



HHS Public Access

Author manuscript

Psychol Serv. Author manuscript; available in PMC 2016 May 01.

Published in final edited form as:

Psychol Serv. 2015 May ; 12(2): 123–133. doi:10.1037/ser0000019.

Cultural Adaptation, Psychometric Properties, and Outcomes of the Native American Spirituality Scale

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Abstract

Spirituality is central to many Native Americans (NAs) and has been associated with recovery from substance use disorders (SUDs). However, no published questionnaire uniquely taps tribal-specific spiritual beliefs and practices. This hinders efforts to integrate traditional NA spirituality into SUD treatment and track spiritual outcomes. As part of a randomized controlled trial examining SUD treatment for NAs, we adapted the Daily Spiritual Experience Scale (DSES) in collaboration with members of a Southwest tribe to create the Native American Spirituality Scale (NASS) and measured changes in the NASS over the course of treatment. The 83 participants (70% male) were from a single Southwest tribe and seeking SUD treatment. They completed the NASS at baseline, four-, eight-, and 12-months. Exploratory factor analysis of the NASS was conducted and its temporal invariance, construct validity, and longitudinal changes in the factor and item scores were examined. The NASS yielded a two-factor structure that was largely invariant across time. Factor 1 reflected behavioral practices, while Factor 2 reflected more global beliefs. Both factors significantly increased across 12 months, albeit at different assessment points. At baseline, Factor 1 was negatively related to substance use and positively associated with

measures of tribal identification while Factor 2 was unrelated to these measures. Given the importance of tribal spirituality to many NAs, the development of this psychometrically sound measure is a key precursor and complement to the incorporation of tribal spirituality into treatment, as well as research on mechanisms of change for SUD treatment among NAs and assessment of NA spirituality in relation to other aspects of health.

Keywords

Native Americans; substance use disorder treatment; alcohol; Native American Spirituality Scale; Daily Spiritual Experience Scale

Many commonly utilized assessment instruments have not been validated with Native Americans (NAs), and often do not capture the experience of tribal communities or measure outcomes that would interest them, such as spirituality. In fact, assessment of spirituality is frequently absent, both in the few studies addressing substance use disorder (SUD) treatment in NAs and in SUD research in general. This is unfortunate given that the vast majority of individuals in the U.S. believe in God or another higher power (96%; Gallup & Lindsay, 1999) and that spirituality is often considered highly important for maintaining sobriety among individuals recovering from SUDs (Pardini, Plante, Sherman, & Stump, 2000). Similarly, researchers have found that spirituality is salient to NA people and intricately woven throughout their daily lives (Frame, 2003; Graham, 2002). A common belief across Native American tribes is that all things are connected. These connections refer to humans being connected to the land and to all living things (Fletcher & La Flesche, 1968). This extent of spiritual connectivity is not common among Judeo-Christian religions.

In an epidemiological study of a Northern Plains tribe and a large Southwestern tribe, over half endorsed Native spirituality as “very important,” 22–39% reported Christian religion as “very important,” and similar percentages (22–35%) reported the Native American Church as “very important” (Garrouette et al., 2009). In both tribes, of those who rated at least one set of beliefs as “very important” the norm was to also rate another tradition as “very important,” indicating overlapping spiritual belief systems. One example demonstrating intertribal heterogeneity regards those who adhere only to a singular belief system. Specifically, NAs in the Southwest who rated Christianity as “very important” were less likely to ascribe to other religions while those in the Northern Plains who held indigenous beliefs as “very important” were less likely to indicate overlapping beliefs with Christianity or the Native American Church. Despite heterogeneity among tribes regarding specific spiritual beliefs and practices, in general spirituality is commonly practiced and highly regarded across NA tribes (Cross, 2001). This suggests that a general measure of Native spirituality could be developed and tested across tribes.

Research has demonstrated the importance of measuring spirituality and testing for associations with health outcomes. Religious involvement, one aspect of spirituality, consistently serves as a protective factor against developing substance use problems (Miller, 2013). A literature review by Koenig et al. (2001) indicated that endorsing a religious denomination has protective qualities for mental health and lack of substance use problems in the general population. Higher levels of faith and spirituality also were associated with

greater resilience to stress, lower anxiety, and a more optimistic life orientation among individuals who self-identified as being in recovery from a SUD (Pardini et al., 2000). For NA populations, spirituality and traditional practices are related to substance use cessation (Torres-Stone, Whitbeck, Chen, Johnson, & Olson, 2006) as well as greater maintenance of sobriety among older NAs (Bezdek, Croy, Spicer, & AI-SUPERPFP Team, 2004).

Spirituality has also been examined in those seeking SUD treatment. Over the course of SUD treatment, researchers have found that spirituality increases from baseline through treatment completion (Piederman et al., 2007; Robinson et al., 2007; Robinson et al., 2011). Robinson and colleagues (2011) found significant increases at the six-month follow-up in eight of 12 spirituality measures administered to a large sample including individuals seeking SUD treatment, those in a moderation program, and those who had not sought treatment. Whether or not individuals were in formal treatment, they reported increases in spirituality such as prayers and daily spiritual experiences.

Researchers have also sought to uncover associations between spirituality and substance use outcomes. Piederman and colleagues (2008) conducted a longitudinal survey of 74 participants seeking treatment for alcohol use disorders (AUDs). At the one-year follow-up, they divided their sample into matched groups based on those who had achieved one year of sobriety and those who had not, and found that increases in spiritual behaviors such as prayer, meditation, and in existential well-being were associated with abstinence. Finally, changes in spirituality over the course of SUD treatment have significantly predicted abstinence and other drinking variables at follow-up. Robinson and colleagues (2011) conducted several types of regression analyses showing that changes in spirituality at 6 months, particularly an increase in private spiritual practices and forgiveness of self, predicted more percent days abstinent, fewer days since last drink, a lower percentage of heavy drinking days, and fewer drinks per drinking day.

