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Depressive Symptoms Moderate the Association between the Recent History of Alcohol Use Severity and Suicide Attempt History among Adults in a Pretrial Jail Diversion Program

Sean M. Mitchell¹, Tuğba Görgülü^{2,3}, Katie Dhingra⁴, Hugh F. Crean^{2,5}, and Marc T. Swogger²

¹ Department of Psychological Sciences, Texas Tech University

² Department of Psychiatry, University of Rochester Medical Center

³ Department of Psychology, Ankara Science University

⁴ School of Social, Psychological and Communication Sciences, Leeds Beckett University

⁵ School of Nursing, University of Rochester Medical Center

Author Note

Sean M. Mitchell <https://orcid.org/0000-0002-3729-7368>

Tuğba Görgülü <https://orcid.org/0000-0002-5440-7354>

Katie Dhingra <https://orcid.org/0000-0002-2495-3952>

Hugh F. Crean <https://orcid.org/0000-0001-7292-7700>

Marc T. Swogger <https://orcid.org/0000-0002-3662-9084>

We have no known conflict of interest to disclose.

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Correspondence concerning this article should be addressed to Sean M. Mitchell, Ph.D., Department of Psychological Sciences, Mail Stop 42051, Texas Tech University, Lubbock, TX 79409-2051. Email: sean.mitchell@ttu.edu

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⁴ School of Social, Psychological and Communication Sciences, Leeds Beckett University

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Hugh F. Crean <https://orcid.org/0000-0001-7292-7700>

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Abstract

Background: Justice-involved individuals are at elevated risk for suicidal behavior; however, research examining risk for suicidal behavior in pretrial jail diversion programs (pretrial diversion) is limited. **Aims:** We aimed to test 1) associations between depressive symptoms and alcohol and drug use, and suicide attempt history (SAH), and 2) interactions between depressive symptoms and alcohol and drug use in relation to SAH among adults in an urban pretrial jail diversion program. **Method:** The design was cross-sectional, including self-report assessments and file reviews of historical information. Adults ($N = 274$; $M_{age} = 33.72$; 73.7% men; 52.6% Non-Hispanic Black) completed assessments within two weeks of beginning the pretrial program. **Results:** Depressive symptoms were positively associated with SAH after adjusting for other covariates. The significant depressive symptoms by alcohol use interaction indicated that adults with low to average depressive symptoms evidenced a similar likelihood of SAH to those with high depressive symptoms when they also had elevated alcohol use scores. **Limitations:** We used cross-sectional self-report data. **Conclusion:** It may be important to conduct suicide risk assessments for justice-involved people who use alcohol even when depressive symptoms are low.

Keywords: Alcohol use, depression, drug use, pretrial setting, suicide attempt

Introduction

Justice-involved people in the community are at high risk for suicide (Sirdifield et al., 2020). Substance use and depression are robust risk factors for suicide attempts (Favril et al., 2020; Stoliker et al., 2020), and these factors often co-occur in justice-involved people (Preuss et al., 2002). Understanding the combined effects of the severity of a recent history of substance use and depressive symptomatology is essential for improving the assessment and treatment of people in community corrections systems.

Research has demonstrated the multifactorial determination of suicide attempts (Kessler et al., 1999). Substance use and mood disorders are key modifiable risk factors for suicide attempts that warrant further attention among high-risk justice-involved populations. For example, among prisoners with suicide ideation, depressive disorders and alcohol use, but not drug use, were significantly associated with a suicide attempt history (SAH; Favril et al., 2020). Furthermore, alcohol use, drug use, and depressive symptoms were linked to SAH and/or suicide ideation history among prisoners (Stoliker et al., 2020). Thus, clarifying these risk factors in relation to suicidal behaviors in other justice-involved populations may have significant clinical impact.

