Trauma Exposure, DSM-5 Post-Traumatic Stress Disorder, and Sexual Risk Outcomes

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Introduction: The current study examined associations between DSM-5 post-traumatic stress disorder (PTSD) and three sexual risk outcomes: presence of a sexually transmitted disease/infection, frequency of condom use, and sex with a known user of injection drugs.

Methods: Data were from the National Epidemiologic Survey on Alcohol and Related Conditions−III (2012−2013, analyzed 2017), a nationally representative survey of non-institutionalized U.S. adults aged ≥18 years. Sexual outcomes and trauma exposure were assessed via self-report, and PTSD was assessed using a validated structured interview. Logistic and multinomial regression analyses examined associations between PTSD, PTSD symptom clusters, trauma type, and each sexual outcome.

Results: Lifetime PTSD was associated with increased odds of having a past-year sexually transmitted disease/infection and sex with a known injection drug user (AOR=1.54 and 1.74, respectively); fewer intrusion symptoms were associated with sometimes/fairly often condom use relative to very often. Reporting of adult sexual assault, assaultive violence, and other trauma as one's worst event was associated with increased odds of a past-year sexually transmitted disease/infection (AOR range, 1.69−4.56), whereas child maltreatment was associated with using condoms never/almost never in the past 12 months (AOR=1.40). No other significant findings emerged.

Conclusions: The current study demonstrates an association between certain trauma exposures, PTSD symptoms, and an increased likelihood of sexual risk outcomes. Clinicians working with individuals with PTSD symptoms, particularly those who have been exposed to interpersonal trauma, should screen for the presence of these sequelae.
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INTRODUCTION

The majority of individuals will experience a traumatic event in their lifetimes, and approximately 7% of adults in the general population will develop post-traumatic stress disorder (PTSD) following trauma exposure.[1,2] Trauma-exposed individuals and those with PTSD have an increased likelihood of engaging in impulsive and risky behaviors, including binge eating, risky sexual behaviors, self-harm, and substance use.[3−6] Engagement in such behaviors further increases the risk of negative mental and physical health sequelae, which, in the case of risky sexual behaviors, could include sexual traumatization or re-traumatization,

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unplanned pregnancy, and the development of sexually transmitted diseases/infections (STDs/STIs). Understanding these associations can guide the development of public health initiatives geared toward prevention and risk reduction.

An emerging body of literature has demonstrated links between trauma exposure, both PTSD and PTSD symptom severity, and sexual risk outcomes (SROs). In this study, SROs have been defined as comprising both risky sexual behaviors (e.g., infrequent condom use, sex with an injection drug user) and the outcomes that can occur following such engagement (e.g., STDs/STIs). Risky sexual behaviors have sometimes been conceptualized in the context of PTSD symptoms as a coping strategy to reduce distress, thereby providing a maladaptive form of affect regulation.[7−9] Studies have examined associations between exposure to certain types of traumatic events, specifically interpersonal traumas across the lifespan, and SROs. Childhood and adolescent abuse,[4,10−13] adult sexual and physical victimization,[12,14−16] and military sexual assault,[17] for example, have all been associated with an increased likelihood of SROs.

Other studies have examined associations between PTSD and SROs in samples of individuals with heterogeneous trauma exposures. PTSD and greater PTSD symptom severity have been shown to be associated with SROs, such as sexual intercourse without a condom, and engagement in intercourse with multiple partners or with an injection or HIV-infected drug user, among substance dependent samples,[6,9,18] Veterans,[19,20] men who have sex with men,[21] female college students,[10] individuals living with HIV/AIDS,[22] and low-income women experiencing intimate partner violence.[23] Although few of these studies have examined whether individual PTSD symptom clusters are independently associated with SROs, greater hyperarousal and intrusion symptoms[9,22] and fewer avoidance symptoms[22] have been found to be associated with engagement in risky sexual behaviors.

Previous literature examining associations between trauma, PTSD, and SROs has had a number of limitations. First, most studies have been conducted in specific samples of trauma survivors as opposed to nationally representative samples. A nationally representative sample can clarify whether these links extend to the general population and inform targeted interventions accordingly. Second, scarce research exists on the associations between DSM-5 PTSD and SROs despite a number of changes between DSM-IV and DSM-5, including the addition of an additional cluster of symptoms—negative cognitions and mood—and a new symptom assessing engagement in reckless and self-destructive behavior.[24] Individuals who might receive a PTSD diagnosis using DSM-IV versus DSM-5 criteria do not completely overlap,[25] highlighting the importance of examining these associations using DSM-5 symptoms. Third, few studies have examined whether individual PTSD symptom clusters are particularly associated with SROs. Finally, studies have often focused on the impact of exposure to particular traumatic events on SROs (e.g., childhood abuse, sexual assault), as opposed to examining the role of a range of trauma types. Understanding those traumas most strongly associated with SROs can assist in focusing screening and intervention efforts to those specific subpopulations.

