

# Adverse Childhood Experiences and Suicidality and Self-Harm in Persons in Secure Forensic Care

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Prior research suggests a greater degree of suicidality and self-harm behavior in those involved with criminal justice and forensic mental health systems. Such individuals also evidence increased exposure to early childhood adversity, which is often associated with suicide risk. Other significant predictors of suicidality have been noted within forensic populations, however, including indicators of specific psychopathology and situational and demographic factors. These populations present with overlapping risk factors that remain underexamined. In the current study, 182 persons residing in secure forensic psychiatric care following incidents of illegal and aggressive behavior were evaluated. Adverse childhood experiences and other empirically derived potential predictors of suicide attempts and self-harm were examined via binomial logistic regression. Findings indicate frequent experiences of early adversity across participants, and that a combination of race, individual adverse childhood experiences, number of biological children, and diagnoses of either posttraumatic stress disorder or borderline personality disorder were significant predictors of suicide attempts, self-harm behavior, and first hospitalization resulting from a suicide attempt. Clinical and research implications are discussed.

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**Key words:** suicide attempts; self-harm behavior; adverse childhood experiences; forensic mental health

Ample research indicates greater prevalence of suicidal and self-harm behavior among those with criminal histories, including persons on probation and parole, incarcerated prisoners, and forensic patients housed in secure psychiatric facilities. Internationally, incarcerated persons demonstrate significantly increased rates of suicide and suicide attempts in comparison with nonoffending community samples,<sup>1,2</sup> with deaths from suicide ranging from five or six times higher in justice-involved men<sup>3</sup> to 20 times higher in justice-involved women.<sup>4</sup> Despite recent reductions in jail suicide

mortality, those detained or sentenced to jail are nine times more likely to die by suicide than persons in the community,<sup>5</sup> with suicide remaining the single leading cause of death among those in U.S. jails.<sup>6</sup> Additionally, approximately one-third of those who are incarcerated report a history of nonsuicidal self-injurious behavior.<sup>7</sup> Similar findings emerge among community corrections samples; in one epidemiological survey of probationers in England and Wales, nearly one-third of participants reported at least one prior suicide attempt, and 25 to 40 percent indicated a history of self-harm behavior.<sup>8</sup> Among those in secure forensic care, 22 to 38 percent report previous suicide attempts.<sup>9,10</sup>

Persons with histories of childhood abuse or maltreatment are disproportionately likely to have suicidal ideation and engage in suicidal or nonsuicidal self-injurious behavior. Adverse childhood experiences (ACEs) consist of experiences of childhood physical, sexual, and emotional abuse; physical and emotional neglect; and indicators of household

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dysfunction, including household violence, and parental substance abuse, incarceration, divorce, and mental illness.<sup>11,12</sup> ACEs are empirically linked with suicidality and associated behaviors,<sup>11–14</sup> particularly in populations with criminal justice and forensic mental health system involvement,<sup>9</sup> where higher rates of exposure to ACEs have been established. For example, 18 to 98 percent of adults housed in correctional institutions report experiences of childhood maltreatment.<sup>15–19</sup> Justice-involved youth have reported singular experiences of trauma or maltreatment at rates ranging from 8 to 80 percent.<sup>20–22</sup> With regard to cumulative ACEs, 30 to 48 percent of justice-involved adult men<sup>15,17,23</sup> and 50 to 68 percent of justice-involved male youths<sup>20,21</sup> endorse experiences of four or more ACEs.

Research describing individual and cumulative experiences of trauma and maltreatment among those with legal involvement and inpatient psychiatric stays reveal similar trends. In differing samples of patients from the forensic mental health system in community and secure care settings, rates of reported abuse and maltreatment range from 32 to 90 percent.<sup>9,24–26</sup> Among females in forensic care in particular, these rates may be even higher, ranging from 65 to 89 percent, resulting in 94 percent having been removed from their childhood home due to maltreatment.<sup>27</sup>

ACEs are a strong correlate of suicidality and self-harm in a range of samples drawn from criminal justice and forensic mental health populations. In a community corrections sample, experiences of trauma prior to age 18 were predictors of suicidal ideation, suicide attempts, and self-harm behaviors.<sup>28</sup> Among incarcerated men and women, experiences of childhood abuse in multiple categories and childhood neglect have been associated consistently with suicidal ideation and suicide attempts in adulthood,<sup>12,29–32</sup> at times serving as the strongest predictor among a range of correlates. This has also been true of justice-involved youth with increased cumulative ACEs.<sup>32</sup>

