physicians, physician assistants, nurse practitioners) were asked at baseline, Phase One, and Phase Two of the study to report how often they participated in tobacco dependence intervention activities within the past month. "Providers" did not include nurses because of the distinct role that each position plays in asking and documenting patient cigarette smoking status and were reported separately. A combined total of 17 nurses and 15 providers were eligible for assessment during baseline (59% response rate), Phase One (69% response rate), and Phase Two (59% response rate). Table 4 highlights the percentage of nurses and providers who reported they "Often" or "Always" completed a set of evidence-based tasks for treating tobacco dependence.

Nurses and providers increased their self-reported behaviors to address tobacco dependence throughout the duration of the STAT study. Nurses reported increased documentation

of tobacco use status, and the percent of nurses who used the EHR to record tobacco use status increased from 60% at baseline to 80% by Phase Two (see Table 4). Providers reported being more likely to ask about tobacco use at each visit, advise about the importance of quitting, help those who are ready to quit make a quit plan, and make referrals to supportive services. In addition, more providers reported distributing self-help materials, providing follow-up for patients during their quit attempt, informing patients about pharmacotherapy options, prescribing cessation medication, and documenting tobacco interventions in the EHR system (see Table 4).

Table 4
Frequency of Respondents who Report They "Often" or "Always" Complete Tasks

Nurses	**Baseline (*n* = 5 of 17)**	**Phase One (*n* = 10 of 17)**	**Phase Two (*n* = 10 of 17)**
Document the current tobacco use of your patient in the Electronic Health Record	60%	70%	80%
Document how much tobacco a patient is using (ex: ppd, pack-years, etc.).	60%	70%	80%
Providers	**Baseline (*n* = 14 of 15)**	**Phase One (*n* = 12 of 15)**	**Phase Two (*n* = 9 of 15)**
Ask about current use of commercial tobacco at each visit	57%	83%	89%
Advise about the importance of quitting with patients who use commercial tobacco	43%	83%	89%
Help those who are ready to make a quit attempt to set a date and to develop a quit plan	43%	58%	67%
Make referrals to suitable and intensive services to support quit attempts of patients who use commercial tobacco	29%	50%	56%
Distribute self-help quit materials to commercial tobacco users	14%	44%	50%
Provide follow-up support for commercial tobacco users during their quit attempt	36%	50%	67%
Inform commercial tobacco users about the use of pharmacotherapy for tobacco cessation	43%	67%	78%
Prescribe tobacco cessation medication for commercial tobacco users who are ready to set a quit date	36%	50%	78%
Document any intervention related to tobacco cessation for patients who use commercial tobacco.	25%	50%	67%

DISCUSSION

The rate of tobacco use in AI/AN communities remains alarmingly high. The STAT study partnered with three AI clinics in Minnesota to address this challenge by implementing an intervention designed to integrate tobacco dependence treatment into clinic processes. The intervention consisted of clinic staff education and the provision of clinical system tools developed and tailored for each clinic. In addition, the clinics formed working groups that set the priorities of the intervention and made EHR and policy change recommendations for the clinic.

Literature on the implementation of systems change strategies to address tobacco dependence in primary care settings has promoted the important process of identifying a clinic champion to spearhead the work, forming tobacco work groups to support them, and utilizing EHRs to increase clinicians' tobacco dependence treatment behaviors (Boyle, Solberg, & Fiore, 2014; Jansen, Capesius, Lachter, Greenseid, & Keller, 2014; Land et al., 2012; Papadakis et al., 2014; USDHHS & Agency for Healthcare Research and Quality, 2008). Engaging clinic leadership was essential to the project. This resulted in various changes to clinic policy including edits to the EHR (for assessment and referral), new partnerships with tribal public health tobacco control efforts, and new investigations into opportunities for billing for cessation in the clinic. The STAT clinic working groups were provided with a menu of possible clinic system tools to develop, and they selected the strategies most relevant to their patient population. This strategy likely improved staff buy-in and satisfaction with the products. It also allowed the clinic to tailor their activities and materials to their own context and progress in a way that was most appropriate within their system. Providers involved in this study recognized the importance of treating tobacco dependence with their patients, but reported that they could not find the time to fit it into a regular office visit or the clinic lacked the policies and clinical systems needed to support consistent intervention. Being external to the clinic, STAT project staff were uniquely situated to convene clinic staff on a regular basis for training and provide them the opportunity to discuss challenges and improvement strategies. Project staff provided technical assistance, expertise, and facilitation so that these important conversations could take place within the clinic.

A number of clinic actions might create more consistent tobacco dependence treatment within AI clinics. Efforts are needed to develop stronger management buy-in to the importance of addressing tobacco dependence. Providing treatment such as the 5A's should be integrated into clinic care processes. The EHR can prompt the provision of cessation counseling. Clinic and tribal policy should remove barriers, such as deductibles and co-pays, to receiving FDA-approved

cessation medications. Finally, staff turnover in the clinics is high. Re-training will have to be addressed to sustain the provision of tobacco dependence treatment.

This study has some limitations. First, we did not collect outcome data such as quit attempts and cessation, making it hard to document long-term impacts related to patient behavior change. Second, the study included only three clinics. Results may not generalize to other AI health clinics in Minnesota or elsewhere. Third, because this study utilized a multi-component intervention, it is not possible to examine the effects of each intervention component separately. Doing so in future research will be important. Fourth, staff behavior change was assessed by self-report and may be subject to social desirability bias. Fifth, as a pilot study involving only three clinics, it is not possible to compare results across clinics statistically. Finally, it was impossible to assess the impact of secular trends, such as Minnesota's and the CDC's public service campaigns to promote cessation (e.g., Quitplan and "Tips from Former Smokers").

CONCLUSION

This study yielded promising results in establishing the feasibility of a systems change intervention addressing tobacco dependence—a vital health concern in the AI/AN population. Further, the intervention yielded positive results regarding increased provider knowledge, skills, and self-efficacy as well as increased identification of smokers in need of treatment. Our findings are consistent with other studies that have shown system-level interventions in medical clinics improve preventive service delivery and rates of referrals for cessation services (Bentz et al., 2007; Holt et al., 2012; Land et al., 2012). In addition, this study offered valuable lessons to guide future research, namely the importance of forming a clinic-based working group/committee that tailors approaches and materials to its unique clinical environment. These lessons can be used to inform a larger scale study designed to increase the provision of the tobacco cessation 5A's in health clinics serving AIs. More research and evaluation is needed to fully understand the extent to which providers in AI clinics are implementing the USPHS guideline, as well as barriers and facilitators to their implementation, and impacts on quit attempts and cessation.