Religion and spirituality have been measured by indices such as attendance at church or denominational affiliation, which do not specify how or why religion and spirituality affect health (Hill & Pargament, 2008). Measures of spirituality in the U.S. often have a Judeo-Christian focus even when they are meant to be broad and used across various religious and spiritual philosophies. Underwood and Teresi (2002) involved people from several religious viewpoints including Agnostics, Buddhists, Christians, Jews, Muslims, and NAs to develop a spirituality measure called the Daily Spiritual Experience Survey (DSES). Given that NAs had been included in the DSES development, this measure was chosen as a starting point to measure spirituality for the present study.

Historically, psychological assessment measures have been developed by and normed on predominately non-Hispanic White populations. One concern is whether these measures have been validated across racial/ethnic minorities to ensure that they are accurate and appropriate for use with these populations (Bhopal, Vettini, Hunt, Wiebe, Hanna, & Amos, 2014; Guillemin, Bombardier, & Beaton, 1993; van de Vijver & Poortinga, 1997). Researchers have been advocating for cultural adaptation of measures (Bowden & Fox-Rushby, 2003; Bhopa et al., 2014; Poortinga, 1989; van de Vijver & Poortinga, 1997) and ground-up development of new measures to more accurately assess racial/ethnic minority

groups (Mohatt, Fok, Burket, Henry, & Allen, 2011; Whitbeck, Adams, Hoyt, & Xiaojin, 2004). For example, cultural factors were found to influence the degree to which participants endorsed symptoms of depression on a structured depression interview in a Northern Plains and Southwest Native American sample (Beals et al., 2005). Similarly, with spirituality measures, it is important to ensure that assessment of NA spirituality is accurate, which may necessitate cultural adaptations or ground-up development of measures and specifying for which tribes the measures is relevant.

Study Aim

The goal of this paper was to describe the cultural adaptation and psychometric evaluation of a brief questionnaire, the Native American Spirituality Scale (NASS), among Southwestern NAs seeking treatment for SUD at a tribal treatment center. We conducted an exploratory factor analysis to determine the factor structure of the adapted measure, tested its invariance across time, identified changes in spirituality over time, and tested its convergent validity by examining its association with other relevant baseline measures.

Method

Participants

The sample included 83 Native Americans from a single tribe seeking SUD treatment on a rural Southwestern reservation. All participants were part of the MICRA Project, a randomized controlled trial (RCT) of a combination of two evidence-based SUD treatments compared to treatment as usual (Venner et al., in preparation). Four participants (5%) were from a pilot test of the intervention, 39 participants (47%) were from the MICRA intervention group (described in the Procedure section below), and 40 participants (48%) were from the tribal SUD treatment center and received treatment as usual (TAU).

Community Description

The tribal community in which this study took place has maintained their cultural and social institutions despite heavy colonization efforts. This includes spirituality alongside clan/kinship systems and native language preservation. This cultural preservation may be reflective of the remote and relatively isolated location of the community. While aspects of tribe-specific spirituality are unique, other aspects represent commonalities across NA tribes. The uniqueness of this Southwestern tribe's spirituality is reflected in specific origin stories, prayers, ceremonial protocol, and organization of religious leaders and clans or groups (Dozier, 1983).

Measures

Native American Spirituality Scale—Our goal was to assess the degree to which participants believed and practiced tribe-specific spirituality while developing a measure that might apply to other NA populations as well. After reviewing existing measures of spirituality, the closest instrument available was the Daily Spiritual Experience Scale (DSES), which was designed to measure “day to day spiritual experiences for many people” (p. 23; Underwood & Teresi, 2001). The DSES is a 16-item self-report inventory, based on

extensive individual and focus group interviews with people from several religious orientations, that describes the extent to which an individual endorses feeling a connection with religiosity or spirituality on an ordinary, everyday basis. Except for those following the Buddhist philosophy, respondents from the other traditions felt that the word “God” was easily understood or “translated” to their own concept of the divine. Sample DSES items include “I feel God’s love for me, directly” and “I find comfort in my religion or spirituality.” The DSES has demonstrated excellent internal consistency across several testing sites (α range .91–.95; Underwood & Teresi, 2002), including a primarily non-Hispanic White sample with which the instrument was originally tested (Underwood & Teresi, 2002) and with a sample of African Americans (Loustalot, Wyatt, Boss, May & McDyess, 2006).

As a starting point to modify the DSES for the present study, the measure was presented to the Tribal Council and the tribal SUD treatment center staff. Although the development of the DSES included NAs, both tribal groups felt it was heavily Christian-oriented and did not reflect the community’s spiritual belief system. Several of the study authors adapted the measure together with one Tribal Council member who had been suggested by the Tribal Council as a liaison. The Tribal Council then recommended consultation with other cultural leaders or cultural educators. A copy of the adapted measure was submitted to the cultural educators for review. Subsequently, an adapted version of the measure was submitted to the Tribal Council and was approved for the study. The adaptation process involved iterative drafting and revision of items; several items from the original DSES were removed but no newly composed items were discarded.

The final adapted measure consisted of 12 items (see Appendix) that queried current experiences of tribal-specific spirituality. The response options from the DSES were retained and included *many times a day* (5), *every day* (4), *most days* (3), *some days* (2), *once in awhile* (1), and *never or almost never* (0). The number of items was reduced from 16 to 12. Only three of the items on the Native American Spirituality Scale (NASS) parallel those on the DSES: DSES item 4 (I find strength in my religion or spirituality) corresponds to NASS item 6 (I find strength in my faith and spirituality); DSES item 11 (I am spiritually touched by the beauty of creation) was modified to NASS item 9 (I am spiritually touched by participating in my faith); and DSES item 12 (I feel thankful for my blessings) was changed to NASS item 11 (I feel thankful for my understanding of my faith and beliefs). The other nine NASS items were developed specifically for the NASS. The measure was given at baseline, 4-, 8-, and 12-months.

