

1 **Alcohol Use Disorder as a Moderator in the Relationship Between PTSD and**
2 **Suicidality Among Military Personnel**

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1
2 **Background:** Alcohol use disorder (AUD), posttraumatic stress disorder (PTSD), and suicide are
3 substantial public health concerns among military service members, yet the nature of their
4 relationships is not well understood. The present study tests the hypothesis that AUD moderates the
5 relationship between PTSD symptom severity and suicidality.

6 **Methods:** This secondary analysis uses data collected at baseline for a randomized clinical trial. The
7 sample consists of 161 active-duty service members from three service branches (Army, Air Force,
8 and Navy). All participants met diagnostic criteria for PTSD and were not engaged in evidence-
9 based PTSD treatment at the time of enrollment. Zero-inflated Poisson generalized linear regression
10 models were used to test the associations of PTSD and AUD symptom severity with likelihood and
11 severity of suicidal ideation.

12 **Results:** Findings suggest that AUD symptom severity moderates (i.e., amplifies) the relationship
13 between PTSD symptoms and severity of suicidal ideation among military personnel with untreated
14 PTSD. Among service members with low or absent AUD, no significant association was found
15 between PTSD symptoms and severity of suicidal ideation. However, when AUD severity was
16 average (i.e., sample mean) or high, PTSD symptoms had a significant positive association with
17 severity of suicidal ideation.

18 **Conclusions:** This study highlights the importance of including assessment of AUD and PTSD in
19 suicide risk evaluations. Further, results provide strong support for the maintenance and further
20 development of treatment programs that simultaneously address AUD and PTSD comorbidity in
21 the military health system.

22
23 *Key Words:* Alcohol use disorder, PTSD, suicide, military, active-duty

1 INTRODUCTION

2 The prevalence of death by suicide among US military personnel has increased since the start of
3 the wars in Iraq and Afghanistan to levels higher than at any time since before the Second World
4 War (Smith et al., 2019). While the suicide rate among civilians has also been steadily rising
5 (Ramchand et al., 2021), service members face a unique constellation of risk factors. Frequent
6 exposure to potentially traumatic events and a culture of alcohol consumption have made PTSD and
7 alcohol use disorder (AUD) common among service members, estimated to affect 3.9 - 10.5% and
8 26.1 - 48.6% respectively depending on branch of service (Schuler et al., 2022). Both disorders
9 increase the likelihood of suicidal behavior (Forehand et al., 2022; Hill et al., 2021).

10 PTSD among service members has been linked to a variety of causes. First, individuals who
11 endured adverse childhood experiences, such as physical or sexual abuse, are more likely to join the
12 military than those without such experiences (Blosnich et al., 2014). Such experiences have been
13 linked to the development of PTSD (Syed Sheriff et al., 2019) and are prevalent among soldiers who
14 attempt suicide (65%; Perales et al., 2012). Once enlisted, trauma exposure while in the service
15 similarly increases the likelihood that service members will develop PTSD (Banducci et al., 2019;
16 Eekhout et al., 2016) and may increase the likelihood they will engage in suicidal behavior (Bryan et
17 al., 2015; Monteith et al., 2019).

18 Military-specific stressors have also been linked to hazardous use of alcohol and other drugs
19 (Banducci et al., 2019; Battles et al., 2019; Gilmore et al., 2016; Kehle et al., 2012; Maguen et al.,
20 2012, 2023). Consistent with the self-medication hypothesis (Leeies et al., 2010), prior research has
21 shown that a desire to cope with painful emotional states motivates trauma-exposed service
22 members to consume alcohol (McDevitt-Murphy et al., 2017). Moreover, service members have
23 described coping-motivated drinking as normative in the military environment, especially during
24 post-deployment reintegration and among combat-involved units (Besse et al., 2018; Vest et al.,

25 2021). Empirical research has shown that a substantial proportion of service members (28.5%)
26 perceive military culture to be supportive of alcohol consumption (Meadows et al., 2021) and that
27 such perceptions are associated with greater likelihood of hazardous drinking behaviors (Meadows et
28 al., 2023). Further, drinking motivated by a desire to conform to military social norms has been
29 linked to suicidal behavior (Herberman Mash et al., 2016). Alcohol use, more generally, is also
30 associated with elevated risk for suicide, with effects found to be greatest in military samples (Isaacs
31 et al., 2022).

