

POST-TRAUMATIC STRESS DISORDER AND HIV RISK BEHAVIORS AMONG RURAL AMERICAN INDIAN/ALASKA NATIVE WOMEN

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Abstract: We assessed the relationship between post-traumatic stress disorder (PTSD), binge drinking, and HIV sexual risk behavior by examining number of unprotected sex acts and number of sexual partners in the past 6 months among 129 sexually active American Indian women. A total of 51 (39.5%) young women met PTSD criteria. Among women who met the PTSD criteria, binge drinking was associated with a 35% increased rate of unprotected sex (IRR 1.35, $p < .05$), and there was a stronger association between increased binge drinking and risk of more sexual partners (IRR 1.21, $p < .001$) than among women who did not meet PTSD criteria (IRR 1.08, $p < .01$) with a difference of 13% ($p < .05$). HIV intervention and prevention interventions in this population likely would benefit from the inclusion of efforts to reduce binge drinking and increase treatment of PTSD symptoms.

INTRODUCTION

Exposure to traumatic events increases risk for post-traumatic stress disorder (PTSD) and substance use disorders. From a public health perspective, an important but frequently overlooked sequela of trauma exposure is risk for HIV. Left untreated, PTSD symptoms present with high rates of concurrent alcohol and drug dependence (>50% and >30% respectively) (Volpicelli, Balaraman, Hahn, Wallace, & Bux, 1999), in turn elevating HIV sexual risk behavior (HSB). (Green et al., 2005; Hutton et al., 2001; Lang et al., 2003; Messman-Moore, Ward, & Brown, 2009). The rate of HIV diagnosis among American Indians and Alaska Natives (AI/ANs) in the U.S. continues to climb, rising from 9.5 per 100,000 in 2001 to 12.8 per 100,000 in 2010 (Centers for Disease Control and Prevention [CDC], 2010); one out of every three new HIV cases diagnosed is an AI/AN woman. The primary mode of exposure for AI/ANs women (67%) is heterosexual intercourse (CDC, 2012).

Particularly alarming is that, after an HIV diagnosis, AI/AN women have one of the lowest survival rates of any ethnic or racial group. Furthermore, epidemiologic evidence points to excessively high rates of sexually transmitted infections (STIs) among AI/ANs compared to the general population (Kaufman et al., 2007). These elevated rates of STIs may provide a two- to five-fold increase in risk for HIV infection among AI/ANs in the U.S. (Bertolli et al., 2004). Thus, it is important to understand this triangle of risk among trauma exposure, substance use, and HIV sexual risk behavior.

Multiple challenges place AI/ANs women at increased risk of HIV/STIs. These include a history of exposure to violence or assault (2.5 times higher than all other women; Amnesty International, 2007), alcohol misuse (U.S. Department of Health and Human Services, 2010), and elevated rates of intimate partner violence (IPV; Hess et al., 2012). Female survivors of IPV have higher STI prevalence and HIV sexual risk behaviors than women in nonviolent relationships (Hess et al., 2012). Research among non-Natives indicates that exposure to traumatic and abusive childhoods (Bartholow, Doll, Joy, & Douglas, 1994), sexual abuse (Miller & Paone, 1998), lifetime physical or sexual abuse by a partner (Molina & Basinait-Smith, 1998), and rape (Cunningham, Stiffman, Dore, & Earls, 1994) are associated with increased HIV sexual risk behaviors. These same links are likely to exist for AI/ANs. Indeed, AI/AN women have higher lifetime rates of mental health disorders associated with trauma exposure, including PTSD, than those reported by non-AI/AN women (Laudenslager et al., 2009). Increased risk for trauma exposure and its associations with substance use and PTSD have received special attention from many AI/AN communities (Libby et al., 2007; Libby, Orton, Novins, Beals, & Manson, 2005; Whitesell, Beals, Mitchell, Manson, & Turner, 2009).

