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Silvi C. Goldstein

University of Rhode Island, scgoldstein@uri.edu

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VALIDATION AND APPLICATION OF AN ALCOHOL-RELATED PROBLEM
SCALE FOR AMERICAN INDIAN ADOLESCENTS: RACE MODERATING THE
RELATIONSHIP BETWEEN ALCOHOL CONSUMPTION AND ALCOHOL-
RELATED PROBLEMS

BY

SILVI C. GOLDSTEIN

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS
IN
CLINICAL PSYCHOLOGY

UNIVERSITY OF RHODE ISLAND

2020

MASTER OF ARTS THESIS

OF

SILVI C. GOLDSTIEN

APPROVED:

Thesis Committee:

Major Professor Dr. Nichea Spillane

Dr. Joseph Rossi

Dr. Chiristan Gonzales

Nasser H. Zawia
DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND
2020

ABSTRACT

American Indian (AI) communities and researchers have identified alcohol as a primary concern for AI, acknowledging the severity of alcohol-related consequences experienced by individuals, families, and whole communities (Stanley, Harness, Swaim, & Beauvais, 2014; Yuan et al., 2010) as well as the long-term damaging effects (Radin et al., 2015). Though extant research has shown varied results regarding actual prevalence rates of alcohol use among AI adolescents (Lynne-Landsman, Komro, Kominsky, Boyd, & Maldonado-Molina, 2016; Whitbeck et al., 2014), there is strong agreement that AI youth suffer disproportionate negative consequences associated with alcohol use (Landen, Roeber, Naimi, Nielsen, & Sewell, 2014; Prevention, 2008; Indian Health Services, 2018; Szlemko, Wood, & Thurman, 2006). Despite this, there are few to no measures of alcohol-related consequences that have been validated with AI/AN samples. Thus, the purpose of this study is to evaluate the psychometric properties of the American Drug and Alcohol Survey's (ADASTM) alcohol-related problem scale for AI adolescents, and to examine how race (AI and non-Hispanic White) moderates the relationship between alcohol consumption and alcohol-related problems. The current study ($n = 2,214$, 52.1% female) is a secondary data analysis study of a large population-based sample that included youth between the ages of 15-21 drawn from a large sample of adolescents living on or near a reservation. The scale had good internal consistency, Cronbach's $\alpha = .834$. Results from the principal component analysis suggested one-factor and confirmatory factor analysis confirmed a one-factor model. Multiple group confirmatory factor analysis found the ADAS'sTM alcohol-related problem scale was invariant across race (AI and

non-Hispanic white) and sex (female and male), suggesting that the scale is appropriate for use to compare across groups (race and sex) with little to no measurement bias. However, a multi-group confirmatory factor analysis was conducted with all four groups and that model failed to reach convergence. Point-biserial correlations revealed a significant positive association between frequency of endorsing drinking over the past-12 months ($r(2076) = .435, p < .001$) and frequency of endorsing being drunk over the past-12 months ($r(2017) = .535, p < .001$) and alcohol-related problems, suggesting this scale can be considered valid. Next, two multilevel regression analyses to evaluate the effects of age, sex, alcohol use and race (level 1 variables) and accounted for nesting with community location (level 2), on alcohol-related problems. A significant main effect was found for race ($b = -0.559, SE = 0.102, t = -5.485, p < .001, 95\% CI [-0.759, -0.359]$), and frequency of drinking over 12-months ($b = 0.524, SE = 0.054, t = 9.671, p < .001, 95\% CI [0.418, 0.631]$), on alcohol-related problems, as well as for race ($b = -0.513, SE = 0.102, t = -5.01, p < .001, 95\% CI [-0.714, -0.312]$), and frequency of being drunk over 12-months on alcohol-related problems ($b = 0.562, SE = 0.053, t = 10.700, p < .001, 95\% CI [0.459, 0.666]$). A significant main effect was found between the association of alcohol-related problems and drinking, and alcohol-related problems and being drunk, for both AI and non-Hispanic white adolescents. Though, simple slopes revealed these relationships were stronger for AI adolescents. Results from this study aid in the alcohol-related health disparity literature for AI adolescents and emphasize the importance of using cross-culturally validated measures with use among AI.

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CHAPTER 1

INTRODUCTION

Justification for and Significance of the Study

Alcohol Use Rates

American Indian (AI) communities have identified that, due to high prevalence rates, alcohol is a primary concern faced by many AI groups (Radin et al., 2015). It is important that researchers and consumers of research appreciate the likely role that history plays in the continue struggle many AI communities face with respect to alcohol. Most AIs believe that historical trauma, including the loss of culture, lies at the heart of substance use and mental illness within their communities (SAMHSA, 2018). Studies have also shown that AI/AN tend to report high rates of alcohol and drug use as a result of acculturative stress directly and indirectly related to historical trauma (Lane & Simmons, 2011; Myhra, 2011; Whitesell, Kaufman, et al., 2012). With that, there exists high variability in the literature on prevalence rates of alcohol use in this population. Some research suggests that AI adolescents may not be at higher risk for engaging in past-month alcohol use as compared to their non-AI peers (Lynne-Landsman et al., 2016). One study found that while AI students in 12th grade reported lower past month alcohol use, AI students in 8th and 10th grade reported higher alcohol use when compared to data from the Monitoring the Future (MTF) study (Swaim & Stanley, 2018). As for binge drinking, AI adolescents show lower

rates when compared to white, Black, and Hispanic or Latino adolescents (SAMHSA, 2018), perhaps speaking to regional and demographic differences that are understudied. However, other studies have found that adolescent alcohol use is a concern among AI adolescents, with rates of use higher than as seen in the general population (Stanley et al., 2014; Swaim & Stanley, 2018; Whitbeck et al., 2014) and higher when compared to their white counterparts (Frieze, Grube, Seninger, Paschall, & Moore, 2011; Swaim & Stanley, 2018). Moreover, AI adolescents have been found to have higher rates of AUD compared to their non-AI counterparts (SAMHSA, 2018) and higher rates of having been drunk and past-month binge drinking compared to their white counterparts (Swaim & Stanley, 2018).