The combination of substance use and depression may create a particularly high risk for suicide attempts (Preuss et al., 2002), relevant to justice-involved populations. Conner et al. (2014) found that individuals in residential substance use treatment with substance-induced and independent depression had approximately four and ten times greater odds of a SAH, respectively, than those without depression. Indeed, among individuals involved in community corrections, both substance use and depressive symptoms have been linked to suicidal behaviors (Sirdifield et al., 2020).

Approximately 4.5 million U.S. adults are in community supervision programs (including pretrial, probation, and parole; Jones, 2018). Although studies evaluating

depression, substance and alcohol use severity, and suicide attempts in justice-involved samples exist (Favril et al., 2020; Gunter et al., 2011; Sirdifield et al., 2020; Stoliker et al., 2020), studies examining suicide risk among adults in pretrial jail diversion programs (referred to as “pretrial diversion” moving forward) are limited. Those in pretrial diversion includes a broad group of people in the community, under uniquely stressful circumstances (awaiting trial). Research indicates that early periods of involvement in the justice system may represent a crisis event that increases suicide risk (Boren et al., 2018). Additionally, jail and prison detainees awaiting trial are more likely to die by suicide than those post-trial (Boren et al., 2018). Thus, focusing on the adult pretrial diversion population may inform¹ suicide risk assessment and prevention among a particularly vulnerable group.

We aimed to test the relation between severity of a recent history substance use (alcohol and drug use), depressive symptoms, and SAH in an under-studied group—adults in pretrial diversion. We hypothesized that 1) depressive symptoms and severity of recent substance use would be positively associated with SAH, and 2) depressive symptoms would moderate the associations between severity of recent substance use and SAH. We expected that severity of recent substance use would be more strongly related to SAH among individuals high versus low in depressive symptoms across both the recent history of alcohol and other drugs use severity.

Method

Participants

Participants were 274 adults recruited from urban pretrial diversion in Rochester, New York, U.S. between 2007 and 2009. Pretrial-involved individuals in this study have been charged with a misdemeanor or non-violent felony crime and have been released from jail without paying bail while awaiting their court date. They are monitored in the community throughout pre-adjudication court processes and attend the pretrial diversion five days per

week. During this time, they are expected to abstain from substance use and are subject to toxicology tests. Our study's inclusion criteria were: 1) ≥ 18 years old, 2) able to read English, 3) provide informed consent within 2 weeks of beginning the program. Participants were adults ($M_{age} = 33.72$, $SD_{age} = 11.02$) who were mostly men ($n = 202$, 73.7%), Non-Hispanic Black ($n = 144$, 52.6%), and unemployed or receiving disability income ($n = 160$, 58.4%). See *Electronic Supplementary Material (ESM)* for additional sample and program descriptions.

Measures

Psychiatric Diagnostic Screening Questionnaire (PDSQ)

The PDSQ (Zimmerman & Mattia, 2001) is a 125 yes/no item self-report screening questionnaire of common symptoms of psychiatric disorders, excluding personality pathology, where higher scores after summing relevant items indicate greater symptom severity. The PDSQ subscales have demonstrated strong psychometric properties (Zimmerman & Mattia, 2001). See Table 1 for descriptive statistics for the PDSQ scales used in the current study and bivariate associations with SAH, and the *ESM* for additional details.

Depressive Symptoms. This was measured using the Major Depressive Disorder subscale of the PDSQ, consisting of 21 yes/no self-report items relating to the prior 2 weeks. Scores of a 9 or greater indicate a clinical elevation (Zimmerman, 2002).

Severity of a Recent History of Alcohol Use. This was measured by the Alcohol Abuse/Dependency subscale of PDSQ, consisting of 6 yes/no items that measure alcohol use disorder symptoms during the prior 6 months.

Severity of a Recent History of Drug Use. This was measured by the Drug Abuse/Dependency subscale of PDSQ, consisting of 6 yes/no items related to other drug use disorder symptoms during the prior 6 months.

