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Posttraumatic Stress Symptoms Predict Transition to Future Adolescent and Young Adult Moderate to Heavy Drinking in the NCANDA Sample.

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Abstract

Purpose of study: Approximately two thirds of youth report experiencing or witnessing a trauma. It is not known whether trauma or the posttraumatic stress symptoms (PTSS) following trauma increases adolescent drinking risk.

Recent findings: We described trauma experienced by the National Consortium on Alcohol and Neurodevelopment in Adolescence (NCANDA) longitudinal sample (N=831) participants and examined drinking over 4 years. We hypothesize that more traumatic events and PTSS will predict transition to moderate/heavy drinking.

Summary: 658 no/low drinkers at baseline were followed yearly for 4 years for transition to moderate/heavy drinking using logistic regression models. Youth were grouped by: No Trauma (n=257), Trauma (n= 348), and Trauma with PTSS (n=53). Those with Trauma and PTSS showed escalation to moderate/heavy drinking compared to the No Trauma group in follow-up years 2, 3,

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and 4. Number of traumatic events did not predict moderate/heavy drinking. Interventions targeting PTSS may prevent transition to moderate/heavy drinking.

Keywords

alcohol use disorder; binge drinking; trauma; posttraumatic stress disorder; subthreshold posttraumatic stress disorder symptoms; adolescence

Introduction

Epidemiological studies have demonstrated that experiencing Diagnostic and Statistical Manual of Mental Disorders: fourth (DSM-IV) and Fifth Edition (DSM-5) Type A traumas (1, 2) are common during development, as over 50% of adolescents reported experiencing, witnessing, or learning about at least one DSM Type A trauma that happened to a close friend or relative during childhood (3, 4). Experiencing a Type A trauma is associated with age (5), sex (5, 6), and race/ethnicity (3, 6) disparities, as well as greater family history of parental posttraumatic stress disorder (PTSD), mood disorders, and alcohol/substance use disorders (7). The overall rate of PTSD in children and adolescents after a traumatic event was reported to be as high as 15.9% in a recent meta-analyses that involved data from 43 independent samples and 3563 participants (8). However, epidemiological studies which used structured interviews have shown much lower rates of full criteria PTSD (0.5%) but similar rates (13.4%) of impairing subthreshold PTSD symptoms (PTSS) (4). It should be noted that youth with subthreshold PTSD do not differ from youth with PTSD in regard to their level of impairment or distress (9).

Child maltreatment, and other DSM type A traumas and PTSD during development, significantly increase the risk of adolescent onset alcohol and substance use disorder (AUD/SUD) (10–13). Having PTSD as an adolescent also increases the risk of an adolescent onset AUD or SUD (11, 12). Much of the adolescent traumatic stress research is cross-sectional or based on retrospective reports of child trauma or maltreatment. Consequently, it is not known if experiencing Type A traumatic events or PTSS in response to trauma increases the risk of adolescent onset AUD. Developmental traumatology theory suggests that traumatic experiences in youth would result in dysregulation of biological stress systems in vulnerable individuals, leading to PTSD and PTSS as part of generalized stress-induced maturation failures in the developing adolescent executive and inhibitory neuro-networks (14). This can result in unbalanced influence of subcortical emotional and reward networks leading to failures of self-regulation, psychological distress, and a greater incidence of impulsive behaviors (e.g., problematic alcohol and substance use) during adolescence. Typical adolescence and young adulthood marks a period of greater maturity of executive and inhibitory brain pathways (15, 16). Adolescents with PTSD or PTSS may be more likely to engage in problematic alcohol and substance use due to these stress related discrepancies in neuro-maturation (14).

We tested this theory in the National Consortium on Alcohol and Neurodevelopment in Adolescence (NCANDA) baseline and annual follow-up years 1–4 datasets. NCANDA is a diverse sample of youth ages 12–21 years recruited across five US sites (Duke University

Medical Center, University of Pittsburgh Medical Center, Oregon Health & Science University, University of California, San Diego, and SRI International). Using an accelerated longitudinal design, the NCANDA study is designed to examine the psychological, environmental, and neuro-predictors and consequences of adolescent drinking on psychological and neurodevelopment (17). NCANDA is a unique open science study that provides the opportunity to prospectively study the effects of trauma on adolescent alcohol use.

