Trauma and Suicide Attempts among Insanity Acquittees

Anusha Mamidipaka, Jeffrey Guina, MD, James Cameron, BS, Andrew Lemmen, BS, and Nicole Kletzka, PhD

Although many studies have assessed trauma as a suicide risk factor, to the authors' knowledge this is the first study of that risk factor among forensic psychiatric populations. Using a cross-sectional self-report survey methodology, this study investigated trauma histories, adverse childhood experiences (ACEs), posttraumatic stress disorder symptoms, and lifetime suicide attempts among forensic hospital patients adjudicated not guilty by reason of insanity (***n*** = 107). About 45 percent reported a previous suicide attempt and 22 percent reported multiple attempts, higher than the general population. The average number of attempts was 1.05 (2.39 among those with at least one attempt). The only PTSD symptoms significantly associated with attempting suicide were negative emotions and anhedonia, both in the cognitive/mood cluster, which was the only one of the four clusters to be significantly associated with attempting suicide. Childhood physical abuse was the only trauma significantly associated with attempting suicide. Higher number of attempts was significantly associated with ACEs (emotional neglect and abuse, sexual abuse, physical neglect, and household members with substance-related problems), number of traumas, substance-related problems (especially from alcohol), arousal symptoms (excessive startle, inattention) and negative emotions. We found several statistically significant suicide risk factors, particularly ACEs. Possible explanations and implications of the results are discussed.

J Am Acad Psychiatry Law 50(3) online, 2022. DOI:10.29158/JAAPL.210104-21

Key words: trauma; ACE; PTSD; suicide; insanity; NGRI

Despite high numbers of posttraumatic stress disorder (PTSD) among psychiatric and criminal populations and the known link between PTSD and suicide,[1–4] there have been few studies investigating trauma as a suicide risk factor among forensic psychiatric populations.[5,6] Mental illness is a well-established risk factor for suicidality,[2,7] particularly among criminal populations.[8,9] Because of the high severity of mental illness among forensic populations and trauma being a risk factor for criminal justice involvement, individuals found not guilty by reason of insanity (NGRI) are expected to have high rates of suicide attempts, which is hypothesized to correlate with several trauma-related variables.[5]

In a previous study of suicidality among NGRI inpatients in California, Mitchell *et al.*[10] found 46.4 percent had a history of suicide attempts, substantially higher than 0.6 percent of the U.S. general population.[11] Mitchell and colleagues also reported a 58 percent history of suicidal ideation among NGRI inpatients,[9] which is elevated compared with 3.3 percent of the general population,[11] 41 percent of psychiatric patients in a Michigan study,[12] and 27 percent of prisoners in a British study.[13]

Although suicidality has been investigated among NGRI patients, the authors were unable to identify previous studies that also assessed trauma as a risk factor. Because of the complex relationship established between trauma and suicide,[14] it is necessary to assess the impact of a wide range of trauma types.

Published online June 24, 2022.

Ms. Mamidipaka is an Undergraduate at Michigan State University, Lansing, MI. Dr. Guina is Psychiatry Residency Program Director, Beaumont Health, Southfield, MI, and Chief Medical Officer, Easterseals Michigan, Auburn Hills, MI. Mr. Cameron is a Child Care Worker, Hawthorn Center, Northville, MI. Mr. Lemmen is Program Development Associate, Neuroscience Education Institute, Carlsbad, CA. Dr. Kletzka is Forensic Psychologist, Center for Forensic Psychiatry, Saline, MI. Address correspondence to: Jeffrey Guina, MD. E-mail: doctor@jeffreyguina.com.

Grant acknowledgment: This study received financial support from the American Academy of Psychiatry and the Law Institute for Education and Research.

Disclosures of financial or other potential conflicts of interest: None.

Interpersonal traumas are not only more likely to lead to the development of PTSD when compared with other traumas[15] but are more associated with suicidal ideations and attempts.[16] For example, sexual traumas[3,17] and assaultive violence[14] correlate with suicidality more than other trauma types. Adverse childhood experiences (ACEs) have been found to increase suicide risk,[18,19] especially childhood sexual[17,20–22] and emotional abuse.[23] Number of ACEs and early age at trauma have also been found to correlate with increased risk for suicide.[24–26]

Research indicates that individuals with PTSD are more likely to consider or attempt suicide compared with those without PTSD,[22] and, under the previous DSM-IV-TR classification scheme (prior to PTSD's being reclassified into the trauma- and stressor-related disorder category in DSM-5), PTSD was found to be the only anxiety disorder independently associated with suicidal ideation and suicide attempts.[4,27] Most PTSD symptoms are associated with increased suicidality, including the intrusion cluster,[27–29] avoidance cluster,[29] negative alterations in cognitions and mood (NACM) cluster, recklessness, anhedonia, negative beliefs,[22] and emotional numbing.[30] Another well-studied suicide risk factor is substance-related problems, which is assessed in this study.[12,22]

Based on previous findings and our experience, we expected high rates of lifetime suicide attempts. We hypothesized that trauma is associated with lifetime suicide attempts among NGRI acquittees in the Michigan state hospital system. Namely, we hypothesized that ACEs, number of traumas, PTSD diagnosis, NACMs, recklessness, avoidance, arousal, and substance-related problems would correlate with suicide attempts.