Suicide Attempt History

A self-report yes/no-question assessed lifetime SAH. Participants were asked, “Have you ever tried to kill yourself or attempt suicide?” This item was obtained from the National Comorbidity Survey (Kessler et al., 1999) and has evidenced robust test-retest reliability (Conner et al., 2007). Thirty-three participants (12%) reported one or more previous lifetime suicide attempts.

Procedures

An informational session presenting the study to potential participants occurred at pretrial diversion. Individuals who met inclusion criteria completed self-report measures in groups immediately after or within one week of screening for the inclusion criteria. Among those who heard the announcement, 73.8% participated. Participants were compensated with a \$20 gift card. The local Institutional Review Board approved the study, and a federal certificate of confidentiality was obtained and maintained throughout the study.

Data Analysis Plan

We conducted analyses using SPSS version 27. See the *ESM* for descriptions of handling missing data, additional model assumption and specification information, results without outliers removed, and alternative models (the pattern of findings did not change). The final analyses below included 274 participants. We mean-centered continuous predictor variables for the primary analyses, and sex (coded 0 = women, 1 = men) and age were covariates in the analyses. Logistic regression was used to test the primary hypotheses entering sex, age, the recent history of alcohol use severity, the recent history of drug use severity, and depressive symptoms as predictors (i.e., main effects) in the first step. Next, we included the hypothesized two-way interactions (i.e., depressive symptoms*alcohol use severity, depressive symptoms*drug use severity). For significant interactions ($p < .05$), we conducted simple slopes analyses, examining the association between the recent history alcohol or drug use severity and SAH at various levels of depressive symptoms (i.e.,

depressive symptoms a raw score of 0 (low depressive symptoms), at M (6.18) of the raw scores, and a raw score 9 [the clinical cutoff value]).

Results

Bivariate Associations

Given that little is known about pretrial diversion populations and suicide risk, we examined bivariate logistic regressions to identify potential additional demographic covariates, which indicated age and sex were the only demographic variables significantly associated with SAH. Additionally, a recent history of alcohol use and drug use severity, and depressive symptoms were significantly bivariately associated with SAH (see Table 1). Men were less likely to report a SAH (25% [$n = 18$] of women and 7.4% [$n = 15$] of men reported SAH). Notably, additional demographic covariates (i.e., race, relationship status, education, employment, income, violence history) did not change the pattern or significance of our findings, or improve model fit. See the *ESM* text and tables for additional information and bivariate results.

Main Analysis

First, we tested main effects. The model was significant ($\chi^2[5, N = 274] = 45.91, p < .001$; Nagelkerke $R^2 = .30$), and the Hosmer-Lemeshow (HL) test demonstrated adequate model fit to the data ($\chi^2[8, N = 274] = 7.82, p = .451$). There were significant unique associations between sex and depressive symptoms, and SAH (see Table 2).

Next, we tested the hypothesized two-way interactions. The model was significant ($\chi^2[7, N = 274] = 68.24, p < .001$; Nagelkerke $R^2 = .42$), the HL test demonstrated the model fit the data ($\chi^2[8, N = 274] = 5.56, p = .696$), and model fit significantly improved with the inclusion of the interactions (Likelihood Ratio Test $\chi^2[2, N = 274] = 22.33, p < .001$). Of the two interactions entered, there was only a significant interaction between depressive symptoms and the recent history of alcohol use severity (see Table 2). Simple slopes analyses

indicated when depressive symptoms were a raw score of 0 ($OR = 2.42, p = .001$), average ($M = 6.18; OR = 1.55, p = .001$), or high (a score of 9; $OR = 1.24, p = .028$) there was a positive association between the recent history of alcohol use severity and SAH. Notably, the relation between the recent history of alcohol use severity and SAH was stronger when depressive symptoms were low. Figure 1 graphically presents these findings separately for men and women given sex was included as a covariate.

