



## Prospective prediction of first lifetime onset of suicidal ideation in a national study of substance users

Rachel F.L. Walsh\*, Ana E. Sheehan, Richard T. Liu

Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University, Bradley Hospital, 1011 Veterans Memorial Parkway, East Providence, RI, 02915, United States

### ARTICLE INFO

#### Keywords:

Longitudinal study  
Suicide  
Suicidal ideation  
Substance use

### ABSTRACT

Suicide rates have increased over the past several decades. Prior research has evaluated risk factors for suicidal behavior, but much of this work does not adequately differentiate between risk factors for suicidal ideation (SI) and suicide attempts, nor does it differentiate between first-onset SI and recurrent ideation. This study seeks to identify risk factors for first-onset SI among a high-risk group: individuals receiving treatment for substance use disorders. Data were drawn from the National Treatment Improvement Evaluation Study, a prospective study examining the impact of addiction treatment programs. Patients with no lifetime history of suicide attempts or ideation ( $n = 2560$ ) were assessed at baseline and one year later for prospectively-occurring SI. Sociodemographic variables, mental health indices, interpersonal factors, and substance use severity indicators were evaluated as prospective predictors of first-onset SI in linear regression models. Current mental health problems (OR = 1.54, 95% CI = 1.19–2.01), current substance use problems (OR = 1.33, 95% CI = 1.04–1.70), and difficulty accessing treatment for substance use problems (OR = 1.90, 95% CI = 1.16–3.11) emerged as significant predictors of first-onset SI in a multivariate analysis, suggesting that individuals with current mental health or substance use related symptoms are among the most at risk for developing SI. Difficulty obtaining treatment remained significant, highlighting the importance of treatment accessibility. Future clinical work and research would benefit by addressing these issues, potentially by focusing on mental health treatment in substance abuse programs and evaluating barriers to treatment.

### 1. Introduction

Suicide is a major public health concern. While the prevalence of conditions such as cancer and heart disease has declined considerably over the past several decades, rates of suicide have increased (Centers for Disease Control and Prevention, 2016a). A major antecedent of death by suicide is suicidal ideation. However, much of the suicide research either focuses on risk factors for suicide attempts alone or does not cleanly differentiate between risk factors for suicide attempts and suicidal ideation, often not excluding the former in assessing risk for the latter construct (Klonsky et al., 2016; Klonsky and May 2014). Consequently, in these studies of suicidal ideation, it is often unclear to what degree any observed association with this outcome is in part a function of its frequent co-occurrence with suicide attempts. It is important to cleanly differentiate risk factors for ideation and attempts, given the common view that they differ notably in etiology (Klonsky et al., 2016; O'Connor and Nock, 2014). In fact, there has been considerable theoretical and empirical work supporting the view that risk factors for

ideation and attempts are not necessarily predictive of each other (e.g. Cheek et al., 2015; Van Orden et al., 2010). Therefore, although suicidal ideation is associated with future attempts (Reinherz et al., 2006), it is also an important clinical condition in and of itself, and warrants investigation for this reason.

Furthermore, when trying to identify who is most at risk for experiencing suicidal ideation, a potentially important distinction is between first-onset ideation and recurrent ideation, as it cannot be assumed that the mechanisms of risk for first-onset and recurrent ideation are the same (Everitt and Robbins, 2013; Monroe and Harkness, 2005). Indeed, for several other psychiatric conditions such as depression and substance use disorders, there is theoretical and empirical support for differences in underlying mechanisms of the first-onset and the recurrence of these clinical phenomena (Bircusa and Iacono, 2007; Everitt and Robbins, 2013). Such may similarly be the case for suicidal ideation. Elucidating risk factors specifically for first-onset suicidal ideation is important for informing preventive intervention efforts for this clinical phenomenon before it can develop a recurrent course and

\* Corresponding author.

E-mail addresses: [rachel\\_walsh@brown.edu](mailto:rachel_walsh@brown.edu) (R.F.L. Walsh), [ana\\_sheehan@brown.edu](mailto:ana_sheehan@brown.edu) (A.E. Sheehan), [rliupsych@gmail.com](mailto:rliupsych@gmail.com) (R.T. Liu).

before potential transition to suicidal behavior.