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AUTHOR INFORMATION

Brandie Buckless is a research associate with James Bell Associates in Arlington, VA and formerly of the American Indian Cancer Foundation. Kristine Rhodes is the chief executive officer at the American Indian Cancer Foundation in Minneapolis, MN. Meggan McCann is a senior evaluation specialist at the National Marrow Donor Program in Minneapolis, MN and formerly of the American Indian Cancer Foundation. Dr. Bruce Christiansen is a senior scientist at the

University of Wisconsin Center for Tobacco Research and Intervention in Madison, WI. Dr. Jean Forster is a professor emeritus at the University of Minnesota School of Public Health in Minneapolis, MN. Dr. Anne Joseph is a Wexler Professor of Medicine at the University of Minnesota Medical School in Minneapolis, MN.

APPENDIX

Figure A1. Phases of the Intervention and Assessments

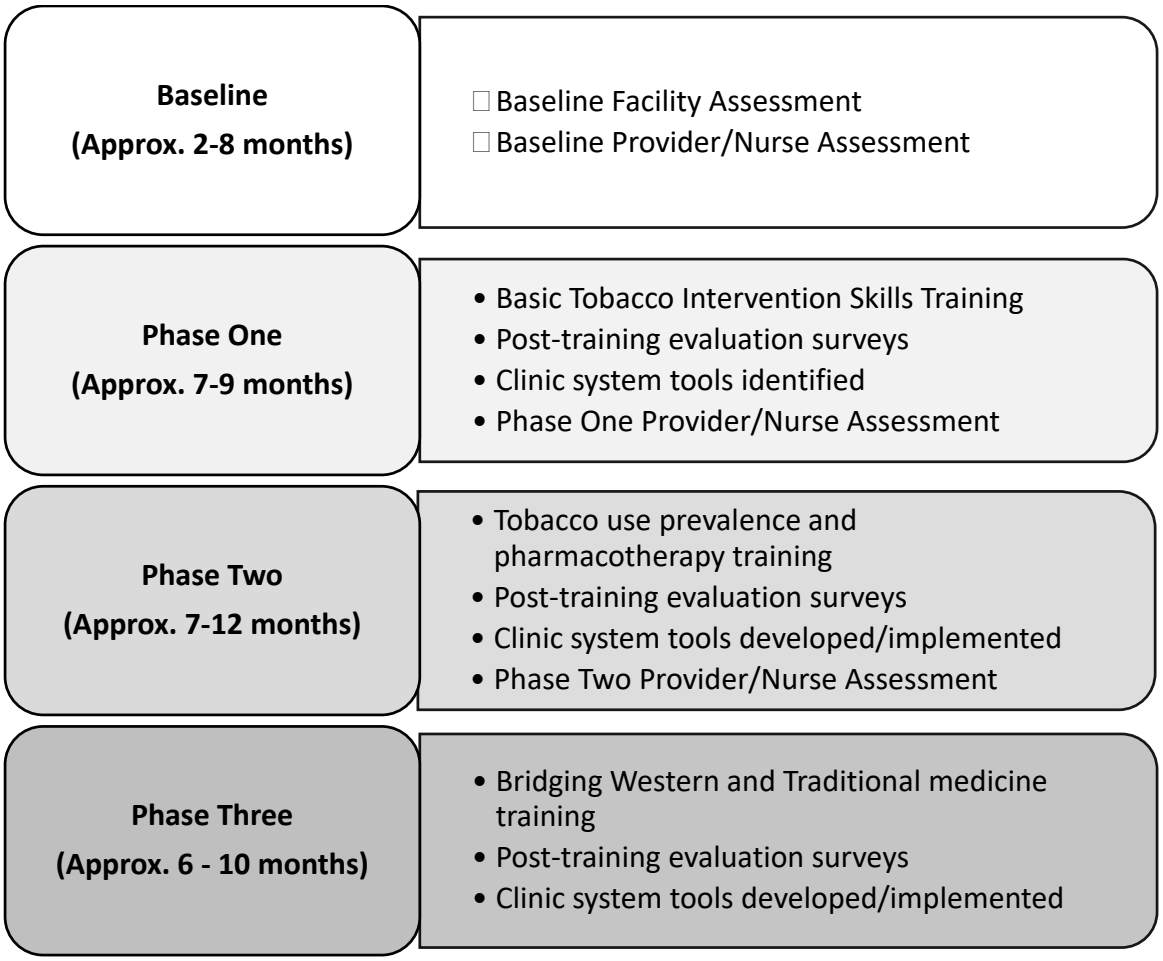
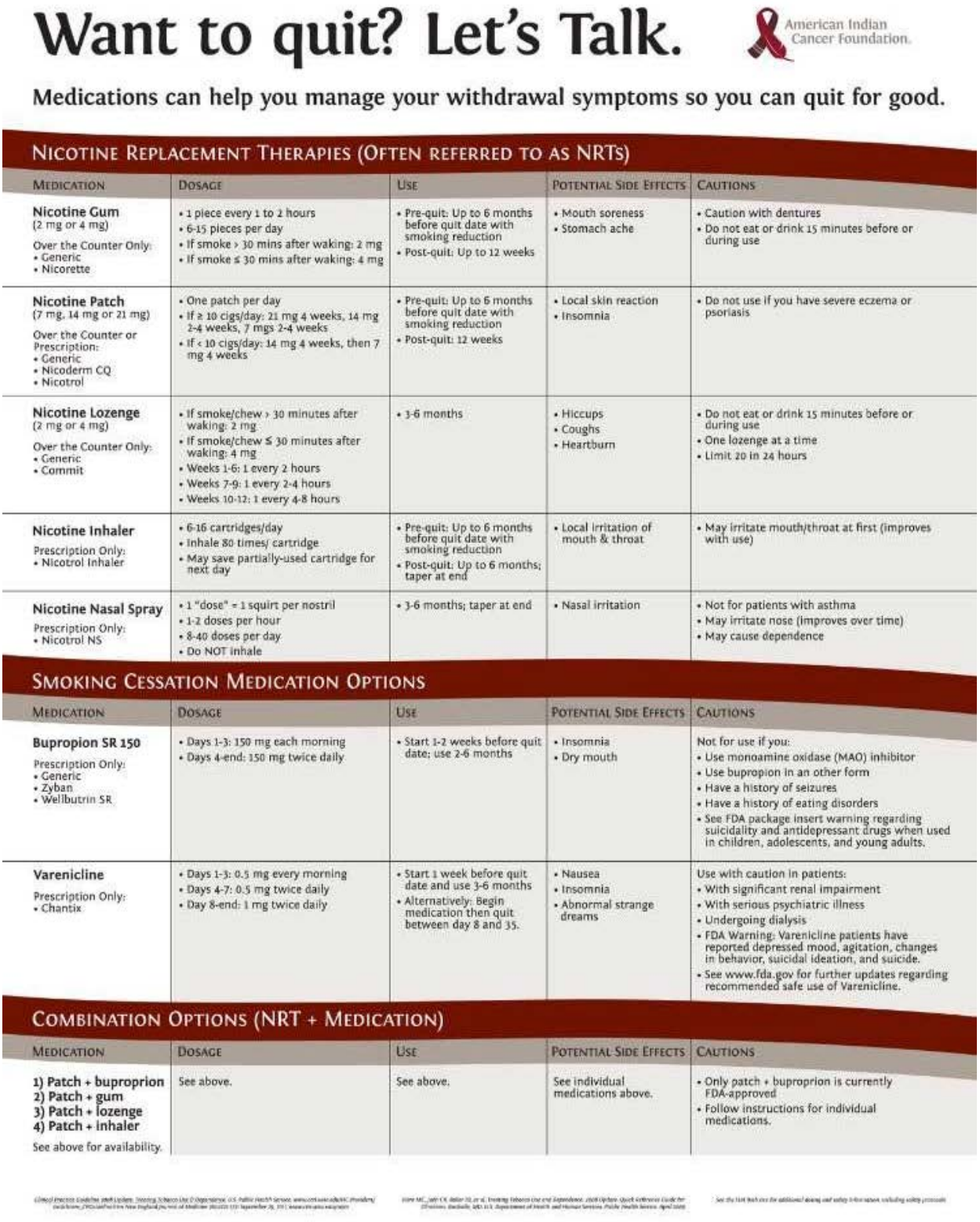