Methods

This study was approved by the Michigan Health and Human Services Institutional Review Board. The sample of adult inpatients ($n = 107$) came from the Center for Forensic Psychiatry, where all insanity acquittees in Michigan are involuntarily committed following adjudication. Details of participant selection methodology, consent procedures, and further study data are reported elsewhere.[31] Using investigator-designed queries and chart review, we assessed participants' demographic information, the number of lifetime suicide attempts, substance-related problems (i.e., any history of difficulty controlling use of various substances, or any social, occupational, legal or medical problems caused by various substances), and clinical diagnoses. Trauma history was assessed using the Trauma History Screen (THS)[32] and the ACE Questionnaire.[24] The presence of PTSD symptoms was assessed using the PTSD Checklist for DSM-5 (PCL-5).[33] Participants were considered to meet DSM-5 PTSD criteria[34] if they reported a trauma history along with at least moderate severity (≥ 2 on a 0-4 scale) of the following: at least one intrusion symptom, at least one avoidance symptom, at least two NACMs, and at least two hyperarousal symptoms. To be conservative, less than moderate symptoms were not considered sufficient for diagnosis.

The associations between the explanatory variables described below and having ever attempted suicide were tested using a binary logistic regression. The strengths of association are recorded as adjusted odds ratios (AORs) for logistic outcomes. To calculate the association between the average number of previous suicide attempts (≥ 1) and the explanatory variables, two-sample t-tests with two-tailed hypotheses were used to calculate significance. An intervariable correlation and hierarchical linear regression were used in follow-up analysis to determine the effect of trauma on suicide history beyond the effects of age, marital status, sex, and race. Age, marital status, sex, and race were evaluated in Block 1, alcohol abuse in Block 2, arousal and NACMs in Block 3, and total ACE score and total number of traumas in Block 4.

Results

The majority of participants were male (88%), single (81%), White (56%), and the average age was 40. Table 1 compares the characteristics of those with attempted suicide histories (45%) and those without (55%). The number of previous attempts was 1.05, averaged across all study participants, including those without any history of suicide attempt, and 2.39 among those who had previously attempted suicide (range = 1–10). More than one-fifth (21.5%) of the participants reported more than one previous suicide attempt. There were no significant differences when comparing age, race, marital status, or psychiatric diagnoses. Women (76.9%) were significantly more likely than men (40.4%) to attempt suicide ($P = .011$), with men and women averaging .88 and 2.23 previous attempts (2.25 and 2.90

Table 1 Participant Characteristics for Those Who Have and Have Not Attempted Suicide

Characteristic	All Participants	Suicide Attempts	
		0	≧1
Participants, *n* (%)	107 (100.0)	59 (55.1)	48 (44.9)
Gender			
Men, *n* (%)	94 (87.9)	56 (59.6)	38 (40.4)
Women, *n* (%)	13 (12.1)	3 (23.1)	**10 (76.9)***[a]
Age, mean (SD)	39.98 (14.2)	39.86 (14.2)	40.13 (14.3)
Race, *n* (%)			
White	60 (56.1)	34 (56.7)	26 (43.3)
Black	34 (32.8)	20 (58.8)	14 (41.2)
Native American	8 (7.5)	5 (62.5)	3 (37.5)
Asian	3 (2.8)	1 (33.3)	2 (66.7)
Hispanic	2 (1.9)	1 (50.0)	1 (50.0)
Not specified	8 (7.4)	3 (37.5)	5 (62.5)
Marital status, *n* (%)			
Single	85 (79.4)	47 (55.3)	38 (44.7)
Single & cohabitating	6 (5.6)	3 (50.0)	3 (50.0)
Married	2 (1.9)	2 (100.0)	0 (0.0)
Divorced	9 (8.4)	5 (55.6)	4 (44.4)
Widowed	5 (4.7)	2 (40.0)	3 (60.0)
Psychiatric disorder, *n* (%)			
Schizophrenia-spectrum	79 (73.8)	59 (74.7)	46 (58.2)
Substance use	41 (38.3)	21 (51.2)	20 (48.8)
Bipolar	22 (20.5)	11 (50.0)	11 (50.0)
Anxiety	9 (8.41)	3 (33.3)	6 (66.7)
Borderline personality	5 (4.67)	2 (40.0)	3 (60.0)
Antisocial personality	5 (4.67)	1 (20.0)	4 (80.0)
Depressive	1 (2.1)	0 (0.0)	1 (100.0)
Suicide attempts, mean (SD)	1.05 (2.06)	0 (0.0)	2.39 (2.55)

[a]Numbers in bold indicate significantly more suicide attempts than comparison group.
* $P < .05$.

among those who previously attempted suicide), respectively. Women were also more likely than men to experience any trauma (100% to 84%) and any ACE (100% to 73%), significantly so for ACEs ($P = .036$).