Addiction Severity Index (ASI)—The ASI has demonstrated sound psychometric properties and is included in nearly all clinical trials in the addictions field (McLellan, Cacciola, Alterman, Rikoon, & Carise, 2006). A culturally adapted version of the ASI for Northern Plains Native Americans (Carise & McLellan, 1999) was modified for this RCT. Relevant variables measured at baseline included gender, religious/spiritual preference, first language, past-month days of cannabis and alcohol use, and percent of life using alcohol or cannabis regularly.

Scale of Ethnic Experience—The Scale of Ethnic Experience (SEE; Malcarne, Chavira, Fernandez, & Liu, 2006) is a 32-item self-report measure that assesses aspects of ethnic identity utilizing a multidimensional framework. Sample items include “[Participant’s ethnic group] has been treated well in American society,” “I find it easiest to trust people who are [participant’s ethnic group],” and “I think of myself as a typical American.” Participants responded to each item on a five-point Likert-type scale. The SEE provided four subscales: Ethnic identity (e.g., sense of pride and participation in ethnic group; 12 items), social affiliation (e.g., most comfortable with members of own ethnic group; 5 items), mainstream comfort (e.g., sense of being a “typical American,” 6 items), and perceived discrimination (e.g., perception of treatment of ethnic group by larger society; 9 items).

Brief Symptom Inventory-18—The Brief Symptom Inventory-18 (BSI-18; Derogatis, 2001) is an 18-item self-report measure that addresses current psychological distress across three domains, including somatization, depression, and anxiety. An overall Global Severity Index (GSI) provides a total index of psychological distress. Derogatis (2001) found acceptable levels of internal consistency for the Global Severity Index (Cronbach’s $\alpha = .90$).

Procedure

University Institutional Review Board and Tribal Council approvals for the project were obtained and Tribal Council approved submission of this paper. Participants were recruited through the tribally-run SUD treatment program. In order to participate in the study, individuals had to self-identify as a member of the tribe and reside within the reservation boundaries or neighboring small settlements, be 18 years or older, speak English, be seeking SUD treatment, meet DSM-IV diagnostic criteria for current substance abuse or dependence for alcohol, amphetamines, cannabis, cocaine, or inhalants, and be willing and able to understand and voluntarily participate in the assessment and treatment protocol.

Three preliminary exclusion criteria were assessed at the tribal SUD treatment center before potential participants were referred to the study, including active psychosis, major cognitive impairment, or presence of imminent danger to self or others. This was determined through clinical impressions made by the treatment director, a clinical psychologist. Additional exclusion criteria included planned absences from the reservation for more than fourteen consecutive days during the treatment period and not being able to identify at least one “locator” person for research tracking purposes.

After eligibility screening and consent, which occurred at the research study offices in the TC building, participants completed a baseline assessment that included the measures described above. These measures were also administered at 4, 8, and 12 months after the baseline assessment. Of the 83 participants assessed at baseline, 78 (94%) provided follow-up data at 4 months, 80 (97%) provided data at 8 months, and 74 (89%) provided data at 12 months. All data were double-entered and verified to ensure accuracy. Participants began SUD treatment following the baseline assessment, and treatment was generally completed around the time of the 4-month assessment.

Interventions

The MICRA intervention consisted of 16 to 20 individual counseling sessions and included elements of both Motivational Interviewing (MI; Miller & Rollnick, 2013) and the Community Reinforcement Approach (CRA; Meyers & Smith, 1995). MI emphasizes a client-centered style of interacting where the provider seeks to draw out the client's motivation for change with a particular emphasis on resolving ambivalence about change. In the present study, MI was used as a front-end induction (1–2 sessions) to engage participants in treatment as well as a guiding style throughout treatment. CRA seeks to increase sources of positive reinforcement for non-substance use and engage the client in positive social activities in order to decrease substance use. In the present study, the CRA portion of treatment consisted of a menu of procedures that counselors and clients chose from to meet the client's needs. MICRA was manual-guided, but specific content was not prescribed session by session, and a primary goal in the treatment was to re-engage clients in extended family, clan, community, and (if applicable) societal activities and responsibilities.

The sole SUD treatment program located within the reservation community is outpatient and served as the TAU comparison for this study. Treatment provided was fairly consistent in its approach: the intake staff assessed all clients and there was no attempt to match client to counselor, other than considerations of gender and counselor availability. Treatment started with individual sessions, and soon thereafter the client joined ongoing therapy groups (~90 minutes) that included unstructured sharing of stories of substance use problem development, anger management, and parenting. From time to time, elder tribal members attended the group meeting to present either their personal struggles with substance abuse, or share tribal perspectives on treating all things, including the self, with respect. Individual counseling sessions (~60 minutes) consisted of listening and implementing a generally didactic style. Twelve-step principles were presented, but more in spirit than in substance. Counselors could refer clients to one of the three cultural educators who were part of the staff. Cultural educators and counselors would review traditional tribal teachings, showing the client his or her place within the framework of tribal life. While clients could spend up to a year at the treatment center, the average length of treatment was two months.

Results

Participant Baseline Characteristics

Seventy percent of the 83 participants were male ($n = 58$) and their average age was 33.9 years ($SD = 10.9$). Thirty-seven percent ($n = 31$) were married or remarried, 42% ($n = 35$) had never married, 18% ($n = 15$) were divorced or separated, and 2% ($n = 2$) were widowed. Ninety-nine percent ($n = 82$) of participants lived on the tribal reservation and 97% ($n = 80$) were tribally enrolled. Approximately two-thirds of the sample ($n = 54$) had learned the tribal language as their first language. Only 19% ($n = 16$) of participants indicated that they predominately spoke English at home. Forty-six percent ($n = 38$) indicated predominantly speaking the tribal language at home, and 35% ($n = 29$) reported speaking a mix of English and the tribal language. On average, participants had completed 11.5 ($SD = 1.0$) years of education.