32 Recent studies have shown that veterans with comorbid PTSD-AUD are at greater risk for
33 suicidal behavior than veterans with PTSD or AUD alone (Blakey et al., 2022; Gradus et al., 2017;
34 Norman et al., 2018). However, the nature of the relationship between PTSD, AUD, and suicidality
35 is not well understood. One study of trauma-exposed firefighters (N=632) did not find a significant
36 interaction between AUD and PTSD symptoms on suicide risk (Bing-Canar et al., 2019). Another
37 study with a military sample (N=545) comprised predominantly of veterans (82%) similarly failed to
38 find a significant effect on suicidal behavior for the interaction between number of drinking days
39 and PTSD symptoms, though the authors did find the interaction between days of cannabis use and
40 PTSD symptoms to predict suicidal behavior (Allan et al., 2019) with higher number of days of use
41 coupled with higher PTSD being associated with more suicidal behavior. However, the effect of this
42 interaction within the unique context of active-duty military service has yet to be examined.

43 The present study explores the effects of PTSD and AUD symptom severity on suicidal
44 ideation in a sample of currently serving military personnel. Based on existing literature, we first
45 hypothesize (H1) both PTSD and AUD symptoms will have significant positive main effects on the
46 presence and severity of suicidal ideation. Due to the unique context of military service, we
47 hypothesize that, unlike results found among firefighters and veterans, (H2) AUD symptoms will
48 moderate the relationship between PTSD and suicidal ideation presence and severity where

49 associations between PTSD severity and suicidal ideation will be strong for those with more
50 symptoms of AUD.

51 METHODS

52 Parent trial

53 The present study is a secondary analysis of data collected for a randomized clinical trial of a
54 brief motivational enhancement intervention designed to support active-duty service members with
55 untreated PTSD in their exploration of treatment options. The trial protocol and primary outcomes
56 are presented elsewhere (Kaysen et al., 2022; Walker et al., In Press). Participants were recruited
57 through advertisements placed in major social media platforms as well as print media posted locally
58 at a large military installation in the Pacific Northwest. Eligibility required that participants be active-
59 duty US military service members (including members of Reserve or National Guard components
60 on active status), meet diagnostic criteria for PTSD (measurement described in section 2.3.1), and
61 not be engaged in evidence-based psychotherapy or pharmacotherapy for PTSD at the time of
62 enrollment. Prospective participants were excluded if they were not fluent in English or anticipated
63 an upcoming combat deployment (within six months of eligibility screening), which would have
64 prevented participation in study activities. The present study uses data collected during screening
65 and baseline assessments, which occurred prior to randomization (January 2018 – February 2021).
66 These assessments were administered over the phone by study staff, all of whom had completed
67 graduate-level training in a clinical mental health field. One-hundred and sixty-one eligible
68 participants enrolled in the trial. Trial procedures were approved by the University of Washington's
69 Institutional Review Board.

70 Participants

71 The sample for the present study includes 160 military service members, as one participant was
72 excluded due to missing data on key variables. As shown in Table 1, the sample (N=160) was
73 predominantly assigned male at birth (68.7%), married or living with a partner (65.0%), non-
74 Hispanic (86.9%), white (81.3%), and straight-identified (83.1%). Ages ranged from 19 to 54 years
75 ($M = 29.7$, $SD = 7.5$). Three service branches are represented in the sample, though the majority of
76 participants were Army personnel (80.0%). The majority of participants were classified as active-duty
77 (70.0%), and 30% were on active-duty status at the time of enrollment as members of the Reserve
78 component (11.3%) or National Guard (18.8%).

79 Measures

80 PTSD

81 First, exposure to a traumatic event that meets the DSM-5 definition of Criterion A for PTSD
82 (American Psychiatric Association, 2013) was assessed with the Life-Events Checklist (LEC; Pugach
83 et al., 2021). Then, the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al.,
84 2018) was administered. The CAPS includes 30 items necessary for determining if the respondent
85 meets DSM-5 diagnostic criteria for PTSD. Twenty of these items cover each of the symptoms for
86 Criterion B through E. Rated on a scale of 0 (“Absent”) to 4 (“Extreme/Incapacitating”), the sum
87 of these items provides a PTSD symptom severity score with a range of 0 to 80. All participants met
88 diagnostic criteria as a condition of eligibility for the parent study, whereas summary scores are used
89 in the present study to represent PTSD symptom severity over the prior month. In the present
90 study, the CAPS-5 was found to have satisfactory internal reliability (Cronbach’s $\alpha = .74$; Taber,
91 2018).