Table 2 summarizes correlations between explanatory variables, and suicide attempt prevalence and number of suicide attempts among those who have attempted suicide. Insanity acquittees with a history of suicide attempts were approximately three times more likely to have childhood physical abuse than those without such a history and three times more likely to have stimulant problems, but only childhood physical abuse ($P = .047$) was statistically significant. In addition, insanity acquittees with a history of suicide attempts were significantly more likely to have NACMs ($P = .033$), especially negative emotions (i.e., persistent states including fear, horror, anger, guilt, or shame) ($P = .003$) and anhedonia ($P = .025$).

Among those who experienced trauma, 45 percent reported attempting suicide (mean of 1.05 attempts), and 45 percent of those with ACEs reported attempting suicide (mean of 1.09 attempts). Among those with suicide attempts, higher number of attempts was significantly associated with childhood emotional neglect ($P < .001$), childhood sexual abuse ($P < .001$), childhood physical neglect ($P < .001$), childhood emotional abuse ($P < .001$), childhood physical abuse ($P < .001$), alcohol-related problems ($P < .001$), arousal ($P < .001$), excessive startle ($P = .007$), any substance-related problems ($P = .011$), motor vehicle accident ($P = .012$), negative emotions ($P = .042$), household member with substance-related abuse ($P = .044$), inattention ($P = .048$), and any ACE ($P = .049$).

Table 3 summarizes intercorrelations between demographic information and explanatory variables that were found to be significantly associated with suicide attempts in the logistic regression analysis. Higher number of attempts was significantly correlated with ACE score ($P = .002$) and alcohol-related problems ($P = .037$). ACE scores were also significantly correlated with total traumas ($P < .001$) and arousal symptoms ($P = .024$). Arousal symptoms were also correlated with

Table 2 Odds Ratio, Adjusted (AOR) for Sex and Age, for Association between Explanatory Variable, and Suicide Attempt Prevalence and Mean Number of Attempts among Those with at Least 1 Suicide Attempt