The overall rate of alcohol consumption among AI/ANs is significantly lower than the national average (43.9% vs. 55.2%, respectively; Substance Abuse and Mental Health Services Administration, 2010). AI/AN women, however, are 2-3 times more likely than the general U.S. population to engage in binge drinking (May, 1996), typically defined as consuming 4 drinks over a 2-hour period for women (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2004). This pattern of alcohol consumption often co-occurs with increased engagement in HIV sexual risk behaviors and has been found to be associated with higher prevalence of violent events, lifetime diagnosis of PTSD, and increased risk for revictimization (Cook, Dinnen, & O'Donnell, 2011; Ginzburg et al., 2009; Johnson, Cottler, O'Leary, & Ben Abdallah, 2010). These cumulative findings highlight the urgency to better understand the potential etiological links between PTSD, HIV sexual risk behaviors, and substance use among AI/AN women.

PTSD has been associated with increased sexual risk behavior (Lang et al., 2003) and HIV seropositive status among women (Sherr et al., 2011). PTSD symptoms of emotional numbing or detachment, feelings of dissociation, or emotional dysregulation may interfere with women's ability

to establish emotional intimacy and, subsequently, to engage in long-term monogamous relationships (El-Bassel et al., 1998; El-Bassel, Gilbert, Vinocur, Chang, & Wu, 2011; El-Bassel, Gilbert, Witte, Wu, & Chang, 2011). Fear, mistrust, and emotional avoidance could compel individuals to engage in HIV sexual risk such as pattern of concurrent relationships and/or short-term serial monogamy (Brown et al., 2010). PTSD symptoms may have a direct relationship with HIV sexual risk behavior by interfering with cognitive or social problem-solving skills required to negotiate safe sexual practices successfully (Hien, Nunes, Levin, & Fraser, 2000). Furthermore, high sexual risk behavior may function as a means to decrease or cope with PTSD symptoms and related distress or negative affect (Kaysen et al., 2007). Similarly, alcohol misuse may result from the use of alcohol to self-soothe psychiatric distress related to PTSD symptoms (Jacobsen, Southwick, & Kosten, 2001; Ouimette, Read, Wade, & Tirone, 2010)

This study began in response to an AI/AN community's identified concerns regarding trauma, substance use, and sexual risk behaviors, and is seen as an important first step to provide the community a voice in developing empirically based interventions. We assessed the relationship between overall PTSD severity and substance use on HIV sexual risk behaviors among 129 young AI/AN women who were sexually active in the 6 months prior to the interview. We hypothesized that women with a clinical diagnosis of PTSD or subthreshold PTSD who reported more binge drinking would be more likely to engage in HIV sexual risk behaviors than women without these symptoms.

METHODS

Setting and Population

In full collaboration with a rural Northwest AI community, situated in the Plateau region, we use audio computer-assisted self-interviews (ACASI) to collect epidemiological data via respondent-driven, convenience, and venue-based recruitment methods from August to December 2011. Our venue-based recruitment focused on areas where young AI/AN women were known to socialize, such as tribal housing areas, local powwows, the maternal health clinic, high schools, and the local college. Young women 15-35 years old who self-identified as AI/AN and resided on or around the reservation were invited to participate in a survey on women's wellness. Participants were each compensated \$40. Interviews took up to 2 hours. The University of Washington Institutional Review Board for Protection of Human Subjects approved the study, and the Sacred Journey Community research team reviewed and approved all study materials.

Data were obtained from 146 women. Of these, 129 were sexually active in the past 6 months. To maintain anonymity of the respondents, oral consent was obtained from participants, and parental oral permission was obtained from females younger than 18 years unless they were

living independently from a guardian. The research protocol was approved by the University of Washington. Tribal partners participated in every phase of this research study. Specifically, they identified the area of concern, collaborated in the instrument design, conducted outreach and data collection activities, and assisted in interpretation of the findings. Tribal members governing the research approved the protocol and this manuscript.