92 *Alcohol use*

93 The Alcohol Use Disorder Identification Test (AUDIT) is widely used to screen for hazardous
94 alcohol consumption (Babor et al., 2001; Saunders et al., 1993). The 10-item measure assesses
95 drinking behaviors (e.g., “How often do you have a drink containing alcohol?”) and related
96 consequences (e.g., “How often during the past year have you failed to do what was normally
97 expected of you because of drinking?”). The sum of all items ranges from 0 to 40, with higher values
98 indicating greater severity of hazardous alcohol use. Internal reliability in the present study was high
99 (Cronbach’s alpha = .85; Taber, 2018).

100 *Suicidal ideation*

101 The Suicidal Ideation Scale (SIS) developed by Rudd (1989) is a 10-item measure of current
102 (past-month) suicidality. Respondents were asked to indicate the frequency of thoughts and
103 behaviors using a 5-point Likert scale (0 = “Never” to 4 = “Always”). The measure includes two
104 validated factors: suicidal desire (e.g., “I feel life just isn’t worth living.”) and preparation (e.g., “I
105 have been thinking of ways to kill myself.”; Luxton et al., 2011). Both factors are combined to yield a
106 sum score of all items (range: 0 to 40), with higher scores representing greater suicidal ideation.
107 Internal reliability in the present study was high (Cronbach’s alpha = .92; Taber, 2018).

108 *Demographics*

109 Three demographic characteristics, often related to the primary outcome of suicidality, are
110 relevant to the present study. These include age, sex, and marital/cohabitation status. For analyses,
111 sex assigned at birth was dummy-coded as “female-assigned at birth”. Two participants who
112 identified as transgender at the time of enrollment were assigned “female” at birth. Married
113 participants were grouped with those who were living with an intimate partner for the dummy-
114 coded variable “married/cohabitating”.

115 Analysis

116 Statistical analysis was performed in R version 4.3.1 (R Core Team, 2023). First, correlations
117 between all variables were calculated using the ‘Hmisc’ package version 5.1-0 (Harrell, 2023). Next,
118 two regressions were run to (1) estimate the main effects of AUDIT and CAPS scores on SIS score,
119 and then to (2) test for moderation by regressing the interaction of those scores on SIS. Because
120 60.4% of the sample did not endorse any level of suicidal ideation (i.e., a score of 0 on SIS), a zero-
121 inflated Poisson (ZIP) distribution with a log link function was specified for the generalized linear
122 regression models (GLM). ZIP models are based in the assumption that two types of participants
123 exist – in the present study, those who would endorse some level of suicidal ideation (i.e., $SIS > 0$)
124 and those who would not endorse any level of suicidal ideation (i.e., $SIS = 0$). Analyses are thus
125 divided by a ZIP model to predict which individuals are likely to have a score of zero on the SIS and
126 then to predict scores on the SIS for those who are expected to have a non-zero score. The former,
127 “zero-inflated” portion of the model, is estimated with logistic regression in which coefficients may
128 be exponentiated to yield odds ratios. The latter, “count” portion of the model, is estimated with a
129 Poisson regression in which exponentiated coefficients produce rate ratios.

130 Odds ratios indicate the change in the odds of an outcome occurring – in the present study, the
131 odds of having an SIS score of zero – relative to a one-unit increase in each covariate. Rate ratios
132 indicate the proportional change in the count outcome – in the present study, change in SIS score –
133 in response to a one unit increase in each covariate. Both regression models controlled for age,
134 marital/cohabitation status, and sex at birth, and all variables were included as predictors in both the
135 logistic and Poisson portions of the ZIP models. ZIP regressions were run via the ‘pscl’ package
136 version 1.5.5.1 (Jackman, 2020; Zeileis et al., 2008).