	Suicide Attempt Prevalence (%)			Mean Number of Suicide Attempts		
Explanatory Variable	With	Without	Adjusted Odds Ratio	With (*n*)	Without (*n*)	*F*
Any ACE	71.7	28.3	1.455	2.64 (33)	1.77 (13)	**4.056***[a]
Parents separated/divorced	50.00	50.85	0.967	2.67 (24)	2.09 (22)	3.645
Household member-substance	35.59	45.83	1.531	2.95 (21)	1.92 (25)	**4.283***
Emotional abuse	37.5	32.2	1.009	3.29 (17)	1.86 (29)	**14.539*****
Physical abuse	37.29	31.25	2.035	2.86 (14)	2.19 (32)	2.947
Emotional neglect	32.20	37.50	1.263	3.61 (18)	1.61 (28)	**28.520*****
Household member-mental	23.73	29.17	1.324	3.15 (13)	2.09 (33)	2.033
Sexual abuse	22.03	20.83	1.198	3.80 (10)	2.00 (36)	**20.132*****
Physical neglect	20.83	16.95	1.289	4.00 (10)	1.94 (36)	**18.081*****
Witnessed domestic violence	18.75	16.95	1.131	2.67 (9)	2.32 (37)	1.523
Household member-prison	11.86	20.83	1.955	2.60 (10)	2.33 (36)	0.286
Any Trauma	89.58	83.05	1.755	2.51 (41)	1.40 (5)	2.214
Sudden death of loved one	62.5	55.9	1.212	2.28 (29)	2.59 (17)	0.892
Witnessed death/injury	35.42	34.59	1.186	2.88 (16)	2.13 (30)	1.575
Adult physical assault	29.17	37.39	1.259	2.79 (14)	2.22 (32)	0.770
Motor vehicle accident	33.33	33.90	1.047	3.13 (16)	2.00 (30)	**6.888***
Weapon attack	33.33	30.51	1.294	1.69 (16)	2.77 (30)	2.513
Childhood physical abuse	35.59	18.75	**3.162***	3.44 (9)	2.14 (37)	**11.716*****
Childhood sexual abuse	27.08	20.34	1.075	3.00 (12)	2.18 (34)	**4.978***
Natural disaster	22.92	16.95	0.744	1.18 (11)	2.77 (35)	2.959
Adult sexual assault	25.00	13.56	1.052	2.91 (11)	2.23 (35)	2.335
Other severe accident	12.5	18.64	1.749	2.00 (6)	2.45 (40)	3.441
Military	4.17	5.08	2.738	1.00 (2)	2.45 (44)	1.525
Other	31.25	35.59	0.883	2.93 (15)	2.13 (31)	0.628
PTSD diagnosis	30.4	28.8	1.017	2.79 (14)	2.22 (32)	0.571
Intrusion	65.2	62.7	1.006	2.17 (30)	2.81 (16)	1.532
Intrusive memories	45.6	43.6	1.005	2.19 (31)	2.80 (15)	2.108
Nightmares	43.6	46.2	0.989	2.79 (24)	1.95 (22)	1.821
Flashbacks	48.3	40.8	1.783	2.43 (28)	2.33 (18)	0.272
Psychological reactivity	46.6	41.2	0.975	2.44 (34)	12 (2.25)	0.247
Physical reactivity	49.1	40.0	1.044	2.11 (27)	2.79 (19)	2.255
Avoidance	46.1	41.9	0.906	3.05 (20)	1.88 (26)	3.480
Internal avoidance	43.3	47.5	0.935	2.24 (29)	2.65 (17)	1.400
External avoidance	47.8	39.5	1.097	2.47 (32)	2.21 (14)	0.263
NACM	69.6	61.9	**1.121***	2.34 (32)	2.50 (14)	0.072
Amnesia	51.8	37.3	1.191	2.66 (29)	1.94 (17)	1.242
Negative beliefs	50.0	39.3	1.211	2.45 (29)	2.29 (17)	0.009
Blame	44.9	44.7	1.065	2.37 (30)	2.44 (16)	0.045
Negative emotions	52.0	28.1	**2.664****	2.63 (38)	1.25 (8)	**4.383***
Anhedonia	50.0	37.8	**2.146***	2.07 (30)	3.00 (16)	2.713
Detachment	49.2	38.1	1.220	2.16 (31)	2.87 (15)	1.040
Emotional numbness	51.7	36.7	1.164	2.55 (29)	2.12 (17)	0.832
Arousal	49.2	47.8	1.026	3.05 (22)	1.79 (24)	**14.491*****
Irritability	47.2	42.6	0.990	2.52 (25)	2.24 (21)	1.549
Recklessness	48.9	41.9	1.027	2.33 (21)	2.44 (25)	0.119
Hypervigilant	48.5	38.5	1.061	2.41 (32)	2.36 (14)	0.057
Excessive startle	48.4	40.0	1.134	2.80 (30)	1.63 (16)	**7.945****
Inattention	46.4	42.1	1.189	2.72 (32)	1.64 (14)	**3.972***
Insomnia	45.3	44.2	1.092	2.28 (29)	2.59 (17)	0.440
Substance-related problems	72.9	63.0	1.786	2.86 (29)	1.59 (17)	**6.984***
Alcohol	28.3	42.4	0.867	3.46 (13)	1.97 (33)	**15.525*****
Stimulants	22.0	10.9	3.090	2.60 (5)	2.37 (41)	0.013
Opioids	16.9	10.9	1.090	1.80 (5)	2.46 (41)	1.691
Cannabinoids	44.1	37.0	1.201	2.59 (17)	2.28 (29)	0.543
Nicotine	47.9	42.6	1.626	2.90 (21)	1.96 (25)	2.670
Sedatives	25.9	46.5	0.223	2.43 (44)	1.50 (2)	1.778
Hallucinogens	35.7	46.2	0.364	3.00 (5)	2.24 (41)	1.005
Inhalants	57.1	44.0	1.567	2.90 (4)	2.45 (42)	0.531

[a] Numbers in bold indicate significantly more suicide attempts than comparison group.

* $P < .05$. ** $P < .01$. *** $P < .001$.

Abbreviations: ACE = adverse childhood experience, NACM = negative alterations of cognitions and mood, PTSD = posttraumatic stress disorder.

Table 3 Intercorrelations Related to Suicide Attempts and Trauma-Related Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Suicide attempts	1									
2. Age	−0.016	1								
3. Marital status	0.011	−0.117	1							
4. Gender	−0.106	−0.092	0.139	1						
5. Race	0.004	**0.386***[a,b]	−0.122	0.188	1					
6. Alcohol	**0.266***	−0.124	**0.310***[c]	0.097	0.188	1				
7. Arousal	0.113	−0.193	0.064	0.061	−0.027	0.138	1			
8. NACM	0.037	0.042	−0.025	−0.023	0.088	−0.099	**0.776*****	1		
9. ACE score	**0.331***	−0.103	−0.146	−0.146	0.042	0.169	**0.293***	0.199	1	
10. Total traumas	0.073	−0.045	0.126	−0.126	0.049	0.017	**0.229***	0.293	**0.553*****	1
Mean	1.050	39.54	0.800	0.780	0.540	0.280	6.930	10.11	2.970	3.170
SD	1.296	14.24	0.401	0.417	0.504	0.455	5.587	6.631	2.615	2.308

[a] Numbers in bold indicate significant correlation.
[b] Caucasian race significantly associated with higher age ($P = .004$).
[c] Alcohol-related problems significantly correlated with being single ($P = .018$).
* $P < .05$. *** $P < .001$.
Abbreviations: ACE = adverse childhood experience, NACM = negative alterations of cognitions and mood.

NACMs ($P < .001$), ACE score ($P = .038$), and total traumas ($P = .046$).