There is a notable paucity of studies predicting first-onset of ideation. This is in large part due to the considerable methodological challenges involved in conducting such studies. First, it is impossible to study risk factors in cross-sectional studies (Kraemer, 1997), necessitating a prospective design and attendant increases in sample size. Studying risk for suicidal ideation is particularly challenging because its low base rate (i.e., 12-month prevalence of 2.8–3.3% in epidemiological samples; Kessler et al., 2005) increases the required sample size considerably more to achieve adequate statistical power for analyses (Brent, 1989; Goldsmith et al., 2002; Prinstein, 2008; Prinstein et al., 2008). This challenge is magnified even more in the case of prospectively predicting first lifetime onset of suicidal ideation, particularly unconfounded with suicide attempts.

In addition to drawing on large samples, a strategy to address this challenge of ensuring adequate prospective rates of first-onset suicidal ideation for statistically powered analyses is to sample from high-risk populations (e.g., substance users; Nock et al., 2008a). There are also clinically important reasons for adopting this strategy. First, even among high-risk populations, most individuals do not go on to experience suicidal ideation or behavior, and it remains difficult to accurately predict risk in these populations (Jacobs and Brewer, 2004; Liu et al., 2012; Yen et al., 2013). Second, it is important to distinguish risk factors for non-clinical or community samples from risk factors for clinical populations, as they are not necessarily the same (King et al., 2015; Yen et al., 2013). Third, clinicians most frequently assess suicide risk in at-risk or treatment-seeking samples, making risk factors derived from clinical samples of particularly value. Identifying the specific constructs that convey risk for first-onset ideation within a clinical sample could allow clinicians to intervene while a patient's general clinical presentation is less severe, and thus reduce the likelihood of suicidal ideation, and ultimately, the transition to suicidal behavior.

This study aims to address the need in the empirical literature to characterize risk factors for first-onset suicidal ideation among a large high-risk sample of substance users. In particular, the National Treatment Improvement Evaluation Study (NTIES) offers a rare opportunity to study the first onset of ideation prospectively over a one-year follow up, unconfounded by prospectively occurring suicide attempts. Drawing on prior literature to identify specific candidate risk factors, we hypothesized that several sociodemographic characteristics (i.e., sex; Nock et al., 2008b), mental health indices (i.e., depression; Nock et al., 2008a; Troister et al., 2013), interpersonal factors (i.e., partner or spousal physical abuse; Heru et al., 2006; McLaughlin et al., 2012), indicators of substance use severity (Borges et al., 2008; Cheek et al., 2015; Liu et al., 2014), and psychiatric treatment utilization (Luoma, 2002) conveyed risk for first-onset suicide ideation.

## 2. Methods

### 2.1. Participants and procedures

Data were obtained from the National Treatment Improvement Evaluation Study (NTIES; Gerstein et al., 1997), a five-year (1992–1997) longitudinal, multi-site study of publicly-funded addiction treatment programs. NTIES is comprised of 4526 patients who consented to participate and completed the intake, discharge, and one-year follow-up interviews. Participants were recruited from 78 clinical service delivery units and data were collected by the National Opinion Research Center at the University of Chicago with assistance from the Research Triangle Institute, Research Triangle Park, NC. Although the sample is generally comparable to those found in other large-scale treatment follow-up studies in terms of distributions in sex, educational attainment, prior treatment experience, NTIES includes a higher representation of traditionally underserved and vulnerable populations (e.g., minorities, pregnant women, welfare recipients, and individuals in the criminal justice system). It also includes a higher proportion of

minorities, specifically African Americans and Hispanics (Gerstein et al., 1997; Gerstein and Johnson, 2000). The sample for the present study consisted of a subset of individuals who reported no lifetime history of suicide ideation or suicide attempts at the intake assessment.<sup>1</sup> Additionally, to assess risk factors for first-onset suicidal ideation unconfounded by risk for suicide attempts, we also excluded individuals with prospectively occurring suicide attempts during follow-up.

Data were collected at treatment intake, treatment exit, and a year after treatment completion. Participants completed structured, computer-assisted, study specific survey protocols, which were administered by trained NTIES staff at each time point. At treatment intake, data were collected on sociodemographic characteristics, indices of mental health, interpersonal factors, substance use severity, and lifetime history of suicidal ideation and suicide attempts. At post-baseline assessments, participants reported on any suicidal ideation (and suicide attempts, in the case of the present study to screen out prospective attempters) since the prior assessment.