Participants were most commonly self-employed making jewelry or other artwork as their source of income in the past three years (44%; $n = 37$). Other participants reported working full time (17%; $n = 14$), being students (13%; $n = 11$), working part-time (14%; $n = 12$), or being unemployed (10%; $n = 8$). On average, participants reported consuming alcohol on 5.64 days ($SD = 4.72$) and using cannabis on 6.67 days ($SD = 8.32$) of the past 30 days at baseline. Eighty-nine percent ($n = 74$) of individuals reported past-month alcohol use, 75% ($n = 62$) past-month cannabis use, 12% ($n = 10$) past-month cocaine use, and 1% ($n = 1$) past-month hallucinogen use.

A majority of the sample (65.1%; $n = 54$) indicated tribal-specific spirituality as their only religious/spiritual preference. An additional 12% ($n = 10$) listed tribal-specific religion as one of two religious/spiritual preferences, with the majority of those individuals listing both tribal-specific religion and a Christian denomination. Eighty-six percent ($n = 71$) reported a belief in “God,” “Higher Power,” or “Creator.” Sixty-one percent ($n = 51$) indicated that they would like help learning more about a particular religion/spirituality, with 86% ($n = 44$) of these individuals specifying that they would like help learning more about tribal spirituality. Eighty-four percent ($n = 70$) of participants reported that they regularly participated in tribal-specific religious and ceremonial activities.

Factor Structure

We tested a one-dimensional factor structure for the NASS using confirmatory factor analysis with all items freely loading onto a single latent factor. This model yielded poor overall fit, $\chi^2(df = 54, N = 83) = 158.1, p < .001$, root mean square error of approximation (RMSEA) = 0.152, comparative fit index (CFI) = 0.749, Tucker Lewis index (TLI) = 0.693, and standardized root mean residual (SRMR) = 0.101, suggesting that unlike the DSES, the NASS was poorly represented by a unidimensional factor structure.

The factor structure was therefore examined within the framework of exploratory factor analysis. The number of factors to extract was determined using parallel analysis, which has been shown to identify the number of factors more accurately than the Kaiser criterion of retaining factors with eigenvalues greater than 1.0, the latter of which tends to overestimate the number of factors (Costello & Osborne, 2005). Comparing the eigenvalues of simulated datasets with known factor structures to the eigenvalues of the observed correlation matrix, the parallel analysis indicated that a two-factor solution provided the optimal fit (see Figure 1).

An exploratory factor analysis with oblimin rotation and ordinary least squares minimal residual solution was specified with two factors and included the twelve NASS items measured at baseline. Fit indices suggested improved fit for the two-factor solution compared to the one-factor solution based on RMSEA and TLI values; however, the chi-square estimate was still significant which indicates that the correlation matrix implied by the factor analysis was significantly different than the correlation matrix of the observed data, which is commonly observed in latent variable modeling (Brown, 2006). Standardized factor loadings and model fit indices are presented in Table 1, with factor loading cutoffs of 0.32 (Tabachnick & Fidell, 2001) used to indicate that an item loaded onto a corresponding factor (i.e., indicating an item shared at least 10% of its variance with a corresponding

factor). Factor loadings above the 0.32 cutoff are indicated in bold in Table 1. There were no items that cross-loaded onto multiple factors above the 0.32 level, and all items loaded onto a factor. Factor 1 was composed of eight items that tended to represent spiritual behaviors (e.g., Item 4, I wake up early and pray to Creator/ancestors), and Factor 2 was composed of four items that tended to represent spiritual beliefs (e.g., Item 3, All things are related to one another). Cronbach's alpha estimates for the summed factor scores were adequate for Factor 1, $\alpha = 0.86$, and Factor 2, $\alpha = 0.79$.

Measurement Invariance

Measurement invariance was assessed to determine whether the manner in which the underlying constructs assessed by the NASS factors were measured consistently across time (longitudinal measurement invariance). Longitudinal invariance was assessed by testing whether constraining factor loadings to equality across time points (weak invariance model) caused significantly worse model fit than allowing factor loadings to be different across different time points (configural invariance model). Invariance was further tested by constraining item intercepts to equality across time points (strong invariance model) and constraining item residual errors to equality across time points (strict invariance model). Assessing longitudinal measurement invariance for both factors concurrently across the four time points led to convergence problems due to the large number of latent variable and indicator covariances required, therefore longitudinal measurement invariance was assessed independently for each factor. In general, weak and strong invariance are considered necessary for comparing factors across time. Strict invariance is of less importance, but often is formally included in invariance testing (Widaman, Ferrer, & Conger, 2010) and is included here.

Measurement invariance was assessed within a confirmatory factor analytic framework, with items specified to load onto factors in which they had factor loadings greater than 0.32 (see Table 1). Measurement invariance results are presented in Table 2, which provides chi-square and CFI values for each model, sequentially nested chi-square difference tests, and changes in CFI estimates. Because invariance tests are highly powered to detect even small amounts of measurement variance, significant p values were examined in conjunction with changes in overall CFI to determine the degree to which invariance assumptions were violated.

Weak invariance was obtained across all time points (all $p > .053$), indicating that factor loadings were not significantly different across time. Strong invariance was obtained across time for Factor 1, but p values indicated significant differences in item intercepts across time for Factor 2. The change in CFI values for the strong invariance model of Factor 2 was relatively small, $\Delta CFI = 0.017$, indicating that constraining intercepts to equality across time yielded only a small amount of change in the relative model fit for Factor 2. In other words, although statistically significant, the magnitude of non-invariance for Factor 2 was relatively small. Strict invariance was not obtained for Factor 1 or Factor 2 based on significance tests, with $\Delta CFI = 0.011$ and 0.036, respectively.