In this report, we will examine DSM-5 Type A traumas experienced by participants in the NCANDA baseline sample (N=831) to see if the sample reported similar traumatic events as other published epidemiological investigations of adolescents. We will then determine if the number of traumatic events experienced, and reported PTSD symptom responses that occurred after such events, predict transitions to moderate/heavy drinking in subsequent follow-up years 1–4. This understanding will aid the field in targeting AUD intervention efforts in youth with trauma histories. We hypothesize that increased number of traumatic events and PTSD symptoms in response to these events will predict transition to moderate/heavy drinking during adolescence and young adulthood.

Methods and Materials

Subjects

The NCANDA community sample was recruited through announcements distributed to student populations that were located within 50-mile radius of each research site. This was done by distributing flyers to all students in the age range of recruitment at schools and colleges. This included giving flyers to students at their schools, mailing flyers to students, and their parents, or telephone calls that targeted families who had a student in the age range of recruitment. All recruitment methods used were IRB approved at the respective NCANDA site. Those that involved the school systems were approved by the school officials before any flyers were handed out to students. Interested participants and one parent had the opportunity to be screened into the study by calling the study staff (e.g., the telephone number on the flyer). Detailed information on NCANDA study design can be found in Brown et al 2015 (17). Briefly, inclusionary criteria included: 1) age 12 to 21.9 years, 2) English fluency, 3) living within driving distance of the research site with continued plans to live within the area, and 4) limited or no exposure to alcohol or other drugs as determined by the age and sex based guidelines from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) indicative of problem use based on the Center for Disease Control surveillance (18), with the exception of 15% of the cohort specifically allowed to exceed these criteria, as part of the accelerated longitudinal design (17).

To ensure sufficient inclusion of participants in NCANDA who would likely begin drinking heavily during the course of the study, we oversampled participants at risk for future AUD by recruiting 50% of participants with one or more of the following: 1) family history of alcohol or drug problems; 2) early experimentation with alcohol (e.g., first drink less than age 15 years); and/or 3) endorsement of one or more externalizing or two or more internalizing symptoms. Exclusionary criteria at baseline included: 1) MRI contraindications, 2) serious medical problems or physical disabilities that are associated

with differences in adolescent brain development (e.g., serious traumatic brain injury, deafness) or ability to validly complete the protocol (e.g., uncorrected sensory impairment), 3) use of daily medications that affect brain/CNS function (e.g., psychotropic medications), 4) autism or severe learning disorder, 5) current or persistent major Axis I disorders (e.g., psychosis or alcohol or substance use disorder), 6) significant prenatal exposure to alcohol, nicotine, prematurity (<30 weeks gestation), or other perinatal complications requiring medical interventions, and 7) no parent or guardian to consent for participants under age 18. The institutional review board of each site approved the study. Legal guardians and adult participants gave written consent while minors provided written assent prior to data collection.

In this on-going prospective longitudinal study, participants undergo the same comprehensive assessment comprised of self-reports, biological development, family background, psychiatric symptomatology, neurocognitive function, and brain maturation measured by magnetic resonance imaging scans at baseline (2013–2014) and each yearly follow-up assessment, with a brief mid-year telephone assessment to maintain continuity of contact.

Measures

Traumatic Events and PTSD symptoms.—Measures of trauma history and DSM type A traumas and PTSD symptoms were collected as part of the baseline assessment from the youth and parent with the Computerized Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA) (19, 20). The SSAGA was modified for adolescents and includes an interview assessment of DSM-IV and 5 Axis I disorders, DSM type A traumas and PTSD interview questions (17). Of the 831 NCANDA subjects, 830 parents and/or youth completed the trauma interview. In this study, we report DSM Type A traumatic events reported at baseline.

Alcohol Drinking Classifications.—Drinking behaviors, lifetime marijuana, tobacco and other substance use were measured at baseline and yearly with the Customary Drinking and Drug Use Record (CDDR) (21) described previously (17). All NCANDA participants at baseline study entry met two sets of drinking criteria determined with the data obtained from the CDDR. Briefly, the initial NCANDA inclusion criteria for no/low drinking were based on NIAAA alcohol use threshold guidelines (18) and are as follows: maximum lifetime drinking days for male and female participants was <5 for age 12–15.9 years, <11 for age 16 to 16.9 years, <23 for age 17 to 17.9 years, and <51 for age 18 years old and older. The maximum allowable drinks per occasion was <3 for females at any age but varied by age for males: <3 for age 12 to 13.9 years, <4 for age 14 to 19.9 years, and <5 for age 20 years old and older. As part of the NCANDA study, a smaller portion of youth were strategically allowed to exceed the NIAAA alcohol use threshold guidelines to enable estimations of long-term trajectories that represent a continuum from no/low drinking to moderate to heavy drinking on an accelerated time scale. Those who exceeded no/low drinking thresholds were also allowed to exceed marijuana and nicotine exposure criteria but required to meet all other eligibility criteria.