137 Simple slopes for the interaction term, estimated in the Poisson portion of the ZIP model, were
138 calculated at three levels of the moderating variable AUDIT (mean, mean – 1SD, and mean + 1SD),

139 using the ‘emmeans’ package version 1.8.7 (Lenth, 2023). A visualization of the interaction was
140 created using the ‘ggeffects’ (version 1.2.3; Lüdtke, 2018) and ‘ggplot2’ (version 3.4.2; Wickham,
141 2016). Recently, new approaches to estimating and probing interactions for GLM count models
142 have been proposed, but are not yet able to handle zero-inflated models (McCabe et al., 2022); thus,
143 we used the traditional approach to estimating and probing interactions.

144 RESULTS

145 Clinical characteristics

146 Index traumas included combat (39.4%), military sexual trauma (17.5%), exposure to non-
147 combat violent death (e.g., suicide; 13.1%), accident (10.6%), non-military sexual assault (9.4%),
148 non-combat physical assault (5.0%), and “other” (5.0%). Of the 17 potentially traumatic events
149 included in the LEC, participants endorsed exposure to a mean of 10.89 (SD = 2.92). Table 2
150 presents descriptive statistics for clinical outcomes. The mean CAPS score (i.e., PTSD symptoms)
151 was 32.94 (SD = 8.93). Note that all participants were above 12 on the CAPS due to eligibility
152 requirements. The mean AUDIT score was 7.94 (SD = 7.11) out of a possible score of 40, which is
153 just below the cutoff for hazardous drinking (Saunders et al., 1993). Finally, the mean SIS score was
154 2.54 (SD = 5.10) from a possible range of 0 – 40. Also shown in Table 2, the three clinical variables
155 were all significantly ($p < .05$) and positively correlated with one another.

156 Covariate effects on suicidal ideation

157 In the logistic portion of the main effects model (see Table 1), participants assigned female at
158 birth were found to be 57% less likely (OR = 0.430, $p = .028$) to score a zero on the SIS. In other
159 words, male-assigned participants were more likely to have no level of suicidal ideation relative to
160 their female-assigned peers and holding other variables constant. A similar significant effect was
161 found in the interaction model (see Table 2). However, among those who endorsed some level of

162 suicidality (i.e., SIS scores > 0), female-assigned participants were predicted to have 20.1% lower SIS
163 scores relative to their male-assigned peer (RR = 0.799, $p = .045$). A similar effect was estimated in
164 the Poisson portion of the interaction model, though it did not reach statistical significance.

165 Similar effects of age were found in both the main effects and interaction models. Whereas,
166 years of age was not a significant predictor of whether or not a participant would endorse any
167 suicidal ideation, among those with some suicidal ideation, each year of age was estimated to
168 increase total SIS score by roughly 1.5 percent (RRs = 1.014 & 1.015, $ps < .05$). Participant
169 relationship status (i.e., married or living with a partner) was not found to have significant
170 association with SIS score in either model.

171 Main effects of AUD and PTSD

172 In the logistic portion of the model (Table 1) AUD severity, as measured by the AUDIT, was
173 found to have a significant effect on likelihood of endorsing any suicidal ideation. Each additional
174 point of AUDIT score was estimated to decrease the odds of scoring 0 on the SIS by 5.3% (OR =
175 0.947, $p = .036$). Among participants with some amount of suicidal ideation (i.e., SIS scores > 0), no
176 significant main effect of AUDIT score was detected. Conversely, PTSD severity, as measured by
177 the CAPS, had a significant effect in the count portion of the main effects model but not the logistic
178 portion. CAPS severity did not reach statistical significance ($p = .063$) in predicting whether or not a
179 participant would endorse any suicidal ideation. However, among those who were estimated to have
180 some level of suicidal ideation, each additional point on the CAPS was associated with an increase in
181 SIS score of 3.2% (RR = 1.032, $p < .001$). For context, a one standard deviation increase in CAPS
182 score corresponds to a greater than 40% increase in SIS score among those with some level of
183 suicidal ideation and when holding other variables in the model constant.