Focusing on the importance of weak and strong measurement invariance with longitudinal data (Widaman et al., 2010), these results indicate that NASS items had adequate weak

invariance (equality of factor loadings) and adequate strong invariance for Factor 1 but a statistically significant violation of strong invariance across time for Factor 2 with a relatively small effect size. This suggests that the NASS tended to measure similar constructs across time with the caveat of significant non-invariance of item intercepts for Factor 2.

Longitudinal Changes in NASS Scales

Mean and standard deviation statistics for mean factor scores computed based on sums of items and individual items across the four time points are presented in Table 3. Significance tests were examined using *t*-tests to assess changes in scores at 4-, 8-, and 12-month follow-ups compared to baseline using multiple imputation to reduce bias in the presence of missing follow-up data (Hallgren & Witkiewitz, 2013). Because 6 factor-level comparisons and 36 item-level comparisons were tested, alpha values for factor-level comparisons were retained at 0.05 but were reduced to 0.01 for item-level comparisons to reduce type-I error rates. Scores for Factor 1 increased significantly from baseline to 4-month follow-up, suggesting increases in spiritual behaviors/prayer concurrent with SUD treatment. Mean values for Factor 1 remained steady through 8- and 12-month follow-ups, although Factor 1 scores were no longer significantly different compared to baseline, $p = 0.06$ and $p = 0.11$, respectively, likely due to the larger standard errors caused by missing data at these times. Within Factor 1, item 4 (morning prayer) was higher at the 8-month follow-up compared to baseline, indicating increases in self-reported morning prayers, and item 6 (strength in faith) was higher at the 12-month follow-up time point compared to baseline, indicating increasing frequency of finding strength in tribal spirituality. Scores for Factor 2 were significantly higher at 8- and 12-month follow-ups compared to baseline, reflecting delayed increases in spiritual beliefs. Within Factor 2, item 1 (I believe all life is sacred) increased at 4-month follow-up compared to baseline but was no longer significantly elevated at 8 and 12 months.

We conducted post-hoc regression analyses to determine whether scores in one factor at a follow-up assessment predicted scores on the other factor at the next follow-up assessment, controlling for the other factor at the earlier assessment (e.g., Factor 1 scores at 4-month predicting Factor 2 scores at 8-months, controlling for Factor 2 scores at 4 months, and vice versa). None of these regression results were significant.

For each mean NASS factor score, time-lagged autocorrelations in factor scores between consecutive time points were computed to determine the stability of individual differences in scores over time. Autocorrelations were all significant and positive: the Factor 1 autocorrelation range was 0.66 to 0.73, the Factor 2 autocorrelation range was 0.44 to 0.64, all $p < .001$. Individuals who had higher scores on NASS scales relative to the sample mean at any given time point tended to have higher scores on the same NASS scales at subsequent time points.

Correlations with Other Constructs

Pearson correlations between mean NASS factor scores and other psychosocial variables at baseline were assessed in an exploratory framework using bivariate correlations (see Table 4). The NASS mean factor scores were significantly and positively correlated with each

other, $r = 0.53, p < .001$. Higher scores on Factor 1 were correlated with lower past-month alcohol use, lower past-month cannabis use, lower lifetime cannabis use, greater SEE ethnic identity, greater likelihood of learning the tribal language first, and greater likelihood of tribal-specific spiritual preference. In contrast, Factor 2 scores were not significantly associated with any of the psychosocial variables. Both NASS factors were unrelated to gender, lifetime alcohol use, BSI-18 Global Severity Index, Depression, Anxiety, and Somatization (3 of 3 subscales), and SEE perceived discrimination, mainstream comfort, and social affiliation (3 of 4 subscales).

Discussion

The aim of this study was to describe the development and psychometric properties of the Native American Spirituality Scale (NASS), developed to measure tribally-specific spiritual beliefs and practices as they changed after formal SUD treatment as part of a larger randomized controlled trial of SUD treatment for a rural Southwestern tribe. We tested the factor structure of the measure, its stability over time, and its relationship to other constructs at baseline. Finally, we examined changes in the NASS from intake for SUD treatment to one year later. Given the importance of tribally based spirituality for NA people, the development and psychometric validation of such a measure is a key precursor and complement to the incorporation of tribal spirituality into treatment. The NASS may also be useful in other studies of NA health and wellness and should be validated in populations beyond this initial sample.

We began with the Daily Spiritual Experience Scale (DSES; Underwood, 2006), and at the behest of Tribal Council members and spiritual advisors, we modified DSES items to better reflect this tribe's spiritual practices and beliefs. The adaptation process required close consultation and discussion with tribal members and cultural educators. The final measure was deemed to correctly reflect the tribe's spiritual beliefs and was administered at intake, 4-, 8-, and 12-month follow-ups.

An exploratory factor analysis of the adapted measure yielded a two-factor structure, which is in contrast to the unidimensional structure of the DSES. The first factor, consisting of eight items, tended to reflect behavioral spiritual practices, while the second factor, consisting of four items, tended to reflect more global tribal worldviews and beliefs. Another psychometric paper evaluating the General Alcoholics Anonymous Tools of Recovery, a measure of 12-step work, found a similar grouping. Items reflecting spiritually-related steps (e.g., admitting powerlessness over alcohol, Step 1) loaded onto one factor while items reflecting behaviorally-oriented steps (e.g., preparing a written inventory, Step 4) loaded onto a second factor (Greenfield & Tonigan, 2013).

Temporal invariance is a key precursor to evaluating a construct as a treatment mechanism because it helps to ensure that changes observed over time in key constructs are due to actual changes in the constructs rather than differences in the way the constructs are measured. We found that the two NASS factors measured their corresponding constructs consistently across time points, with the caveat of significant differences in item intercepts across time for Factor 2, but with a small effect size for this difference. This finding

provides the foundation for future studies to test Native American spirituality as a mechanism of action in SUD treatment and other wellness interventions among NAs. As the nature of spiritually-based mechanisms of change are better understood, these findings could in turn lead to more research and monetary support for programs that incorporate spirituality and cultural practices.