Table 4 summarizes the hierarchical multiple regression. The model as a whole was statistically significant (F [2, 105] = 4.082, $P = .025$) and accounted for 25 percent of the variance in the number of suicide attempts. Age, gender, race, and marital status were each nonsignificant and together accounted for less than 1 percent of the variance. Alcohol-related problems accounted for 8.2 percent of the variance but was nonsignificant. The main effects of the PTSD arousal and NACMs were nonsignificant and accounted for approximately 1 percent of the variance. There was a significant effect of the ACE score ($P = .009$) and total number of traumas ($P = .040$), which accounted for 16 percent of the variance.

Table 4. Hierarchical Multiple Regression Predicting Number of Suicide Attempts

	R^2	β	t	P
Block 1	0.000			
Age		0.13	0.817	0.419
Marital status		−0.03	−0.214	0.832
Gender		0.08	−0.721	0.419
Race		−0.13	−0.793	0.433
Block 2	0.082			
Alcohol-related problems		0.22	1.279	0.209
Block 3	0.089			
Arousal symptoms		0.05	0.203	0.841
NACM		−0.01	−0.036	0.971
Block 4	0.254			
ACE score		0.50	2.749	**0.009***[a]
Total traumas		0.37	2.124	**0.040***

[a]Numbers in bold indicate significantly more suicide attempts.
* $P < .05$.
Abbreviations: ACE = adverse childhood experience, NACM = negative alterations of cognitions and mood.

Discussion

To our knowledge, this is the first study of a forensic population that assesses suicidality in relation to trauma history. NGRI patients were found to have a 45 percent prevalence of suicide attempts, comparable with Mitchell *et al.*'s finding of 46 percent.[10] Both studies indicate that insanity acquittees have higher rates of suicide attempts compared with the general population (0.6%), general psychiatric patients (41%), and prisoners (27%).[11–13] More than one in five participants reported greater than one previous suicide attempt. That is 36 times higher than the prevalence of any attempt[11] and higher than the proportion of multiple attempters among all attempters in general populations (48% to 31%).[35] These findings raise the question of what factors account for the high prevalence of suicide attempts among forensic populations. We hope that the knowledge of the high rates of suicidality will motivate clinicians to do more suicide-related assessments and interventions in forensic populations, and for researchers to further elucidate suicide risk factors (including and beyond what we describe below) and develop specific treatment interventions.

As we hypothesized, trauma was strongly predictive of suicide attempts. Number of traumas and ACEs were found to account for 16 percent of the variance in the number of suicide attempts, more than any other identifiable cause of variance in this

study. Several ACEs, including emotional abuse, emotional neglect, sexual abuse, physical neglect, and living with a household member with substance-related problems were significantly associated with a higher number of suicide attempts. Childhood physical abuse was the only trauma-related variable studied that was significantly associated with suicide attempts, increasing the odds of attempting by three times. ACEs are known risk factors for poor adult mental health, suicide attempts, and increased number of suicide attempts,[18,24,25,36,37] which was corroborated by our findings. According to the interpersonal theory of suicide, interpersonal traumas like abuse may place an individual at risk for suicide when triggering feelings of social isolation, being a burden, and habituation in response to repeated exposure to painful or fear-inducing experiences.[38] Although knowledge that traumas can lead to negative sequalae (including suicidality) may motivate clinicians, researchers, and politicians to examine ways to prevent or provide early interventions for ACEs, once trauma survivors reach the criminal justice system, our main task is preventing suicide. Clinicians can review the above factors when assessing risk, and researchers may further assess these risk factors to understand causation, mediation, etc. and determine effective interventions.

Just as has been found in general[27,39] and psychiatric populations,[27,38] we found that, among NGRI patients, women were significantly more likely to attempt suicide than men. Women were also found to experience significantly more ACEs. Because ACEs are suicide risk factors, this could at least partially explain why women were more likely to attempt suicide.[40] This is consistent with our hierarchical multiple regression. It is also consistent with previous findings that many trauma-related problems, including suicide attempts, are at least partially explained by higher rates of trauma (especially sexual trauma) among women.[41] Therefore, although gender may be used in risk assessment, it is likely that trauma and trauma type are more important indicators for determining risk and for targeting in trauma-focused and trauma-informed interventions.

We found that insanity acquittees with a history of any substance-related problems, especially alcohol-related problems, had significantly more suicide attempts than those without substance-related problems. Those with stimulant-related problems were also found to be three times more likely to attempt suicide, though this was not statistically significant. Previous studies have identified substance[12,22] and, specifically, alcohol-related problems[22,39] as suicide risk factors. Potential explanations include depressed, anxious or suicidal individuals using substances to self-medicate their psychiatric symptoms, substances exacerbating these symptoms, substances causing disinhibition and impaired judgment, or substances easing the feelings of distress and guilt when attempting suicide.[42] In addition, untreated alcohol use disorder can lead to social withdrawal and social marginalization which may lead to an increased risk for suicide.[42] Suicide, substances, and trauma likely have complex interactions. For example, in addition to suicide attempts, ACE scores were also significantly associated with substance-related problems and arousal symptoms. Past research has indicated that trauma, particularly in childhood, increases the risk of substance-related problems, which also increases suicide risk.[18,19] Therefore, trauma may lead to suicide attempts, directly and indirectly, as a result of substance-related problems. We recommend clinicians assess substance use history, in general, but also as it relates to suicide risk and, when present, ensure that substance use is addressed as part of a comprehensive treatment plan that addresses mental illness, substance use, suicide, and violence.