Figure A2. FDA-Approved Pharmacotherapy Options Poster



Want to quit? Let's Talk.

American Indian Cancer Foundation

Medications can help you manage your withdrawal symptoms so you can quit for good.

Nicotine Replacement Therapies (Often referred to as NRTs)

Medication	Dosage	Use	Potential Side Effects	Cautions
Nicotine Gum (2 mg or 4 mg) Over the Counter Only: • Generic • Nicorette	• 1 piece every 1 to 2 hours • 6-15 pieces per day • If smoke > 30 mins after waking: 2 mg • If smoke ≤ 30 mins after waking: 4 mg	• Pre-quit: Up to 6 months before quit date with smoking reduction • Post-quit: Up to 12 weeks	• Mouth soreness • Stomach ache	• Caution with dentures • Do not eat or drink 15 minutes before or during use
Nicotine Patch (7 mg, 14 mg or 21 mg) Over the Counter or Prescription: • Generic • Nicoderm CQ • Nicotrol	• One patch per day • If ≥ 10 cigs/day: 21 mg 4 weeks, 14 mg 2-4 weeks, 7 mgs 2-4 weeks • If < 10 cigs/day: 14 mg 4 weeks, then 7 mg 4 weeks	• Pre-quit: Up to 6 months before quit date with smoking reduction • Post-quit: 12 weeks	• Local skin reaction • Insomnia	• Do not use if you have severe eczema or psoriasis
Nicotine Lozenge (2 mg or 4 mg) Over the Counter Only: • Generic • Commit	• If smoke/chew > 30 minutes after waking: 2 mg • If smoke/chew ≤ 30 minutes after waking: 4 mg • Weeks 1-6: 1 every 2 hours • Weeks 7-9: 1 every 2-4 hours • Weeks 10-12: 1 every 4-8 hours	• 3-6 months	• Hiccups • Coughs • Heartburn	• Do not eat or drink 15 minutes before or during use • One lozenge at a time • Limit 20 in 24 hours
Nicotine Inhaler Prescription Only: • Nicotrol Inhaler	• 6-16 cartridges/day • Inhale 80 times/ cartridge • May save partially-used cartridge for next day	• Pre-quit: Up to 6 months before quit date with smoking reduction • Post-quit: Up to 6 months; taper at end	• Local irritation of mouth & throat	• May irritate mouth/throat at first (improves with use)
Nicotine Nasal Spray Prescription Only: • Nicotrol NS	• 1 "dose" = 1 squirt per nostril • 1-2 doses per hour • 8-40 doses per day • Do NOT inhale	• 3-6 months; taper at end	• Nasal irritation	• Not for patients with asthma • May irritate nose (improves over time) • May cause dependence