Discussion

In this study, we tested the recent history of alcohol and drug use severity (past six months) and depressive symptoms (past two weeks) in association with a lifetime SAH among diverse adults in pretrial diversion (within two weeks of beginning this program). Our data indicated that 12% of participants reported a SAH, similar to other community corrections samples (e.g., Sirdifield et al., 2020). Women (25%) were more likely than men (7.4%) to report SAH. This is consistent with the prevalence of a SAH among men and women in prison and probation services (Favril et al., 2020; Hakansson et al., 2010).

Our study extends the finding that, among justice-involved people, depressive symptoms are robustly related to a SAH among individuals in pretrial diversion (Sirdifield et al., 2020). However, contrary to our hypothesis, there were no main effects of the relation between the severity of recent alcohol and drug use symptoms and a SAH after adjusting for other covariates, and there was no significant depressive symptoms by severity of recent drug use interaction. This is inconsistent with some prior findings indicating a relation between suicide attempts and substance use disorders adjusting for other covariates (e.g., Hakansson et al., 2011); however, the recent history of alcohol and drug use severity and depressive symptoms were bivariately associated with SAH in our study. The current non-significant result indicates that prior literature in this area may not entirely extend to a pretrial diversion sample closely monitored in an urban community. Although, another recent study of prisoners

indicated drug use was not linked to SAH among those with suicide ideation (Favril et al., 2020). It is also possible, however, that in our study and Favril et al. (2020), drug use measures masked drug-SAH relations by not differentiating between various illicit drugs. Thus, the relation between drug use and SAH should be examined in greater detail.

We did find that the association between the recent history of alcohol use severity and SAH was moderated by depressive symptoms, albeit in a surprising way. Here, this interaction was similar to that found among adolescents with current suicide ideation, indicating a stronger relation between alcohol use frequency and a SAH when depressive symptoms were low (McManama O'Brien, 2014). In our study, a recent history of alcohol use severity was most strongly associated with SAH at low depressive symptoms, followed by average and then high depressive symptoms. The estimated probabilities (Figure 1) indicated similar trends for men and women, such that adults in pretrial diversion with low to average depressive symptoms evidenced a similar likelihood of SAH to those with high depressive symptoms when they also had elevated recent history of alcohol use severity.

The noted alcohol use by depressive symptom interaction could be conceptualized through ideation-to-action theories of suicide, which suggest that the development of suicide ideation and transition from ideation to suicidal behaviors occur through unique processes (Klonsky et al., 2018). Suicide capability (i.e., one's ability to engage in suicidal behaviors) is thought to be a key mechanism in this transition, to which access to means to attempt suicide, fearlessness about death, and pain tolerance contribute (Klonsky et al., 2018). Our findings provide preliminary evidence that alcohol use may increase suicide capability, and, in turn, suicidal behaviors among people in pretrial diversion. Perhaps alcohol use contributes to one's suicide capability, whereas depression may be less relevant to suicidal capability, increasing suicide ideation only. Consistent with this idea, research has shown depression, but not alcohol use, differentiated adolescents with suicide ideation from those without; however,

alcohol use, but not depression, differentiated adolescents with suicide ideation from those with a SAH (McManama O'Brien, 2014). However, alcohol use and depression differentiated between prisoners with a suicide ideation history only versus those with SAH (who had higher alcohol use scores; Favril et al., 2020). Favril et al. (2020) propose alcohol use may increase capability through various mechanisms (e.g., disinhibition, exposure to painful and provocative events that increase pain tolerance and decrease fear of death); however, we did not test these postulations. Other research suggested that alcohol use was linked to increased general fearlessness about death and perceived pain tolerance among university students, but this has not been directly tested among justice-involved adults (Wolford-Clevenger et al., 2015). Future research that more directly tests mechanisms of the relation between alcohol use and suicide capability, as well as clarifies the role of depression in suicide ideation vs. attempts, among incarcerated and community-supervised justice-involved individuals will be illuminating.