Measures

Sociodemographic characteristics included age, high school/GED or higher versus less than 12 years of education, in school or employed (student, no job, full time, part time, or temporary) versus not in school or employed; in stable housing (own or rent, group home, dormitory) as opposed to unstable housing (homeless, transitional housing, temporary housing), whether the individual was currently living with a partner, and whether she was raising a child.

HIV sexual risk behavior with a male partner in the past 6 months. Based upon self-reported sexual histories, we calculated the number of unprotected vaginal or anal sex acts by subtracting the number of condom-protected sex acts from the total number of sex acts. We also asked about the number of male sexual partners in the last 6 months and concurrency (e.g., whether participants had overlapping sexual partners, and whether their partners had other sexual partners during the time they were together).

PTSD was measured with the 17-item PTSD Symptom Severity Interview (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993). Participants were coded with PTSD or threshold PTSD as defined by the DSM-IV diagnostic criteria (yes/no). PTSD diagnosis included the following: re-experiencing (at least one of five items); avoidance (at least three of seven items); and hyperarousal (at least two of five items) in the past month. Nine items assessed the presence or absence of functional impairment across life domains (e.g., work, household duties, friendships). For subthreshold PTSD, we used a conservative definition: An individual had to meet the re-experiencing criteria and either avoidance or hyperarousal criteria, as well as report symptoms lasting 1 month or more and functional impairment (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996).

Binge drinking. Women were asked how often they engaged in binge drinking (i.e., consumed five or more drinks within a couple of hours) in the last 12 months. Responses were on a 6-point scale from *Never* to *About once a day*. (Note that NIAAA [n.d.] defines binge drinking for women as four or more drinks within a couple of hours; thus, our findings will produce a conservative estimate of binge drinking.)

Childhood abuse. We used the sexual and physical abuse subscales from the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998). Participants responded to each item in the context of “when you were growing up” and answered according to 5-point Likert scales ranging

from 1 (*Never*) to 5 (*Very often*). Items for the sexual and physical abuse subscales were summed, producing scores ranging from 5 to 25 with good to excellent internal reliabilities (Cronbach's alphas for the subscales were .95 for sexual abuse and .88 for physical abuse; Cronbach & Elbert, 2015).

IPV (Vannatter, Stancil, & D'Angelo, 2008). Physical IPV was assessed if one or more of the following occurred in the past 12 months: husband or partner physically abused (hit, slapped, kicked, choked) or threatened, limited activities against the women's will, or made [the woman] feel unsafe. Sexual IPV was assessed by asking women if they were "forced to take part in any sexual activity when did not want to" within the past 12 months.

Data Analysis

To determine if there was bias in our data collection methods and to assess our sample representativeness, we compared the sample demographic with U.S. Census Bureau American Community Survey (ACS) 2011-2013 estimates for AI/AN women ages 15-34 years old on the tribal lands. We focused on two HIV sexual risk behavior outcomes: number of unprotected vaginal or anal sex acts, and number of male sexual partners in the past 6 months. The two primary predictors of interest were binge drinking and PTSD status (threshold/PTSD diagnosis compared to no PTSD diagnosis). We considered demographics, child care and living arrangements, history of abuse, and domestic violence as potential confounding factors. We conducted bivariate analyses examining associations among demographics, social risk factors, binge drinking, and PTSD status, using chi-square tests on categorical measures and *t*-tests on continuous measures. We conducted univariate Poisson regressions to examine bivariate associations between potential covariates and the two outcomes. The impact of binge drinking and PTSD, and their interaction on HIV sexual risk behavior, then was assessed using multivariate regression models. Because the two outcomes were count variables, we considered both Poisson regression models and negative binomial models. We applied a modified likelihood ratio test to test for overdispersion. Based on the results of this test, we chose negative binomial regression model for number of unprotected sex acts and Poisson regression model for number of male sexual partners during the past 6 months. Additional covariates adjusted in the models were currently raising a child, currently living with a partner, having unstable housing, age, history of childhood sexual abuse, and sexual and physical 12-month IPV. Concurrency was excluded from the analysis due to overlap with the outcome measures. The criteria for inclusion were significant at $p < .10$ in the bivariate analysis, or suggested strongly by empirical evidence or literature regardless of statistical significance. For both outcomes, we present findings from subgroup analyses to highlight differences in effects of binge drinking on sexual risk behavior among those with and without a diagnosis of PTSD, with the significance of the difference

based on testing the coefficient of the interaction term between binge drinking and PTSD in the full model. For ease of interpretation, we present regression results in incidence rate ratio, which can be interpreted as relative risk.