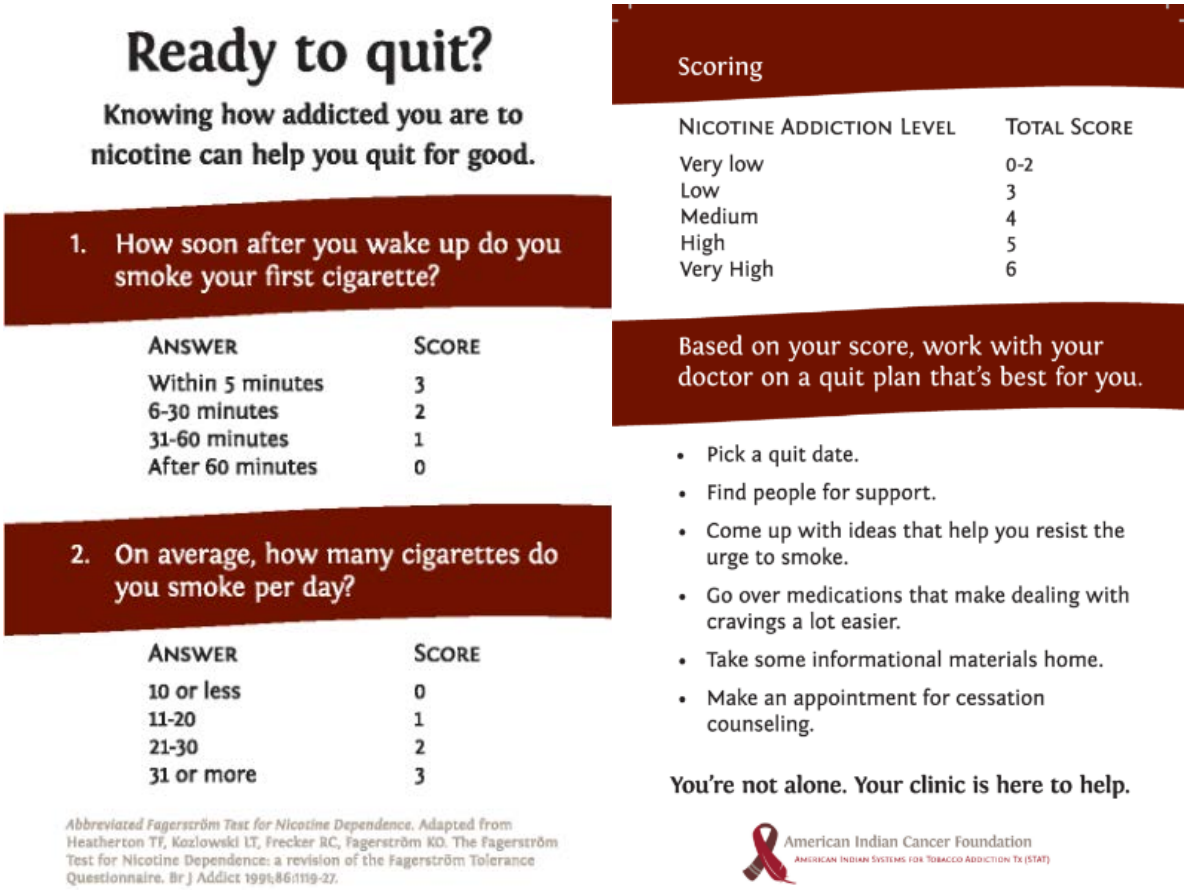
Smoking Cessation Medication Options

Medication	Dosage	Use	Potential Side Effects	Cautions
Bupropion SR 150 Prescription Only: • Generic • Zyban • Wellbutrin SR	• Days 1-3: 150 mg each morning • Days 4-end: 150 mg twice daily	• Start 1-2 weeks before quit date; use 2-6 months	• Insomnia • Dry mouth	Not for use if you: • Use monoamine oxidase (MAO) inhibitor • Use bupropion in an other form • Have a history of seizures • Have a history of eating disorders • See FDA package insert warning regarding suicidality and antidepressant drugs when used in children, adolescents, and young adults.
Varenicline Prescription Only: • Chantix	• Days 1-3: 0.5 mg every morning • Days 4-7: 0.5 mg twice daily • Day 8-end: 1 mg twice daily	• Start 1 week before quit date and use 3-6 months • Alternatively: Begin medication then quit between day 8 and 35.	• Nausea • Insomnia • Abnormal strange dreams	Use with caution in patients: • With significant renal impairment • With serious psychiatric illness • Undergoing dialysis • FDA Warning: Varenicline patients have reported depressed mood, agitation, changes in behavior, suicidal ideation, and suicide. • See www.fda.gov for further updates regarding recommended safe use of Varenicline.

Combination Options (NRT + Medication)

Medication	Dosage	Use	Potential Side Effects	Cautions
1) Patch + buproprion **2) Patch + gum** **3) Patch + lozenge** **4) Patch + inhaler** See above for availability.	See above.	See above.	See individual medications above.	• Only patch + buproprion is currently FDA-approved • Follow instructions for individual medications.

Figure A3. Abbreviated Fagerstrom Nicotine Dependence Test



Ready to quit?

Knowing how addicted you are to nicotine can help you quit for good.

1. How soon after you wake up do you smoke your first cigarette?

Answer	Score
Within 5 minutes	3
6-30 minutes	2
31-60 minutes	1
After 60 minutes	0

2. On average, how many cigarettes do you smoke per day?

Answer	Score
10 or less	0
11-20	1
21-30	2
31 or more	3

Abbreviated Fagerström Test for Nicotine Dependence. Adapted from Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström Test for Nicotine Dependence: a revision of the Fagerström Tolerance Questionnaire. Br J Addict 1991;86:1119-27.

Scoring

Nicotine Addiction Level	Total Score
Very low	0-2
Low	3
Medium	4
High	5
Very High	6

Based on your score, work with your doctor on a quit plan that's best for you.

- Pick a quit date.
- Find people for support.
- Come up with ideas that help you resist the urge to smoke.
- Go over medications that make dealing with cravings a lot easier.
- Take some informational materials home.
- Make an appointment for cessation counseling.

You're not alone. Your clinic is here to help.

American Indian Cancer Foundation
American Indian Systems for Tobacco Addiction Tx (STAT)

Figure A4. 5A's Clinical Flow Chart

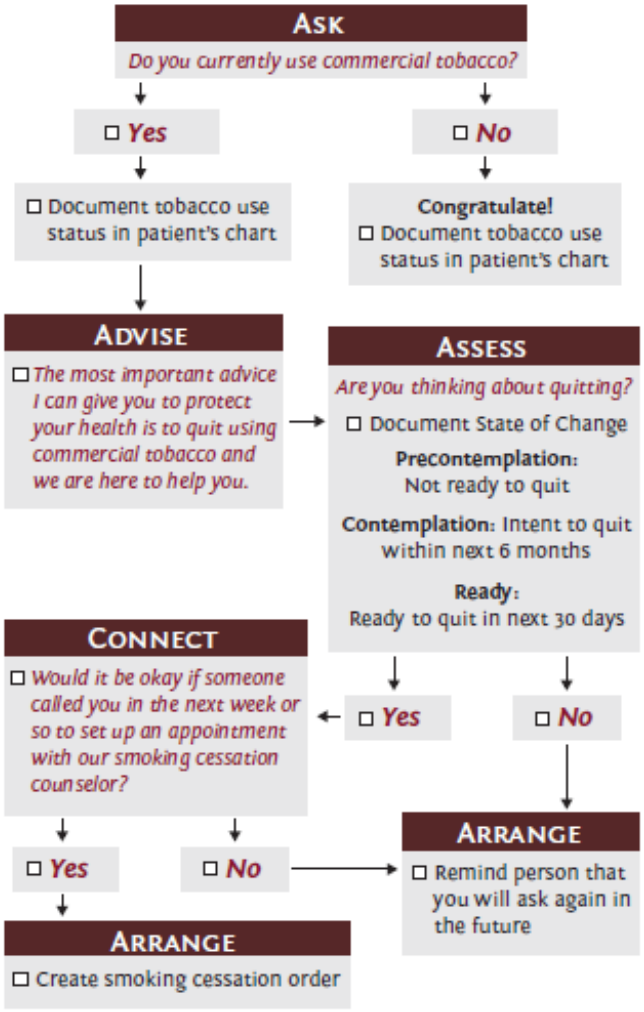


Figure A5. Clinic Lobby Banner

IN-HOSPITAL MORTALITY, LENGTH OF STAY, AND DISCHARGE DISPOSITION IN A COHORT OF RURAL AND URBAN AMERICAN INDIANS AND ALASKA NATIVES

John M. Clements, PhD, and Stephanie J. Rhynard, MD

Abstract: This study uses data from the 2012 National Inpatient Sample to determine if mortality, length of stay, and discharge disposition are different between rural and urban American Indians and Alaska Natives (AI/ANs) with alcohol abuse, depression, diabetes, and post-traumatic stress disorder. Results show no difference in mortality between groups. Alcohol abuse, depression, and diabetes are less prevalent in rural AI/ANs, and rural patients have shorter lengths of stay and fewer chronic conditions, diagnoses, and procedures. Finally, urban patients are discharged to short-term hospitals or skilled nursing facilities at higher rates. Rural diabetes patients exhibit increased mortality, but there is little evidence that rurality adversely affects the AI/AN population for the conditions we studied.

INTRODUCTION

The American Indian and Alaska Native (AI/AN) populations in the United States face significant health disparities that impact their life expectancy (Henderson & Carson, 2014; Castor et al., 2006; Nelson, 2013; Rieckmann et al., 2012; Indian Health Service, 2014). The presence of disparities related to alcohol addiction, drug use, and chronic diseases like diabetes is well established, but concrete explanations for the differences remain elusive. One factor in AI/AN health care that is under examined is the role of place (rural versus urban) in health outcomes. Further explanations for the differences in AI/AN health outcomes may come from examining the role of rurality in their morbidity and mortality.