Although our findings cannot speak to how depressive symptoms and the recent severity of alcohol use may impact future suicidal behaviors, our results may provide preliminary clinical insight. Given that a SAH, elevated alcohol use, and heightened depressive symptoms are predictors of future suicidal behaviors (e.g., Darvishi et al., 2015; Christiansen & Jensen, 2007; Ribeiro et al., 2018), understanding how recent alcohol use severity and depressive symptoms are linked to SAH may help identify those at elevated risk for future suicidal behaviors through mental health screening assessments. An important implication of the alcohol use by depressive symptom interaction is that, in addition to depressive symptom assessments, justice-involved people who may overuse alcohol should be carefully assessed for suicide risk as it is more likely they have SAH, and alcohol use and SAH are potent risk factors for later suicide (e.g., Conner et al., 2007). Thus, suicide risk assessments should occur even in the absence of signs of recent depression, given that high

alcohol use appears to increase the probability of SAH among those with low to average depressive symptoms. Targeted screening assessments for alcohol use, depressive symptoms, and past suicidal behaviors could inform suicide risk considerations, the provision of mental health resources and referrals, and the frequency of monitoring in pretrial diversion.

The significant interaction between the severity of recent alcohol use and depressive symptoms in relation to SAH is also consistent with prior findings that problematic alcohol use may be a more significant risk factor than general illicit substance use for suicide attempts. For example, Preuss et al. (2002) conducted a study with 3,190 alcohol-dependent individuals with antisocial personality disorders in prisons, and they found that alcohol users have more substance-induced psychiatric problems than other substance users, potentially contributing to suicide risk. Furthermore, people with more severe alcohol use have a higher prevalence of psychiatric disorders than other substance users.

Whereas there is increasing recognition of the importance of treating substance use disorders among justice-involved people, these problems remain under-treated (Chandler et al., 2009). Research shows that justice-involved people in the community are at high risk for suicide (Sirdifield et al., 2020). Our data indicate the potential suicide prevention utility of assessing and treating depressive symptoms and problematic alcohol use in a jail diversion program, and alcohol assessment and treatment is likely important even among adults who do not report elevated depressive symptoms. For example, evidence-based interventions for substance use (e.g., brief motivational interventions; Swogger et al., 2016) among justice-involved people can be incorporated into community-based programs and may help these individuals decide to seek depression treatment (Zuckoff et al., 2008). Effective treatments for both depression and substance use problems, either in isolation or combined when needed, could effectively reduce suicide-related outcomes.

There are important limitations to our study. First, our study involved a one-item, retrospective, self-report measure of SAH, which generates less reliable information than prospective, observational measures with multiple items and our cross-sectional design precludes interpretations regarding temporal precedence and causality. It is possible that elevations in substance use and depression occurred only after the suicide attempt; thus, our findings should not be assumed to be directly linked to future suicidal behaviors, an interpretation which would require longitudinal data. Additionally, results may not generalize to all justice-involved individuals, pretrial programs, those who chose not to participate, or those who die by suicide. Furthermore, our drug use measure combined many substances and did not explicitly examine poly-substance use, perhaps obscuring relations between substance use and SAH. Furthermore, the pretrial diversion program's requirement to abstain from substance use could have decreased participants' willingness to report such use. We note, however, from subsequent studies of this pretrial diversion population (e.g., Swogger et al., 2016), there was high convergence between self-report and objective toxicology measures of substance use. Because pretrial diversion monitored substance use, the generalization of findings to programs that do not have this condition for program participation, which may have a protective effect, is unclear. These limitations are balanced by many strengths, including the use of a diverse, understudied population, and well-validated measures. This study provides specific insight into the conceptualization of suicide risk among adults in an urban pretrial diversion program.