RESULTS

Overall, the sample represented 15% of the population, and the participants' sociodemographic characteristics were similar to the demographic estimates reported by the ACS for the reservation for being married or having an unmarried partner (45.5% vs 42.7%, respectively) and raising a child in the household (48.8% vs. 42.6%, respectively); however, our sample had higher educational attainment (74.4% vs. 64.5% completed high school, respectively).

Sociodemographic characteristics, IPV and sexual history, and PTSD diagnosis are presented in Table 1. A total of 51 women (39.5%) met the criteria for PTSD (diagnoses: $n = 23$, 17.8%; subthreshold: $n = 28$, 21.7%). Women who met PTSD criteria were more likely to have at least a high-school diploma/GED ($x^2 = 4.34$, $p < 0.05$), had a greater history of childhood sexual and physical abuse ($t = 3.11$, $p < 0.01$; $t = 3.06$, $p < 0.01$, respectively), and reported greater rates of previous 12-month sexual and physical IPV ($x^2 = 5.54$, $p < .05$; $x^2 = 5.33$, $p < 0.001$, respectively) compared to those who did not meet PTSD criteria.

Table 1
Sociodemographic Characteristics, Substance Abuse, and Violence History of Those Who Met PTSD Threshold/Subthreshold Criteria Compared to Those With No PTSD Among 129 Young Rural AI/AN Women

| | Total <i>N</i> = 129 | No PTSD <i>n</i> = 78 (60.5%) | Threshold/ Subthreshold PTSD <i>n</i> = 51 (39.5%) | Test Statistic ^a |
|--|-------------------------|----------------------------------|---|--------------------------------|
| High school diploma or GED, # (%) | 96 (74.4) | 53 (68.0) | 43 (84.3) | 4.34* |
| In school or employed, # (%) | 67 (51.9) | 39 (50.0) | 28 (54.9) | 0.30 |
| Currently raising a child, # (%) | 63 (48.8) | 36 (46.2) | 27 (52.9) | 0.57 |
| Unstable housing, # (%) | 50 (38.8) | 29 (37.2) | 21 (41.2) | 0.21 |
| Currently live with a partner, # (%) | 59 (45.7) | 37 (47.4) | 22 (43.1) | 0.23 |
| Age in years, mean (<i>SD</i>) | 24.5 (5.7) | 24.1 (5.5) | 25.1 (5.9) | 0.97 |
| Sexual Behavior (past 6 months) | | | | |
| Number of partners, mean (<i>SD</i>) | 1.6 (1.0) | 1.8 (1.2) | 1.4 (0.7) | 2.44* |
| More than one partner, # (%) | 48 (37.2) | 23 (45.1) | 25 (32.1) | 2.25 |
| Concurrent partners, # (%) | 45 (34.9) | 20 (39.2) | 25 (32.1) | 0.70 |
| Number of unprotected sex acts, mean (<i>SD</i>) | 22.2 (27.6) | 23.0 (30.8) | 21.6 (25.5) | 0.29 |