Other research, however, suggests that the relationship is more complex, with one study finding that only sexual abuse, and not other forms of childhood adversity, was associated with onset and persistence of suicidal behavior among a sample of incarcerated persons,<sup>33</sup> and another finding that childhood trauma was only predictive of suicidality when personality mediators were included within the analytic model.<sup>34</sup> Similarly, Barton and colleagues<sup>35</sup> noted that a range

of predictors were relevant for suicidality and self-harm behavior among incarcerated men, though physical and sexual abuse histories differed with regard to their association with suicide attempts in the context of comorbid history of self-injurious behavior compared to suicide attempts alone. This was true in another similar sample, in which experiences of abuse in childhood only indirectly affected self-injurious behavior.<sup>36</sup>

More limited research exists examining the role of ACEs in subsequent suicidality and self-harm behavior among those with forensic mental health system involvement. Dudeck and colleagues<sup>9</sup> reported that ACEs were a significant predictor of suicidal behavior, even more so than other factors typically associated with suicidality, in persons with histories of violence residing in forensic care. Specifically, they found that each additional ACE increased the odds of a suicide attempt by 123 percent. A systematic review and meta-analysis examined factors associated with death by suicide while psychiatrically hospitalized; it identified moderate associations between suicide and a family history of suicide and weak associations with family history of mental illness,<sup>37</sup> both of which are sometimes ACEs depending on the nature of the familial relationship and the age of the patient at the time these events occurred. Only some of the studies included in the meta-analysis involved uniquely forensic populations.

In addition to the influence of childhood maltreatment and experiences of household dysfunction, a number of other factors have been identified as risk factors for suicidality and self-harm behavior, some of which may be characteristic of persons with criminal justice system involvement and histories of forensic mental health treatment. These range from features associated with personal demographics or psychiatric symptoms to those representing specific behaviors or life experiences. For example, common demographic predictors associated with suicidality and self-harm in justice-involved, psychiatric, and community samples include youthful age,<sup>38</sup> marginalized minority identities,<sup>35</sup> female gender,<sup>36</sup> being single,<sup>35,39</sup> separation from children while incarcerated,<sup>35</sup> and lower educational attainment.<sup>11</sup>

A history of specific symptoms or diagnosed psychopathology have been associated with increased suicidality, suicide risk, and self-injurious behavior in forensic and correctional samples as well. Important

psychiatric risk correlates include substance use disorders,<sup>11,28,35</sup> psychotic spectrum disorders,<sup>35,37,40–42</sup> anxiety, hypervigilance, posttraumatic stress disorder (PTSD),<sup>35,40,43–45</sup> depression or other affective disorders,<sup>35,37,40,42,44</sup> borderline personality disorder,<sup>10,35,42</sup> antisocial personality disorder,<sup>35</sup> and presence of a disorder or need for psychotropic medication.<sup>35–37,46,47</sup> Histories of aggression and violence are consistently strong correlates of suicidality and self-injurious behavior,<sup>9,10,32,38,48–50</sup> as are increased involvement with the courts and episodes of institutional misconduct.<sup>35</sup> Involvement in the child welfare system also has been linked to increased risk of suicide attempts,<sup>26,51</sup> as have factors like recent admission to forensic psychiatric inpatient care<sup>38</sup> and personal or familial history of prior suicide attempts and self-harm.<sup>14,37,38</sup>

Taken together, findings from the available literature suggest a number of relevant factors that may clarify important interactions between ACEs, psychopathology, and demographic and behavioral characteristics in persons with justice-system involvement who have engaged in suicidal and self-injurious behavior. The goal of this study is to better understand the individual and combined contributions of these variables to the occurrence and onset of suicidal and self-harming behavior. Because persons in a justice-involved, psychiatric inpatient sample may evidence higher-than-normal rates of some of these factors, it is currently unclear how each factor will predict measured outcomes. It is possible that simple measures of trauma and maltreatment, such as cumulative counts of adversity (which are common in ACE survey research),<sup>11,12,20,21,26,27</sup> may have more limited predictive validity in samples where very frequent ACEs occur. Therefore, we explored the following research questions:

Are individual and cumulative ACEs significantly associated with the presence of prior suicide attempts, age at first attempt, and likelihood of first psychiatric hospitalization resulting from suicidality?

Does the presence of specific forms of parental mental illness and suicide attempts relate to later suicidality among participants?

Given the presence of ACEs, how do other factors identified within the empirical literature further influence suicidality and self-harm behavior? Do

they offer increased postdictive validity beyond that which ACEs alone would indicate?

## Methods

### Participants

The participants were 182 adults residing in secure inpatient forensic care because of their histories of serious mental illness and aggressive behavior. Archival records were made available for the purposes of this research. Eligibility criteria included residence within the facility during or later than 2005 (when current records retention systems were enacted), residence period of at least one year between 2005 and 2013 (to facilitate availability of necessary medical record information), and discharge from the facility prior to data collection, which began in late 2013. A member of the facility's quality management office generated a list of inpatients meeting these criteria, from which a random set of 250 patients was selected. From this group, 182 participants with complete medical records were eligible for the purposes of this study. Incomplete records included those that were missing diagnostic, admission, discharge, or relevant psychiatric or social services data. Those with missing information were frequently admitted for a duration shorter than we had specified in our inclusion criteria.