Alcohol-Related Problems

Underscoring the importance of alcohol-related research is literature suggesting that AIs suffer disproportionate negative effects associated with alcohol use compared to the general population (Landen et al., 2014; Prevention, 2008; Services, 2018; Szlemko et al., 2006). AI initiate drinking at younger ages compared to their non-AI counterparts (Frieze et al., 2011; Henry et al., 2011; Stanley et al., 2014; Stanley & Swaim, 2015; Yu & Stiffman, 2007) with an average age of initiation among AI/AN and First Nations at 14 and 13 respectively (Spillane, Greenfield, Venner, & Kahler, 2015; Whitesell, Kaufman, et al., 2012). AIs who drink alcohol until intoxicated before or by age 14 experience more alcohol-related problems, use alcohol more heavily, and are more likely to be diagnosed with an alcohol use disorder later in life (Henry et al., 2011). In fact, one study found that AI who began drinking between the ages of 11 and 13 years of age were at 5-9 times greater risk for alcohol

misuse in later adolescence (Cheadle & Whitbeck, 2011). Moreover, AI who drink, rather than abstain, are more likely to smoke, to use more drugs, be convicted, and to run away from home (Mitchell, Beals, Whitesell, & teams, 2008). Additionally, research suggests a strong association between binge drinking and suicidal behavior among AI adolescents (Cwik et al., 2018). Though recent research on comparing alcohol-related problems among AI and white adolescents is limited, Beauvais (1992) found that various alcohol-related problems, such as driving (e.g. car accidents) and relationship-related problems (e.g., fights with parents and peers), were highest for reservation dwelling AI youth compared to their white peers, and considerably higher overall for reservation dwelling AI youth when compared to AI/AN not living on a reservation (Beauvais, 1992). Further, AI adolescents will continue to face alcohol-related health disparities into adulthood. For instance, the rate of alcohol related-mortality for AIs was 6.6 times higher than the general population, death from chronic liver disease and cirrhosis was 4.6 times higher, suicide was 1.7 times higher, alcohol-related hypothermia was 14.2 times higher, alcohol poisoning was 7.6 times higher, and alcohol-related psychosis was 5.0 times higher (Landen et al., 2014; Services, 2018). There is a clear alcohol-related health disparity with experiences of alcohol-related problems that begin in adolescence and continue through adulthood. Thus, given this health disparity, combined with the lack of studies examining the psychometric properties of alcohol-related problem scales, it is necessary to prioritize the validity of measurement tools with this population in order to accurately assess this alcohol-related health disparity.

Psychometric Properties of Alcohol Use Instruments in AI adolescents and the ADASTM

Despite the importance of investigating the psychometric properties when using instruments among new populations, some of the most notable instruments have not yet been validated with AI adolescents, (Ferreira, Martins, Coelho, & Kahler, 2014; Pilatti et al., 2014; Read, Kahler, Strong, & Colder, 2006; Verster, van Herwijnen, Olivier, & Kahler, 2009; White & Labouvie, 1989; Winters, 1999) with a few exceptions (Noel et al., 2010). Researchers have widely studied alcohol and other drugs among AI adolescents living on or near a reservation using the American Drug and Alcohol SurveyTM (ADAS) (Stanley et al., 2014; Stanley & Swaim, 2015; Stanley & Swaim, 2018), which has been consistently used since the 1980s to measure patterns of substance use among adolescents (Oetting, Edwards, & Beauvais, 1985). The ADASTM is a survey tool used to measure substance use rates and related problems, as well as other variables related to substance use (Oetting & Beauvais, 1990). However, there is a dearth of literature examining the psychometric properties of the ADAS'sTM specific scales, including the alcohol-related problem scale, a 13-item scale that asks about whether drinking alcohol has ever caused a series of problems (e.g. getting a traffic ticket, being in a car accident, getting arrested, having money problems). By not testing the psychometric properties of a measure, we risk introducing measurement bias when drawing conclusions across racial groups. Given the existence of alcohol-related health disparities, it is vital to accurately report on differences across race when drawing comparisons. One approach is to test the psychometric properties of the ADASTM alcohol-related problem scale and the

invariance of the scale across racial groups. Finding invariance between racial groups across the scale argues that latent means can be meaningfully compared across groups and thus it can be concluded that the scale has little to no measurement bias (Milfont & Fischer, 2010).

Purpose of the Study

In sum, there is a strong body of literature that has found that AI suffer disproportionate negative effects associated with alcohol use compared to the general population (Landen et al., 2014; Prevention, 2008; Services, 2018; Szlemko et al., 2006) and some older literature that suggests AI adolescents experience more harm than their white counterparts (Beauvais, 1992). Further, measurement tools created to assess alcohol-related harm are often used indiscriminately with AI and white adolescents, though they were not created or validated for use with AI. Because culture likely impacts the experience of alcohol-related problems and differences may exist in the factor structure or item characteristics across AIs and whites. Additionally, psychological researchers are expected to strive to conduct culturally appropriate and informed research, assessment, and evaluation (Association, 2017). No study to date has examined the psychometric properties of the ADAS's™ alcohol-related problems scale. Thus, the purpose of this study is to examine the following aims:

1. To examine the factor structure of the ADAS™ alcohol-related problems measure.
2. To evaluate the extent to which the ADAS™ alcohol-related problems scale is invariant across race (AI vs non-Hispanic white), sex (female vs male), and

combined four groups (AI females, AI males, non-Hispanic white females, and non-Hispanic white males).

3. If invariance is found across both AI and non-Hispanic white adolescents, to evaluate the effect of race (AI and non-Hispanic white) in the association between alcohol consumption and alcohol-related problems across race.

- I hypothesize that race (AI vs. White) will moderate the association between alcohol consumption and alcohol-related problems.

Specifically, AIs will experience more alcohol-related problems at higher levels of drinking and being drunk over the past 12-months compared to the non-Hispanic white adolescents.

CHAPTER 2

METHODOLOGY

Participants

Participants were drawn from a larger parent study ($N = 5744$) of adolescents aged 10 – 21 years old living on or near a reservation. For the present study, we excluded any participants who were under the age of 15 given that content in the alcohol-related problem scale of the ADAS™ includes questions (e.g. related to driving) that may be less relevant for younger participants ($n = 3395$). Because our aim is to validate this scale, it is important that the content on the scale is applicable to the adolescents in our sample. Next, only participants who endorsed having ever had alcohol were included ($n = 2460$). To allow for complete case analysis, any participant with missing data was deleted ($n = 2214$). The current study ($n = 2,214$, 52.1% female, $M_{age} = 16.25$ years, $SD = 1.08$) was made up of adolescents who identified as American Indian ($n = 1139$), White ($n = 899$), Black ($n = 113$), Latino or Hispanic ($n = 93$), Alaska Native ($n = 23$), Hawaiian, ($n = 8$), Asian American ($n = 18$), or Other ($n = 80$).