184 Interaction effects

185 When added to the subsequent model, the interaction between PTSD symptoms and AUD
186 symptoms was not found to significantly predict the presence of any suicidal ideation (i.e., SIS score
187 > 0) in the logistic portion of the model ($p = .850$). However, the interaction was a significant
188 predictor of non-zero SIS scores ($p < .001$), indicating that AUD symptoms moderated (i.e.,
189 amplified) the effect of PTSD symptoms on severity of suicidal ideation.

190 Table 5 presents the simple slopes predicted by the Poisson portion of the interaction model
191 for the effect of PTSD severity on suicidal ideation at three levels of AUD. When AUD severity was
192 low or effectively absent (AUDIT score = 0.82, mean - 1SD), CAPS score was not found to have a
193 significant effect on SIS score ($p = .898$). At the sample's mean AUDIT score of 7.94, each one-
194 point increase in CAPS score was predicted to increase SIS score by 2.4% (RR = 1.024, $p < .001$).
195 When AUD severity was high (AUDIT score = 15.05, mean + 1SD) each one-point increase in
196 CAPS score predicted an 4.9% higher SIS score (RR = 1.049, $p < .001$). For context, when AUDIT
197 score was average, a one-standard deviation increase in CAPS score was predicted to increase SIS
198 score by roughly 23%, and when AUDIT score was high, the same increase in CAPS score predicted
199 a roughly 54% increase in SIS score. A visualization of these effects at high and low levels of AUD
200 is provided in Figure 1.

201 DISCUSSION

202 The goal of this study was to estimate the effects of PTSD and AUD on suicidal ideation
203 among military service members with untreated PTSD and examine the extent to which AUD
204 symptoms moderate associations between PTSD and suicidal ideation. AUD was found to have a
205 main effect association with the presence of suicidal ideation but not severity, whereas PTSD had a
206 main effect association with severity but not likelihood of having any level of ideation, thus

207 confirming and characterizing these risk factors in a currently serving military sample. Moreover, we
208 found that among individuals with some level of suicidal ideation, AUD symptom severity
209 moderated the effect of PTSD symptoms on severity of suicidal ideation, such that for those with
210 low AUD symptoms, PTSD symptom severity did not have a statistically significant effect on
211 suicidal ideation, while the association between PTSD symptom severity and suicidality was quite
212 pronounced for those with relatively higher AUD symptoms. Finally, results of the study
213 demonstrated that sex assigned at birth differs in its association with presence of suicidal ideation
214 and with the severity of suicidal ideation among those with any ideation. Overall, these findings
215 suggest that high-risk alcohol use may be a key factor in the etiology of suicide among military
216 personnel with untreated PTSD and highlight the importance of assessing and treating AUD among
217 non-treatment seeking service members.

218 The present study found AUD and PTSD to each have unique effects on different aspects of
219 the suicidal process. Partial support was found for the first hypothesis, that both AUD and PTSD
220 would have significant positive relationships with the presence and severity of suicidal ideation.
221 Thus, AUD symptom severity, but not PTSD symptom severity, increased the likelihood a service
222 member would have some level of suicidal ideation. Among those service members with some
223 degree of suicidal ideation, PTSD symptom severity, but not AUD symptom severity, was associated
224 with higher levels of ideation. These findings highlight differential roles of alcohol and PTSD in
225 understanding suicidal behavior, with alcohol misuse being more strongly associated with whether
226 suicidality is likely to occur at all, and PTSD being associated with severity of suicidality among
227 those who are already at risk. These results suggest that the military health system should consider
228 screening for suicidal ideation among those with positive screens for AUD as one way to identify
229 those service members who may be at elevated risk. Results also suggest that for service members

230 who are experiencing suicidal ideation, clinical follow-up should include screening for trauma
231 exposure and for PTSD.

232 Our second hypothesis was partially supported in that findings suggest AUD symptom
233 severity moderates the effect of PTSD on severity of suicidal ideation but has no such effect on the
234 presence of any suicidal ideation. For service members with low AUD symptoms, PTSD symptom
235 severity had no effect on their level of suicidal ideation. However, for service members with average
236 or high levels of AUD, higher PTSD was associated with more suicidal ideation, at least among
237 those service members endorsing suicidal ideation. In contrast, in a primarily veteran sample,
238 marijuana use, but not alcohol use, moderated the effect of PTSD severity on suicidal ideation
239 (Allen et al., 2019). This discrepancy in findings with the present study may be due to differences
240 between current and former service members in cannabis use and perceptions (Clary et al., 2021).
241 For example, generally cannabis use is low among current service members which may reflect the
242 impact of routine drug testing within the military (Santangelo et al., 2022). These mixed findings
243 highlight the need to examine the substance use, PTSD, and suicidality relationship across both
244 populations and substances. Overall, the present study findings highlight the importance of
245 integrated PTSD-AUD treatment programs within the military's behavioral health system, as this
246 comorbidity was found to be associated with significant risk for severe suicidal ideation.