There is very little current research describing health outcomes in rural versus urban AI/AN populations. The gap in all-cause mortality between rural and urban populations increased from 1969-2009 and is largely attributed to greater reduction in mortality in metropolitan areas compared to rural areas (Singh & Siahpush, 2014). Mortality rates increase with increasing levels of rurality for both the population as a whole, and also for non-Hispanic whites, blacks, and AI/AN

racial subgroups (Singh & Siahpush, 2014). However, there is a lack of information that compares outcomes for specific diseases or conditions between rural and urban areas.

Alcoholism, diabetes, and mental health issues particularly affect the AI/AN population as a whole. AI/AN rates of current alcohol use in youths aged 12-17 fell from 20.5 percent in 2006 to 9.3 percent in 2013. Current AI/AN rates of alcohol use in anyone ages 12 and over remained steady at 37.2 percent in 2007 to 37.3 percent in 2013 (Substance Abuse and Mental Health Services Administration [SAMHSA], 2007; 2014). Overall, recent AI/AN alcohol use rates in adults may be trending down, with overall heavy drinking decreasing from 6.9 in 2006 to 6.3 percent in 2013, and binge drinking coming down to 23.5 percent in 2013 from 31.0 percent in 2006 (SAMHSA 2007; 2014). While current data indicates that people in metropolitan areas are more likely to be current users of alcohol, and be binge drinkers, the data does not provide a geographical breakdown of AI/AN rates (SAMHSA, 2014). However, despite these trends, the AI/AN population suffers a rate of alcohol-attributable death 3.3 times higher than whites in the same geographical region (Landen, Roeber, Naimi, Nielsen, & Sewell, 2014).

The prevalence of diagnosed diabetes by race is highest in AI/ANs at 15.9% as compared to 7.6% of non-Hispanic whites (American Diabetes Association, n.d.). Additionally, the AI/AN population suffers from a 2.5 to 3.5 times higher rate of death caused by diabetes (Cho et al., 2014). The all-cause diabetes-related mortality rate in noncore (rural) areas of the United States is approximately 34.2 per 100,000 population and ranges from 20.5 to 30.7 in more urbanized areas (Callaghan, Towne, Bolin, & Ferdinand, 2017). Unfortunately, there is limited data regarding outcomes for AI/AN people with diabetes based on geographic region.

Finally, between 2009-2010, AI/ANs experienced serious psychological distress 1.5 times more than whites (USDHHS, 2012). The AI/AN population also has 1.5 times greater odds of suffering from major depressive disorder when compared to whites, and PTSD has been described as one of the most serious mental health problems faced by the AI/AN population (Basset, Buchwald, & Manson, 2014; Hasin, Goodwin, Stinson, & Grant, 2005). While specific data on mortality related to PTSD in this population is unavailable, Bassett, Buchwald, and Manson (2014) suggest that AI/AN groups experience a greater burden of PTSD and related symptoms than their white counterparts.

The ongoing disparities in health conditions experienced by the AI/AN population warrant further investigation. The specific objective of this study is to examine differences in length of stay (LOS), discharge disposition (e.g., home, short-term care, skilled nursing, etc.), and mortality

related to alcohol abuse, depression, diabetes (both uncomplicated and complicated), and PTSD in the AI/AN population when they receive health care in urban settings compared to rural settings. We first hypothesize that 1) LOS, discharge disposition, and mortality are different between rural and urban AI/AN populations. Second, we further hypothesize that the prevalence of diagnoses included in discharge records for 2a) alcohol abuse, 2b) depression, 2c) uncomplicated diabetes, 2d) complicated diabetes, and 2e) PTSD will differ between rural and urban settings. Finally, we hypothesize that LOS, discharge disposition, and mortality will differ between urban and rural AI/AN populations in subsamples of subjects with diagnoses of 3a) alcohol abuse, 3b) depression, 3c) uncomplicated diabetes, 3d) complicated diabetes, and 3e) PTSD.

METHODS

We use discharge data from the National Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality (2012). The 2012 NIS includes a sample of discharges from HCUP-participating hospitals. As such, the data does not represent individual patients, but instead represents discrete hospital stays. The NIS for each year is comprised of four files: Inpatient Core, Hospital Weights, Disease Severity Measures, and Diagnosis and Procedure Groups. We use the Inpatient Core, Hospital Weights, and Disease Severity Measures files to create our sample.

The Inpatient Core file provides the following variables: age, sex, race (to filter our subsample of Native Americans, which is how they are described and coded in the database), location of patient's residence, length of stay, disposition (where the patient went upon discharge), and death. In the NIS, the location of patient's residence was coded as 1 = "Central" counties of metropolitan areas of > = 1 million population, 2 = "Fringe" counties of metropolitan areas of > = 1 million population, 3 = Counties in metro areas of 250,000-999,999 population, 4 = Counties in metropolitan areas of 50,000-249,999 population, 5 = Micropolitan counties, and 6 = Not metropolitan or micropolitan counties. We recoded this variable reflecting the advice from Ingram and Franco (2012) to reflect urban (codes 1-4) and rural (codes 5-6). A unique identifier (KEY_NIS) provides a link between the Inpatient Core file, the Hospital Weights, and Disease Severity Measures files.

From the Disease Severity Measures we linked information from the Core file to chronic conditions including alcohol abuse, depression, and diabetes (uncomplicated and with chronic

complications). PTSD is not included as a chronic condition in the Disease Severity Measures, but ICD-9 diagnosis codes related to each stay are included in the Core file. Filtering by diagnosis code allowed us to create a subsample of stays with PTSD as a diagnosis code. Finally, the Hospital Weights file provided the location of the hospital (coded as rural, urban teaching, and urban non-teaching). For comparison of groups, we used the hospital location variable and the patient location variable to create two groups: rural patient/rural hospital (hereafter referred to as rural), and urban patient/urban hospital (referred to as urban). Because we are interested in comparing groups of subjects that are representative of rural and urban areas, we only considered subjects who were likely to obtain treatment near where they lived. Thus, we exclude the group of rural patients cared for in urban hospitals, and a much smaller group of urban patients cared for in rural hospitals. However, we do know from the data that people sought care in locations that were not close to their homes, but still matched the rural or urban residence designation (e.g., rural residents who seek care in an urban hospital). Because we were only interested in situations where patient residence matched hospital location, and because we did not want to bias our analyses with patients who were likely sicker than the two original groups, we did not consider cases where rural patients sought care in urban hospitals. For those interested, we include a supplemental table as an online appendix that includes our original two group comparisons with the addition of this rural patient/urban hospital group.

Table 1 describes the variables we include in our study for the entire group of AI/ANs and comparisons of the rural and urban subgroups. Table A1 (see Appendix) includes comparisons of the rural and urban subgroups based on subjects with alcohol abuse, depression, uncomplicated and complicated diabetes, and PTSD diagnoses.