Regarding PTSD symptoms, the NACM and arousal clusters were significantly associated with attempting suicide and repeated attempts, respectively. Among individual symptoms, excessive startle and inattention (both from the arousal cluster) and negative emotions significantly correlated with higher number of attempts. This is consistent with studies finding arousal to be the cluster most associated with suicidality,[43–45,46] and links between agitation and suicide in inpatient and incarcerated settings.[47,48] Negative emotions and anhedonia (both from the NACM cluster) were the only individual symptoms to significantly correlate with attempting suicide. This is consistent with previous studies that have found these two symptoms to predict suicidal ideation, suicide attempts, and self-injurious behavior.[22,30,49] In our experience, if PTSD symptoms are addressed at all in treatment, the focus tends to be about externalizing symptoms (e.g., recklessness, irritability). Our findings speak to the importance of addressing internalizing symptoms, which most evidence-based trauma-focused therapies do. We encourage clinicians to ensure that trauma-focused psychotherapy modalities are available to forensic patients.

Because the indicated PTSD symptoms were significantly associated with suicide attempts using binary logistic regression, but not in the intercorrelations and hierarchical multiple regression, we theorize that PTSD symptoms are likely a mediator between ACEs and suicidality. For example, among intercorrelations, arousal was significantly associated with ACEs, total traumas, and NACMs, but not suicide attempts. Whether they are direct risk factors or mediators, our findings are consistent with the escape theory, in which those experiencing trauma-related hyperarousal or negative emotions may use suicide as a means of escaping these aversive states.[50] In addition, or alternatively, considering that negative emotions, anhedonia, and inattention are symptoms of both PTSD and major depressive episodes, it may be that depressive comorbidities are the true suicide risk factor, though that is not consistent with our lack of significant findings in the psychiatric diagnoses analysis.

We did not find any significant correlations between diagnosis and suicide attempts. This may be explained by high rates of serious mental illness across the entire sample. The NGRI population represents an intersection between psychiatric conditions and criminality, both of which are associated with increased suicide risk. Previous studies have identified links between antisocial personality and suicide attempts among prison inmates.[51,52] Although this correlation was nonsignificant in our study, this may be due to the small *n*, considering that four of five individuals with antisocial personality disorder (80%) attempted suicide.

Limitations of the study include cross-sectional methodology, self-report bias, and a small *n* of women. As with all survey studies of suicide attempts, we analyzed survivors, which limits conclusions. Cross-sections limit our ability to assess relationships of the timing of suicide attempts, which could have theoretically occurred before or after traumatic events and before or after NGRI adjudication. Although a self-reported survey method might lead to the possibility of participants reporting inaccurate memories of traumas and past suicide attempts, especially since the surveyed population was severely mentally ill, there is no way of independently verifying the reported histories. Although childhood sexual abuse, as assessed by both the THS and ACE Questionnaire, was associated with both suicide attempt prevalence and number of suicide attempts, each of these two latter variables was significantly correlated with childhood physical abuse as assessed with THS but not ACE. It should be noted that those with ACE childhood physical abuse were twice as likely to attempt suicide as those without, but the difference was not found to be statistically significant. As we have reported elsewhere, ACE has a broader definition of childhood physical abuse while THS is narrower, indicating the importance of how questions are asked and that there are divergent opinions about what constitutes a trauma.[31]

In conclusion, we found high rates of suicide attempts among the insanity acquittees in our study population. As expected, suicide attempts were significantly associated with ACEs, number of traumas, substance-related problems, PTSD arousal symptoms, and NACMs. Some factors distinguished those more likely to attempt suicide: being a woman, worse negative emotions, worse anhedonia, and experiencing childhood physical abuse. Among those with a history of suicide attempts, multiple attempters were distinguished by ACEs (especially emotional neglect and abuse, sexual abuse, physical neglect, and household members with substance problems), number of traumas, substance-related problems (especially alcohol), arousal symptoms (especially excessive startle and inattention) and negative emotions. We hope that this first study of suicide and trauma among a forensic population not only increases awareness and leads forensic staff to better assess trauma and suicide histories in forensic populations, but also leads to further research to identify risk and protective factors. This should improve our ability to prevent suicides in this population by better screening for risk factors and intervening when individuals have them and allow us to deliver care that is more trauma-informed.