247 Although not the primary focus of the present study, findings related to differences in
248 suicidality based on sex assigned at birth are consistent with the body of research highlighting a
249 "gender paradox" of suicidal behavior in Western countries wherein women are more likely than
250 men to attempt suicide while men are more likely than women to die by suicide (Canetto and
251 Sakinofsky, 1998; Shelef, 2021). Our study found that service members assigned female at birth are
252 more likely than those assigned male to have thoughts of suicide; however, among those who do
253 have some level of suicidal ideation, the severity of suicidal ideation is lower among female-assigned

254 service members. However, findings from the present study should not be misinterpreted to suggest
255 suicidality among female-assigned service members is of any lesser concern, as other research has
256 shown the large gender-disparity in suicide mortality observed among civilians is much smaller
257 among military-involved individuals. Hoffmire et al. (2015) found that over an 11-year period (2000
258 – 2010) civilian suicide rates were much lower for women (4.8 – 5.6 per 100k) than men (11.1 – 12.7
259 per 100k), whereas the difference was minimal among veterans (24.3 – 34.6 for women vs. 28.8 –
260 36.0 for men, per 100k). Additional research is necessary to understand the higher rates of suicidality
261 among military women and to identify the risk factors and predictors associated with this elevated
262 risk as an important step toward prevention.

263 Strengths and limitations

264 The present study is an important contribution to the literature on AUD comorbidities and
265 consequences as it describes effects in a vulnerable and under-studied population – active-duty
266 military personnel with untreated PTSD – for whom suicidal behavior is a significant public health
267 concern. Robust study procedures ensure reliable findings. The study’s data consists of well-
268 validated measures that were administered by assessors with advanced clinical degrees, and analytic
269 techniques were carefully chosen to account for the unique distribution of the primary outcome.

270 Several limitations should also be noted. First, the sample is relatively small and homogeneous
271 with respect to service branch (80% Army). As such, generalizability of results to other branches
272 may be limited, so additional research is needed to examine these relationships in a larger and more
273 diverse military sample. Second, the cross-sectional nature of the data allows only for the testing of
274 associations. Longitudinal data will be necessary to confirm the causal pathways implied by present
275 findings. Newer methods for estimating and interpreting interactions for count (GLM) models are
276 on the horizon, but because they cannot yet handle zero-inflated data, we used a traditional
277 approach to moderation testing (McCabe et al., 2022). Although the results likely yield similar

278 findings to forthcoming approaches to GLM interactions, findings should be replicated or at least
279 re-analyzed when these approaches are available to zero-inflated data. Finally, the sample was
280 comprised of individuals who met clinical criteria for PTSD. While this is certainly an important
281 military subpopulation, findings should not be generalized to those with subthreshold PTSD until
282 further research is conducted.

283 In sum, this study is one of the few conducted among a current military sample, addressing
284 complex interrelationships between alcohol use disorders, PTSD, and suicidality. Given high rates of
285 suicidal behavior among service members, understanding potential risk factors and mechanisms for
286 suicidality is of high public health importance. Our findings highlight the importance of integrated
287 behavioral health systems that have the capacity to address both substance use and mental health
288 concerns. In the past these systems have often been siloed, where substance use programs may not
289 address psychiatric disorders like PTSD and behavioral health programs may not feel equipped to
290 address substance use (Simpson et al., 2021). However, based on our findings, providing alcohol use
291 prevention/intervention programs within the military could have downstream effects on reducing
292 suicidal behaviors. Similarly, treating PTSD may also reduce alcohol use as well as suicidality
293 (Gradus et al., 2013; Norr et al., 2018; Simpson et al., 2022).