### 2.2. Measures

#### 2.2.1. Sociodemographic characteristics

At intake, participants reported on their sex, age, race and ethnicity, along with the highest education level they had attained (i.e., responses ranged on a scale from “6th grade or lower” to “4 years of college/technical school or more”), in addition to marital status (currently married versus not currently married).

#### 2.2.2. Mental health

Current psychiatric distress was assessed by the question “Right now, how troubled or bothered are you by your emotions, nerves, or mental health?” Responses were on a three-point Likert scale (i.e., “not at all,” “somewhat,” or “very much”). To evaluate lifetime history of depressive symptoms, participants were asked whether they had ever experienced a period of at least two weeks when they felt: (1) very sad or depressed, or (2) had lost interest and pleasure in things that they used to care about. Individuals that endorsed either of these items were then classified as having a lifetime history of depressive symptoms. Depressive symptoms were operationalized in this way following the precedence of previous studies that have used these data (Bohnert et al., 2011; Trout et al., 2017). A history of intensive or outpatient psychiatric treatment was assessed using the following two items: “Have you ever stayed somewhere for at least 24 h for professional treatment of problems with your emotions, nerves, or mental health?” and “Have you ever received outpatient treatment for problems with your emotions, nerves, or mental health?”

#### 2.2.3. Substance use severity

Two measures of substance use were assessed, including lifetime history of injection drug use and polysubstance use. To measure lifetime injection drug use history, participants were asked “Have you ever, even one time, used a needle to inject drugs to get high or for other non-medical effects?” Lifetime polysubstance use was generated by summing affirmative responses to items asking if they have ever tried any one of the twelve categories of substances including inhalants, marijuana/hashish, crack, cocaine, PCP/angel dust, hallucinogens, heroin, illegal methadone, other narcotics, illegal uppers, other downers or any other drugs besides alcohol. Problems getting treatment for substance use was determined with an item asking “Is there anything that might make it hard for you to get treatment or counseling here, such as getting time off from work or school, getting child care, not being able to find a way to get here, or something else?” Hospitalizations resulting from

<sup>1</sup> A comparison of this subset of individuals to all remaining NTIES patients (which included those with a baseline history of suicidal ideation and attempts) on baseline study variables is presented in Supplemental Table 1.

drug overdose or alcohol intoxication, respectively, were assessed by the items “Have you ever had to go to the hospital because of a drug overdose?” and “Have you ever been in a hospital because of your drinking?” Current distress regarding substance use and alcohol use, respectively, was assessed by the items “Right now, how troubled or bothered are you by your use of drugs other than alcohol?” or “Right now, how troubled or bothered are you by your alcohol use?” to which answers ranged from not at all, somewhat, or very much.

#### 2.2.4. Romantic partner abuse

Physical abuse by a romantic partner was assessed with an item asking participants “Have you ever been beaten a spouse or partner?”

### 2.3. Data analyses

A series of univariate logistic regression analyses was conducted, with prospective suicidal ideation as the criterion variable. Sociodemographic characteristics (i.e., age, years of education, sex, race/ethnicity, and marital status), mental health indices (i.e., history of psychiatric treatment utilization, depressive symptoms, and current psychiatric distress), substance use severity indices (i.e. polysubstance use, history of intravenous substance use, hospitalization for drug overdose and intoxication, respectively, current distress regarding substance use and alcohol use, respectively, and current difficulties getting adequate treatment for substance use) and romantic partner abuse were assessed individually as candidate predictor variables. All predictors found to be significant at  $p < 0.05$  were included in a final multivariate logistic regression model with prospective suicide ideation as the criterion variable.

## 3. Results

The sample consisted of 2560 individuals with a mean age of 31.49 (SD = 8.81). A fifth of the sample was female (20.82%), and 30.08% was non-Hispanic white, 56.02% non-Hispanic black, and 13.91% Hispanic.<sup>2</sup> The average level of education at baseline was 11.21 years (SD = 1.94). Finally, 19.92% was currently married, and 12.97% reported a history of partner or spousal physical abuse. In terms of mental health, 13.95% of the sample had a history of mental health treatment, and 56.29% reported a history of depressive symptoms specifically. A substantial portion (40.08%) reported some degree of current mental health trouble. Descriptive information about substance use history is as follows: on average, participants reported using 3.86 (SD = 2.60) different substances, 30.82% had a history of intravenous drug use, 10.02% had been hospitalized for an overdose, and 12.77% had been hospitalized for drinking. In terms of current issues, 62.30% reported distress due to substance use problems, 38.98% were distressed by current drinking problems, and 10.04% reported difficulty accessing treatment for substance use issues. Over the one-year follow-up period, 5.12% developed lifetime first-onset suicidal ideation. Correlations among study variables are presented in Table 1 and range from  $r = -0.11$  to 0.36. Sex, current troubles with mental health and substance problems, lifetime polysubstance use, history of IV drug use, past hospitalization for an overdose, difficulty getting treatment for substance use problems, and partner or spousal physical abuse were significantly correlated with first lifetime onset of suicidal ideation.