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Table 1, Continued
Sociodemographic Characteristics, Substance Abuse, and Violence History of Those Who Met PTSD Threshold/Subthreshold Criteria Compared to Those With No PTSD Among 129 Young Rural AI/AN Women

| | Total N = 129 | No PTSD n = 78 (60.5%) | Threshold/ Subthreshold PTSD n = 51 (39.5%) | Test Statistic ^a |
|---|------------------|---------------------------|--|--------------------------------|
| Binge drinking (past 12 months) | | | | |
| Frequency of binge drinking, mean (SD) ^b | 2.8 (1.6) | 2.6 (1.5) | 3.0 (1.7) | 1.19 |
| Intimate Partner Violence History | | | | |
| Physical intimate partner violence, # (%) | 26 (20.2) | 7 (9.0) | 19 (37.3) | 15.33*** |
| Sexual intimate partner violence, # (%) | 11 (8.5) | 3 (3.9) | 8 (15.7) | 5.54* |
| Childhood sexual abuse, mean (SD) | 8.5 (5.7) | 7.3 (4.5) | 10.3 (6.7) | 3.06** |
| Childhood physical abuse, mean (SD) | 9.3 (4.9) | 8.3 (4.1) | 10.9 (5.5) | 3.11** |

^a Test statistics include chi square and *t* statistics; ^b Frequency of binge drinking was measured on a 6-point scale from *Never* to *Once a day*. **p* < .05, ***p* < .01, ****p* < .001.

On average, women had 1.6 (range, 1-6) sexual partners in the past 6 months, with 48 (37.2%) women reporting more than one sexual partner in the past 6 months. Forty-five (34.9%) women reported that they had concurrent sexual partners, their partner had other sexual partners, or both. Together, 59 (45.7%) women either had multiple partners or knew that they were not in a monogamous relationship during the past 6 months even though 19 (32.2%) of these women reported living with their current partner. On average, women reported having vaginal or anal sex 26.4 times (*SD* = 28.1; range, 0-105); an average of 22.2 times (*SD* = 27.6; range, 0-100) were unprotected.

HIV Sexual Risk Behavior

In the bivariate analyses (data not shown in tables), we found several associations among the two HIV sexual risk behaviors (i.e., number of unprotected sex acts and number of sexual partners) and sociodemographic characteristics, binge drinking, IPV history, and PTSD diagnostic criteria. Specifically, a greater number of unprotected sex acts was associated with older age ($b = 0.04, p < 0.001$), raising a child ($b = 0.46, p < 0.001$), unstable housing ($b = 0.14, p < 0.001$), living with a partner ($b = 1.14, p < 0.001$), concurrency ($b = 0.15, p < 0.001$), binge drinking ($b = 0.06, p < 0.001$), sexual IPV ($b = 0.48, p < 0.001$), physical IPV ($b = 0.36, p < 0.001$), and childhood sexual abuse ($b = 0.05, p < 0.001$). Women reported a greater number of sexual partners in the last 6 months if they were not living with a partner ($b = -0.65, p < 0.01$), reported greater binge drinking ($b = 0.12, p < 0.01$), and met PTSD criteria ($b = 0.26, p < 0.10$).

In Table 2, we present an adjusted subgroup analysis predicting number of unprotected sex acts in the past 6 months for women who met PTSD criteria and those who did not. Among women who met criteria for PTSD, binge drinking was associated with a 35% increased rate of unprotected sex (IRR = 1.35, $p < 0.05$), whereas, among women who did not meet the criteria for PTSD, binge drinking was not significantly associated with unprotected sex. The full model showed that there was a significant interaction between PTSD and binge drinking. Among those who met criteria for PTSD, binge drinking was more strongly associated with the rate of unprotected sex than among those who did not meet the criteria ($p < 0.001$).