294

295

Table 1

Demographic and military characteristics

(N=160)

Age	<i>M</i> = 29.7 <i>(SD</i> = 7.5)
Married / Cohabiting	65.0%
Sex assigned at birth	
Male	68.7%
Female	31.3%
Sexual orientation	
Straight	83.1%
Bisexual	11.3%
Gay/lesbian	5.6%
Hispanic or Latino/a	13.1%
Race ^a	
White	81.3%
Black	9.4%
“Other”	6.9%
Asian-American	3.8%
American Indian or Alaskan Native	3.1%
Native Hawaiian or	2.5%

Pacific Islander

Service branch

Army	80.0%
Air Force	16.3%
Navy	3.8%

Military status

Active-duty	70.0%
Reserve	11.3%
National Guard	18.8%

Years of Service

$M = 8.9$
 $(SD = 6.3)$

Paygrade

E1-E4	43.8%
E5-E9	43.1%
O1-O9; W1-W5	13.1%

Combat deployed 56.0%

^a Participants invited to endorse multiple

race categories

Table 2

Means, standard deviations, and correlations of all variables

	Mean (SD)	Range	r				
			Married		Age	CAPS	AUDIT
			Female	/ LWP			
Female	0.31 (0.46)	—	—				
Married/ Cohabiting	0.66 (0.48)	—	-.09	—			
Age	29.74 (7.52)	19 – 54	-.05	.10	—		
CAPS	32.94 (8.93)	12 – 64	.19*	.01	-.03	—	
AUDIT	7.94 (7.11)	0 - 34	-.11	-.12	-.23**	0.16*	—
SIS	2.54 (5.10)	0 – 33	.07	-.04	-.01	0.26***	0.18*

*** $p < .001$, ** $p < .01$, * $p < .05$; CAPS = Clinician-Administered PTSD Scale; AUDIT = Alcohol Use Disorder Identification Test; SIS = Suicidal Ideation Scale; Statistically significant parameters ($p < .05$) are highlighted in bold.

Table 3

Zero-inflated Poisson regression model predicting suicidal ideation scale score: Main effects model

	Zero-inflation ^a				Count			
	(Logistic)				(Poisson)			
			Odds Ratio				Rate Ratio	
	<i>b</i>	SE	[95% CI]	<i>p</i>	<i>B</i>	SE	[95% CI]	<i>p</i>
Intercept	2.045	1.052	7.727 [0.983 – 60.757]	.052	0.353	0.327	1.423 [0.750 – 2.703]	.281
Female	-0.845	0.384	0.430 [0.203 – 0.911]	.028	-0.224	0.112	0.799 [0.641 – 0.995]	.045
Married/ Cohabiting	0.052	0.370	1.054 [0.510 – 2.177]	.887	-0.118	0.105	0.889 [0.723 – 1.093]	.263
Age	0.009	0.024	1.009 [0.963 – 1.058]	.695	0.014	0.006	1.014 [1.002 – 1.027]	.026
PTSD	-0.038	0.020	0.963 [0.925 – 1.002]	.063	0.032	0.007	1.032 [1.020 – 1.044]	<.001
AUD	-0.055	0.026	0.947 [0.899 – 0.996]	.036	0.009	0.007	1.009 [0.996 – 1.022]	.192

^a Coefficients predicting zero-values on Suicidal Ideation Scale; AUD = Alcohol use disorder;Statistically significant parameters ($p < .05$) are highlighted in bold.

Table 4

Zero-inflated Poisson regression model predicting suicidal ideation scale score: Interaction model

	Zero-inflation ^a				Count			
	(Logistic)				(Poisson)			
			Odds Ratio				Rate Ratio	
	<i>b</i>	SE	[95% CI]	<i>p</i>	<i>b</i>	SE	[95% CI]	<i>p</i>
Intercept	2.149	1.328	8.576 [0.635 – 115.818]	.106	1.547	0.402	4.698 [2.138 – 10.320]	<.001
Female	-0.842	0.385	0.431 [0.202 – 0.916]	.029	-0.120	0.120	0.887 [0.702 – 1.121]	.315
Married/ Cohabiting	0.080	0.373	1.084 [0.522 – 2.250]	.829	-0.002	0.118	0.998 [0.792 – 1.258]	.987
Age	0.010	0.024	1.010 [0.964 – 1.059]	.671	0.015	0.007	1.015 [1.002 – 1.005]	.022
PTSD	-0.042	0.032	0.959 [0.901 – 1.022]	.198	-0.004	0.011	0.996 [0.976 – 1.016]	.691
AUD	-0.078	0.099	0.925 [0.761 – 1.124]	.434	-0.127	0.035	0.881 [0.822 – 0.943]	<.001
PTSD*AUD	0.001	0.003	1.001 [0.995 – 1.006]	.850	0.003	0.001	1.003 [1.002 – 1.005]	<.001