Although NCANDA included a smaller portion of youth who were strategically allowed to exceed the NIAAA alcohol use as described above, for this study's analyses, only participants in the no/low drinking group at baseline were followed to examine the effects of trauma and PTSS on their future transition to moderate and heavy drinking. At all yearly time points (follow-ups 1 to 4) participants were characterized as no/low, moderate, and heavy drinkers, using an adolescent modified process (22, 23), including both quantity (average and maximum consumption) and frequency combinations of consumption during the prior year. In the entire NCANDA baseline sample, most (83%) had limited or no history of alcohol or other drug use and were considered no/low drinkers. On follow-up, the no/low drinking class comprised of drinking 1–2 drinks less than once a month, the moderate class consisted of drinking <4 drinks between 1–8 times a month, and the heavy drinking class consisted of drinking >4 drinks once a week or more or drinking daily (23). Because the moderate group membership included binge drinking (i.e., 4 or more drinks for females and 5 or more drinks for males in a single drinking event (18)), and as most adolescents with problematic drinking binge drink, we combined the moderate and heavy drinking groups into one moderate-heavy drinking group for the purposes of our follow-up regression analyses for years 1–4. Therefore, our final data set comprised 658 no/low drinkers at baseline, who were followed to examine the lifetime number of traumatic events and PTSS in response to those events that occurred prior to baseline as predictors of transition to moderate/heavy drinking, reported at each of the four annual follow-up interviews (follow-up years 1 to 4).

Co-variates in our models included age at baseline interview, sex, parent socioeconomic status measured as highest year of parent education, race/ethnicity, and density of family alcohol dependence using the Family History Assessment Module (20) as described in Brown et al. (2015) (17).

Statistical Analysis

Nominal logistic regression models were used to examine the hypothesized effects on transition to moderate/heavy drinking (no/yes) for each follow up year 1–4. Participants were classified into 3 trauma groups (No Trauma (n=257), Trauma (n= 348), and Trauma with PTSS (n=53)). Number of traumatic events reported at baseline were calculated as the sum of positive baseline endorsements by either parent or youth of one or more of the DSM type A traumas listed in Table 1. Co-variates in our models included age at baseline interview, sex, parent socioeconomic status measured as highest year of parent education, race/ethnicity, and family alcohol density using the Family History Assessment Module (25) as described in Brown et al. (2015) (17). Since data were not normally distributed, we used non-parametric analyses for descriptive and demographic variables. Our group and clinical comparisons were specific, hypotheses driven and planned. Therefore, multiple comparison adjustments were not necessary (24). Alpha was .05 (two tailed) and analyses were undertaken using JMP Pro 11 software (SAS Inc.).

Results

Demographic Characteristics, Traumatic Events, and PTSD symptoms.

Table 1 shows the results of traumas endorsed by baseline NCANDA sample. The mean number of traumatic events was 1.15 (+1.21), was a range 0–6; 62% of the youth sample experienced at least one traumatic event.

There were no differences between the mean number of traumas or trauma types/characteristics endorsed by the no/low (n=658) (1.02+1.05) vs the moderate/heavy (n=163) (1.17+1.15) drinking groups at baseline ($X^2 = 2.09$, $p = .15$). The most common traumas reported were experiencing an unexpected death of a close friend or relative (32.29%), learning about a trauma happening to a close friend or relative (23.13%) and other traumatic experiences not listed (20.12%). Only 9.16% of the baseline NCANDA sample had PTSD symptoms that lasted a month or more. No participant endorsed the full DSM criteria for PTSD.