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Table 1

The Bivariate Associations Between the Predictor Variables and SAH, and Descriptive Statistics

Predictor and Demographic Variables	Logit	SE	Wald χ^2	p	OR	OR 95% CI		M	SD	Possible Range	Observed Range	Cronbach's alpha	Mean Inter-item Correlation
						Lower	Upper						
Depressive Symptoms	0.23	.04	27.73	< .001	1.26	[1.16	1.37]	6.18	4.63	0-21	0-21	.87	.25
Alcohol Use Severity	0.25	.08	9.81	.002	1.28	[1.10	1.50]	1.47	2.09	0-6	0-6	.82	.53
Drug Use Severity	0.29	.09	11.12	.001	1.33	[1.13	1.57]	2.91	2.50	0-6	0-6	.92	.64
Sex	-1.42	.38	13.89	< .001	0.24	[0.11	0.51]	----	----	----	----	----	----
Age	0.04	.02	5.25	.022	1.04	[1.01	1.07]	----	----	----	----	----	----

Note. SAH = Suicide Attempt History (coded 0 = no history, 1 = history); Depressive Symptoms, Alcohol Use Severity, and Drug Use Severity scores = Psychiatric Diagnostic Screening Questionnaire scores; Sex = (coded 0 = women, 1 = men); Age = Age in years; N = 274.

Table 2

The Main Effects of and Interactions Between Depressive Symptoms and the Recent History of Substance Use Severity on SAH, Adjusting for Covariates

Criterion Variable	Predictor Variable	Logit	SE	Wald χ^2	p	OR	OR 95% CI	
							Lower	Upper
SAH	Constant	-1.84	.36	25.78	< .001	0.16		
	Sex	-1.07	.43	6.31	.012	0.34	[0.15	0.79]
	Age	0.02	.02	1.18	.276	1.02	[0.98	1.06]
	Depressive Symptoms	0.19	.05	15.12	.000	1.21	[1.10	1.33]
	Alcohol Use Severity	0.10	.09	1.30	.254	1.11	[0.93	1.33]
	Drug Use Severity	0.11	.09	1.42	.233	1.12	[0.93	1.35]
SAH	Constant	-2.52	.55	20.71	< .001	0.08		
	Sex	-1.19	.46	6.82	.009	0.30	[0.12	0.74]
	Age	0.00	.02	0.04	.852	1.00	[0.96	1.05]
	Depressive Symptoms	0.38	.09	20.22	< .001	1.47	[1.24	1.73]
	Alcohol Use Severity	0.44	.13	10.49	.001	1.55	[1.19	2.01]
	Drug Use Severity	0.35	.18	3.81	.051	1.42	[1.00	2.01]
	Depressive Symptoms x Alcohol Use Severity	-0.08	.02	10.22	.001	0.93	[0.88	0.97]
	Depressive Symptoms x Drug Use Severity	-0.05	0.03	2.80	.094	0.95	[0.89	1.01]

Note. SAH = Suicide Attempt History (coded 0 = no history, 1 = history); Alcohol Use Severity, Drug Use Severity, and Depressive Symptoms = Psychiatric Diagnostic Screening Questionnaire scores; Sex = (coded 0 = women, 1 = men); Age = Age in years; $N = 274$.