In total, 79.99% of participants completed the follow-up assessment at treatment exit, and 81.72% completed the follow-up assessment one year post-treatment discharge. A series of  $\chi^2$  tests and independent-samples t-tests was conducted to assess for potential differences, between participants based on attrition status, in terms of demographic and baseline study variables (i.e., sex, race/ethnicity, marital status, age, education, as well as a history of mental health

treatment, history of depressive symptoms, being currently troubled by mental health, being currently troubled by substance use, being currently troubled by alcohol use, difficulty accessing treatment for substance use, lifetime polysubstance use, history of injection drug use, history of being hospitalized for a drug overdose, history of being hospitalized for alcohol intoxication, and a history of physical abuse by a romantic partner). Those who attrited were more troubled by difficulties relating to substance use ( $t = 2.77$ ,  $p = 0.01$ ) and alcohol ( $t = 3.04$ ,  $p < 0.01$ ), and greater difficulties accessing treatment for substance use ( $\chi^2 = 9.41$ ,  $p < 0.01$ ). No differences were observed between those who remained in the study and those who attrited for all remaining variables ( $ps > 0.05$ ).

Results of univariate logistic regression analyses predicting first lifetime onset of suicidal ideation are presented in Table 2. In these analyses, sex emerged as a significant predictor, with females having twice the odds of experiencing first-onset suicidal ideation at follow-up. Among the mental health variables, current psychiatric distress, but neither history of mental health treatment, nor past depression, heightened risk for first-onset suicidal ideation. Notably, all substance use variables, with the exception of current distress relating to alcohol problems, were associated with greater odds of first-onset suicidal ideation. Finally, participants who experienced partner or spousal physical abuse had almost twice the odds of experiencing first-onset suicidal ideation as compared to those without partner or spousal physical abuse history.

Variables that reached significance at the univariate level were entered into a multivariate analysis. Results from the multivariate logistic regression are presented in Table 3. Current distress over mental health and substance use, respectively, remained significant predictors of first lifetime onset of suicidal ideation. Difficulty accessing treatment for substance abuse also remained a significant predictor in the multivariate model.<sup>3</sup>

## 4. Discussion

The current study aimed to identify risk factors for first lifetime onset suicidal ideation among a high-risk group of individuals with substance use disorders. Our findings indicate current distress relating to mental health and substance use, respectively, and difficulty adequately accessing treatment for substance use uniquely predicted first-onset suicidal ideation. These results address a particularly important gap in the literature, as there is a want of research characterizing risk factors for the first lifetime occurrence of this clinical outcome, particularly featuring analyses unconfounded by risk for suicide attempts. This phenomenon is of great clinical relevance, as prior research has found the transition from first-onset ideation to attempt to be relatively short, with over 60% of individuals transitioning from lifetime first-onset of suicidal ideation to attempt within a one-year time frame (Glenn and Nock, 2014; Kessler et al., 1999; Nock et al., 2013, 2008a; O'Connor and Nock, 2014). This highlights the importance of identifying at-risk individuals and intervening before the initiation of this trajectory.

Several findings warrant discussion. First, all three variables that emerged as significant in the multivariate model had effect sizes ranging from small to small-to-medium. This is consistent with the notion that suicidal thoughts and behaviors are multidetermined. Numerous genetic and environmental factors contribute to the onset of suicidality (Brent and Mann, 2005; Smith et al., 2012), and therefore it can be expected that the individual effect sizes would not be large, and thus our findings are consistent with previous literature (Ribeiro et al.,

<sup>3</sup> The same univariate and multivariate logistic regression analyses were conducted with individuals who prospectively attempted during the follow-up period ( $n = 52$ ) included in the analyses. The results of these analyses are presented in Supplemental Tables 2 and 3, respectively.

<sup>2</sup> The cumulative values for race/ethnicity exceeded 100% due to rounding.