The current study aimed to address these gaps in the literature by examining (1) associations between lifetime DSM-5 PTSD and three past year SROs (presence of an STD/STI, infrequency of condom use, and sex with a known injection drug user), (2) associations between individual PTSD symptom clusters (re-experiencing, avoidance, negative cognition and mood, hyperarousal) and SROs, and (3) associations between trauma type and SROs, in a nationally representative sample of U.S. adults. It is hypothesized that PTSD symptoms, especially greater intrusion and hyperarousal symptoms, would be associated with SROs, and that individuals reporting interpersonal traumas as their worst event would have the highest odds of SROs.

METHODS

Study Sample

Data came from the National Epidemiologic Survey on Alcohol and Related Conditions−III (NESARC-III; April 2012−June 2013), a cross-sectional, nationally representative survey of 36,909 U.S. civilians aged ≥18 years. All 50 states were included; institutionalized individuals and those serving in the U.S. Armed Forces were excluded. Trained lay interviewers conducted face-to-face interviews (response rate = 60.1%), and data were analyzed in 2017.[26] Details related to NESARC-III design and procedures can be found elsewhere. Permission to access the NESARC-III was in accordance with the National Institute on Alcohol Abuse and Alcoholism Data Access policy. This study was approved by the University of Manitoba Health Research Ethics Board.

Measures

The NESARC-III assessed lifetime exposure to 34 potentially traumatic events. Events were grouped comparably to previous work: combat-related, child maltreatment, adult sexual assault, assaultive violence, injurious or shocking event, witness/learning of trauma, and other trauma.[27] Adult sexual assault was examined separately due to previous research.[14,28] The event, "juvenile detention or jail" was excluded from the list of traumatic events as it does not necessarily meet the definition of a trauma in DSM-5.

Lifetime DSM-5 PTSD was assessed using the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS-5), a standardized, fully structured interview.[29−31] PTSD was diagnosed based on respondents' worst reported traumatic event. In