References

1. Kessler RC, Sonnega A, Bromet E, *et al*. Posttraumatic stress disorder in the National Comorbidity Survey. Arch Gen Psychiatry. 1995; 52(12):1048–60
2. Kessler RC, Borges G, Walters EE. Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. Arch Gen Psychiatry. 1999; 56(7):617–26
3. May AM, Klonsky ED. What distinguishes suicide attempters from suicide ideators? a meta-analysis of potential factors. Clin Psychol Sci Pract. 2016; 23(1):5–20
4. Sareen J, Houlahan T, Cox BJ, *et al*. Anxiety disorders associated with suicidal ideation and suicide attempts in the National Comorbidity Survey. J Nerv Ment Dis. 2005; 193(7):450–4
5. Ardino V. Offending behaviour: The role of trauma and PTSD. Eur J Psychotraumato. 2012; 3(1)

6. Molnar BE, Berkman LF, Buka SL. Psychopathology, childhood sexual abuse and other childhood adversities: Relative links to subsequent suicidal behaviour in the US. Psychol Med. 2001; 31 (6):965–77
7. Spitzer C, Dudeck M, Liss H, *et al*. Posttraumatic stress disorder in forensic inpatients. J of Forensic Psychiatry Psychol. 2001; 12 (1):63–77
8. Webb RT, Qin P, Stevens H, *et al*. Combined influence of serious mental illness and criminal offending on suicide risk in younger adults. Soc Psychiatry Psychiatr Epidemiol. 2013; 48(1):49–57
9. Haynes RL, Marques JK. Patterns of suicide among hospitalized mentally disordered offenders. Suicide Life Threat Behav. 1984; 14(2):113–25
10. Mitchell SM, Brown SL, Bolaños AD, *et al*. Psychiatric symptom severity, criminal risk, and suicidal ideation and attempts among not guilty by reason of insanity state hospital inpatients. Psychol Serv. 2018; 15(3):340–8
11. Kessler RC, Berglund P, Borges G, *et al*. Trends in suicide ideation, plans, gestures, and attempts in the United States, 1990–1992 to 2001–2003. JAMA. 2005; 293(20):2487–95
12. Healy DJ, Barry K, Blow F, *et al*. Routine use of the Beck Scale for Suicide Ideation in a psychiatric emergency department. Gen Hosp Psychiatry. 2006; 28(4):323–9
13. Slade K, Edelman R. Can theory predict the process of suicide on entry to prison? Predicting dynamic risk factors for suicide ideation in a high-risk prison population. Crisis. 2014; 35(2):82–9
14. LeBouthillier DM, McMillan KA, Thibodeau MA, *et al*. Types and number of traumas associated with suicidal ideation and suicide attempts in PTSD: Findings from a US nationally representative sample. J Trauma Stress. 2015; 28(3):183–90
15. Breslau N, Peterson EL, Poisson LM, *et al*. Estimating posttraumatic stress disorder in the community: Lifetime perspective and the impact of typical traumatic events. Psychol Med. 2004; 34(5):889–98
16. Belik S-L, Cox BJ, Stein MB, *et al*: Traumatic events and suicidal behavior: Results from a national mental health survey. J Nerv Ment Dis. 2007; 195(4):342–9
17. Darves-Bornoz JM, Choquet M, Ledoux S, *et al*. Gender differences in symptoms of adolescents reporting sexual assault. Soc Psychiatry Psychiatr Epidemiol. 1998; 33(3):111–7
18. Merrick MT, Ports KA, Ford DC, *et al*. Unpacking the impact of adverse childhood experiences on adult mental health. Child Abuse Negl. 2017; 69:10–9
19. Dube SR, Anda RF, Felitti VJ, *et al*. Exposure to abuse, neglect and household dysfunction among adults who witnessed intimate partner violence as children. Violence Vict. 2002; 17(1):3–17
20. Maniglio R. The role of child sexual abuse in the etiology of suicide and non-suicidal self-injury. Acta Psychiatr Scand. 2011; 124(1):30–41
21. Ystgaard M, Hestetun I, Loeb M, *et al*. Is there a specific relationship between childhood sexual and physical abuse and repeated suicidal behavior? Child Abuse Negl. 2004; 28(8):863–70
22. Guina J, Nahhas RW, Mata N, *et al*. Which Posttraumatic Stress Disorder Symptoms, Trauma Types and Substances Correlate with Suicide Attempts in Trauma Survivors? Prim Care Companion CNS Disord. 2017; 19:170–7
23. Taillieu TL, Brownridge DA, Sareen J, *et al*. Childhood emotional maltreatment and mental disorders: Results from a nationally representative adult sample from the United States. Child Abuse Negl. 2016; 59:1–12
24. Felitti VJ, Anda RF, Nordenberg D, *et al*. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. Am J Prev Med. 1998; 14 (4):245–58
25. Metzler M, Merrick MT, Klevens J, *et al*. Adverse childhood experiences and life opportunities: Time to shift the narrative. Child Youth Serv Rev. 2017; 72:141–9
26. Pietrzak RH, el-Gabalawy R, Tsai J, *et al*. Typologies of posttraumatic stress disorder in the US adult population. J Affect Disord. 2014; 162:102–6
27. Oquendo MA, Friend JM, Halberstam B, *et al*. Association of comorbid posttraumatic stress disorder and major depression with greater risk for suicidal behavior. Am J Psychiatry. 2003; 160 (3):580–2
28. Bell JB, Nye EC. Specific symptoms predict suicidal ideation in Vietnam combat veterans with chronic posttraumatic stress disorder. Mil Med. 2007; 172(11):1144–7
29. Selaman ZM, Chartrand HK, Bolton JM, *et al*. Which symptoms of posttraumatic stress disorder are associated with suicide attempts? J Anxiety Disord. 2014; 28(2):246–51
30. Guerra VS, Calhoun PS. Mid-Atlantic Mental Illness Research Education and Clinical Center Workgroup Examining the relation between posttraumatic stress disorder and suicidal ideation in an OEF/OIF veteran sample. J Anxiety Disord. 2011; 25(1):12–8
31. Guina J, Audu A, Cameron J, *et al*. Prevalence of traumas and PTSD among individuals adjudicated not guilty by reason of insanity. J Am Acad Psychiatry Law. 2021 June; 49(2):194–201
32. Carlson E, Palmieri P, Smith S, *et al*. The Trauma History Screen (THS) [Internet]; 2005. Available from: http:/www.ptsd.va.gov. Accessed February 11, 2019
33. Weathers FW, Litz BT, Keane TM, *et al*. PTSD Checklist for DSM-5 (PCL-5) [Internet]; 2014. Available from: http://www.ptsd.va.gov. Accessed February 11, 2019
34. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Washington, DC: American Psychiatric Association; 2013
35. Castillo YAA, Rodriguez AMB, Torres NMC. High prevalence of two or more suicide attempts associated with suicidal ideation and mental disease in Colombia 2016. Rev Colomb Psiquiatr. 2020; 49:96–101
36. Chapman DP, Whitfield CL, Felitti VJ, *et al*. Adverse childhood experiences and the risk of depressive disorders in adulthood. J Affect Disord. 2004; 82(2):217–25
37. Gilbert LK, Breiding MJ, Merrick MT, *et al*. Childhood adversity and adult chronic disease: An update from ten states and the District of Columbia, 2010. Am J Prev Med. 2015; 48 (3):345–9
38. Van Orden KA, Witte TK, Cukrowicz KC, *et al*. The interpersonal theory of suicide. Psychol Rev. 2010; 117(2):575–600
39. Bernal M, Haro JM, Bernert S, *et al*. Risk factors for suicidality in Europe: Results from the ESEMED study. J Affect Disord. 2007; 101(1–3):27–34
40. Wiederman MW, Sansone RA, Sansone LA. History of trauma and attempted suicide among women in a primary care setting. Violence Vict. 1998; 13(1):3–9
41. Guina J, Nahhas RW, Kawalec K, *et al*. Are gender differences in DSM-5 PTSD symptomatology explained by sexual trauma? J Interpers Violence. 2019; 34(21–22):4713–40
42. Pompili M, Serafini G, Innamorati M, *et al*. Suicidal behavior and alcohol abuse. Int J Environ Res Public Health. 2010; 7(4):1392–431
43. Ben-Ya'acov Y, Amir M. Posttraumatic symptoms and suicide risk. Pers Individ Dif. 2004; 36(6):1257–64
44. Tarrier N, Gregg L. Suicide risk in civilian PTSD patients—predictors of suicidal ideation, planning and attempts. Soc Psychiatry Psychiatr Epidemiol. 2004; 39(8):655–61
45. Ribeiro JD, Silva C, Joiner TE. Overarousal interacts with a sense of fearlessness about death to predict suicide risk in a