**Table 1**  
Correlations between study variables (n = 2560).

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Sex	–													
2. Education (years)	0.05 <sup>b</sup>	–												
3. Currently unmarried	0.02	–0.11 <sup>c</sup>	–											
4. History of mental health treatment	0.07 <sup>c</sup>	< 0.01	0.03	–										
5. Depressive symptoms	0.04 <sup>a</sup>	–0.01	< 0.01	0.17 <sup>c</sup>	–									
6. Currently troubled by mental health	0.08 <sup>c</sup>	0.04	–0.02	0.21 <sup>c</sup>	0.28 <sup>c</sup>	–								
7. Lifetime polysubstance use	–0.02	0.09 <sup>c</sup>	–0.05 <sup>a</sup>	0.05 <sup>a</sup>	0.14 <sup>c</sup>	0.16 <sup>c</sup>	–							
8. History of intravenous drug use	< 0.01	0.01	–0.08 <sup>c</sup>	0.02	0.07 <sup>c</sup>	0.09 <sup>c</sup>	0.52 <sup>c</sup>	–						
9. Hospitalized for overdose	< 0.01	–0.04 <sup>a</sup>	–0.03	0.01	0.04	0.07 <sup>c</sup>	0.24 <sup>c</sup>	0.28 <sup>c</sup>	–					
10. Currently troubled by substance use problems	0.09 <sup>c</sup>	0.05 <sup>b</sup>	< 0.01	< 0.01	0.12 <sup>c</sup>	0.24 <sup>c</sup>	0.34 <sup>c</sup>	0.21 <sup>c</sup>	0.11 <sup>c</sup>	–				
11. Difficulty getting treatment for substance use problems	0.10 <sup>c</sup>	0.02	–0.05 <sup>a</sup>	–0.01	–0.03	< 0.01	0.05 <sup>a</sup>	0.05 <sup>a</sup>	0.06 <sup>b</sup>	0.03	–			
12. Hospitalized for drinking	–0.04	–0.03	< 0.01	0.10 <sup>c</sup>	0.09 <sup>c</sup>	0.12 <sup>c</sup>	0.02	0.02	0.10 <sup>c</sup>	–0.03	0.02	–		
13. Currently troubled by alcohol problems	–0.07 <sup>c</sup>	–0.01	< 0.01	0.09 <sup>c</sup>	0.09 <sup>c</sup>	0.20 <sup>c</sup>	0.02	–0.03	0.05 <sup>a</sup>	0.13 <sup>c</sup>	–0.05 <sup>b</sup>	0.29 <sup>c</sup>	–	
14. Partner or spousal physical abuse	0.36 <sup>c</sup>	0.01	–0.04	0.06 <sup>b</sup>	0.10 <sup>c</sup>	0.08 <sup>c</sup>	0.06 <sup>b</sup>	0.05 <sup>b</sup>	0.05 <sup>a</sup>	0.05 <sup>a</sup>	0.03	0.03	0.03	–
15. First lifetime onset suicidal ideation at follow-up	0.07 <sup>c</sup>	–0.02	–0.01	0.02	0.02	0.09 <sup>c</sup>	0.07 <sup>c</sup>	0.05 <sup>b</sup>	0.04 <sup>a</sup>	0.08 <sup>c</sup>	0.07 <sup>c</sup>	0.03	< 0.01	0.06 <sup>b</sup>

<sup>a</sup>p < 0.05, <sup>b</sup>p < 0.01, <sup>c</sup>p < 0.001.

**Table 2**  
Univariate predictors of first-onset suicidal ideation (n = 2560).

Predictor	First-onset suicidal ideation	p
	Odds Ratio (95% CI)	
<i>Sociodemographic variables</i>		
Sex (female)	2.01 (1.38–2.92)	< 0.001
<i>Race</i>		
Non-Hispanic White (reference)	–	
Non-Hispanic Black	1.05 (0.69–1.58)	0.83
Hispanic	1.54 (0.91–2.61)	0.11
Currently unmarried	0.87 (0.57–1.33)	0.51
Age (years)	1.00 (0.98–1.02)	0.99
Education (years)	0.95 (0.86–1.04)	0.22
<i>Mental health variables</i>		
History of mental health treatment	1.34 (0.84–2.13)	0.22
Depressive symptoms	1.19 (0.83–1.70)	0.34
Currently troubled by mental health	1.75 (1.37–2.24)	< 0.001
<i>Substance use variables</i>		
Lifetime polysubstance use	1.11(1.04–1.19)	< 0.01
History of intravenous drug use	1.62 (1.13–2.31)	< 0.01
Hospitalized for overdose	1.72 (1.05–2.83)	0.03
Currently troubled by substance use problems	1.53 (1.23–1.90)	< 0.001
Difficulty getting treatment for substance use	2.23 (1.42–3.52)	< 0.001
Hospitalized for drinking	1.49 (0.93–2.37)	0.09
Currently troubled by alcohol problems	0.87 (0.81–1.28)	0.87
<i>Interpersonal variables</i>		
Partner or spousal physical abuse	1.95 (1.25–3.04)	< 0.01