The 658 no/low drinkers were divided into these Trauma groups: No Trauma (n=257, 114 females, 143 males), Trauma (n=348, 181 females, 167 males) and Trauma with PTSS (n=53, 34 females, 19 males) at baseline. Trauma groups did not differ in lifetime number of drinks, lifetime binge drinking episodes, or family history of alcohol use disorder. The Trauma with PTSS group was older (mean age (SD)=16.23±2.33) than the No Trauma Group ((mean age (SD)= 15.41±2.43) (X2=7.16, p<.03, Dunn's method $Z = 2.54$, $p < .04$)); while the Trauma group did not differ in age from either of the two groups (mean age (SD)= 15.64±2.20). As predicted by the literature, the Trauma and Trauma with PTSS groups had more females than males (56% versus 44%; trauma history versus no trauma history in females; $X^2 = 8.08$, $p < .02$) and more African Americans (87% versus 13%; trauma history versus no trauma history in African Americans; $X^2 = 34.94$, $p<.0001$). All above variables (i.e., baseline age, sex, parent socioeconomic status measured as highest year of parent education, ethnicity, and family alcohol density) were co-variates in the predictive nominal logistic regression models.

Number of Traumatic Events as predictors of transitions to moderate/heavy drinking at each follow-up year 1–4.

We examined the baseline number of traumatic events reported in the 658 no/low drinkers. These did not predict transitions to moderate/heavy drinking at any of the four follow-up years. See Table 2. We ran additional analyses to investigate the effects of lifetime marijuana and lifetime tobacco use at each follow-up year on the above results. The baseline number of traumatic events reported did not predict transitions to moderate/heavy drinking at any follow-up year when these co-variates were included in the model.

PTSS as predictors of transitions to moderate/heavy drinking at each follow-up year 1–4.

We examined transitions to moderate/heavy drinking in the 658 no/low drinkers, as seen in Table 2 and Figure-1. The participants with PTSS were more likely to transition to moderate/heavy during in follow-up years 2–4 compared to the participants who reported no traumas at baseline. In year 4, the Trauma with PTSS group was also more likely to

transition to moderate/heavy drinking in follow-up 4 compared to the Trauma group. Figure-2 shows that at each follow up the Trauma with PTSS group showed greater transitions to moderate/heavy drinking. By follow-up year-4, 71% of the Trauma with PTSS group were classified as moderate/heavy drinkers while only 51% of the No Trauma and 53% of the Trauma group were classified in the moderate/heavy drinking group.

Adolescents who drink usually use other substances. Therefore, we used lifetime marijuana and lifetime tobacco use at each follow up year as a co-variate in secondary analyses. Co-varying for lifetime tobacco use at each follow-up time point did not change the significant effects regarding the Trauma with PTSS group described above. We ran additional analyses to co-vary the baseline number of traumatic events in our follow-up models, which did not change the significant effects regarding the PTSS group described above. Lastly, we ran additional analyses to consider the effects of lifetime marijuana at each follow-up year on the above results. While the Trauma with PTSS group still showed greater transitions to moderate/heavy drinking compared to the No Trauma group in follow-up Year 3 (OR = 2.60 $p < .03$) and follow-up Year 4 compared to the No Trauma (OR = 3.14 $p < .02$) group when lifetime marijuana was co-varied; the Trauma with PTSS group no longer predicted moderate/heavy drinking in follow-up year 2 (OR = 2.09, $p = .1$) and the Trauma with PTSS group comparison to the Trauma group in follow-up Year 4 became a trend (OR = 2.33, $p < .07$). Although lifetime marijuana use was a significant predictor in these models, the results regarding the Trauma with PTSS group transitions to moderate/heavy drinking in the follow-up years were similar. It should be noted that lifetime marijuana use was significantly correlated with drinking classes at each time point (all Spearman's Rho - range = .45 to .62, $p < .0001$). Additionally, lifetime tobacco use was significantly correlated with drinking classes at each time point (all Spearman's Rho - range = .28 to .45, $p < .0001$).

Number of Traumatic Events and Trauma groups as predictors of lifetime marijuana and lifetime tobacco use at each follow-up year 1–4.

Given the high correlations between drinking classes, and lifetime marijuana and lifetime tobacco use, we ran additional analyses to examine if the Trauma groups (No Trauma, Trauma, and Trauma with PTSS) at baseline predicted lifetime marijuana and lifetime tobacco use at each of the four follow-up time points, while controlling for baseline age, sex, SES, site, Ethnicity, and family history of SUD (including AUD) in the NCANDA sample of no/low drinkers. Baseline number of traumatic events did not predict lifetime marijuana or lifetime tobacco use in any of the follow-up years 1 to 4. Additionally, trauma groups did not predict lifetime marijuana or lifetime tobacco use in any of the follow-up years 1 to 4.