Table 1. Sociodemographic Variables by Sex and Lifetime PTSD

Variable	Males PTSD, 4.1% (3.7, 4.5)			Females PTSD, 8.0% (7.4, 8.7)		
	No PTSD, % (95% CI)	PTSD, % (95% CI)	OR (95% CI)	No PTSD, % (95% CI)	PTSD, % (95% CI)	OR (95% CI)
Age, M, years	46.0 (45.5, 46.4)	44.2 (42.8, 45.5)	**0.99 (0.989, 0.999)***	47.5 (47.1, 48.0)	42.9 (42.0, 43.8)	**0.99 (0.98, 0.99)*****
Education						
Less than high school	94.7 (93.6, 95.7)	5.3 (4.3, 6.4)	1.00	89.9 (88.4, 91.2)	10.2 (8.8, 11.6)	1.00
High school	95.4 (94.6, 96.1)	4.6 (3.9, 5.4)	0.86 (0.67, 1.10)	92.1 (91.1, 93.0)	7.9 (7.0, 8.9)	**0.76 (0.63, 0.91)****
Some post-secondary	95.5 (94.6, 96.2)	4.5 (3.8, 5.4)	0.85 (0.65, 1.12)	90.5 (89.3, 91.6)	9.5 (8.4, 10.7)	0.93 (0.78, 1.11)
Completed post-secondary	96.9 (96.3, 97.4)	3.1 (2.6, 3.7)	**0.57 (0.45, 0.74)*****	93.4 (92.7, 94.1)	6.6 (6.0, 7.3)	**0.63 (0.52, 0.75)*****
Marital status						
Married/Common law	96.7 (96.2, 97.1)	3.3 (2.9, 3.8)	1.00	93.0 (92.3, 93.7)	7.0 (6.3, 7.7)	1.00
Separated/Divorced/ Widowed	93.4 (92.2, 94.4)	6.6 (5.6, 7.8)	**2.07 (1.64, 2.61)*****	90.5 (89.3, 91.6)	9.5 (8.4, 10.7)	**1.40 (1.19, 1.64)*****
Never married	95.5 (94.6, 96.3)	4.5 (3.7, 5.4)	**1.38 (1.09, 1.74)****	90.8 (89.4, 92.1)	9.2 (7.9, 10.6)	**1.35 (1.11, 1.64)****
Income, $						
<20,000	93.6 (92.6, 94.4)	6.4 (5.6, 7.4)	1.00	89.2 (87.9, 90.4)	10.8 (9.6, 12.1)	1.00
20,000−39,999	95.7 (94.9, 96.4)	4.3 (3.6, 5.1)	**0.65 (0.53, 0.81)*****	91.4 (90.3, 92.3)	8.7 (7.7, 9.7)	**0.78 (0.67, 0.92)****
40,000−69,999	95.8 (95.1, 96.5)	4.2 (3.6, 4.9)	**0.64 (0.50, 0.80)*****	92.3 (91.0, 93.3)	7.7 (6.7, 9.0)	**0.69 (0.57, 0.84)*****
≥70,000	97.4 (96.7, 97.8)	2.7 (2.2, 3.3)	**0.40 (0.31, 0.51)*****	94.4 (93.5, 95.2)	5.6 (4.8, 6.5)	**0.49 (0.40, 0.60)*****
Race/Ethnicity						
White	96.1 (95.5, 96.5)	3.9 (3.5, 4.5)	1.00	91.4 (90.5, 92.2)	8.6 (7.8, 9.5)	1.00
Black	94.7 (93.5, 95.8)	5.3 (4.3, 6.5)	**1.36 (1.05, 1.74)***	93.0 (91.8, 94.1)	7.0 (5.9, 8.2)	**0.80 (0.66, 0.97)***
American Indian/ Alaska Native	88.9 (82.8, 93.0)	11.1 (7.0, 17.2)	**3.05 (1.82, 5.12)*****	80.3 (74.2, 85.3)	19.7 (14.7, 25.9)	**2.61 (1.78, 3.84)*****
Asian/Native Hawaiian/ Other Pacific Islander	98.8 (97.7, 99.4)	1.2 (0.6, 2.3)	**0.29 (0.14, 0.58)*****	96.7 (94.8, 97.9)	3.3 (2.1, 5.2)	**0.36 (0.23, 0.58)*****
Hispanic	95.7 (94.8, 96.5)	4.3 (3.5, 5.2)	1.08 (0.86, 1.36)	93.2 (92.2, 94.0)	6.8 (6.0, 7.8)	**0.78 (0.66, 0.93)****

Table 1. Sociodemographic Variables by Sex and Lifetime PTSD *(continued)*

Variable	Males PTSD, 4.1% (3.7, 4.5)			Females PTSD, 8.0% (7.4, 8.7)		
	No PTSD, % (95% CI)	PTSD, % (95% CI)	OR (95% CI)	No PTSD, % (95% CI)	PTSD, % (95% CI)	OR (95% CI)
Any mental disorder[a]						
No	99.2 (98.9, 99.4)	0.8 (0.6, 1.1)	1.00	98.6 (98.3, 98.9)	1.4 (1.1, 1.7)	1.00
Yes	88.9 (87.9, 89.8)	11.1 (10.2, 12.1)	**15.19 (11.28, 20.46)** ***	83.0 (81.8, 84.2)	17.0 (15.8, 18.2)	**14.49 (11.92, 17.62)** ***
Any substance use disorder[b]						
No	98.2 (97.9, 98.5)	1.8 (1.5, 2.1)	1.00	95.8 (95.3, 96.3)	4.2 (3.7, 4.7)	1.00
Yes	93.7 (93.0, 94.3)	6.3 (5.7, 7.0)	**3.75 (3.07, 4.58)** ***	85.2 (84.0, 86.4)	14.8 (13.6, 16.1)	**4.00 (3.44, 4.65)** ***

Note: Boldface indicates statistical significance (* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$).
[a] Any mental disorder includes any mood, any anxiety, any personality (borderline, conduct-antisocial, schizotypal), and/or any eating (anorexia nervosa, bulimia, binge eating) disorders.
[b] Any substance use disorder includes any alcohol use disorder, any drug use disorder, and any nicotine dependence.
PTSD, posttraumatic stress disorder.