Procedures

The present study is a secondary analysis of data collected as part of a larger study conducted by the Tri-Ethnic Center for Prevention Research at Colorado State University. The purpose of the parent study was to examine trends in substance use as well as risk and protective factors associated with substance use among adolescents

who attend school on or near AI reservations (Stanley et al., 2014). While the parent study has collected this data in waves for the past three decades (Stanley et al., 2014), the present study will make use of data collected between 2009 and 2013 (i.e., the most recent wave to be made publicly available through the National Addiction and HIV Data Archive program). Institutional review board (IRB) approval was obtained by the parent study's principal investigator through Colorado State University (Stanley et al., 2014). Recruitment was stratified across six geographic regions, of students on or near reservations, stratified schools by region, and then sampled them according to the relative AI population within that region based on 2000 United States Census (Snipp, 2005; Stanley et al., 2014). Schools in these regions were invited to participate if at least 20% of their student body were AI, and appropriate tribal and/or school board authority approval was obtained prior to beginning data collection (Stanley et al., 2014). Thirty-three schools participated (Stanley et al., 2014). Self-report surveys were administered during classes by school staff. Parents were able to opt their children out of participation by contacting the school, and students could decline to participate by leaving their survey blank; less than 1% of children at the schools declined to participate or were opted out by their parents (Stanley et al., 2014). In order to conduct this secondary study, University of Rhode Island (URI) IRB approval was obtained.

Measures

Participants were administered the American Drug and Alcohol Survey™ (ADAS), a widely used measure of child and adolescent substance use (Oetting & Beauvais, 1990). The ADAS™ includes questions assessing types, frequencies, and

experiences of substance use, as well as questions regarding normative influences to use substances, outcome expectancies related to substance use, family support, and other psychosocial characteristics, including personality factors.

Demographic characteristics including age, sex, grade, and race were collected.

Alcohol use. Frequency of alcohol use and frequency of gotten drunk were both assessed by five questions asking participants how frequently they had alcohol to drink or got drunk over the past 12 months. (e.g., “How often in the last 12 months have you had alcohol to drink” on a 5-point scale (1 = *none*, 5 = *20 or more times*) ($M = 1.564$, $SD = 1.133$), and “How often in the last 12 months have you gotten drunk” on a 5-point scale (1 = *none*, 5 = *20 or more times*) ($M = 1.040$, $SD = 1.156$).

Alcohol-related problems were measured with 13 items assessing whether or not they have experienced specific problems over their lifetime as a result of their alcohol use (instructions asked respondents to report if drinking alcohol had caused problems which was followed by a list of 13 problems) on a 4-point scale (No = 0, ≥ 10 times = 3). For the purpose of the present study, items were dichotomized such that 0 (*no*) reflected never experiencing any alcohol-related problems and 1 (*yes*) indicating having experienced at least one alcohol-related problem. For moderation analyses, a total score reflecting number of alcohol-related problems endorsed was created by adding up the number of individual items endorsed with total scores ranging from 0 to 13.

Data Analysis Plan

Aim 1. To examine the factor structure of the ADASTTM alcohol-related problems measure.

All study analyses were conducted using SPSS v25.0 and R 1.2. As recommended by Tabachnik and Fidell (2007), all variables of interest were assessed for assumptions of normality, homoscedasticity, and multicollinearity (Harlow, 2014; Tabachnick, Fidell, & Ullman, 2007). First, we evaluated the factor structure of the ADAS™ alcohol-related problems scale, the full dataset was randomly split into two halves; principal components analysis (PCA) was conducted on one half of the sample ($n = 1107$) and confirmatory factor analysis (CFA) was conducted on the second half of the sample ($n = 1107$).

Principal Components Analysis.

Using SPSS v25.0, principal components analysis (PCA) using the principal axis factoring extraction method and varimax orthogonal rotation (allowing factors to be uncorrelated) was conducted on the 13 alcohol-related problem items on a random half of the sample ($n = 1107$). A scree test (Cattell, 1966; Zwick & Velicer, 1986) was used to explore interpretations for retaining factors given that the scree test is a more accurate method of retaining factors than the Kaiser-Guttman criterion (Cattell & Vogelman, 1977). In order to confirm accuracy of the scree test, parallel analysis using Lautenschlager's (1989) average eigenvalues of random correlation matrices assuming independence for a 15-item scale ($P = 15$) was conducted. We compared the obtained eigenvalues to average eigenvalues of random correlation matrices and determined the factor structure (Lautenschlager, 1989; Zwick & Velicer, 1986).

Confirmatory Factor Analysis.

After determination of the number of factors from the PCA, a confirmatory factor analysis (CFA) using R 1.2 was conducted on the second random half of the

present sample ($n = 1107$) to test the factor structure for the 13-item alcohol related problem scale. Weighted least squares estimation method (WLSMV) was used due to the categorical nature of item responses (i.e., alcohol-related problem scale). WLSMV has been shown to be less biased and more accurate than robust maximum likelihood in estimating factor loadings for categorical data (Li, 2016). Overall model fit was assessed using the likelihood ratio test, based on the Satorra-Bentler adjusted chi-square value to account for uneven distribution. A nonsignificant likelihood ratio test indicated good model fit. However, because the chi-square test rejects even adequately fitting models, especially with larger sample sizes (Hu & Bentler, 1999), the following fit indices based on the chi-square distribution was used to assess model fit: the Comparative Fit Index (CFI; Bentler, 1990), Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) with corresponding 90% confidence intervals (CIs), and Standardized Root Mean Square Residual (SRMR; Kline, 2016). Goodness of fit was established based on the following indices: a CFI $> .95$ for good fit (Bentler, 1990), a RMSEA value of $\leq .05$ for good fit and up to $.08$ for acceptable fit (Steiger, 1990), and a SRMR value of value of $\leq .05$ indicating good fit and with $< .10$ indicating acceptable fit (Cangur & Ercan, 2015; Hu & Bentler, 1999; Kline, 2016). Agreement among fit indices provides evidence that at least an adequate model fit was achieved. Next, a second CFA was conducted on the full sample ($n = 2214$) in order to confirm good fit using the same criteria as was used for the first CFA.

Aim 2. To evaluate the extent to which the ADASTM alcohol-related problems scale is invariant across race (AI vs non-Hispanic white), sex (female vs male), and

combined four groups (AI females, AI males, non-Hispanic white females, and non-Hispanic white males).

Multigroup Confirmatory Factor Analysis.

Three measurement invariance analyses, also known as multiple group confirmatory factor analysis (MGCFA), were examined, on the alcohol-related problem scale of the ADAS™ using R 1.2. First, an MGCFA was conducted across race on AI ($n=1084$) and non-Hispanic white ($n = 837$) participants (total $n = 1983$). Any participants who identified as mixed-race were excluded ($n = 47$). Participants identifying as Hispanic-white were excluded given the history and crossover between Hispanic ethnic heritage and Indigenous peoples across the Americas before colonialism ($n = 15$; total $n = 1921$). Second, a MGCFA was conducted across sex on females ($n = 1153$) and males ($n = 1061$). Third, a MGCFA was conducted across four groups: AI Female ($n = 582$), Male ($n = 502$), Non-Hispanic white Female ($n = 440$), and Non-Hispanic white Male ($n = 397$) adolescents. Most commonly, MGCFA test three levels of restrictions: configural (no parameter constraints imposed), metric (factor loadings constrained to be equal across groups), and scalar (factor loadings and intercepts constrained to be equal across groups) invariance (Pendergast, von der Embse, Kilgus, & Eklund, 2017; Putnick & Bornstein, 2016). However, given the binary nature of the alcohol-related problem data, metric and scalar invariance cannot be tested separately (Millsap & Yun-Tein, 2004; Wu & Estabrook, 2016). Instead, measurement invariance was tested by first assessing configural invariance and then assessing metric and scalar invariance simultaneously by holding factor loadings and thresholds equal across groups.