Sex was not a significant co-variate (all p-values were >.5) in all of our above regression models.

Discussion

The NCANDA study has contributed to the literature by demonstrating in a prospective investigation that an individual's response to trauma events (i.e., PTSS) predicts future transitions to moderate/heavy drinking. Adolescents who experienced a traumatic event and reported PTSS after the event showed significantly increased drinking at the 2, 3 and 4 year

follow-up visits compared to the no trauma group. Reporting baseline traumatic events in the NCANDA sample was common, with 62% of the baseline NCANDA sample reporting at least one trauma. These data are similar to the National Comorbidity Survey Replication Adolescent Supplement (NCSRAS), which reported that 61.8% of 6483 adolescents age 13 to 17 years reported a traumatic event (3). In both this study, and in NCANDA, the most commonly reported trauma was an unexpected death of a loved one. Additionally, NCSRAS found a lifetime prevalence of 4.7% of PTSD; while a meta-analyses showed an overall rate of PTSD in children and adolescents of 15.9% (8). Since youth with subthreshold PTSD do not differ from youth who make full criteria for PTSD in regard to their level of impairment or distress (9), our finding of 9.16% of participants having subthreshold PTSD (PTSS) is in line with larger epidemiological studies.

The present study suggests that early adverse responses to significant trauma elevates risk for progression to moderate and heavy alcohol use over an extended period of time. As Hurd and Zimmerman outline (26), youth without resilience processes (compensatory or pro-motive factors) experience traumatic events more profoundly and are susceptible to more negative developmental outcomes on multiple domains of development. Child protective services-involved maltreated youth with PTSD show smaller ventral medial prefrontal cortex (e.g., orbitofrontal cortex), a complex structure rich in glucocorticoid receptors, and involved in tracking safety, impulsive behaviors, and extinction learning, compared to maltreated youth without PTSD (27). Developmental traumatology theory suggests that these cortical differences in youth with PTSD may represent shared mechanisms for depression, AUD and SUD, disorders which also show structural and functional differences in the ventral medial prefrontal cortex (28). The unique dataset of NCANDA can help the field address these neurobiological questions in the future.

Although there is a vast literature suggesting that adverse childhood experiences are associated with alcohol and drug use disorders, the mechanisms of this effect are not known because most of the studies in youth are cross-sectional and retrospective (10–13). The prospective design of NCANDA allows us to track the effects of trauma during adolescence on transitions to moderate/heavy drinking in a relatively large sample. Our main finding suggests one mechanism for AUD and SUD prevention is to screen adolescents for traumatic events and PTSS in response to such events and to offer evidence based interventions to those youth with PTSS. This is an important part of preventing AUD and SUD in our youth, and improving their health and well-being. The National Child Traumatic Stress Center (www.nctsn.org) maintains a detailed listing of empirically supported evidence-based interventions as well as promising practices to address PTSS in children and adolescents, who experience trauma. Fortunately, recent studies are showing that trauma focused evidence-based cognitive behavioral therapy can change brain function and improve PTSS (29).

This study has many strengths including large sample size, comprehensive and state of the art psychological, cognitive, and neurobiological assessments that were standardized across the 5 sites. Another strength of NCANDA is that it has an accelerated longitudinal design, which allows us to examine longitudinal effects across a wide age range of development.

This is one of the first studies to be able to examine the effects of trauma and PTSS in a large longitudinal sample of adolescents and young adults.

The study requires longitudinal replication and the group size was modest. By the end of follow-up year 4, the Trauma with PTSS group showed little resilience with regard to transitions to moderate/heavy drinking, only 11 (8 females, 3 males) stayed in the no/low drinking group out of the original n=53. Unfortunately, this is too small a sample to explore factors related to resilience and is a limitation of the study. A larger adolescent study with a sample that experienced youth traumas likely to result in PTSD would help the field understand factors related to resilience to moderate/heavy drinking despite having PTSS or PTSD. No participant met strict DSM-IV or 5 criteria for PTSD. The lower rates of PTSD but similar rates for PTSS may be related to our assessment measure. During the first 5 years of NCANDA we used the Computerized SSAGA, a well-validated interviewed that was originally developed for adults and then adapted for adolescents. PTSD is frequently missed as a diagnosis because childhood trauma tends to be interpersonal and complex and requires more information than parent and child informants provide, particularly when the trauma is childhood maltreatment (30). However, this type of research assessment is extremely difficult to perform during a one-time adolescent and parent structured interview given the time constructs and variety of data collection needs of NCANDA. Since prior research has indicated that sexual abuse is particularly associated with adverse outcomes (31), the low rates of this class of traumatic experiences in this sample may have influenced the results. The timing of stress and trauma needs further investigation as this may influence both immediate response and alter important aspects of behavioral responses and neurodevelopmental trajectories (32).