In accordance with previous research (Piederman et al., 2007; Piederman et al., 2008; Robinson et al., 2007; Robinson et al., 2011), we found increases in some aspects of spirituality over the course of SUD treatment extending to one-year post intake. Between baseline and the 4-month assessment, there were significant increases in scores on Factor 1 (behavioral/prayer) but not Factor 2 (tribal spiritual beliefs). These mean increases on Factor 1 appeared to be maintained through the 12-month follow-up but were no longer statistically significant, possibly due to an increase in error related to some missing follow-up data. At the item level, item 4 (morning prayers) was significantly higher at the 8-month follow-up; item 6 (find strength in faith and spirituality) was significantly higher at the 12-month follow-up. Tribal religious practices occur year-round in this specific community; participation in spiritual practices could be a consistent alternative to substance use.

Interestingly, mean scores on Factor 2 (tribal spiritual beliefs) were significantly higher at the 8-month and 12-month follow-up versus baseline whereas increases in Factor 1 were significant only at the 4-month follow-up. In other words, significant increases occurred first on Factor 1 during treatment, then on Factor 2 after treatment had ended. Conceptually, increases in behavioral/prayer practices as assessed by Factor 1 could lead to changes in Factor 2. However, post-hoc analyses indicated that this was not the case. It may be that Factor 1 items such as prayer, participation in tribal dances, and expressing gratitude are easier to adopt and therefore increase earlier than Factor 2 items reflecting tribal values and worldviews. Also, this may indicate that the practices reflected by Factor 1 and the spiritual beliefs reflected by Factor 2 did not change in a parallel manner, as increases in spiritual practices were not associated with increases in spiritual beliefs in the present study. Perhaps this result may be due to individual differences in interest for engaging in spiritual behaviors such as prayer and attending tribal dances regardless of tendency to endorse deeper spiritual beliefs of the connectedness and sacredness of all things. Only one of the four items loading on Factor 2 evidenced significant increases over time: believing all things are sacred was significantly higher only at 4 months. We did not examine relationships between changes in spirituality and substance use or SUDs. Future studies are warranted to examine whether decreases in substance use precede increases in spiritual behavior and beliefs or vice versa (or whether they change simultaneously).

Our final analyses centered on construct validity by examining the association of the two NASS factors with other measures at baseline. Surprisingly, we found that only Factor 1 was significantly associated with other psychosocial variables measured at baseline, while Factor 2 was not significantly associated with any psychosocial variables. For instance, Factor 1 was positively associated with preference for tribal spirituality, ethnic identity, and learning the tribal language first. In turn, Factor 1 was negatively associated with substance use variables such as past month alcohol and cannabis use and lifetime cannabis use. These associations provide evidence of construct validity. The associations between spiritual

behaviors and learning tribal language first support the importance of tribal language revitalization programs. However, firm conclusions about causality should not be drawn at this point. For example, it may be that substance misuse and SUDs interfere with practicing spiritual behaviors or vice versa. Perhaps spiritual beliefs are not as reliably impacted by substance misuse and SUDs such that some people maintain their spiritual beliefs while others do not. Similar to Torres-Stone et al. (2006), NA adults who were more likely to stop using alcohol participated in traditional activities and spiritual practices, thus highlighting the possibility of cultural identity serving as a moderator for SUD treatment outcomes.

Limitations

The present study provides a starting point for assessing NA spirituality; however, several limitations should be addressed. First, the present study used exploratory factor analysis, which is data-driven rather than theory-driven. Although the factors obtained from the factor analysis represented theoretically consistent constructs, further research should test whether a similar factor structure replicates in other samples from similar populations (e.g., NAs from other tribes) and samples from different indigenous populations. Second, our method for testing correlation and regression models utilized mean factor scores computed based on sums of items, which provide a simple way of computing factor scores that can be easily implemented in clinical practice. However, there are multiple methods for computing factor scores (Grice, 2001) which could lead to different results depending on the method used. When we repeated the correlation and regression analyses with factor scores computed using the ten Berge regression score method (see Eq. 8 in Grice, 2001), we found a similar pattern of results as reported above. Third, although the sample size was large compared to many existing longitudinal studies of NAs engaged in SUD treatment, a larger sample size would increase the confidence in the factor analysis results and increase power to detect significant changes in and associations among the constructs that were measured. In particular, only having 25 women limited our ability to test invariance across gender, and oversampling women in future SUD treatment research to test measurement invariance across gender is warranted. Fourth, the present study involved only one tribe so results may not generalize to other tribes or indigenous populations, although we do believe it may be useful beyond the current sample. Finally, this is an SUD treatment-seeking population that predominately preferred their traditional Native religion and elected to participate in research. Results may not generalize to other NAs with less severe substance use, lower endorsement of Native spirituality, and those who would not participate in the research, or to general NA community members. Future research should evaluate the usefulness of this measure in additional NA populations and its relation to other behavioral and health outcomes.

In light of these limitations, our findings support the validity of the NASS to measure tribal spirituality for one Southwest tribe, and highlight the importance of cultural adaptation and measuring spirituality in SUD treatment programs. Once validated by other tribes, the NASS may be a useful tool for tribal communities to incorporate into wellness and treatment centers (e.g., tribally-run treatment centers and Indian Health Service clinics). However, heterogeneity of spiritual beliefs, including Christianity and the Native American Church (Garrouette, et al., 2009), must be considered to allow autonomous selection of spiritual beliefs and avoid a one-size-fits-all model. There are many paths to resolving substance use

problems; spirituality may represent only one path by which NAs experience successful cessation, reduction in problems, and maintenance of wellness. However, similar to many religious traditions that proscribe substance use, indigenous beliefs posit that alcohol and illicit drugs constrain or interfere with spiritual growth and wellness.