Configural invariance was assessed by testing whether the proposed factor model fit the empirical data from each group. The same indices were used to evaluate model fit as above, likelihood ratio test, CFI, RMSEA, and SRMR with the same cut offs as mentioned above. Agreement among fit indices provides evidence that at least adequate model fit was achieved. If the fit indices are within a good range for each group independently, one could expect that configural invariance will be supported (Milfont & Fischer, 2010). Then, scalar invariance was assessed, where factor loadings and error variance were held constant. Scalar invariance was tested by assessing the chi-square test (should be non-significant), CFI with decreases by no more than .01), RMSEA (with increases by no more than .015), and SRMR (with increases by no more than .015) (Putnick & Bornstein, 2016). If these requirements are met, then we can assume latent means can be meaningfully compared across groups (Milfont & Fischer, 2010). Support for error variance invariance is indicated when two observed variables are invariant across groups, having no measurement bias (Milfont & Fischer, 2010).

Aim 3. To evaluate the effect of race (AI and non-Hispanic white) in the association between alcohol consumption and alcohol-related problems across race. I hypothesized that race (AI/AN vs. White) will moderate the association between alcohol consumption and alcohol-related problems. Specifically, the association between drinking and being drunk, and alcohol-related problems will be stronger for AIs compared to non-Hispanic white adolescents.

Bivariate Correlations.

In order to determine if race (AI and non-Hispanic white) moderated the relationship between alcohol consumption and alcohol-related problems, point-biserial correlations using SPSS v25.0 were calculated. Point-biserial correlations were calculated for both AI and non-Hispanic white adolescents to explore their bivariate associations with alcohol-related problems, frequency of drinking and frequency of being drunk over the past-12 months.

Independent Samples t-Tests.

Following this, *t* tests were conducted to explore racial (AI versus non-Hispanic white) differences in alcohol consumption and alcohol-related problems. Cohen's *d* effect size of small (0.2), medium (0.5), and large (0.8) were included to determine effect size (Cohen, 1988). Significant differences were determined based on $p < .05$. Chi-squared tests of independence were conducted to explore racial (AI versus non-Hispanic white) differences among the 13 alcohol-related problem items. Cramer's *V* effect size of small (.30), medium (.40), and large (.50) were included to determine effect size of the significance test (Steinberg, 2010).

Moderation Analyses.

Data for the moderation analysis was conducted using multilevel modeling to account for students being nested within community location. To examine whether race moderated the association between frequency of drinking and being drunk over the past 12-months and alcohol-related problems, multilevel regression analyses were used to evaluate the effects of age, sex, alcohol use, and race (level 1 variables) as well as community location (level 2), on alcohol-related problems. To allow for easier interpretation of parameter estimates, and to lessen the correlation between the

interaction term and its components, variables were standardized by centering around the mean. Two moderation analysis using multilevel modeling to account for students being nested within community location were conducted. First, controlling for sex, the effect of race on the association between frequency of drinking over the past-12 months and alcohol-related problems was assessed. Second, controlling for sex, we assessed the effect of race on the association between frequency of being drunk over the past-12 months and alcohol-related problems. Then, an interaction term was created by multiplying the mean centered alcohol consumption variable and race. Next, a regression analysis was conducted. A significant interaction requires probing the interaction term to identify the nature of the effect. Following the methods described by Aiken, West and Reno (1991), we plotted regression slopes of differences in race (AI vs. non-Hispanic white) participants and conducted simple slope analyses to examine whether the slopes of the regression lines differed significantly from zero.

CHAPTER 3

FINDINGS

Aim 1

Principal Components Analysis.

PCA was performed on one half of the random sample on the 13-item alcohol-related problem scale ($n = 1107$). A PCA with varimax rotation indicated a three-factor solution with eigenvalues greater than one. The first, second, and third factor explained 35.68%, 10.13%, and 8.38% of the variance respectively. However, individual items did not load clearly onto a three-factor model, such that no grouping of items with similar constructs loaded $>.40$ on any of the three factors. Therefore, we explored a one and two factor model as a part of our PCA. Scree plot analyses and parallel analyses using Lautenschlager's (1989) average eigenvalues of random correlation matrices assuming independence for $P = 15$ showed support for a two-factor solution. However, items did not load clearly onto a two-factor model, such that no grouping of items with similar constructs loaded $>.40$ on the factors. Therefore, we then explored a one-factor model and found that all items loaded well onto a one-factor model, with all items loading $>.40$ (see Table 2).

Confirmatory Factor Analysis.

A CFA was performed on the second half of the random sample on the 13-item alcohol-related problem scale ($n = 1107$). A one-factor solution demonstrated good fit

(CFI = .966, RMSEA = .057 90% CI [.051, 0.064], SRMR = .082, $\chi^2(65) = 298.677$, $p < .001$). Next, a CFA was performed on the full sample ($n = 2214$) in order to confirm good fit. A one-sample solution again demonstrated good fit (CFI = .961, RMSEA = .060 90% CI [.056, 0.065], SRMR = .077, $\chi^2(65) = 583.495$, $p < .001$) (See Table 3).

Aim 2

Multiple Group Confirmatory Factor Analysis.

Multiple Group Confirmatory Factor Analyses (MGCFA) were conducted in order to test invariance across race (AI and White), sex (male and female), and across both race and sex (AI and White; male and female).

Race: AIs and non-Hispanic whites.

Using the one-factor model, an MGCFA for AI ($n = 1084$) and White ($n = 837$) adolescents was conducted. First, configural invariance allowing for all parameters to be freely estimated was tested and showed overall acceptable to good fit of the data (CFI = .962, RMSEA = .056, 90% CI [.051, 0.061], SRMR = .091, $\chi^2(130) = 519.272$, $p < .001$). The chi-square test for overall fit was statistically significant $\chi^2(130) = 519.272$, $p < .001$). Though the SRMR (.091) indicated acceptable fit, the RMSEA (.056) indicated adequate fit, and the CFI (.962) indicated good fit. Thus, configural invariance was demonstrated for AI and non-Hispanic white adolescents.