addition to exposure to a traumatic event (Criterion A), a diagnosis of PTSD requires the presence of one or more intrusion symptoms (Criterion B), one or more avoidance symptoms (Criterion C), three or more negative cognition and mood symptoms (Criterion D), and three or more arousal symptoms (Criterion E), as well as a reporting symptom duration of ≥1 month and significant impairment. To examine associations between individual PTSD symptom clusters and SROs, four continuous variables were created representing the number of symptoms within each symptom cluster among trauma-exposed individuals. The validity of the AUDADIS-5 tool to diagnose PTSD has been found to be in the fair to moderate range ($\kappa = 0.34-0.44$).[31]

The SROs assessed in the NESARC-III and examined in the current study were (1) sex with an injection drug user, assessed by asking respondents who reported having sexual intercourse in the past 12 months, *During the last 12 months, did you have sex with someone who you knew or suspected was an injection drug user?* Response options: *yes/no*; (2) Past-year STD/STI: *During the last 12 months, did you have . . . any sexually transmitted diseases or venereal diseases like gonorrhea, syphilis, chlamydia or herpes?* Response options: *yes/no*; and (3) past-year frequency of condom use: *When you had sex in the last 12 months, about how often did you use a condom?* Response options were *Never/Almost never/Sometimes/Fairly often/Very Often* among individuals who reported having intercourse in the past 12 months. Responses were collapsed into a three-level variable (never/almost never, sometimes, fairly often/very often) to account for low cell counts. Frequency of condom use was examined only in participants outside of marriage/cohabitation. HIV/AIDS was not examined because it can be contracted in ways other than sexual intercourse.

The following sociodemographic variables were covariates in analyses because of their associations with PTSD (Table 1): sex, age, education, ethnicity, household income, and marital status (with the exception of condom use analyses). Covariates also included any other lifetime mental disorder (yes/no) as assessed by the AUDADIS-5,[29−31] a variable including mood, anxiety, personality (borderline, antisocial, schizotypal), and eating disorders, as well as any substance use disorder in order to isolate any independent effects of PTSD on SROs. A variable measuring total number of PTSD symptoms was created and used as a covariate when examining associations between trauma types and SROs.

Statistical Analysis

First, cross-tabulations and unadjusted logistic regression analyses were used to describe the associations between lifetime PTSD, sociodemographic variables, any other mental disorder, and any substance use disorder, stratified by sex. Second, associations between PTSD and sex with an injection drug user and past-year STD/STI were examined using logistic regression analysis. Associations between PTSD and past-year frequency of condom use (never/almost never, sometimes, fairly often/very often) were examined using multinomial regression. Models were adjusted for sociodemographic variables, any lifetime DSM-5 mental disorder, and any substance use disorder. Third, logistic regression models were used to examine associations between each PTSD symptom cluster and (1) sex with injection drug users and (2) past-year STD/STI while adjusting for the same covariates and each of the other symptom clusters. A multinomial regression analysis was

Table 2. Relationship Between PTSD and Risky Sexual Behaviors

Variable	No PTSD, % (95% CI)	PTSD, % (95% CI)	AOR (95% CI)
STD/STI in the last 12 months	0.6 (0.6, 0.7)	2.1 (1.5, 3.0)	**1.54 (1.04, 2.28)***
Sex with an injection drug user in the last 12 months[a]	0.8 (0.7, 1.0)	2.5 (1.8, 3.4)	**1.74 (1.15, 2.65)****
Condom use in the last 12 months[b]			
Very often	35.8 (34.4, 37.1)	26.8 (23.3, 30.5)	1.00
Sometimes/Fairly often	21.9 (20.7, 23.2)	20.4 (17.1, 24.0)	1.05 (0.81, 1.37)
Never/Almost never	42.4 (40.8, 44.0)	52.9 (48.5, 57.2)	1.16 (0.91, 1.48)

Note: Boldface indicates statistical significance (**p*≤0.05; ***p*≤0.01). ORs are adjusted for sex, age, marital status, income, race/ethnicity, any mental disorder, and any substance use disorder.
[a]Only assessed for participants who reported having sexual intercourse in the past 12 months.
[b]Only assessed in participants outside of marriage/cohabitation and who reported having sexual intercourse in the past 12 months.
PTSD, posttraumatic stress disorder; STD/STI, sexually transmitted disease/sexually transmitted infection.