Conclusions

In summary, PTSS after the event, but not the traumatic events themselves, predicted transition from no/low drinking to moderate/heavy drinking at the 2, 3 and 4 year follow-up visits in the NCANDA sample. As PTSD and alcohol and substance use disorders may share neurobiological vulnerabilities (33), evidenced-based interventions for PTSS may prevent future problematic drinking in youth.

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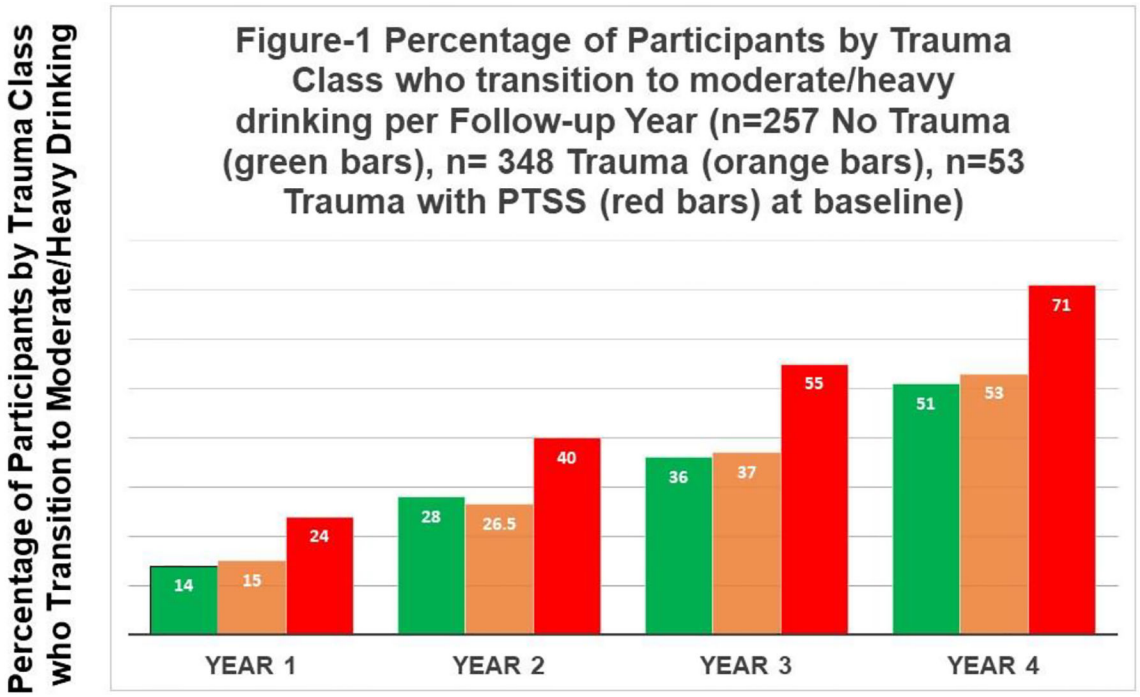

Figure-1.

This figure illustrates the percentage of participants by trauma class who transitioned to moderate/heavy drinking per follow-up years 1–4. At baseline there were n=257 in the No Trauma, n= 348 in the Trauma, n=53 in the Trauma with PTSS groups.

Table-1

DSM-4 & 5 Type A Traumas reported in the baseline NCANDA sample.