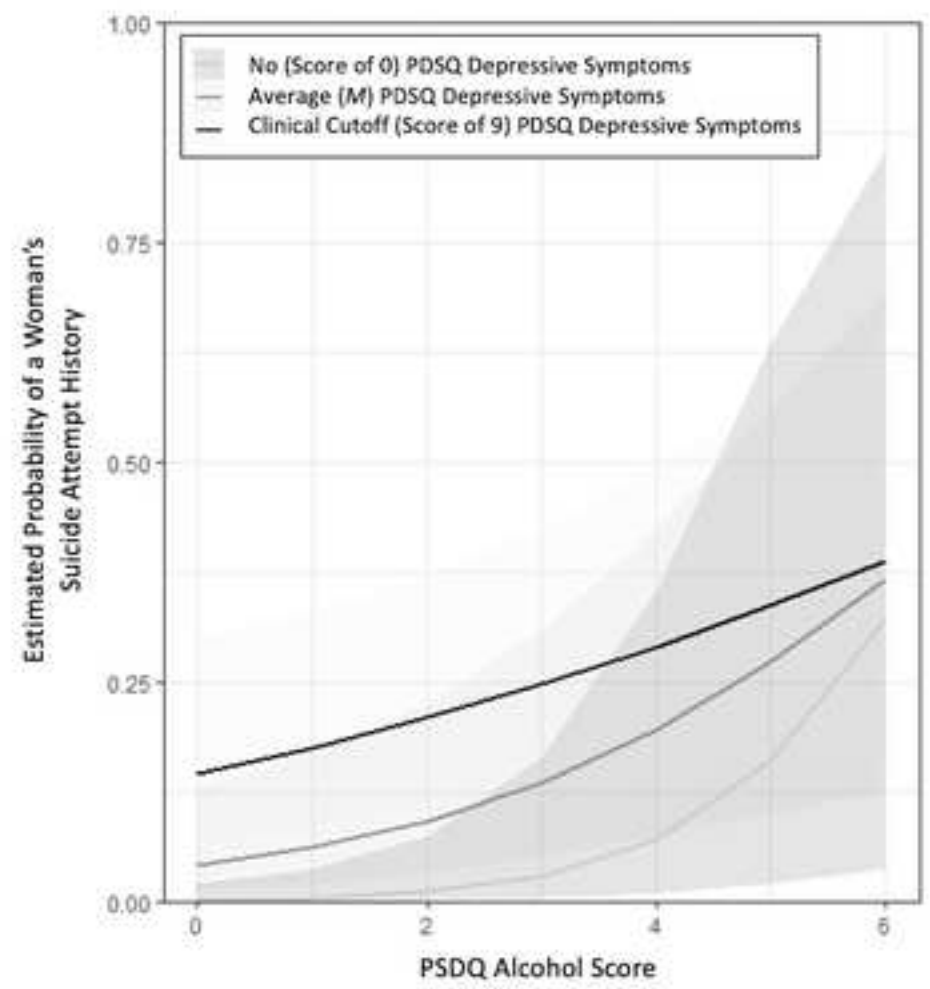
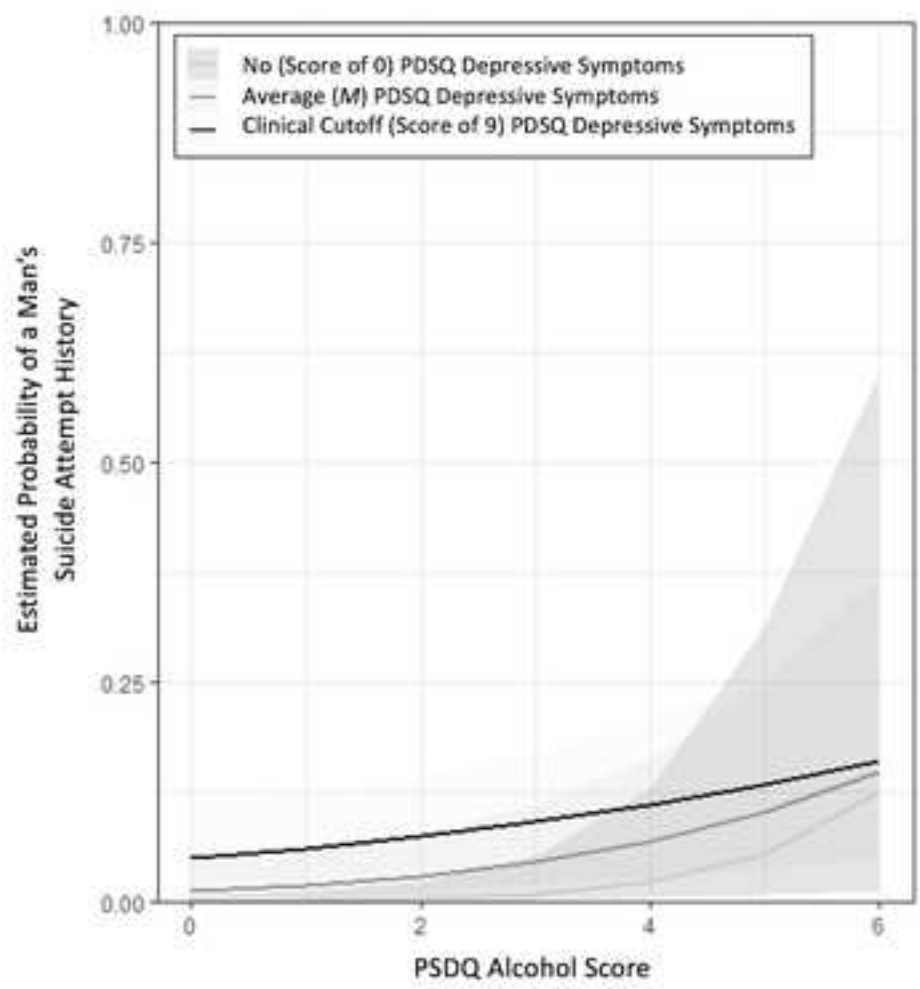
Figure 1