The participants were 81 percent male ( $n = 147$ ), 56 percent Caucasian ( $n = 101$ ), 40 percent African American ( $n = 73$ ), 2 percent Hispanic ( $n = 4$ ), and 2 percent of mixed race ( $n = 4$ ) origins. These distributions are consistent with the facility's overall proportions of gender and race. Average participant age was 32.5 years (standard deviation [SD] = 11.6, range 10–61) at the time of admission and 40.5 years (SD = 12.7, range 23–69) at the time of discharge. It should be noted that the facility previously maintained a child/adolescent unit, though all participants were adults at the time of data collection and patient discharge. The average length of the most recent admission to the facility was 8 years (SD = 7.1, range 1–49).

The majority of participants presented with symptoms indicative of a psychotic disorder (59.9%,  $n = 109$ ), while other frequent disorders included intellectual disability/cognitive developmental disorders (58.0%,  $n = 105$ ) and mood disorders (45.6%,  $n = 83$ ). Please see Table 1 for additional information

**Table 1** Prevalence of Psychiatric Disorder Diagnosis

Diagnosis/Symptom Category	Participants
Psychotic spectrum disorder	109 (59.9)
Intellectual, cognitive, or developmental disorder	105 (58)
Mood disorder	83 (45.6)
Impulse control disorder	41 (22.7)
Antisocial personality disorder	
Traits	14 (7.7)
Diagnosis	38 (20.9)
Posttraumatic stress disorder	24 (13.2)
Borderline personality disorder	
Traits	11 (6.2)
Diagnosis	20 (11.2)
Attention deficit/hyperactivity disorder	18 (9.9)
Anxiety disorder	16 (8.8)
Paraphilic disorder	12 (6.6)
Other personality disorder	35 (19.2)

Data are presented as *n* (%). *N* = 182 participants.

regarding psychiatric disorder diagnoses at the time of patient discharge.

Personality disorders were present, with 28.6 percent of participants (*n* = 52) exhibiting traits or having a diagnosis of antisocial personality disorder, and 17.4 percent (*n* = 31) exhibiting traits or having a diagnosis of borderline personality disorder. Additionally, 19.2 percent (*n* = 35) exhibited other forms of personality pathology or personality disorders not otherwise specified. Comorbidity was frequent, as the majority (70.9%, *n* = 129) met criteria for two or more Axis I diagnoses, and 57.7 percent (*n* = 105) met criteria for one or more Axis I disorders with comorbid personality pathology.

**Procedures**

Data collection procedures were approved by the East Tennessee State University Medical Institutional Review Board, the Research Committee of Fulton State Hospital, and research review personnel of the Missouri Department of Mental Health. The study was funded, in part, through an East Tennessee State University Research Development Committee Major Grant awarded to the first and last authors of this manuscript. Data were collected in 2013 and 2014 and coded from available archival records that included medical, psychiatric, and social services admission, annual, and discharge reports. The presence of a psychiatric disorder diagnosis was coded dichotomously, and major symptom categories were developed to account for diagnostic variability among facility clinicians and to allow for

comorbidity. For example, psychotic disorders were coded as “present” if the participant’s file indicated a diagnosis of any form of schizophrenia, schizoaffective disorder, schizophreniform disorder, brief psychotic disorder, delusional disorder, psychotic disorder not otherwise specified, or a depressive or bipolar disorder with psychotic features. Diagnoses had been determined by facility psychiatrists through unstructured clinical interview using the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision.<sup>52</sup>

Information describing participants’ early childhood experiences and later occurrences of psychiatric and legal involvement were derived from retrospective accounts that were available in the archival record, collected from a combination of participant self-report, corroboration from family members, official legal records, and external agency documentation (e.g., reports from the state’s Division of Family Services office). Experiences of childhood adversity, including specific ACE items, were coded as either present (1) or absent (0). Available records infrequently provided detail with regard to emotional versus physical neglect, so these were combined into one ACE. The ACE score was calculated by adding ACE occurrences as defined by the metric of the ACE survey,<sup>11,12</sup> with one point possible for each of the following occurrences prior to the age of 18: physical, sexual, or emotional abuse; emotional or physical neglect; violence in the home; and parental substance abuse, divorce, incarceration, or mental illness. Because emotional and physical abuse were often not distinguished within available records, these were collapsed into a singular category of neglect. Thus, the ACE score in this sample produced a possible range of zero to nine. Additional variables of interest were obtained from the record and coded either dichotomously as present (1) or absent (0) or continuously, depending on the nature of the data. Such additional variables included presence or absence of self-harm behavior or suicide attempts, age at first suicide attempt, if first psychiatric hospitalization resulted from a suicide attempt, presence or absence of specific forms of parental mental illness (e.g., mood, personality, psychotic spectrum disorder), history of parental suicide attempt(s), out-of-home placements (e.g., presence, age at first placement, total number of placements), sex offender status, violent offender status, number of prior arrests, and number of children.