To determine differences between rural and urban groups, we conducted independent group *t*-tests on age at admission, LOS, and numbers of chronic conditions, diagnoses, and procedures on the discharge record. In addition, we conducted a *z*-test of proportions on the female sex, discharge disposition, and death variables. We used an alpha value of 0.05 to test for statistical significance of differences between groups. We conducted statistical analyses using discharge weights and techniques described by HCUP (Houchens, Ross, & Elixhauser, 2015). As such, all samples sizes and results reflect weighting procedures.

RESULTS

Table 1 shows the demographic information for the total sample of AI/ANs (n = 251,130) used in this study. As a reminder, "rural" refers to rural patients in rural hospitals, and "urban" refers to urban patients in urban hospitals. Patients represented by this discharge data are about 42 years old, majority female, and have approximately 3.8 chronic conditions. Length of stay is about 3.8 days in the hospital, and the overwhelming majority (78.4%) are discharged home with no additional care. The prevalence of the five conditions examined in this study range from 1.0% (PTSD) to 17.7% (uncomplicated diabetes).

Table 1
Sample Statistics and Rural/Urban Location Comparisons

	Total Sample	Rural	Urban
Sample size	251,130	50,005	154,035
Patient Demographics			
Age at Admission (SD)	42.2 (26.6)	42.0 (26.4)	42.3 (26.6)*
% Female Sex	59.3	61.6	60.4*
Chronic Conditions, # (SD)	3.8 (3.5)	3.3 (3.3)	3.8 (3.6)*
Diagnoses, # (SD)	8.6 (5.6)	7.7 (5.5)	8.7 (5.9)*
Procedures, # (SD)	1.6 (2.1)	1.0 (1.4)	1.6 (2.1)*
Dependent Variables			
Length of Stay, days (SD)	4.3 (6.8)	3.5 (5.5)	4.3 (6.7)*
Died in Hospital (%)	1.7	1.7	1.7
% Discharged to:			
Home	78.4	78.9	78.4*
Short-term Hospital	2.3	2.1	2.3*
Skilled Nursing/Long-term Care	9.2	9.0	9.2
Home Health	7.3	7.1	7.3
Against Medical Advice	1.1	1.2	1.1
% with Comorbid Conditions			
Alcohol Abuse	8.1	6.1	7.7*
Depression	8.2	7.9	8.3*
Diabetes, Uncomplicated	17.7	17.9	17.0*
Diabetes, chronic complications	5.5	4	5.5*
PTSD	1.0	1.0	1.0

* statistically significant difference between rural and urban group at P<.05

Turning to the results of our statistical tests, we first hypothesized that LOS, discharge disposition, and mortality are different between rural and urban AI/AN populations. The results in Table 1 provide partial support for this hypothesis. First, LOS is significantly lower in rural versus

urban locations (3.5 days vs. 4.3 days). There is no difference in mortality rate between rural and urban locations. Finally, more rural patients go home after discharge (78.9% vs. 78.4%), and fewer rural patients are discharged to short-term hospitals than are urban patients (2.1% vs. 2.3%). Other results indicate that rural patients are younger and have fewer chronic conditions, diagnoses, and procedures on their discharge records than do urban patients. Female patients make up a larger proportion of rural patients than urban patients do.

We further hypothesized that the prevalence of 2a) alcohol abuse, 2b) depression, 2c) uncomplicated diabetes, 2d) complicated diabetes, and 2e) PTSD will differ between rural and urban settings. Results in Table 1 provide partial support for this hypothesis. In fact, the rates of alcohol abuse (6.1% vs. 7.7%), depression (7.9% vs. 8.3%), and diabetes with complications (4.4% vs. 5.5%) are significantly lower in rural versus urban subjects, while the rate of uncomplicated diabetes (17.9% vs. 17.0%) is significantly higher in rural versus urban subjects. There is no difference in the rate of PTSD.

Finally, we tested to determine if LOS, discharge disposition, and mortality differ between urban and rural AI/AN populations in subsamples of subjects with diagnoses of 3a) alcohol abuse, 3b) depression, 3c) uncomplicated diabetes, 3d) complicated diabetes, and 3e) PTSD. Table A1 (see Appendix) provides partial support for this hypothesis across all five comorbid conditions of interest.

Regarding alcohol abuse, rural subjects had a shorter LOS than urban subjects (4.1 days vs. 5.2 days). A larger percentage of urban subjects with an alcohol abuse diagnosis left the hospital against medical advice (1.4% vs. 0.5%). There was no difference in mortality rate between rural and urban groups. Finally, fewer rural patients with an alcohol abuse diagnosis were female, and rural subjects had a fewer chronic conditions, diagnoses, and procedures during the hospital stay.

In the subgroup with depression, again, rural patients had a shorter LOS than urban subjects (4.2 days vs. 4.8 days). Fewer depressed rural patients were discharged to short-term hospitals (1.8% vs. 2.6%) than urban patients were. Again, there was no difference in mortality rate between rural and urban depression groups. Rural subjects with a depression diagnosis also had fewer chronic conditions, diagnoses, and procedures during the hospital stay.

There was no difference in LOS for subjects with uncomplicated diabetes based on urban and rural location. However, a larger proportion of rural subjects with uncomplicated diabetes died in the hospital than did urban subjects (2.1% vs. 1.7%). In addition, a smaller proportion of rural patients with uncomplicated diabetes was discharged to skilled nursing facilities than urban

patients (8.7% vs. 9.4%), perhaps indicating that the more complicated cases are discharged from urban hospitals due to the availability of step-down care facilities in these areas. Greater numbers of depressed rural patients were female (59.5% vs. 55.5%). Finally, rural subjects with an uncomplicated diabetes diagnosis had fewer chronic conditions, diagnoses, and procedures during the hospital stay.

Rural subjects with diabetes with complications had a shorter LOS (5.3 days vs. 6.2 days) in the hospital and were more likely to be discharged home (80.2% vs. 76.2%), compared to urban subjects. Rural subjects were less likely to be discharged to short-term hospitals (1.3% vs. 2.9%) or skilled nursing facilities (8.0% vs. 10.1%), compared to urban patients. As observed for uncomplicated diabetes discharges, a larger proportion of rural subjects diagnosed with diabetes with complications died in the hospital than did urban subjects (2.3% vs. 1.6%). Again, it is possible that more complicated cases in urban locations are discharged to other facilities because of the availability of short-term and long-term care in these locations. While there is no difference in the proportion of female patients, rural patients with complicated diabetes were younger and had fewer chronic conditions, diagnoses, and procedures during the hospital stay than urban patients.

Finally, regarding the PTSD subgroup, rural subjects had a shorter LOS (3.4 days vs. 3.8 days) and were less likely to die during hospitalization (0.0% vs. 1.3%). Fewer PTSD rural patients were discharged home (77.7% vs. 82.5%) than urban patients, but a greater number of rural patients were discharged to home health care (professional care in the home; 7.8% vs. 3.5%) and left the hospital against medical advice (4.9% vs. 1.6%). Finally, there was no difference in the proportion of female patients with PTSD in urban and rural locations, but rural patients were older and had fewer chronic conditions, diagnoses, and procedures during the hospital stay than urban patients.