Given that configural invariance was established, a model specific for full scalar invariance was estimated across the two groups showing acceptable to good fit (CFI = .957, RMSEA = .057, 90% CI [.052, 0.062], SRMR = .093, $\chi^2(141) = 581.116$, $p < .001$). The chi-square test was statistically significant $\chi^2(141) = 581.116$, $p < .001$.

However, the CFI value (.957) decreased by no more than .01, the RMSEA (.057) increased by no more than .015, and the SRMR increased by no more than .015 (.093), therefore indicating the constrained model did not degrade fit. Thus, scalar invariance was established.

Sex: Females and Males.

Using the one-factor model, MGCFA for females ($n = 1153$) and males ($n = 1061$) was conducted. First, configural invariance, allowing for all parameters to be freely estimated, was tested and showed overall acceptable to good fit of the data (CFI = .966, RMSEA = .057, 90% CI [.052, 0.061], SRMR = .085, $\chi^2(130) = 591.644$, $p < .001$). The chi-square test was statistically significant $\chi^2(130) = 591.644$, $p < .001$). Though, the SRMR (.085) indicated acceptable fit, the RMSEA (.057) and CFI (.966) indicated good fit. Thus, configural invariance was demonstrated for female and male adolescents.

Given that configural invariance was established, a model specific for full scalar invariance was estimated across the two groups showing acceptable to good fit (CFI = .960, RMSEA = .059, 90% CI [.055, 0.063], SRMR = .089, $\chi^2(141) = 682.022$, $p < .001$). The chi-square test was statistically significant $\chi^2(141) = 682.022$, $p < .001$. However, the CFI value (.960) decreased by no more than .01, the RMSEA (.059) increased by no more than .015, and the SRMR value (.089) increased by no more than .015, therefore indicating the constrained model did not degrade fit. Thus, scalar invariance was established.

Four Group: Race and Sex.

Using the one-factor model, a four-group MGCFA was conducted for race and sex. Included in the analyses were AI Female ($n=582$), AI Male ($n=502$), Non-Hispanic white Female ($n=440$), and Non-Hispanic white Male ($n = 397$) adolescents. After several attempts to find invariance across the four groups, we could not get the model to converge.

Aim 3

Bivariate Correlations.

As show in Table 4, point-biserial correlations revealed significant positive associations between AI adolescents and alcohol-related problems ($r(897) = .072, p < .05$). However, there was no significant correlation between AI adolescents and frequency of endorsing drinking over the past-12 months ($r(897) = -.031, p = .372$), and frequency of endorsing being drunk over the past-12 months ($r(825) = -.043, p = .213$). Further, there was a significant negative correlation between non-Hispanic white adolescents and frequency of endorsing being drunk over the past-12 months ($r(1039) = -.076, p < .05$). However, there was no significant correlation between non-Hispanic white adolescents and alcohol-related problems ($r(1137) = -0.035, p = .233$), and frequency of endorsing drinking over the past-12 months ($r(1078) = -.024, p = .423$). There was also a significant positive association between frequency of endorsing drinking over the past-12 months and alcohol-related problems ($r(1078) = .490, p < .01$), frequency of endorsing being drunk over the past-12 months and alcohol-related problems ($r(1039) = .552, p < .01$), and between frequency of endorsing drinking and being drunk over the past-12 months ($r(1009) = .817, p < .001$). Lastly, sex was correlated with alcohol-related problems ($r(1137) = .078, p$

< .01), but not correlated with frequency of endorsing drinking over the past-12 months and alcohol-related problems ($r(1078) = .004, p = .887$), and frequency of endorsing being drunk over the past-12 months ($r(1039) = -.024, p = .438$).

Independent Samples t-Tests.

Levene's test for equality of variances was significant for alcohol-related problems ($F(1, 835) = 70.377, p < .001$) and frequency of endorsing being drunk over the past-12 months ($F(1, 765) = 6.978, p = .008$), therefore equal variances were not assumed. However, Levene's test did reveal that frequency of drinking over the past 12-months was not significant ($F(1, 776) = 0.137, p = 0.712$), therefore homogeneity of variance assumption was satisfied, and equal variances were assumed.

Independent samples *t*-test revealed there was a significant difference between racial groups regarding alcohol-related problems by race, $t(1916.643) = 11.291, p < .001, d = 0.505$, such that AIs endorsed a significantly higher number of alcohol-related problems ($M = 2.771, SD = 2.820$) compared to non-Hispanic white adolescents ($M = 1.464, SD = 2.255$). Specifically, as shown in Table 1, AI adolescents were significantly more likely to report more car accidents, arrests, money problems, trouble in school, hurt school work, fights with other kids, fights with parents, damaged friendships, being passed out from alcohol, couldn't remember what happened while drinking, and breaking something compared to their non-Hispanic white peers. However, though AI reported more alcohol-related traffic tickets and loss of jobs, it was not significantly different from non-Hispanic white adolescents. Additionally, there was a significant difference between racial groups regarding frequency of endorsing being drunk over the past 12-months, $t(1689.411) = 3.89, p$

$<.001$, $d = 0.186$. AI were significantly more likely to have endorsed higher frequency of getting drunk over the past 12-months ($M = 1.117$, $SD = 1.197$), compared to non-Hispanic white adolescents ($M = 0.948$, $SD = 1.129$). However, there was no significant group differences between AI ($M = 1.582$, $SD = 1.150$) and non-Hispanic White adolescents ($M = F$) on frequency of endorsing drinking over the past 12-months, $t(1803) = -.212$, $p = .712$, $d = -0.010$.

Moderation Analyses.

Frequency of Drinking. To examine the main and interactive effects of frequency of drinking over the past 12-months and race (non-Hispanic white and AI), and controlling for sex, we examined a multilevel Poisson regression model. These analyses are summarized in Table 5. A significant main effect was found for race ($b = -0.559$, $SE = 0.102$, $t = -5.485$, $p <.001$, 95% CI $[-0.759, -0.359]$), and frequency of drinking over 12-months ($b = 0.524$, $SE = 0.054$, $t = 9.671$, $p <.001$, 95% CI $[0.418, 0.631]$), on alcohol-related problems. Additionally, there was a significant interaction between frequency of drinking over 12-months by race on alcohol-related problems ($b = -0.208$, $SE = 0.090$, $t = -2.317$, $p < .05$, 95% CI $[-0.385, -0.032]$). As illustrated in Figure 1, analyses of simple slopes revealed that the association between past 12-month drinking and alcohol-related problems is significant for both AI ($b = 0.680$, $SE = 0.0281$, $t = 24.221$, $p <.001$, 95% CI $[0.625, 0.735]$) and non-Hispanic white ($b = 0.510$, $SE = 0.050$, $t = 10.118$, $p <.001$, 95% CI $[0.411, 0.608]$) adolescents; however, the relationship is stronger among AI adolescents (see Figure 1).