### Statistical Approach

For the purposes of this study, outcomes of interest included whether the participant had a history of suicide attempts, self-harm behavior, or suicide attempts and self-harm behavior. All outcome variables were dichotomously coded as yes = 1 or no = 0. It was also noted whether their first episode of psychiatric hospitalization was associated with suicidality (e.g., suicide attempt, serious self-harm behavior, or stated suicidal ideation with intent and plan sufficient to warrant hospitalization) and coded dichotomously. These variables were used as conservative estimates of broad-based suicidality, given that it is often difficult to obtain reliable past reports of number of suicide attempts or details regarding the nature of suicide or self-harm. To examine these outcomes, we conducted a series of binary logistic regressions.

Our initial proposed predictors, based upon the available evidence suggesting a strong relationship between ACEs and later suicidality, included the ACE score, an ACE score of 4+ (dichotomously coded as 0–3 = 0, or 4+ = 1), and individual ACE items. Three different measurements of ACE outcomes were used to understand how ACEs influenced the outcome variables. Further, the various forms of ACE scores used were consistent with the way ACE variables are used in similar research from the original ACE survey.<sup>11,12</sup> Secondary predictors were those identified within the available literature evidencing important links with suicidality and self-harm in justice-involved persons in the community, corrections, and forensic mental health system. These included gender; minority race; number of children; parental diagnoses of mood and psychotic spectrum disorders; parental psychiatric diagnostic comorbidity; parental psychiatric hospitalization or suicide attempts prior to participant age of 18; out-of-home placements before age 18 (both age at first placement and total number of placements); histories of violent or sexual offending; number of prior arrests; and the presence (1) or absence (0) of an anxiety disorder, PTSD, mood disorder, psychotic spectrum disorder, substance use disorder, personality disorder(s), or cognitive disorder.

Initial correlational analyses using the Pearson  $r$  were conducted to identify relationships between predictors and outcomes. Significant predictors from these analyses (Table 2) were included in subsequent binary logistic regression analyses (backward logistic

regression method). Beta and standardized beta values,  $t$  values,  $P$  values, and odds ratios with confidence intervals are presented for significant variables within each model. All analyses were conducted using SPSS 26 (IBM Corporation, Armonk, NY).

### Results

Nearly half of participants had a history of previous suicide attempts ( $n = 76$ ; 43.9%) or self-harm behavior ( $n = 83$ ; 47.7%), with nearly two-thirds having engaged in either or both of these behaviors ( $n = 119$ ; 65.4%). A comparatively small number were first psychiatrically hospitalized due to suicidality or self-harm ( $n = 5$ ; 3%), with more common reasons for initial hospitalization being behavior problems ( $n = 53$ ; 32.3%), drug or alcohol problems ( $n = 37$ ; 22.6%), or unknown reasons ( $n = 44$ ; 26.8%). Participants with a known or reported suicide attempt were an average of 21.2 years old ( $SD = 7.9$ , range 8–45) at the time of their first attempt. Those with known or reported self-harm behavior were an average of 20 years old ( $SD = 6.4$ , range 3–31) at the time of first self-harm.

As expected, ACEs were common within the sample. Participants' average ACE score was 2.6 ( $SD = 2.367$ , range 0–8), with only 20.6 percent ( $n = 37$ ) reporting no experiences of ACEs, as measured by the nine items used in the current study (Table 2). One-third ( $n = 58$ ; 32.2%) presented with a cumulative ACE score of four or higher, the cutoff frequently used within ACE study research to examine the impact of high rates of ACEs.<sup>11,12</sup> Frequencies associated with individual ACE scores and ACE items are presented in Table 3. Descriptive and frequency data associated with additional variables associated with suicidality in the extant literature and used within the current analyses are presented further in Table 4, with diagnostic predictor variables presented previously in Table 1.

Differential predictors of outcomes of interest emerged through correlational analyses (Table 2). Significant correlations were comparatively scarce with regard to history of suicide attempts and first instance of psychiatric hospitalization resulting from suicidality. In contrast, the majority of predictor variables evidenced significant correlations with history of self-harm and having a history of either self-harm or suicidality. The resultant variables were included in subsequent logistic regression analyses.