DISCUSSION

The 2012 NIS provided the ability to study a representative subsample of inpatient hospital discharges of an AI/AN population to examine differences in rural and urban prevalence, length of stay, discharge disposition, and mortality. There was no difference in in-hospital mortality for the entire sample between urban and rural AI/AN groups, in contrast to findings from Singh and Siahpush (2014). In addition, from the entire sample, fewer urban patients were discharged home,

while more urban patients were discharged to short-term hospitals. This is likely due to the increased need to free up hospital beds in urban hospitals combined with the fact that there is greater availability of short-term step down units in urban locations that can more readily accept patient transfers. Finally, for the entire sample, rural patients stayed in the hospital almost one day less (0.8 days) than urban patients, possibly because urban patients were sicker upon admission. In fact, urban patients had more chronic conditions documented in the discharge record than rural patients, perhaps because they were sicker, but also perhaps because of differences in social support mechanisms that influence their health.

When specific diagnoses known to disproportionately impact the AI/AN groups are analyzed some interesting trends result. The fact that there is a statistically significant difference in prevalence across four of the five health conditions we studied between rural and urban suggests a role for psychosocial factors in the health of this population. We argue that an urban AI/AN population that has been displaced from its natural psychosocial setting causes undo stress to a population resulting in disparities in prevalence and outcomes of some health conditions.

Alcohol abuse, depression, and complicated diabetes are documented on records of AI/AN urban hospital discharges more often than AI/AN rural hospital discharges. The rural population may have less access to regular health care and screenings, including health care education about diabetes and substance use or abuse. However, it is entirely possible that for these conditions, a rural setting in closer proximity to historical, cultural, and social support systems may advantage rural AI/AN residents in terms of prevalence of these conditions.

Regarding mortality for the five health conditions we studied, rural AI/ANs died in the hospital at greater rates than did urban AI/ANs for both complicated and uncomplicated diabetes. However, urban AI/ANs were discharged to short-term hospitals and skilled nursing facilities at higher rates than rural AI/ANs for both conditions. In the NIS, mortality is only noted if death occurred in the hospital. The observation that urban patients are transferred out of the hospital at higher rates limits our ability to make conclusions about after hospital mortality. In fact, 30-day mortality is a common outcome measure in many studies that include mortality as an outcome. It is possible that if we were able to consider 30-day mortality, we may encounter equal rates or increased rates in the urban population as they have increased number of chronic conditions, diagnoses, and procedures, perhaps indicating a sicker population who might be more prone to 30-day mortality. Finally, PTSD is documented as diagnosis in urban patients and rural patients at the same rate, but urban patients die at greater rates. Perhaps this speaks to a lack of social and cultural

support mechanisms that may be more prevalent in AI/AN rural communities.

One consistent pattern that emerges from our analysis is that for all five conditions, urban patients have a longer LOS and greater numbers of chronic conditions, diagnoses, and procedures on the discharge record when compared to rural patients. It is worth noting these patients live in urban areas and seek care at urban hospitals as opposed to rural patients seeking care in rural hospitals. There is no reason to think that urban patients would be sicker than rural patients, especially given the finding that the mortality gap has increased between these groups, largely because of the declining mortality rate in urban areas (Singh & Siahpush, 2014). However, for our selected diseases, urban patients present with more chronic conditions and tend to stay longer in the hospital.

Limitations

When considering these patterns and findings, it is important to mention some limitations of this study. The major limitation is that when working with such a large sample size, as we were for many of the analyses, it becomes easy to demonstrate statically significant differences when only minute ones exist. An additional assumption of the study is that patients were seeking care in an area that represents the area in which they live (i.e., a patient from an urban area is assumed to be getting health care in an urban environment). We controlled for this by only including discharges where rural and urban patient residence and hospital location matched. It is entirely possible that people sought care in locations that were not close to their homes, but still matched the rural or urban residence designation, but may have removed them from their social and cultural support system. In addition, because we were only interested in situations where patient residence matched hospital location, and because we did not want to bias our analyses with patients who were likely sicker than the two original groups, we did not consider cases where rural patients sought care in urban hospitals. However, we include a supplemental table as an online appendix that include our original two group comparisons with the addition of this rural patient/urban hospital group. We did not include a much smaller group of urban patients seeking care in rural hospitals in our original analyses, nor in our supplemental table, because HCUP data use agreements prevent researchers from reporting analyses where the cells of any table include a count of less than 10, as was the case with many variables for the group of urban patients in rural hospitals.

CONCLUSION

AI/AN populations face many health disparities, and the goal of this study was to determine if rural versus urban settings contribute to these differences. We found that between rural and urban groups as a whole there were no differences in overall mortality in the hospital, but that rural patients had shorter LOS and there were minimal differences in discharge disposition. However, rural patients had lower rates of alcohol abuse, depression, and diabetes with chronic complications. In addition, rural patients with diabetes died in the hospital more often than urban patients, perhaps due to urban patients being discharged at higher rates to step-down facilities in urban areas. However, rural patients with PTSD died at lower rates than urban patients. The findings regarding chronic conditions, diagnoses, procedures, and LOS across all five conditions we studied, along with the observation that many of these conditions are more prevalent in urban areas, suggests that urban living may adversely affect AI/AN populations with these health conditions. This research only focused on five health conditions prevalent in the AI/AN community. Additional research could consider a wider range of conditions that influence rural versus urban health outcomes. These results may provide information to the public health infrastructure to help identify strategies to address different health concerns in urban and rural areas.

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AUTHOR INFORMATION

Dr. John M. Clements is an assistant professor in the College of Medicine at Central Michigan University in Mt. Pleasant, MI.

Dr. Stephanie J. Rhynard conducted this work as a 4th year medical student at the College of Medicine at Central Michigan University and is currently a resident physician in the Department of Physical Medicine and Rehabilitation at Beaumont Hospital in Royal Oak, MI.