used to examine the associations between each symptom cluster and frequency of condom use. Fourth, associations between traumatic event type and sex with an injection drug user were examined using logistic regression. Trauma categories were placed into the model as a single categorical variable, with no trauma exposure as the reference group. Logistic regression analysis was employed to examine the association between trauma type and past-year STD/STI; multinomial regression was used to examine the association between trauma type and condom use. Respondents' worst reported traumatic events were examined to disentangle the effect of trauma exposure from the effect of PTSD symptoms on SROs. Analyses were adjusted for sociodemographic variables, any lifetime mental disorder, any substance use disorder, and number of PTSD symptoms. All analyses were conducted using Stata, version 13, and were weighted to ensure representativeness of the sample. Taylor series linearization was applied to all analyses as a variance estimation technique.

RESULTS

Sociodemographic characteristics of the entire sample by sex and PTSD status are provided in Table 1. Separated/divorced/widowed and single (versus married/co-habiting) male and female respondents had significantly increased odds of lifetime PTSD. Compared with white respondents, American Indian/Alaskan Native respondents had significantly increased odds of PTSD and Asian/Native Hawaiian/Other Pacific Islanders had significantly decreased odds of PTSD. Black males were more likely to have PTSD than white males, and black females had lower odds of PTSD relative to white females. Increasing age, higher levels of education, and higher past-year household income were associated with decreased odds of PTSD in both sexes. Having any other DSM-5 mental disorder and any substance use disorder were strongly associated with increased odds of lifetime PTSD.

Associations between PTSD and each of the SROs are shown in Table 2. Lifetime PTSD was associated with significantly increased odds of having a past-year STD/

STI (AOR=1.54, 95% CI=1.04, 2.28) and past-year sex with an injection drug user (AOR=1.74, 95% CI=1.15, 2.65), after adjustment for covariates. The association between PTSD and frequency of condom use was not statistically significant.

Associations between PTSD symptom clusters and each SRO in trauma-exposed respondents are shown in Table 3. A higher number of intrusions was negatively associated with wearing a condom sometimes/fairly often relative to very often (AOR=0.94, 95% CI=0.89, 0.99). Specific PTSD symptom clusters were not significantly associated with having sex with an injection drug user or with frequency of condom use.

Associations between trauma type and SROs are shown in Table 4. Compared to those with no trauma exposure, individuals exposed to adult sexual assault (AOR=2.55, 95% CI=1.00, 6.51), assaultive violence (AOR=1.69, 95% CI=1.05, 2.73), and other traumatic event (AOR=4.56, 95% CI=2.19, 9.48) were associated with significantly increased odds of a past-year STD/STI, after adjustment for sociodemographic covariates, any other DSM-5 mental disorder, any substance use disorder, and number of PTSD symptoms. Also, compared to those with no trauma exposure, individuals exposed to injurious or shocking events (AOR=0.55, 95% CI=0.33, 0.92) and respondents who witnessed or learned about others' trauma (AOR=0.53, 95% CI=0.33, 0.85) were associated with significantly decreased odds of having sex with an injection drug user in the past year. Finally, compared to those with no trauma, respondents reporting child maltreatment (AOR=1.40, 95% CI=1.06, 1.84) were at higher odds of never/almost never using a condom in the past 12 months.

DISCUSSION

The current study is the first investigation of the associations between trauma exposure, DSM-5 PTSD, and

Table 3. Relationship Between PTSD Symptom Clusters and Risky Sexual Behaviors

Variable	Intrusions, AOR (95% CI)	Avoidance, AOR (95% CI)	Negative cognitions and mood, AOR (95% CI)	Alterations in reaction and reactivity, AOR (95% CI)
STD/STI in the last 12 months	0.96 (0.87, 1.05)	0.94 (0.78, 1.13)	1.07 (0.996, 1.14)[c]	1.05 (0.91, 1.23)
Sex with an injection drug user in the last 12 months[a]	0.95 (0.82, 1.09)	1.14 (0.86, 1.52)	1.05 (0.97, 1.14)	1.07 (0.91, 1.27)
Condom use in the last 12 months[b]				
Very often	1.00	1.00	1.00	1.00
Sometimes/Fairly often	**0.94 (0.89, 0.99)***	1.08 (0.98, 1.19)	1.00 (0.95, 1.04)	1.04 (0.95, 1.13)
Never/Almost never	0.96 (0.93, 1.00)	1.08 (0.99, 1.18)	1.02 (0.97, 1.06)	1.01 (0.93, 1.09)

Note: Boldface indicates statistical significance (*$p \leq 0.05$). ORs are adjusted for sex, age, marital status, income, race/ethnicity, any mental disorder, any substance use disorder, and all other PTSD symptom clusters.
[a]Only assessed among participants who reported having sex in the past 12 months.
[b]Only assessed for participants outside of marriage/cohabitation and who reported having sex in the past 12 months.
[c]Marginally significant: $p=0.063$
PTSD, posttraumatic stress disorder; STD/STI, sexually transmitted disease/sexually transmitted infection.