Table 2
Adjusted Models within PTSD (Subgroup 1) and No PTSD (Subgroup 2) Subgroups:
Effects of Binge Drinking on Number of Unprotected Sex Acts in Last 6 Months,
Controlling for Various Factors, among 129 Sexually Active AI/AN Women

| | Subgroup 1 (meet PTSD criteria) Unprotected Sex Acts <i>M</i> = 1.4 (0.7) <i>n</i> = 78 (60.5%) | | Subgroup 2 (no PTSD) Unprotected Sex Acts <i>M</i> = 1.8 (1.2) <i>n</i> = 51 (39.5%) | |
|---|--|-----------------|---|---------|
| | IRR ^a | SE ^b | IRR | SE |
| Binge drinking | 1.35 | 0.17* | 0.95 | 0.09 |
| Age | 0.97 | 0.04 | 1.04 | 0.03 |
| Currently live with a partner | 4.46 | 2.35** | 4.39 | 1.74*** |
| Currently raising a child | 4.05 | 2.02** | 0.47 | 0.17 |
| Unstable housing | 1.74 | 0.77 | 1.56 | 0.47 |
| Childhood sexual abuse score | 1.00 | 0.04 | 1.00 | 0.04 |
| Physical intimate partner violence in last 12 months | 1.15 | 0.48 | 1.06 | 0.53 |
| Sexual intimate partner violence in last 12 months | 1.19 | 0.74 | 2.28 | 1.91 |
| Constant | 1.90 | 3.11 | 0.89 | 1.73 |

^a IRR = incidence-rate ratios; ^b SE = standard error. * $p < .05$, ** $p < .01$, *** $p < .001$

Similarly, in the subgroup analysis pertaining to number of male partners in the past 6 months (Table 3), binge drinking was significantly associated with a greater number of sexual partners among all women regardless of PTSD criteria. Also of note, women who met PTSD criteria had a higher mean number of sexual partners than those who did not. However, in the full model that included the interaction between PTSD and binge drinking, the incident rate ratio was considerably higher for women who met PTSD criteria (IRR = 1.21, $p < 0.01$) than for women who (IRR 1.08,

$p < 0.01$) with a difference of approximately 13% ($p < 0.05$). This finding suggests that there was a stronger positive association between binge drinking and number of sexual partners among women who met PTSD criteria compared to those who did not.

Table 3
Adjusted Models within PTSD (Subgroup 1) and No PTSD (Subgroup 2) Subgroups:
Effects of Binge Drinking on Number of Male Partners in Last 6 Months,
Controlling for Various Factors, among 129 Sexually Active AI/AN Women

| | Subgroup 1 (meet PTSD criteria) Male Partners <i>M</i> = 21.6 (25.5) <i>n</i> = 78 (60.5%) | | Subgroup 2 (no PTSD) Male Partners <i>M</i> = 23.0 (30.8) <i>n</i> = 51 (39.5%) | |
|---|---|-----------------|--|---------|
| | IRR ^a | SE ^b | IRR | SE |
| Binge drinking | 1.21 | 0.6*** | 1.08 | 0.03** |
| Age | 0.97 | 0.02 | 1.00 | 0.01 |
| Currently live with a partner | 0.60 | 0.10** | 0.65 | 0.09*** |
| Currently raising a child | 1.20 | 0.20 | 0.96 | 0.09 |
| Unstable housing | 1.08 | 0.19 | 0.94 | 0.09 |
| Childhood sexual abuse score | 1.01 | 0.01 | 1.00 | 0.01 |
| Physical intimate partner violence in last 12 months | 0.85 | 0.15 | 1.03 | 0.13 |
| Sexual intimate partner violence in last 12 months | 1.60 | 0.28** | 1.31 | 0.31 |
| Constant | 0.79 | 0.40 | 0.78 | 0.48 |

^a IRR = incidence-rate ratios; ^b SE = standard error. ** $p < .01$, *** $p < .001$.

DISCUSSION

AI/AN women are at high risk for contracting HIV and are increasingly represented in reported new cases of HIV within the U.S. Despite this trend, few studies have attempted to identify specific risk factors for HIV within this population. Based upon previous epidemiological findings within AI/AN communities, we examined the association among several important hypothesized potential risk factors, including trauma exposure, PTSD, and binge drinking (Beals et al., 2005; Deters, Novins, Fickenscher, & Beals, 2006; Liao et al., 2011; Libby et al., 2007)..