Frequency of Getting Drunk. To examine the main and interactive effects of frequency of being drunk over the past 12-months and race (non-Hispanic white and

AI), and controlling for sex, we examined a multilevel Poisson regression model. These analyses are summarized in Table 5. Analyses for alcohol-related problems, controlling for sex, found a significant main effect for race ($b = -0.513$, $SE = 0.102$, $t = -5.01$, $p < .001$, 95% CI $[-0.714, -0.312]$), and frequency of being drunk over 12-months on alcohol-related problems ($b = 0.562$, $SE = 0.053$, $t = 10.700$, $p < .001$, 95% CI $[0.459, 0.666]$). Additionally, there was a significant interaction between frequency of being drunk over 12-months by race for alcohol-related problems ($b = -0.220$, $SE = 0.088$, $t = -2.491$, $p = 0.013$, 95% CI $[-.393, -.047]$). As illustrated in Figure 2, analyses of simple slopes revealed that the association between past 12-month being drunk and alcohol-related problems is significant for both AI ($b = .963$, $SE = .040$, $t = 23.967$, $p < .001$, 95% CI $[0.881, 1.042]$) and non-Hispanic white ($b = .562$, $SE = .049$, $t = 11.371$, $p < .001$, 95% CI $[0.465, 0.658]$) adolescents; however, the relationship is stronger among AI adolescents (See Figure 2).

Reliability Analyses and Descriptive Statistics

Overall, the scale had good internal consistency, Cronbach's alpha = .834. Additionally, good internal consistency for the scale was found for AI (Cronbach's alpha = .820), non-Hispanic white (Cronbach's alpha = .836), females (Cronbach's alpha = .826, and males (Cronbach's alpha = .845). See Table 1 for statistics describing frequency of alcohol-related problem endorsement.

CHAPTER 4

DISCUSSION

The purpose of this study was threefold: 1) to evaluate the factor structure and of the alcohol-related problem scale from the American Drug and Alcohol Survey™ (ADAS), 2) to evaluate whether the ADAS™ alcohol-related problem scale was invariant across race (AI and non-Hispanic white), sex (female vs male), and combined four groups (AI females, AI males, non-Hispanic white females, and non-Hispanic white males), and 3) to examine race (AI and non-Hispanic white) as a moderator in the relationship between alcohol consumption and alcohol-related problems. Results from this study supported a one-factor model through principal components analysis. Confirmatory factor analysis confirmed the one-factor model, consistent with literature on other alcohol-related problem measures that finds alcohol-related problems to be unifactorial (López Núñez et al., 2012; Marra, Field, Caetano, & von Sternberg, 2014). Next, this study found the alcohol-related problem scale to be invariant across race (AI and non-Hispanic white) and sex (female and male) using multigroup confirmatory factor analysis. These results indicate that meaningful comparisons can be drawn across these groups, aiding in research that aims to assess alcohol-related health disparities among AI adolescents. Thereafter, this study found that AI adolescents were more likely to report significantly more alcohol-related problems. Then, this study found a significant interaction between the association of alcohol-related problems and drinking, and alcohol-related problems and being drunk,

for both AI and non-Hispanic white adolescents; Though, simple slopes revealed these relationships were stronger for AI adolescents. Overall, results from this study found the ADAS's™ alcohol-related problem scale to be reliable and cross-culturally valid for adolescents aged 15 – 21, AI, and non-Hispanic white adolescents. Our results contribute to better understanding alcohol-related problems among AI adolescents by aiding in more thorough examinations of alcohol-related health disparities among this population.

Though the ADAS™ and has been used widely among AI adolescents living on or near a reservation (Stanley et al., 2014; Stanley & Swaim, 2015; Stanley & Swaim, 2018; Swaim & Stanley, 2018), and has been consistently used since the 1980s to measure patterns of substance use (Stanley & Swaim, 2015) among adolescents (Oetting et al., 1985), there is a dearth of literature examining the factor structure and psychometric properties of the alcohol-related problem scale contained in the ADAS™. Results from the PCA revealed a one-factor model, providing evidence that one latent variable exists across the 13-items (Warner, 2012). Additionally, results from the CFA provide evidence for good fit among the items, thus concluding that the alcohol-related problem scale is appropriate to administer to adolescents, aged 15 – 21, living on or near a reservation. Furthermore, given the ADAS's™ use among diverse populations, including AIs living on or near reservations (Stanley et al., 2014; Stanley & Swaim, 2015; Stanley & Swaim, 2018; Swaim & Stanley, 2018) it is imperative to assess the psychometric properties of the measure in order to mitigate problematic measurement bias while drawing conclusions across racial groups. Our results, which found the alcohol-related problem scale of the

ADASTM to be invariant across AI and non-Hispanic white, and for females and males, suggest that latent means can be meaningfully compared across race and sex, separately; Thus, our findings suggest that there is little to no measurement bias that exists when comparing across these specific groups (Milfont & Fischer, 2010). Of note, females and males did not show differences between alcohol consumption (drinking and being drunk) and alcohol-related problems. In sum, our results find this scale as valid for use when comparing alcohol-related problems among AI and non-Hispanic white, or female and male adolescents.

Though, caution is necessary when trying to examine the differences across race and sex combined. This study sought to examine whether the alcohol-related problem scale of the ADASTM was invariant across a four-group model (AI Female, AI Male, non-Hispanic white female, and non-Hispanic white male), however the model did not converge. Given lack of convergence, researchers should proceed with prudence when comparing, for example, AI females to non-Hispanic females, and AI males to non-Hispanic males. There may be several reasons for this inconclusive result and many reasons why the model may not have converged. First, covariance matrices were examined in order to assess for differences between the four groups. We found that AI females and non-Hispanic white males had fairly high covariances among the alcohol-related problem items, however AI males and non-Hispanic white females had fairly low covariances among the alcohol-related problem items. While this study found support for a one-factor model and found this measure to be reliable and cross-culturally valid for use among AI and non-Hispanic white adolescents, and female and male adolescents, it is possible that this complex four-group model did not converge is

due to between-group differences. Perhaps when AI and non-Hispanic white adolescents and female and male adolescents are combined and separated into four groups, new factor structures emerge among the different combination of groups. Thus, it would be justified that the model would not converge if each subgroup (e.g., AI females) produces its own underlying factor structure. Furthermore, perhaps AI males and non-Hispanic white females are simply not endorsing enough of the same problems as AI females and non-Hispanic white males; therefore, the model may be strained. Another possible explanation for the model not converging may be due to lack of variance. Perhaps the items do not support much variance given that they are dichotomous. The dichotomous items having restricted variance may limit items' ability to correlate with other variables, and thus converge with the model. These results suggest that caution should be exercised if trying to compare this measure of alcohol-related problems across a combination of race and sex.