Appendix A. Differences in Outcomes Table

Table A1
Rural and Urban Differences in Outcomes for Selected Conditions

	Alcohol Abuse		Depression		Uncomplicated Diabetes		Diabetes w/Complications		PTSD	
	Rural	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
Sample size	3040	11835	3945	12800	8965	26245	1990	8405	515	1575
Patient Demographics										
Age at Admission (SD)	41.7 (28.0)	40.9 (27.8)	41.7 (27.6)	41.2 (27.5)	42.5 (27.4)	42.4 (26.8)	41.7 (26.1)	43.1 (27.1)*	43.2 (15.9)	40.4 (16.3)*
% Female Sex	35.2	37.1*	65.3	66.9	59.5	55.5*	55.5	53.3	65.0	61.9
Chronic Conditions, # (SD)	5.3 (2.9)	5.8 (3.0)*	6.6 (3.0)	7.0 (3.2)*	6.1 (2.8)	6.8 (2.8)	8.3 (3.3)	9.0 (3.0)*	3.4 (3.4)	4.1 (3.7)*
Diagnoses, # (SD)	10.5 (5.2)	12.1 (5.6)*	12.5 (5.5)	13.1 (5.8)*	11.4 (5.2)	12.5 (5.2)	15.2 (5.9)	16.5 (5.3)*	7.5 (5.7)	8.9 (6.3)*
Procedures, # (SD)	0.92 (1.7)	1.6 (2.2)*	0.91 (1.5)	1.5 (2.0)*	0.94 (1.6)	1.7 (2.3)	1.3 (2.1)	2.1 (2.5)*	0.81 (1.2)	1.5 (2.1)*
Dependent Variables										
Length of Stay, days (SD)	4.1 (5.3)	5.2 (6.5)*	4.2 (4.5)	4.8 (5.8)*	4.1 (5.1)	4.8 (5.4)	5.3 (6.1)	6.2 (6.3)*	3.4 (3.1)	3.8 (3.8)*
% Died In Hospital	2.1	1.8	1.8	1.7	2.1	1.7*	2.3	1.6*	0.0	1.3*
% Discharged to:										
Home	78.5	76.8	78.1	77.2	79.1	78.5	80.2	76.2*	77.7	82.5*
Short-term Hospital	2.5	2.6	1.8	2.6*	2.5	2.1	1.3	2.9*	1.9	1.6
Skilled Nursing/LTC	9.2	9.5	9.6	9.5	8.7	9.4*	8.0	10.1*	7.8	9.5
Home Health	7.2	7.9	7.6	7.9	6.7	6.9	7.3	8.2	7.8	3.5*
Against Medical Advice	0.5	1.4*	1.1	1.1	0.9	1.4*	1.0	1.0	4.9	1.6*

* statistically significant difference between rural patient/rural hospital group and urban patient/urban hospital group at P<.05

Appendix B. Online Appendix Screenshot (downloadable appendix available at http://dx.doi.org/10.5820/aian.2503.2018.78)

Supplemental Table: Rural and Urban Differences in Outcomes for Selected Conditions among three Rural/Urban Patient and Hospital Group:

	Alcohol Abuse			Depression			Uncomplicated Diabetes			Diabetes w/Complications			Post Traumatic Stress Disorder		
	Rural Pt Rural Hosp	Urban Pt Urban Hosp	Rural Pt Urban Hosp	Rural Pt Rural Hosp	Urban Pt Urban Hosp	Rural Pt Urban Hosp	Rural Pt Rural Hosp	Urban Pt Urban Hosp	Rural Pt Urban Hosp	Rural Pt Rural Hosp	Urban Pt Urban Hosp	Rural Pt Urban Hosp	Rural Pt Rural Hosp	Urban Pt Urban Hosp	Rural Pt Urban Hosp
Sample size	3040	11835	5315	3945	12800	3495	8965	26245	8540	1990	8405	3345	515	1575	345
Patient Demographics															
Age at Admission (SD)	41.7 (28.0)	40.9 (27.8)	42.0 (28.2)#	41.7 (27.6)	41.2 (27.5)	39.3 (27.9)#	42.5 (27.4)^	42.4 (26.8)	41.6 (27.1)	41.7 (26.1)~	43.1 (27.1)	44.3 (27.3)	43.2 (15.9)*	40.4 (16.3)	41.2 (15.8)
% Female Sex	35.2	37.1	31.0*	65.3	66.9	63.8*	59.5	55.5	51.8$	55.5	53.3	46.2#	65.0	61.9	60.9
Chronic Conditions, # (SD)	5.3 (2.9)	5.8 (3.0)	5.6 (2.9)$	6.6 (3.0)	7.0 (3.2)	7.3 (3.2)$	6.1 (2.8)	6.8 (2.8)	6.8 (2.8)$	8.3 (3.3)^	9.0 (3.0)	9.0 (2.8)	3.4 (3.4)^	4.1 (3.7)	4.1 (3.2)
Diagnoses on record, # (SD)	10.5 (5.2)^	12.1 (5.6)	11.9 (5.9)	12.5 (5.5)	13.1 (5.8)	13.8 (6.2)$	11.4 (5.2)	12.5 (5.2)	12.8 (5.4)$	15.2 (5.9)^	16.5 (5.3)	16.7 (5.5)	7.5 (5.7)^	8.9 (6.3)	9.0 (6.0)
Procedures on record, # (SD)	0.92 (1.7)	1.6 (2.2)	2.1 (2.8)$	0.91 (1.5)	1.5 (2.0)	2.1 (2.4)$	0.94 (1.6)	1.7 (2.3)	2.5 (2.8)$	1.3 (2.1)	2.1 (2.5)	3.0 (3.0)$	0.81 (1.2)	1.5 (2.1)	2.0 (2.2)$
Dependent Variables															
Length of Stay (SD) days	4.1 (5.3)	5.2 (6.5)	5.7 (7.7)$	4.2 (4.5)	4.8 (5.8)	6.3 (9.6)$	4.1 (5.1)	4.8 (5.4)	5.3 (7.0)$	5.3 (6.1)	6.2 (6.3)	7.2 (7.6)$	3.4 (3.1)	3.8 (3.8)#	4.6 (5.1)
% Died During Hospitalization	2.1	1.8	1.6	1.8	1.7	0.6#	2.1	1.7	1.6	2.3	1.6	1.9	0.0	1.3&	0.0
Disposition - % Discharged to:															
Home	78.5	76.8	74.7#	78.1	77.2	80.0*	79.1	78.5	78.5	80.2^	76.2	75.0	77.7	82.5&	72.5
Short-term Hospital	2.5	2.6	3.9#	1.8	2.6&	1.9	2.5	2.1	2.3	1.3+	2.9	2.1	1.9	1.6	4.3*
Skilled Nursing/Long-term Care	9.2	9.5	10.4	9.6	9.5	10.3	8.7	9.4	9.3	8.0+	10.1	10.6	7.8	9.5	15.9#
Home Health	7.2	7.9	7.7	7.6	7.9	6.7	6.7	6.9	6.8	7.3	8.2	9.1	7.8+	3.5	4.3
Against Medical Advice	0.5^	1.4	1.6	1.1	1.1	0.6#	0.9+	1.4	1.3	1.0	1.0	1.2	4.9+	1.6	2.9

* statistically significant difference between rural patient/urban hospital group and urban patient/urban hospital group at p<0.05
# statistically significant difference between rural patient/urban hospital group and the other two groups at p<0.05
$ statistically significant difference among all three patient and hospital group combinations at p<0.05
^ statistically significant difference between rural patient/rural hospital group and the other two groups at p<0.05
& statistically significant difference between urban patient/urban hospital group and the other two groups at p<0.05
+ statistically significant difference between rural patient/rural hospital group and urban patient/urban hospital group at p<0.05
~ statistically significant difference between rural patient/rural hospital group and rural patient/urban hospital group at p<0.05