SROs in a nationally representative adult sample. Three important findings emerged: (1) lifetime PTSD was associated with having sex with an injection drug user and with having a past-year STD/STI; (2) no PTSD symptom cluster was particularly associated with an increased likelihood of SROs; and (3) adult sexual assault, assaultive violence, and other traumas were associated with an increased likelihood of having a past-year STD/STI, whereas child maltreatment was associated with infrequent condom use in the past year.

The results from this study support an association between PTSD and an increased likelihood of SROs, specifically, having sex with a known injection drug user and having a past-year STD/STI. PTSD was not associated with infrequent past-year condom use among non-married/non-cohabiting respondents. These results are mostly consistent with previous studies that have demonstrated that individuals with PTSD are more likely to take elevated sexual health risks.[6,19,21,23] It has been posited that PTSD may lead to SROs through difficulties

Table 4. Associations Between Worst Event Type and Risky Sexual Behaviors

Trauma type	STD/STI in the last 12 months, AOR (95% CI)	Sex with an injection drug user in the last 12 months,[a] AOR (95% CI)	Condom use in the last 12 months[b]		
			Very often, AOR (95% CI)	Sometimes/ Fairly often, AOR (95% CI)	Never/Almost never, AOR (95% CI)
No trauma	1.00	1.00	1.00	1.00	1.00
Combat-related	0.52 (0.14, 1.94)	—[c]	1.00	1.03 (0.60, 1.79)	0.72 (0.42, 1.24)
Child maltreatment	1.68 (0.98, 2.88)[d]	0.75 (0.37, 1.53)	1.00	1.23 (0.88, 1.73)	**1.40 (1.06, 1.84)***
Adult sexual assault	**2.55 (1.00, 6.51)***	0.61 (0.20, 1.88)	1.00	0.90 (0.42, 1.92)	1.68 (0.99, 2.85)[e]
Assaultive violence	**1.69 (1.05, 2.73)***	0.64 (0.34, 1.19)	1.00	1.10 (0.83, 1.45)	1.06 (0.82, 1.35)
Injurious or shocking event	1.23 (0.78, 1.94)	**0.55 (0.33, 0.92)***	1.00	1.11 (0.89, 1.39)	1.15 (0.94, 1.40)
Other event that happened to you	**4.56 (2.19, 9.48)*****	1.27 (0.40, 4.01)	1.00	1.40 (0.73, 2.69)	1.01 (0.60, 1.70)
Witness/Learn of trauma	1.14 (0.78, 1.67)	**0.53 (0.33, 0.85)****	1.00	1.06 (0.90, 1.26)	0.98 (0.82, 1.17)

Note: Boldface indicates statistical significance (*$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$). ORs are adjusted for sex, age, marital status, income, race, any mental disorder, any substance use disorder, and number of posttraumatic stress disorder (PTSD) symptoms.
[a]Only assessed among participants who reported having sexual intercourse in the past 12 months.
[b]Only assessed in participants outside of marriage/cohabitation and who reported having sexual intercourse in the past 12 months.
[c]Unable to calculate OR due to lack of variance in relationship between combat-related traumatic exposures and sex with an injection drug user in past 12 months.
[d]Marginally significant: $p=0.058$.
[e]Marginally significant: $p=0.055$.
STD/STI, sexually transmitted disease/sexually transmitted infection.

with impulse control and emotion regulation, the latter of which involves the ability to control impulsive urges and engage in goal-oriented behaviors when experiencing strong emotions, and use appropriate strategies to manage one's emotional responses.[32] Individuals struggling with the management of distressing, trauma-related reactions may engage in risky sexual behaviors in an attempt to distract from their symptoms in the moment, in line with the role often played by other common self-harming behaviors, such as cutting.[32] On the other hand, whereas a number of demographic and clinical covariates were taken into account in statistical models, many contextual factors could play important roles in the associations between PTSD and SROs, including social disadvantage and substance use. The possible pathways between all of these factors require further exploration.