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**Table 2** Correlations between Proposed Predictors and Outcome Variables

Predictor	History of Suicide Attempts	History of Self-Harm	Any History of Suicidality or Self-Harm	First Episode Hospitalization Due to Suicidality
ACE score	0.147	0.371 <sup>c</sup>	0.261 <sup>c</sup>	0.057
ACE score 4+	0.111	0.336 <sup>c</sup>	0.250 <sup>b</sup>	0.100
Emotional/verbal abuse	0.090	0.267 <sup>c</sup>	0.146	-0.097
Physical abuse	0.192 <sup>a</sup>	0.343 <sup>c</sup>	0.265 <sup>c</sup>	0.082
Sexual abuse	0.074	0.226 <sup>b</sup>	0.176 <sup>a</sup>	0.166 <sup>a</sup>
Intrafamilial sexual abuse	0.074	0.189 <sup>a</sup>	0.199 <sup>b</sup>	0.152 <sup>a</sup>
Extrafamilial sexual abuse	0.015	0.080	0.016	0.105
Neglect	0.184 <sup>a</sup>	0.202 <sup>b</sup>	0.219 <sup>b</sup>	0.097
Parent/caregiver drug or alcohol abuse	-0.021	0.276 <sup>c</sup>	0.155 <sup>a</sup>	-0.055
Parent/caregiver divorce or separation	0.003	0.141	0.067	-0.041
Domestic or intimate partner violence in home of origin	0.102	0.194 <sup>a</sup>	0.148 <sup>a</sup>	0.086
Parent / caregiver with mental illness	0.018	0.168 <sup>a</sup>	0.102	0.036
Parent / caregiver incarceration	0.132	0.162 <sup>a</sup>	0.126	0.106
Gender	-0.119	-0.342 <sup>c</sup>	-0.238 <sup>b</sup>	-0.089
Race	0.167 <sup>a</sup>	0.270 <sup>c</sup>	0.278 <sup>c</sup>	0.015
Participants with any children	-0.154 <sup>a</sup>	-0.239 <sup>b</sup>	-0.202 <sup>b</sup>	-0.046
Number of biological children	-0.124	-0.251 <sup>b</sup>	-0.194 <sup>a</sup>	-0.058
Mood disorder diagnosis in parent/caregiver	-0.020	0.136	0.090	-0.004
Psychotic disorder diagnosis in parent/caregiver	-0.070	-0.137	-0.129	-0.041
Comorbid psychiatric diagnoses in parent/caregiver	-0.040	0.083	0.039	0.098
Parent/caregiver suicide attempt	0.020	0.084	0.031	-0.026
Parent/caregiver psychiatric hospitalization	-0.051	0.127	0.051	-0.063
Out-of-home placement prior to age 18	0.074	0.222 <sup>b</sup>	0.200 <sup>b</sup>	0.052
Age at first out-of-home placement	0.004	0.167 <sup>a</sup>	0.161 <sup>a</sup>	0.051
Age at first foster care/group home placement	-0.309	-0.157	-0.117	-0.162
Number of out-of-home placements prior to age 18	0.075	0.031	0.040	0.111
Any arrest history	0.086	-0.222 <sup>b</sup>	-0.052	0.001
Number of arrests	0.121	-0.181 <sup>a</sup>	0.027	-0.044
Any violent arrests	0.117	-0.074	0.035	-0.046
Any sexual arrests	-0.028	-0.032	-0.043	0.101
History of alcohol abuse	0.062	-0.113	-0.003	-0.005
History of illicit drug abuse	0.083	-0.027	0.033	0.002
Anxiety disorder	0.041	0.078	0.064	0.185 <sup>a</sup>
Posttraumatic stress disorder	0.285 <sup>c</sup>	0.285 <sup>c</sup>	0.181 <sup>a</sup>	0.133
Mood disorder	0.093	0.112	0.133	0.116
Psychotic disorder	-0.120	-0.296 <sup>c</sup>	-0.242 <sup>b</sup>	-0.137
Intellectual, cognitive, or developmental disorder	-0.052	0.096	-0.001	-0.062
Antisocial personality disorder	0.047	0.001	0.030	-0.061
Borderline personality disorder	0.173 <sup>a</sup>	0.406 <sup>c</sup>	0.266 <sup>c</sup>	0.185 <sup>a</sup>

Data are presented as Pearson *r*. *N* = 182 participants.

<sup>a</sup> *P* < .05.

<sup>b</sup> *P* < .01.

<sup>c</sup> *P* < .001.

Binary logistic regression (backward logistic regression method) produced a significant model postdictive of history of suicide attempts after five iterations (chi-square = 17.944, *P* < .001; Nagelkerke *R*<sup>2</sup> = 0.138) that correctly classified 64.8 percent of participants with a history of suicide attempts. Predictors within the final model indicated that those who were White were 1.8 times more likely to have made prior suicide attempts, and that persons with PTSD were nearly 5.7 times more likely to have made prior suicide attempts; however, despite the model being

significant, these individual relationships were not statistically significant. Please refer to Table 5 for further details.