sample of clinical outpatients. Psychiatry Res. 2014; 218(1–2): 106–12
46. Li SX, Lam SP, Yu MW, *et al*. Nocturnal sleep disturbances as a predictor of suicide attempts among psychiatric outpatients: A clinical, epidemiologic, prospective study. J Clin Psychiatry. 2010; 71(11):1440–6
47. Busch KA, Fawcett J, Jacobs DG. Clinical correlates of inpatient suicide. J Clin Psychiatry. 2003; 64(1):14–9
48. Hall RCW, Platt DE, Hall RCW. Suicide risk assessment: A review of risk factors for suicide in 100 patients who made severe suicide attempts: Evaluation of suicide risk in a time of managed care. Psychosomatics. 1999; 40(1):18–27
49. Guertin T, Lloyd-Richardson E, Spirito A, *et al*. Self-mutilative behavior in adolescents who attempt suicide by overdose. J Am Acad Child Adolesc Psychiatry. 2001; 40(9):1062–9
50. Baumeister RF. Suicide as escape from self. Psychol Rev. 1990; 97 (1):90–113
51. Black DW, Gunter T, Loveless P, *et al*. Antisocial personality disorder in incarcerated offenders: Psychiatric comorbidity and quality of life. Ann Clin Psychiatry. 2010; 22(2):113–20
52. Smith PN, Selwyn CN, Wolford-Clevenger C, *et al*. Psychopathic personality traits, suicide ideation, and suicide attempts in male prison inmates. Crim Just & Behav. 2014; 41(3):364–79