However, our results do suggest that the ADAS'sTM alcohol-related problem scale can be used to meaningfully compare across AI and non-Hispanic white adolescents. The literature has greatly elucidated that, for AI adolescents, alcohol initiation (Spillane et al., 2015; Stanley & Swaim, 2015; Whitesell, Kaufman, et al., 2012), and alcohol use rates (Frieze et al., 2011; Stanley et al., 2014; Swaim & Stanley, 2018; Whitbeck et al., 2014) are commonly associated with alcohol-related problems (Cheadle & Whitbeck, 2011; Cwik et al., 2018; Henry et al., 2011; Mitchell et al., 2008), thus contributing to the serious alcohol-related health disparity. Therefore, it is imperative that validated measures of alcohol-related problems exist in order to allow further investigation of how alcohol-related problems differ across race

in order to better understand the related health disparity. Our finding that AI adolescents experience significantly more alcohol-related problems than their non-Hispanic peers, and that at higher frequency of drinking and getting drunk the relationship to alcohol-related problems was stronger for AI, aligns with literature that suggests AI adolescents drink alcohol at higher rates (Frieze et al., 2011; Swaim & Stanley, 2018) and experienced more alcohol-related problems than their white peers (Beauvais, 1992). Our results further emphasize the alcohol-related health disparity experienced by AI adolescents, evinced through alcohol-related problems, which speaks to the importance of prioritizing harm reduction strategies and treatment among this population. Harm reduction focuses on supporting client-driven means of reducing alcohol-related harm for individuals and their communities without requiring abstinence-based treatment goals (Collins et al., 2012). With regard to alcohol, one of the main goals of harm reduction is to reduce alcohol-related consequences. Harm reduction strategies can work in parallel with the Indigenous groups focus on community- and family-driven priorities (Daisy, Thomas, & Worley, 1998). Harm reduction is tailored by the goals of the client. In AI/AN populations, harm reduction can be tailored with different goals for each client in the context of their community (Landau, 1996). Thus, the core harm reduction principles, including the pragmatic emphasis on community outreach as the primary intervention mechanism, aligns well with traditional Indigenous values (Daisy et al., 1998). However, in order to take a harm reduction approach, it is necessary to have reliable and valid ways of assessing reductions in alcohol-related problems; thus, underscoring the importance of the current study. Therefore, perhaps a harm reduction approach, focusing on reducing

alcohol-related problems by reducing alcohol use and frequency of drinking to get drunk, would help alleviate the jarring alcohol-related health disparity among AI adolescents.

Though, in order to meaningfully contextualize the alcohol-related health disparity experienced by AI adolescents, we must consider the necessary contemporary and historical contexts. First, our study, which found AI adolescents have a stronger association with alcohol-related problems when drinking and being drunk, may be best understood against the backdrop of U.S. systematic inequalities and racial disparities. Perhaps AI adolescents are at more risk of alcohol-related problems with or without higher levels of drinking. Take for example the alcohol-related problem item that asked respondents if they had been arrested, a study found that in 2003, AI adolescents were two-and-a-half times as likely as white youth to be committed to juvenile facilities; by 2013, that ratio increased by almost 50 percent to nearly four (Rovner, 2016). It is possible that the items used in this validated alcohol-related problem scale also explain problems related to systemic racial discrimination. Second, it is imperative to acknowledge the history that aided in alcohol-related health disparities for Indigenous peoples to avoid over pathologizing and further stigmatization. Research suggests that historical trauma, related to colonization, is significantly associated with AI past month alcohol use (Wiechelt, 2012) and offers etiological explanations for substance use and disorders (Whitesell, Beals, Crow, Mitchell, & Novins, 2012). Many AIs believe that historical trauma, including the loss of culture, lies at the heart of substance use and mental illness within their communities (SAMHSA, 2018). A number of studies show that lasting intergenerational effects

experienced by AI from social and cultural disturbance related to the colonization of North America- including forced removal from their tribal lands, broken treaties, and enforced placement of AI/AN children in boarding schools – is strongly linked to alcohol and other drug use, as well as psychosocial issues, such as poor mental health and poverty (Evans-Campbell, 2008; Heart, 2003; Ross, Dion, Cantinotti, Collin-Vézina, & Paquette, 2015; Wunder & Hu-DeHart, 1992). Indeed Indigenous people did not have distilled, potent forms of alcohol prior to European contact (Beauvais, 1998). Studies have also shown that AI/AN tend to report high rates of alcohol and drug use as a result of acculturative stress directly and indirectly related to historical trauma (Lane & Simmons, 2011; Myhra, 2011; Whitesell, Kaufman, et al., 2012). Thus, to fully appreciate the results as a movement towards acknowledging the alcohol-related health disparity experienced by AI adolescents, we must also acknowledge the history that likely plays a role in aiding this disparity.

Future Directions and Limitations

Our findings, which found the alcohol-related problem scale as a one factor model, invariant across race and sex, and that alcohol use was related to alcohol-related problems provide support that this scale is valid for use among adolescents, aged 15-21. This research adds to the current literature on validated alcohol-related problems measures for adolescents from diverse backgrounds. Furthermore, our results that find measurement invariance across race (AI and non-Hispanic whites) and sex (females and male) indicate meaningful conclusions can be drawn across AI and non-Hispanic whites, and females and males, and suggest that little to no measurement bias may be present. This finding will allow continued work on accurately

understanding current alcohol-related health disparities among AI adolescents.

However, our invariance tests across the four-group model (AI males, AI females, non-Hispanic white males, non-Hispanic white female) did not converge, thus caution should be exercised when comparing across these four-groups combined.

Furthermore, researchers and scholars have long argued that instruments developed using Eurocentric, Western approaches, or those normed on majority group populations, cannot be indiscriminately used with individuals who differ from the normative population (Suzuki & Ponterotto, 2007). Though some commonly utilized alcohol-related assessment instruments have been validated for use in non-dominant populations (Noel et al., 2010), many tools frequently used with AI populations were not psychometrically validated for use with AI individuals. By using instruments developed for Eurocentric-Western groups on non-Eurocentric populations (such as AI), performance from individuals from nondominant cultural backgrounds may be affected in ways not intended by the test maker (Suzuki & Ponterotto, 2007).

Additionally, it may be that specific alcohol-related problems experienced by AI, including for example cultural practices that require sobriety, are not captured on this scale. Several of the items on the scale (e.g. Had money problems? Got a traffic ticket?) do not inherently align with AI collectivist culture and norms (i.e., more interdependent, interconnected with one another, and focused on the needs of others within one's community; Beckstein, 2014). and may not represent unique problems faced by AI living on or near a reservation. For example, some studies have found AI adolescents who drink to experience alcohol-related problems not captured on the scale including sex assault (Kirk-Provencher, Schick, Spillane, & Tobar-Santamaria,

2020), suicidality (Cwik et al., 2018), likeliness to run away, to smoke, to use more drugs, and to have sex (Mitchell et al., 2008). Other studies have reported AI who live on reservations to experience alcohol-related problems shaped by a constellation of social-ecological conditions including kinship, housing, public/social service capacity, the supply of alcohol in nearby off-reservation areas, as well as inter-governmental relationship and the spiritual life on reservation residents (Lee et al., 2018). AI adolescents may be facing unique alcohol-related problems that are not measured in the ADAS™ alcohol-related problem scale given that it was not created within a reservation-based AI community.