Regression results regarding participants with a history of self-harm behavior revealed a significant model after 19 iterations (chi-square = 46.637, *P* < .001, Nagelkerke *R*<sup>2</sup> = 0.448) that correctly classified 76.3 percent of cases. Overall, as the number of a participant's biological children increased, the likelihood of engaging in self-harm behavior decreased. Those with parents who abused drugs or alcohol

**Table 3** ACE Survey Score and Individual ACE Items

ACE Survey Score	
0	37 (20.6)
1	36 (20)
2	32 (17.8)
3	17 (9.4)
4	13 (7.2)
5	16 (8.9)
6	14 (7.8)
7	13 (7.2)
8	2 (1.1)
ACE Survey Items	
Emotional/verbal abuse	44 (24.7)
Physical abuse	65 (36.7)
Sexual abuse	60 (33.9)
Intrafamilial sexual abuse	40 (22.6)
Extrafamilial sexual abuse	30 (16.9)
Neglect	32 (18)
Parent/caregiver drug or alcohol abuse	59 (34.9)
Parent/caregiver divorce or separation	65 (36.7)
Parents never married or cohabitating	25 (14.1)
Domestic or intimate partner violence in home of origin	35 (19.9)
Parent/caregiver with mental illness	55 (30.2)
Parent/caregiver incarceration	10 (5.6)

Data are presented as *n* (%). *N* = 182 participants.

within the home prior to participants reaching the age of 18 were 6.7 times more likely to have engaged in self-harm. White participants were 2.6 times more likely to self-harm, and those with borderline personality disorder were approximately 6.7 times more likely to self-harm (Table 5).

With regard to any reported or known history of either suicide attempts or self-harm behavior, a significant logistic regression model emerged following 14 iterations (chi-square = 36.246, *P* < .001, Nagelkerke *R*<sup>2</sup> = 0.301) that correctly classified 74.5 percent of participants as having a history of either behavior. Predictors within the significant model mirrored those of the model describing self-harm alone. Those with more biological children were less likely to engage in either behavior. Participants originating from a home characterized by alcohol or drug abuse were 2.4 times more likely to exhibit suicidality or self-harm. White participants were 2.9 times more likely to endorse either. Persons diagnosed with borderline personality disorder or traits were more than seven times more likely to present with historical suicide attempts or self-harm.

Findings related to whether a participant's first psychiatric hospitalization was due to suicidality produced a significant model after three iterations (chi-square = 7.752, *P* = .021; Nagelkerke *R*<sup>2</sup> = 0.191) that correctly classified 97.1 percent of participants

**Table 4** Predictor Variables

Predictor Variable	Data
Gender	
Male	147 (80.8)
Female	35 (19.2)
Race	
White	101 (55.5)
Non-White	84 (44.5)
Number with any children	48 (28.2)
Number of biological children <sup>a</sup>	2.3 ± 1.64 (1–9)
Mood disorder diagnosis in parent/caregiver	38 (20.9)
Psychotic disorder diagnosis in parent/caregiver	10 (5.5)
Comorbid psychiatric diagnoses in parent/caregiver	11 (6)
Parent/caregiver suicide attempt	4 (2.2)
Parent/caregiver psychiatric hospitalization	21 (13.3)
Out-of-home placement prior to age 18	42 (23.9)
Age at first out-of-home placement <sup>a</sup>	7.6 ± 5.54 (1–16)
Age at first foster care / group home placement <sup>a</sup>	7.8 ± 5.32 (1–16)
Number of out-of-home placements prior to age 18 <sup>a</sup>	2 ± 1 (1–4)
Any arrest history	145 (79.7)
Number of arrests <sup>a</sup>	4.3 ± 7.74 (1–69)
Any violent arrests	82 (52.6)
Any sexual arrests	30 (18)
History of alcohol abuse	107 (61.5)
History of illicit drug abuse	108 (59.3)

Data are presented as *n* (%) or as mean ± standard deviation (range). *N* = 182 participants.

<sup>a</sup> Estimates exclude participants for whom these predictors were not applicable.

for whom this was true. Predictors within the final model suggested that those with a history of any sexual abuse were 7.8 times more likely to have been first hospitalized due to suicidality, and that an anxiety disorder diagnosis led to a 6.3 times greater likelihood of such an outcome (Table 5). Similar to the previous model, these individual variable relationships were not statistically significant, despite the overall model being significant.

## Discussion

Available research describing the role of ACEs in suicidality and self-harm behavior among forensic mental health populations is limited. The purpose of this study was to explore associations between ACEs, parental mental illness, parental suicide attempts, and other factors identified within the empirical literature that may influence suicidality and self-harm behavior. Several findings are noteworthy and may contribute to future research, treatment, and prevention efforts.