Surprisingly, wearing a condom sometimes/fairly often relative to very often was negatively associated with PTSD intrusion symptoms. Coupled with the lack of association between PTSD overall and frequency of condom use, these findings may reflect a proportion of individuals whose traumatic experiences and symptoms lead them to be particularly cautious about protection during sexual intercourse as opposed to being less so, thereby tempering associations. The alterations in arousal cluster, which holds the new DSM-5 PTSD symptom related to engagement in reckless behavior, did not emerge as being independently associated with SROs, even though DSM-IV hyperarousal symptoms of PTSD have been shown to be associated with risky sexual behaviors.[9,22] It is possible that some individuals may not recognize the SROs assessed in the present study as being risky, thereby leading to non-endorsement of this symptom.

The current study found that reporting child maltreatment as one's worst trauma was associated with an increased likelihood of infrequent condom use, and that adult sexual assault, assaultive violence, and other worst traumas were associated with a higher likelihood of having a past-year STD/STI. Together, these results are consistent with previous studies demonstrating links between interpersonal traumas in both childhood and adulthood and SROs,[4,10,15] and suggest that exposure to other types of traumas may not be as salient in affecting sexual risk taking. Although the specific types of traumatic events included in NESARC-III's other category are unknown, in the World Health Survey Consortium (a population-based survey of multiple countries) exposure to other trauma was found to load on a factor comprising intimate partner violence and sexual trauma, suggesting that other traumas may be comparable in nature to these trauma types.[1] Child abuse and sexual

trauma often negatively affect one's self-perception, which may result in feelings of shame and powerlessness that can subsequently increase risky sexual behaviors.[12] Meanwhile, in the current study, individuals experiencing an injurious/shocking event or witnessing a trauma as their worst events were at lower odds of engaging in past-year intercourse with an injection drug user relative to individuals reporting no trauma. Although counterintuitive, this finding may be indicative of safer sex practices among individuals exposed to certain trauma types.[33] Future research should longitudinally examine associations between different trauma types and SROs to better understand these links. Subsequent studies should also aim to investigate the specific traumatic events comprising the other trauma category, so that traumatic events demonstrating the strongest associations with SROs can be better understood and included in future assessments of trauma exposure.

Limitations

There were several limitations in the current study. First, although attempts were made to gauge temporality between PTSD and the occurrence of SROs by using lifetime diagnosis and past-year SROs respectively, the cross-sectional design of the NESARC-III precludes inferences of causality. It is equally possible that SROs could lead to the development of PTSD through increasing the risk of trauma exposure, perhaps because of difficulties with impulse control, or that the contraction of an STD/STI may, itself, occur because of a sexual assault. Future research should closely examine the likely bidirectionality of these associations as well as possible mediators. Second, the reliability of AUDADIS-5 in diagnosing PTSD is modest and has been evaluated to be in the fair to moderate range.[31] Third, institutionalized populations and members of the military were not included in NESARC-III, and these subpopulations have been found to have high rates of PTSD.[34] Fourth, SROs were assessed via self-report, and only select SROs were assessed in NESARC-III. Future research should examine associations between PTSD and a more comprehensive range of SROs (e.g., number of sexual partners). Fifth, analyses examining frequency of condom use were only conducted among respondents who were not married or cohabiting; however, relationship status or relationship duration were not assessed, which would likely affect condom use practices.

CONCLUSIONS

Despite these limitations, the results of this study generally support the link between certain trauma exposures, PTSD, and a higher likelihood of SROs. Clinicians

working with individuals with PTSD symptoms, particularly those who have been exposed to interpersonal trauma, should screen for the presence of SROs, and consider interventions for reducing sexual risk behavior, as needed. Behavioral interventions have been effective in impacting SROs, including condom use, frequency of unprotected sex, and incidence of STDs.[35] It should be noted, however, that several racial minority groups experience disproportionately high rates of some types of trauma exposure and STIs/STDs, and also practice less treatment-seeking for PTSD.[27,36] As such, interventions aimed at mitigating SROs may not prove equally effective or accessible across populations, and future work should strive to develop and evaluate novel interventions in ethnically diverse samples. The current findings also provide further support for including skills training in trauma-focused treatments that emphasize increasing distress tolerance and finding adaptive ways of affect regulation.[37−39]

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