Affirming spirituality through its measurement in various health and treatment agencies can contribute to tribal and indigenous cultural revitalization, efforts that are happening across many reservations following a legacy of cultural repression and termination. Asking about spirituality at treatment intake could inform case conceptualization (e.g., the SUD may be considered a spiritual malady; Duran & Duran, 1995; Venner & Bogenschutz, 2008), treatment goals and planning, referrals and consultations, and allow for measurement of changes in spiritual involvement and beliefs over time. In our sample, many participants wanted to learn more about tribal beliefs, suggesting their value and importance. While it is important to ask NA clients about spirituality, one should proceed with caution and assure the client that one is respectful of sacred knowledge and not asking about anything that should not be shared. For instance, some tribes forbid any transfer of tribe-specific spiritual knowledge outside of the tribe (Swinomish Tribal Mental Health Project, 2002) while other tribes feel the knowledge should be shared, indicating controversy around this stance (King, Trimble, Morse, & Thomas, in press). Finally, while these findings may be most applicable to individuals from Southwestern tribes, this spirituality measure should be more widely tested for NA populations throughout the United States and with indigenous people around the world.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This study was supported by NIDA grant 5R01DA021672 (PI: Venner) and NIAAA T32AA018108 (Greenfield and Hagler; PI: McCrady). We would like to sincerely thank the Tribal Council for their support of this project, Sheri Lesensee for reviewing the measure, and the community members who provided input during the adaptation process. The third author discloses a possible conflict of interest resulting from her consultation services providing MI training.

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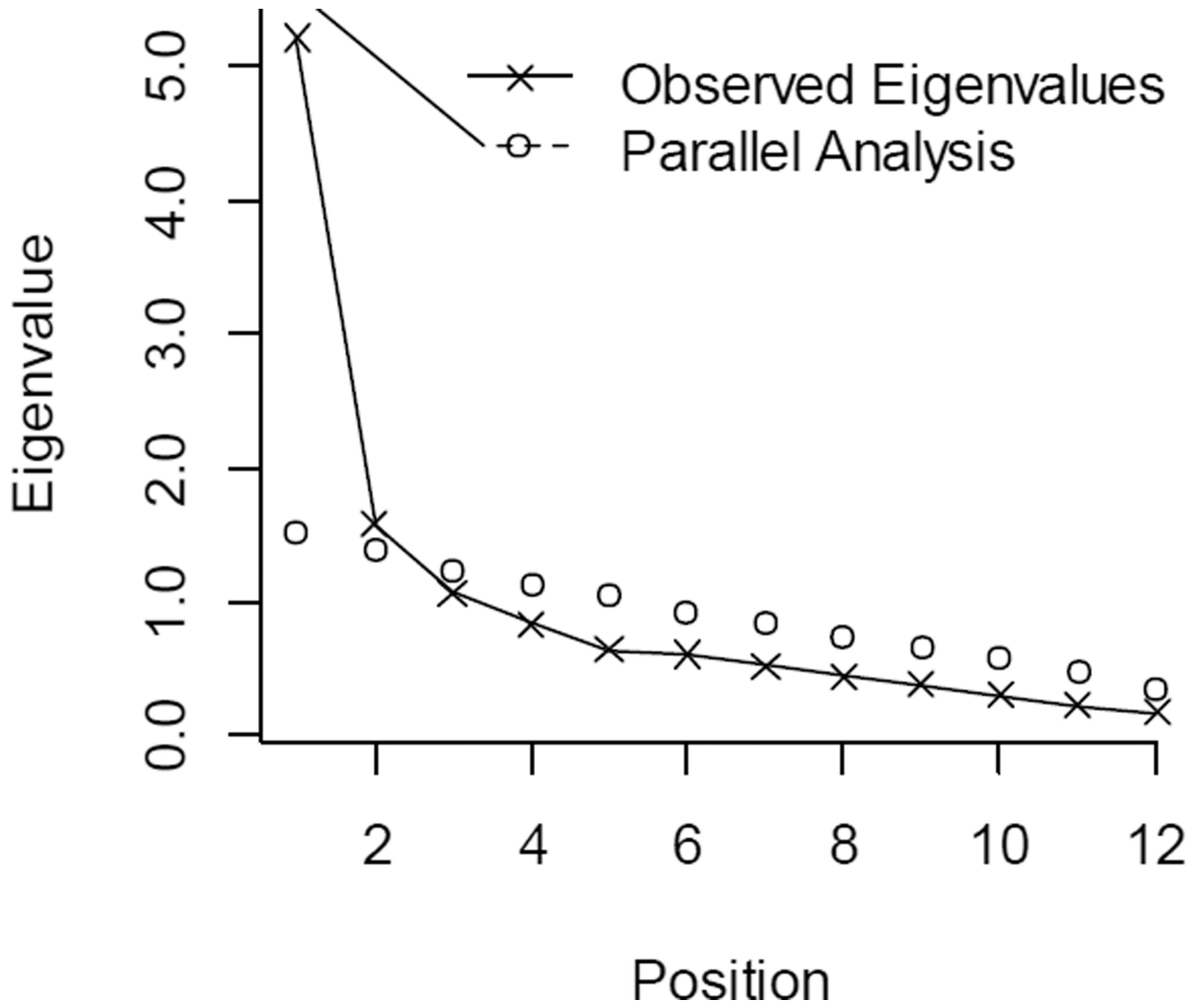


Figure 1.
Parallel analysis results.