Type A Traumas Experienced (from SSAGA)	#Positive	%
1*. Have you ever been in Military combat held captive, tortured, or wounded as victim of combat?	0	0
2*. Have you ever been in seen someone killed or seriously wounded in Military combat?	0	0
3*. Have you ever discovered a dead body (question only relates to Military combat)?	0	0
4*. Have you experienced any other terrible, frightening or horrible experiences, (this question only relates to Military combat)?	0	0
5. Have you ever been shot (not related to Military combat)?	0	0
6. Have you ever been stabbed (not related to Military combat)?	1	.12
7. Have you ever been mugged or threatened with a weapon, or experienced a break-in or robbery? (and not related to Military combat)?	52	6.44
8. Have you ever been raped or sexually assaulted by a relative?	8	.97
9. Have you ever been raped or sexually assaulted by someone not related to you (and not related to Military combat)?	21	2.54
10. Have you ever been in a natural disaster like a fire, flood, earthquake, tornado, mudslide or hurricane?	100	12.05
11. Have you ever learned you had been exposed to radiation, dioxin, or any other dangerous materials?	8	.97
12. Have you ever experienced an unexpected, sudden death of a close friend or relative?	268	32.29
13. Have you ever been held captive, tortured, or kidnapped (not related to Military combat)?	0	0
14. Have you ever been diagnosed with a life- threatening illness?	7	.84
15. Have you ever been in a serious accident?	58	6.99
16. Have you ever seen someone being seriously injured or killed(not related to Military combat)?	65	7.83
17. Have you ever unexpectedly discovered a dead body(not related to Military combat)?	9	1.08
18. Have you ever learned that any of these terrible things had happened to a close friend or relative when you were not there?	192	23.13
19. Have you ever had any other experiences that were terrible, frightening or horrible, or were repeatedly exposed to situations that were traumatic?	167	20.12
20. Do you have persistent and strong negative beliefs or expectations about yourself, others or the world, such as “I am bad,” “No one can be trusted,” or “The world is completely dangerous”?	76	9.16
21. After a very frightening or horrible experience, some people can’t get it out of their minds. They may lose interest in people or activities; they may not sleep well; and they may become very jumpy and easily startled or frightened. Did (this/any of these) experience(s) have that effect on you that lasted one month or longer?	76	9.16

Table 2.

Logistic Regression Parameter Estimates and Odds ratio for Trauma effects on the transitions to moderate/heavy drinking per follow-up year controlling for baseline age, sex, SES, site, Ethnicity, and family history of AUD, in the NCANDA sample.

	No-Low # in No T/T/ PTSS	Moderate-Heavy # in No T/T/ PTSS	Parameter Estimates (SE)	X^2	p-value	95% CI	OR	p-value	95% CI
Follow-up Year 1 N=617 (308 females, 309 males)	213/270/38	35/49/12							
T / No T			0.36 (.28)	1.64	.20	−0.19, 0.93	1.44	.20	.83, 2.53
PTSS / NoT			−0.81 (.43)	3.50	.06	−1.64, 0.06	2.24	<.07	.94, 5.16
PTSS / T			---	---	---	---	1.56	.28	.67, 3.37
Baseline # Traumas	---	---	−0.11 (.11)	.91	.34	−.32, .11	---	---	---
Follow-up Year 2 N=592 (296 females, 296 males)	169/230/27	65/83/18							
T / No T			0.33 (.25)	1.74	.19	−0.16,.81	1.39	.19	.86, 2.23
PTSS / No T			−0.91 (.42)	4.77	<.03	−1.73, −.09	**2.48**	**<.03**	1.09, 5.62
PTSS / T			---	---	---	---	1.79	.14	.82, 3.85
Baseline # Traumas	---	----	−0.05 (.10)	.24	.62	−.25, .15	---	---	---
Follow-up Year 3 N=562 (283 females, 279 males)	147/184/18	82/109/22							
T / No T			0.40 (.22)	3.46	<.06		1.49	<.07	.98, 2.29
PTSS / NoT			−1.07 (.40)	7.01	<.009		**2.90**	**<.008**	1.33, 6.48
PTSS / T			---	---	---	---	1.94	<.09	.91, 4.19
Baseline # Traumas	---	---	−0.11 (.09)	1.45	.23		---	---	---
Follow-up Year 4 N=517 (256 females, 261 males)	99/129/11	105/146/27							
T / No T			0.31 (.22)	1.92	.17		1.37	.17	.88, 2.13
PTSS / No T			−1.25 (.47)	7.14	<.008		**3.48**	**<.006**	1.44, 9.11
PTSS / T			---	---	---	---	**2.55**	**<.03**	1.09, 6.44
Baseline # Traumas	---	---	−0.16 (.09)	2.76	.10	−.34−.02	---	---	---

No T = No Trauma Group, T = Trauma group PTSS = Trauma with PTSS group