The Association between the Psychiatric Diagnostic Screening Questionnaire (PDSQ) Alcohol Severity Scores and Suicide Attempt History (SAH) Status Across Different Levels of PDSQ Depressive Symptoms

[FIGURE 1 HERE; FIGURE BELOW]

Note. The lines in the graph and corresponding 95% CI bands are the estimated probability values of a SAH across PDSQ recent history of alcohol use severity when PDSQ depressive symptoms are a score of 0, average (M), or at the clinical cutoff score of 9, holding the other variables in the model constant. Given sex is dummy coded (impacting only model intercepts), we graphed men (left graph) and women (right graph) separately. We used the mean-centered PDSQ alcohol scores when calculating the estimated probability of suicide attempt(s); however, for better translation of the PDSQ to clinical practice, we provide the non-centered raw scores on the x-axis. See *Electronic Supplementary Material for each graph separated by PDSQ depressive symptoms level and sex.*

Figure 1



Biography Statements

Sean M. Mitchell, Ph.D. is an Assistant Professor in the Department of Psychological Sciences at Texas Tech University. He earned his Ph.D. in Clinical Psychology at Texas Tech University in 2018. He completed a postdoctoral fellowship in suicide prevention research at the University of Rochester Medical Center in 2019.

Tuğba Görgülü, Ph.D. is an Assistant Professor in the Department of Psychology at Ankara Science University, Turkey. She completed her postdoctoral study as a scholarship holder of The Scientific and Technological Research Council of Turkey at the University of Rochester Medical Center in 2020. Her research primarily focuses on substance use, suicide, and self-harm behavior among high-risk groups.

Dr Katie Dhingra, Ph.D. is a Reader/Associate Professor in Psychology at Leeds Beckett University, UK. Her research largely examines why people behave in ways that are harmful to themselves, with an emphasis on suicide and non-suicidal self-injury.

Hugh F. Crean, Ph.D. is an Assistant Professor of Nursing at the University of Rochester School of Nursing. Dr. Crean's main focus is to provide statistical and research support to faculty within the School of Nursing. His research interests focus on children and youth socio-emotional preventive interventions.

Marc T. Swogger, Ph.D. is an Associate Professor in the Department of Psychiatry at the University of Rochester Medical Center. His research focuses on substance use treatment, harm reduction, and self- and other-directed violence among people in psychiatric and criminal justice systems.



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Crisis_Dep_alc_suicide_ESM 1_FINAL.docx