^a Coefficients predicting zero-values on Suicidal Ideation Scale; AUD = Alcohol use disorder;Statistically significant parameters ($p < .05$) are highlighted in bold.

Table 5

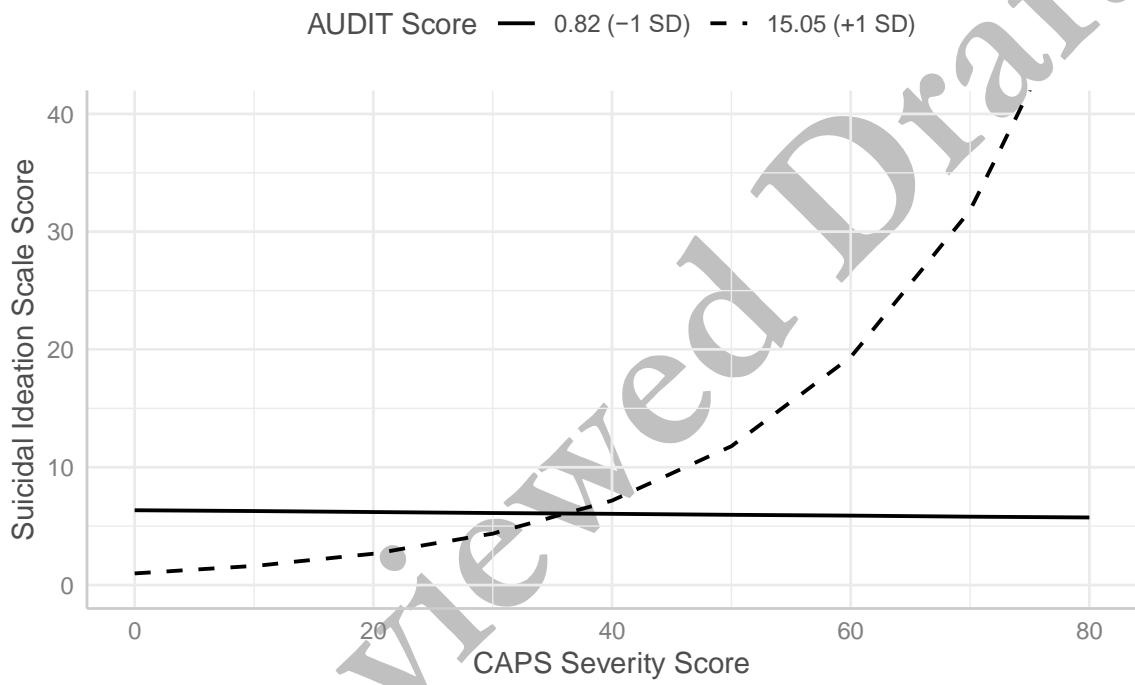
Simple slopes: Estimated effects of CAPS score on SIS score at three levels of AUDIT score

AUDIT Score	<i>b</i>	SE	RR [95% CI]	<i>p</i>
0.82 (Mean - 1 <i>SD</i>)	-0.001	0.010	0.999 [0.980 – 1.018]	.898
7.94 (Mean)	0.023	0.007	1.024 [1.010– 1.037]	<.001
15.05 (Mean + 1 <i>SD</i>)	0.048	0.007	1.049 [1.035 – 1.064]	<.001

RR = Rate ratio; CAPS = Clinician-administered PTSD scale; SIS = Suicidal Ideation Scale; AUDIT = Alcohol Use Disorder Identification Test; Statistically significant parameters ($p < .05$) are highlighted in bold.

Figure Legend

Figure 1: Interaction effect of PTSD and AUD severity on level of suicidal ideation by Poisson portion of the model



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