Overall, we found that meeting PTSD criteria strengthens the association between binge drinking and HIV sexual risk behavior. Binge drinking was associated with increased rates of unprotected sex and a greater number of sexual partners, especially among women who met criteria for PTSD. Specifically, women who met PTSD criteria and engaged in more frequent binge drinking also had more unprotected sex. Participants who reported having multiple sexual partners in this short 6-month time period, concurrent relationships, and a history of elevated trauma exposure reported more unprotected sex. The combination of sexual risk behavior, trauma exposure, and PTSD symptoms could translate to accelerated risk of disease transmission throughout a population (Cassels, Pearson, Walters, Simoni, & Morris, 2010; Morris, Goodreau, & Moody, 2007; Mosack et al., 2010).

Alcohol myopia posits that individuals will attend to the most salient cues in their environment when drinking (Steele & Josephs, 1990). These cues can include one's feelings of sexual arousal, which may help explain the role of binge drinking in influencing HIV sexual risk behavior (MacDonald, MacDonald, Zanna, & Fong, 2000). In other words, women who engage in more frequent binge drinking may be more likely to have sex while intoxicated, focusing their attention on sexual arousal (an impelling cue) rather than the possible risk of HIV/STIs (an inhibiting cue), leading to more instances of unprotected sex (MacDonald et al., 2000).

Consistent with AI/AN prevalence studies, we found relatively high rates of psychosocial stressors, including trauma exposure, PTSD, poverty, housing instability, and unemployment (Beals et al., 2005; Manson, Beals, Klein, & Croy, 2005). More than one third of our sample met the criteria for PTSD—a slightly higher rate than among AI/ANs in the Midwest (Beals et al., 2005). Similar to rates reported in national samples of AI/AN women, (Perry, 2004), one in two women had experienced either childhood sexual or physical abuse, and one fifth had experienced physical IPV in the last year. Of note, only 41.8% of our sample reported no history of exposure to interpersonal victimization. These findings highlight the heightened exposure to violence among this population. Furthermore, significant potential exists for long-term health consequences associated with elevated rates of trauma exposure. For example, childhood sexual abuse has been associated with increased risk of developing PTSD (Cook et al., 2011; Duran et al., 2004, 2009; Ginzburg et al., 2009; Twaite & Rodriguez-Srednicki, 2004; Widom, 1999), engaging in subsequent HIV sexual risk behaviors, and HIV transmission (Greenberg, 2001; Wyatt et al., 2002). Similarly, IPV has been found to increase the risk of both developing PTSD and engaging in a range of HIV sexual risk behaviors, including unprotected sex (Amaro, 1995; Cunningham et al., 1994; El-Bassel, Gilbert, Witte, et al., 2011; Gilbert et al., 2000; Hamburger et al., 2004; Tucker, Wenzel, Elliott, Marshall, & Williamson, 2004; Wingood & DiClemente, 1997; Wu, El-Bassel, Witte, Gilbert, & Chang, 2003), sexual practices leading to a high risk of STIs (El-Bassel et al., 1998; Wu et al., 2003), sex with multiple partners

(Gilbert et al., 2000; Tucker et al., 2004), the trading of sex for money or drugs (Beadnell, Baker, Morrison, & Knox, 2000; Rodriguez, Szkupinski, Quiroga, & Bauer, 1996), sex with risky partners (Cavanaugh, Hansen, & Sullivan, 2010; El-Bassel, Gilbert, Vinocur, et al., 2011; Hutton et al., 2001; Klein, Elifson, & Sterk, 2010; Stiffman, Dore, Earls, & Cunningham, 1992; Weir, Bard, O'Brien, Casciato, & Stark, 2008), and sex with HIV-positive partners (Cavanaugh et al., 2010; El-Bassel, Gilbert, Vinocur, et al., 2011; Weir et al., 2008). In addition, psychosocial stressors and substance use behaviors may interact with and compound each other to increase overall sexual risk. Indeed, alcohol use has been found to increase the risk of sexual assault revictimization, resulting in HIV risk (Messman-Moore et al., 2009; Testa, Hoffman, & Livingston, 2010; Ullman, Najdowski, & Filipas, 2009).