Table 1

Exploratory Factor Analysis Results

<i>Factor Loadings</i>	Factor 1	Factor 2
1. Life is sacred	-.09	.87
2. Value all life	.12	.70
3. All things related	.17	.47
4. Morning prayer	.53	.12
5. Evening thanks	.75	-.03
6. Strength in faith	.77	.06
7. Watch dances	.56	-.23
8. Cultural activities	.69	-.08
9. Spiritually touched	.78	.01
10. All has spirit	.21	.58
11. Thankful for faith	.55	.26
12. Want to learn more	.54	.12
<i>Fit Indices</i>		
χ^2 (df)	86.69	(43)
<i>p</i> -value	< .001	
RMSEA (90% CI)	.120	(0.08, 0.14)
TLI	.820	
Factor Correlation	.487	

Note. Factor loadings greater than 0.32 are in bold. RMSEA = root mean square error of approximation, TLI = Tucker Lewis Index. Factor correlations based on regression scores for Factor 1 and Factor 2. NASS items are abbreviated above; see Appendix for expanded items.

Table 2

Measurement Invariance Tests

	χ^2	df	CFI	χ^2	df	p	CFI
<i>Invariance Across Time (Factor 1)</i>							
Configural model	862.57	450	.794				
Weak invariance model	877.05	471	.797	14.48	21	.848	-.003
Strong invariance model	905.32	492	.794	28.27	21	.133	.004
Strict invariance model	950.73	516	.783	45.40	24	.005	.011
<i>Invariance Across Time (Factor 2)</i>							
Configural model	179.28	94	.863				
Weak invariance model	196.01	103	.851	16.73	9	.053	.012
Strong invariance model	215.72	112	.833	19.71	9	.020	.017
Strict invariance model	250.34	124	.797	34.62	12	.001	.036

Note. CFI = Comparative fit index.

Table 3

Descriptive Statistics for NASS Items Across Time Points

	Baseline (N = 83)		4-Month Follow-Up (n = 78)		8-Month Follow-Up (n = 80)		12-Month Follow-Up (n = 74)	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)
<i>Factor 1</i>	3.02	(0.96)	3.24	(1.07)*	3.23	(1.01)	3.26	(1.06)
4. Morning prayer	2.53	(1.47)	2.81	(1.45)	3.00	(1.44)*	3.04	(1.36)
5. Evening thanks	2.94	(1.38)	3.06	(1.46)	3.03	(1.33)	3.32	(1.31)
6. Strength in faith	3.23	(1.39)	3.62	(1.25)	3.65	(1.19)	3.77	(1.15)*
7. Watch dances	3.10	(1.42)	3.29	(1.46)	3.21	(1.43)	3.07	(1.48)
8. Cultural activities	2.22	(1.38)	2.54	(1.53)	2.54	(1.48)	2.47	(1.68)
9. Spiritually touched	2.81	(1.49)	3.13	(1.44)	3.03	(1.48)	2.95	(1.58)
11. Thankful for faith	3.73	(1.09)	3.76	(1.07)	3.81	(1.11)	3.72	(1.16)
12. Want to learn more	3.64	(1.17)	3.72	(1.23)	3.61	(1.20)	3.74	(1.28)
<i>Factor 2</i>	3.62	(0.92)	3.84	(0.83)	3.87	(0.81)*	3.97	(0.78)**
1. Life is sacred	3.69	(1.17)	4.14	(0.83)*	3.93	(1.10)	4.01	(1.04)
2. Value all life	3.98	(1.04)	4.04	(0.90)	4.08	(0.92)	4.23	(0.75)
3. All things related	3.23	(1.22)	3.40	(1.27)	3.66	(1.15)	3.70	(1.13)
10. All has spirit	3.60	(1.26)	3.78	(1.17)	3.81	(1.02)	3.92	(0.99)

Note. NASS items are abbreviated above; see Appendix for expanded items. Asterisks indicate significant differences from Time 1.

For factors: * $p < .05$, ** $p < .01$

For items: * $p < .01$

Table 4
 NASS Factor Correlations with Alcohol and Cannabis Use, Brief Symptom Inventory, Scale of Ethnic Experience, Native Language, and Spiritual Preference

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Factor 1																
2. Factor 2	.53***															
3. Gender	.21	.18														
4. Alcohol use days, past month	-.31**	-.04	-.16													
5. Cannabis use days, past month	-.26*	-.07	-.16	.71***												
6. % life alcohol use	-.19	.12	-.12	.16	.17											
7. % life cannabis use	-.23*	.01	-.09	.16	.18	.81***										
8. BSI Global Severity Index	-.16	-.03	.13	.20	.14	.14	.17									
9. BSI Depression	-.12	-.01	.21	.19	.08	.13	.16	.84***								
10. BSI Anxiety	-.02	.03	.18	.20	.10	.14	.21	.88***	.75***							
11. BSI Somatization	-.11	-.08	.03	.08	.14	.25*	.22*	.76***	.58***	.65***						
12. SEE perceived discrimination	.07	-.04	-.14	-.05	.01	.06	.03	-.06	.03	-.03	.01					
13. SEE mainstream comfort	.06	.14	-.01	.09	.04	.14	.19	.04	.05	.17	-.06	.07				
14. SEE ethnic identity	.41***	.20	.03	.00	.02	-.09	-.14	-.20	-.20	-.14	-.11	.06	-.02			
15. SEE social affiliation	-.01	-.17	-.16	.00	-.02	-.06	-.07	.09	.08	.09	.12	.05	.10	-.08		
16. First language - Native	.25*	.12	.04	.05	.11	.11	.10	-.18	-.11	-.18	-.03	-.03	-.04	.22	-.03	
17. Tribal-specific spiritual preference	.31**	.13	-.14	-.13	-.08	-.14	-.08	-.21	-.13	-.14	-.18	.09	.14	.34**	-.08	.38***

Note. BSI = Brief Symptom Inventory, SEE = Scale of Ethnic Experience.

* $p < .05$,

** $p < .01$,

*** $p < .001$