The present sample of persons residing in secure forensic psychiatric care was similar to previously examined populations involved with forensic

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**Table 5** Binary Logistic Regression Analyses

Model Predictors	B	SE $\beta$	Wald $\chi^2$	P	Odds Ratio (95% CI)
Outcome: History of suicide attempts					
Race	0.592	0.336	3.105	.078	1.808 (0.936–3.495)
Posttraumatic stress disorder	1.735	0.597	10.425	.001	5.667 (1.977–16.241)
Outcome: History of self-harm behavior					
Parent/caregiver drug or alcohol abuse	1.903	0.538	12.525	.000	6.706 (2.338–19.240)
Race	0.937	0.483	4.053	.044	2.646 (1.026–6.823)
Number of biological children	–0.461	0.266	2.993	.084	0.631 (0.374–1.063)
Borderline personality disorder	1.897	0.648	8.582	.003	6.668 (1.874–23.728)
Outcome: History of either suicide attempts or self-harm					
Parent/caregiver drug or alcohol abuse	0.880	0.441	3.982	.046	2.412 (1.016–5.725)
Race	1.071	0.397	7.282	.007	2.919 (1.341–6.354)
Number of biological children	–0.286	0.141	4.120	.042	0.751 (0.569–0.990)
Borderline personality disorder	1.955	0.912	4.597	.032	7.067 (1.183–42.220)
Outcome: First psychiatric hospitalization resulting from suicidality					
Any sexual abuse	2.062	1.142	3.261	.071	7.864 (0.839–73.731)
Anxiety disorder	1.843	0.987	3.488	.062	6.318 (0.913–43.725)

N = 182 participants.

mental health or criminal justice with regard to cumulative ACE scores of four or more<sup>15,17,20,21,23</sup> as well as a history of suicide attempts and self-harm behavior.<sup>8–10</sup> Still, ACEs were correlated with only half of the outcomes of interest, including history of self-harm behavior and history of suicidality or self-harm but were not significant predictors in the final model. These results likely correspond with previous findings that, in samples with unusually high ACE exposure and therefore limited variability in occurrences of ACEs, factors beyond ACEs may be more impactful.<sup>26,53</sup> This suggests that other indicators identified in the previous literature may be of greater utility than ACEs alone, or that factors beyond discrete yes/no occurrences of ACEs as used here may be particularly relevant in samples characterized by early aggression, serious mental illness, cognitive disability, and forensic mental health system involvement.

Beyond ACEs, differential predictors and implications arose for each of our outcomes of interest. Contrary to research indicating that marginalized minority identities are associated with an increased risk of suicidality and self-harm,<sup>35</sup> in our sample those who were White exhibited an increased likelihood of having engaged in such behaviors. Though this individual predictor was not statistically significant within the model, it is still worth noting. This may not be altogether surprising, given that White individuals evidence the highest age-adjusted suicide rate in the United States<sup>54</sup> (i.e., 16.84 per 100,000 persons).

Consistent with existing literature on PTSD,<sup>35,40,43–45</sup> those in the current sample with a diagnosis of PTSD exhibited an increased likelihood of suicide attempts. This frequently noted link between suicide, trauma, and trauma-related symptoms has been well documented and includes depression,<sup>55</sup> maladaptive coping skills,<sup>56</sup> illicit or problematic substance use,<sup>57,58</sup> and anger or impulsivity.<sup>9,59</sup>

Regarding any history of self-harm or suicidal behaviors, several significant correlates emerged related to early caregivers. All types of abuse (apart from extrafamilial sexual abuse and emotional/verbal abuse), parental drug or alcohol abuse, domestic violence, and the child's experiencing an out-of-home placement were significant postdictive predictors. This aligns with research suggesting that parental abuse and parental interpersonal violence directly influence children's self-harming and suicidal behaviors.<sup>60,61</sup> As is also reflected by initial correlational relationships in this study, inadequate emotional support and caregiver instability have also been shown to be significant predictors above and beyond ACEs that should be examined in vulnerable populations.<sup>53</sup>

In terms of known history of either suicide attempts or self-harm behavior, the only significant predictor was a diagnosis of borderline personality disorder. This is consistent with this disorder's symptomatology,<sup>62</sup> as those with this disorder are at a heightened risk for both self-harm and suicidal behaviors. Prior research has hypothesized a meaningful link between experiences of trauma and

borderline personality disorder symptomatology, to the extent that some have postulated borderline personality disorder as a trauma-related disorder rather than personality psychopathology, though empirical findings remain inconclusive.<sup>63</sup> Rates of borderline personality disorder are comparatively low within this sample in comparison to other diagnostic categories, though it remained a significant predictor on its own. It is possible that individuals with related symptoms or characteristics are diagnosed with disorders frequently conflated with borderline personality disorder (e.g., bipolar disorder, antisocial personality disorder), and that this effect may be even more salient in other similar samples.