Interventions for substance use and comorbid PTSD increasingly have become an area of research focus. Promising effects of integrated treatments for PTSD and alcohol use have been found (Back, Brady, Sonne, & Verduin, 2006; Back et al., 2012; Hien, Campbell, Ruglass, Hu, & Killeen, 2010), although generalizability is limited by small sample sizes, high attrition, absence of control groups, or lack of standardization across protocols. Studies also have found that integrated treatments are not more effective than standard alcohol treatments or health education controls (Cohen & Hien, 2006; Hien et al., 2009; Morrissey et al., 2005). Combined treatments are lengthy and complex, which can create challenges when working in low-resource settings where session attendance may be more problematic. Furthermore, trauma-focused intervention research studies historically excluded individuals with comorbid alcohol or drug dependence (Riggs, Rukstalis, Volpicelli, Kalmanson, & Foa, 2003). However, recent studies suggest that focusing on trauma-related content and PTSD may improve both PTSD and substance use outcomes (Brady, Dansky, Back, Foa, & Carroll, 2001). Similarly, cognitive behavioral interventions for PTSD appear to be effective and helpful for individuals with HIV (Seedat, 2012). However, much of this research is preliminary, with small or uncontrolled trials, and generally does not examine the impact of ethnicity or income on treatment outcomes.

Due to high levels of trauma exposure in AI/AN communities, there is a need for evidence-based treatments that are culturally responsive and that target multiple psychiatric areas, including post-traumatic symptomology and alcohol misuse. Addressing trauma and related PTSD symptoms with clinical protocols for sexual risk behavior is essential and may reduce HIV/STI risk in these populations significantly. Prevention, intervention, and scientific advances for AI/AN populations would benefit from examination of the etiological effects of trauma exposure, substance use, and post-traumatic stress reactions (van der Kolk, 2009).

Limitations

There are several limitations to this study. First, the cross-sectional design limits the interpretation of the findings to associative only, and causal linkages among substance use, PTSD, and HIV sexual risk behaviors cannot be made. Future studies should examine the event-level associations between substance use and condom use among AI/AN women with and without PTSD. Second, the reliance on self-report data may have resulted in reporting bias for questions pertaining to stigmatizing behaviors such as substance use and sexual activity. However, data collection via ACASI, as opposed to interviewer-administrated data collection, may have helped encourage the disclosure of sensitive information (Lind, Schober, Conrad, & Reichert, 2013). A third limitation is generalizability to the community at large. However, in an effort to reduce selection bias, we recruited from a wide variety of venues affiliated with the AI/AN community. Finally, binge drinking was measured as five or more drinks within a couple of hours, which is a conservative estimate (as the typical definition for women involves consuming four or more drinks in a 2-hour period) and may have led to underreporting of binge drinking rates. Despite these limitations, the study also has many areas of strength, including the focus on AI/AN women and involvement of the tribal research committee in study design.

Implications and Conclusions

Among AI/AN women residing on a rural reservation, almost half met the criteria for PTSD or subthreshold PTSD. Women who reported more PTSD symptoms and who engaged in more frequent binge drinking were at greater HIV/STI risk. It is essential, therefore, to identify and address the underlying potential causes of substance use and HIV sexual risk behavior by understanding the effects of trauma on health and behavior. New interventions should address comorbid conditions such as PTSD and substance use to help reduce HIV sexual risk behaviors. Working closely with community-based organizations serving AI/AN populations to identify and address the needs of women with PTSD symptoms and substance use will help reduce both revictimization and additional costs to substance use and mental health programs. Traumatic events have besieged AI/AN women, yet these women display tremendous courage, strength, and resilience and are working together to turn this tide in their communities. Future research should examine how these collective strengths can be harnessed to reduce sexual and psychiatric risk and improve health within AI/AN communities.

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