Findings of this study should be considered within the context of its limitations. First, when examining measurement invariance for the four-group analysis, the model did not converge. Given this, future work should consider refinement of this alcohol-related problem scale through qualitative data methods and focus groups in order to tease apart meaningful differences and consider alternative underlying factor structures. Perhaps this will allow for a more thorough, four-group psychometric validation of the scale to rule out measurement bias. Second, surveys were administered within schools; thus, students who did not attend school or who dropped out were not included in the study. Given that alcohol-related problems experiences by truant adolescents may largely vary compared to those who attend school, future research should consider collecting data from adolescents both attending and not attending school. Third, our study had alcohol use outcomes with a timeframe of 12-months, and alcohol-related problems with a timeframe over their lifetime. Future research should consider matching the timeline for alcohol use outcomes and alcohol-

related problem measures in order to be more specific with these measurements.

Lastly, though this sample was a nationally representative sample of AI adolescents, the sample did not include a nationally representative sample of non-Hispanic white adolescents. Future research should consider replicating this study using a nationally representative sample of AI and non-Hispanic white adolescents.

Table 1. Descriptive statistics for endorsement of alcohol-related problem items.

Item	Frequency of Endorsement of alcohol-related problems			
	Full Sample (<i>N</i> = 2214)	AI (<i>n</i> = 1084)	Non-Hispanic White (<i>n</i> = 837)	Test Statistic (<i>n</i> = 1921)
Traffic ticket	2.4% (54)	2.8% (30)	1.6% (13)	$\chi^2(1) = 3.183, p = .074, v = .041$
Car accident	5.6% (125)	7.6% (82)	2.4% (20)	$\chi^2(1) = 25.159, p < .001, v = .114$
Got arrested	13.1% (291)	20.7% (224)	4.5% (38)	$\chi^2(1) = 104.253(1), p < .001, v = .233$
Money problems	10.7% (238)	15.6% (169)	4.8% (40)	$\chi^2(1) = 56.938(1), p < .001, v = .172$
Trouble at school	9.9% (219)	13.4% (145)	6.1% (51)	$\chi^2(1) = 27.345(1), p < .001, v = .119$
Hurt your school work	13.0% (288)	18.1% (196)	7.4% (62)	$\chi^2(1) = 46.281(1), p < .001, v = .155$
Fought with other kids	21.7% (480)	29.3% (320)	11.9% (100)	$\chi^2(1) = 85.376(1), p < .001, v = .211$
Fought with your parents	16.8% (371)	21.7% (235)	11.5% (96)	$\chi^2(1) = 34.519(1), p < .001, v = .134$
Damaged a friendship	15.6% (346)	21.0% (228)	9.7% (81)	$\chi^2(1) = 45.123(1), p < .001, v = .153$
Passed out	37.7% (835)	45.6% (494)	28.9% (242)	$\chi^2(1) = 55.464(1), p < .001, v = .170$
Couldn't remember what happened while drinking	41.4% (916)	48.5% (526)	35.2% (295)	$\chi^2(1) = 34.032(1), p < .001, v = .133$
Broke something	25.8% (571)	30.7% (333)	20.8% (174)	$\chi^2(1) = 23.978(1), p < .001, v = .112$
Lost your job	1.9% (43)	2.0% (22)	1.6% (13)	$\chi^2(1) = .599(1), p = 0.439, v = .018$
Total number of problems endorsed [M (SD)]	2.158 (2.68)	2.771 (2.820)	1.464 (2.255)	$t(1916.643) = 11.291, p < .001, d = 0.505$

Note. Test Statistics are between AI and non-Hispanic white only

Table 2. 1-factor component matrix for PCA and CFA on random halves of the sample.

Item	Factor Loadings	
	PCA	CFA
Traffic ticket	.419	.085
Car accident	.514	.727
Got arrested	.661	.787
Money problems	.622	.714
Trouble at school	.546	.171
Hurt your school work	.645	.776
Fought with other kids	.690	.756
Fought with your parents	.689	.806
Damaged a friendship	.608	.751
Passed out	.614	.852
Couldn't remember what happened while drinking	.594	.889
Broke something	.632	.747
Lost your job	.459	.870

Table 3. Confirmatory factor analysis model fit for partial and full sample confirmation.

Model	CFI	RMSEA	SRMR	χ^2	df	<i>p</i>
Second half of random sample	.966	.057 90% CI [.051, 0.064]	.082	298.677	65	<i>p</i> < .001
Full Sample	.961	.060 90% CI [.056, 0.065]	.077	583.495	65	<i>p</i> < .001

Table 4. Correlations of among variables of interest.

	1	2	3	4	5	6
1. AI	-	-	.025	.224**	.011	.093**
2. Non-Hispanic white		-	-.002	-.199**	.017	-.072*
3. Female			-	.034	-.002	-.035
4. Alcohol-related problems				-	.435**	.535**
5. Past 12-months drinking					-	.778**
6. Past 12-months drunk						-

Note: * $p < .01$, ** $p < .001$ (two-tailed).

Table 5. Moderation analyses examining main and interactive effects of race on alcohol-related problems.

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI
OUTCOME: Frequency of past 12-month drinking					
Intercept	1.502	1.151	1.305	.192	[-.756, 3.760]
Non-Hispanic White*	-.559	.102	-5.49	<.001	[-.759, -.359]
Female sex**	.085	.095	.900	.368	[-.101, .271]
Frequency of drinking	.524	.054	9.671	<.001	 [.418, .631]
Frequency of drinking X Race	-.208	.090	-2.317	.021	[-.385, -.032]
OUTCOME: Frequency of past 12-month being drunk					
Intercept	1.706	1.164	1.465	.143	[-.579, 3.990]
Non-Hispanic White*	-.513	.1023	-5.009	<.001	[-.714, -.312]
Female sex**	.141	.0965	1.458	.145	[-.049, .330]
Frequency of being drunk	.562	.0526	10.700	<.001	 [.459, .666]
Frequency of being drunk X Race	-.220	.0882	-2.491	.013	[-.393, -.047]

Note. *AI was the reference group; **Male was the reference group; bolded typeface indicates significance at the $p < .05$ level.

Figure 1. Frequency of drinking by race on alcohol-related problems.

Figure 2. Frequency of getting drunk by race on alcohol-related problems.

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