Limitations of this study include low base rates for some predictor variables as well as the use of archival records, which may lack important details and prohibit follow-up information from being gathered. Although results suggested that individuals who had a history of sexual abuse or a diagnosis of an anxiety disorder were more likely to have had their first hospitalization because of suicidality, these results may have been affected by a low base rate since our sample contained only five persons for whom suicidality was the reason for initial hospitalization. Further, due to the small sample size of some variables of interest, the confidence intervals display a wide range, indicating that it would be beneficial to explore the significant relationships with a larger sample size to better understand the increased odds of certain outcomes due to those predictors.

Though eligibility criteria limited the data collection to records that included the greatest amount of information available, a potential disadvantage of using archival data is the lack of control over how the original data were derived and recorded within each participant's record. For example, different providers may have assigned diagnoses to patients by subjective standards, which we attempted to mitigate through collapsing diagnostic variables into recognizable symptom clusters rather than discrete diagnoses. Even this effort, however, may obscure important variants across diagnostic presentations. The collection of original data is particularly relevant given the use of subjective, self-reported variables, including suicide and self-harm histories. These topics are particularly stigmatized, so concerns of underreporting exist. A strength of the available data that may offset this limitation is the corroboration that occurred with patients' family members to verify information.

Additionally, based on the use of cross-sectional, archival data, researchers were unable to determine the chronological order of experiences. For instance, it was not noted whether predictor variables preceded, succeeded, or were medial to reports of occurrences of suicide or self-harm.

Although the current sample's demographics were consistent with the facility's overall distribution of race and gender as well as that of larger forensic mental health samples, Hispanic and female participants remain relatively underrepresented. Future studies examining ACEs as associated with suicidality and self-harm behavior may benefit from oversampling female participants and those from underrepresented minority groups. This is important given potential gender differences in the experience of ACEs and associated outcomes.<sup>21,44</sup> Further, sexual orientation was not identified in the current sample but is an important demographic factor, particularly for criminal justice-involved or forensic mental health populations, as this intersection of identities is largely unexplored and may represent concentrated vulnerabilities. In a different population, high school students who identified as a sexual minority and reported three to five ACEs were at greater risk of suicidal ideation and attempts in comparison with heterosexual students with the same ACE score.<sup>63</sup> This emphasizes a need for future examination.

Findings from this study firmly implicate the use of accurate assessment in clinical practice. Given findings related to PTSD, borderline personality disorder, and suicide and self-harm, it is critical, not only that accurate diagnoses be assigned, but also that appropriate questions regarding ACEs are posed during the course of initial and ongoing assessment. This will aid the implementation of trauma-informed practice for forensic mental health and criminal justice-involved populations. Additionally, it is important for future research to consider the changing landscape and possible limitations of ACEs, as efforts have been made to include experiences of global<sup>64</sup> and urban community-level adversity.<sup>65,66</sup>

Some of our findings further represent a limitation of the use of the ACE survey in its original form, as dichotomous scoring, or if a given act of maltreatment or indicator of household dysfunction has occurred, fails to account for other important considerations, including severity, duration, and interactive

impact of ACEs. Further, such scoring assumes equality of effect across multiple forms of ACEs, which may not accurately reflect the ongoing impact of early adversity. Such limitations are consistent with emerging discussion of the utility of the ACE survey questionnaire in understanding relationships between ACEs and later outcomes.<sup>67</sup> As ACEs were not significant in the final model of this study, utilization of an expanded ACE or trauma questionnaire may mitigate ceiling effects (e.g., many participants have high scores on a limited-item set), particularly within samples with unusually high ACE exposure, such as those involved with the criminal justice or forensic mental health systems. There is also the potential for adjusting ACE cutoff scores for different populations, given the higher-than-average experience of ACEs in justice-involved persons.<sup>21</sup> Evaluating critical links between certain ACEs, ACE clusters, other associated factors, and high-risk outcomes can be useful for risk evaluation and treatment planning. Overall, the findings of this study provide researchers and practitioners with important information regarding risk factors to be assessed and addressed in individuals at risk of suicidality and self-harm behavior.

## Conclusion

Our findings suggest that persons residing in secure forensic psychiatric care exhibit higher rates of ACE exposure, cumulative ACEs, prior suicide attempts, and prior self-harm behavior than is commonly reported in the literature for nonjustice-involved persons or those with less serious mental health concerns. Different factors were associated with histories of suicide attempts and self-harm, with familial substance abuse, White race, and diagnoses of PTSD and borderline personality disorder more consistently associated with problematic outcomes. Sexual abuse in childhood was associated with first hospitalization resulting from a suicide attempt. An increased number of biological children emerged as a protective factor. Future research should consider the complex and multi-faceted nature of suicidality and self-harm in justice-involved and forensic mental health populations.

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