Note. CI = confidence interval.

2018). The modest effect sizes are reflective of the challenges encountered predicting suicide risk, requiring the consideration of a broad array of variables to accurately characterize this risk.

Second, current distress regarding substance use and mental health, respectively, remained significant in multivariate analyses. Notably, even within a sample of people in treatment for substance use, where substance use severity is uniformly high, variability in degree of distress regarding substance use still had value in predicting first onset suicidal ideation. It is also interesting to note that indices of substance use severity were predictive of suicidal ideation in this study, at least at the univariate level, but prior research did not find these variables to predict suicide attempts (Trout et al., 2017). This pattern of findings is consistent with the view that risk factors for ideation often differ from those of attempts (Klonsky and May 2014).

**Table 3**  
Multivariate analysis prospectively predicting first lifetime suicidal ideation (n = 2560).

Predictor	First-onset suicidal ideation	p
	Odds Ratio (95% CI)	
<i>Sociodemographic variables</i>		
Sex (female)	1.50 (0.97–2.32)	0.07
<i>Mental health variables</i>		
Currently troubled by mental health	1.54 (1.19–2.01)	< 0.01
<i>Substance use variables</i>		
Lifetime polysubstance use	1.02 (0.93–1.11)	0.68
History of intravenous drug use	1.19 (0.77–1.86)	0.43
Hospitalized for overdose	1.24 (0.72–2.13)	0.45
Currently troubled by substance use problems	1.33 (1.04–1.70)	0.02
Difficulty getting treatment for substance use	1.90 (1.16–3.11)	0.01
<i>Interpersonal variables</i>		
Partner or spousal physical abuse	1.46 (0.89–2.39)	0.13

Note. CI = confidence interval.

Moreover, distress over substance use and mental health difficulties, collectively, may simply reflect general psychological distress in a manner consistent with the recently proposed p factor, a unidimensional construct of general psychopathology. The p factor is compelling in parsimoniously explaining the frequent high comorbidity of mental disorders and why the etiologies of psychiatric conditions have been difficult to disentangle (Caspi et al., 2014). Our findings support the view that a general psychological distress measure may be worth exploring in future research, specifically examining the predictive value of p factor for first-onset suicidal ideation.

Third, difficulty accessing treatment for substance use problems also predicted first lifetime onset ideation, a particularly interesting finding, as all participants were in treatment at the time. This finding speaks to the importance of addressing barriers to psychiatric care not only amongst untreated individuals, but even amongst those who have already initiated treatment. It may be that these latter individuals, in struggling with barriers to care, have sporadic attendance or ultimately drop out of treatment altogether, and thus receive suboptimal treatment. When considered with the aforementioned finding regarding distress from mental health and substance use difficulties, a potential “double hit” conceptualization of risk for suicidal ideation emerges. Specifically, greatest risk for first-onset suicidal ideation appears to come from having the hardest time with substance use and mental

health problems while also struggling to access much-needed treatment. In such cases, those with greatest need for treatment and at greatest risk for suicidal ideation are also those experiencing significant difficulty having this need met. Despite recent findings that mental health treatment usage has increased considerably over the past several decades (Olfson et al., 2015a, 2015b; 2014; Plemmons et al., 2018), there is still a substantial unmet need. Prior research has demonstrated that individuals with mental health problems tend to under-utilize treatment services (Kessler et al., 2005), with nationally-representative data indicating only 41% of those with a psychiatric disorder received treatment within the past year (Wang et al., 2005). Further research should examine and address barriers to treatment in those at risk for suicidal ideation, thereby potentially preventing its first occurrence.

It is also worth noting that depressive symptoms were not a significant predictor of first-onset suicidal ideation. At first, this finding appears inconsistent with prior research finding a link between depression and suicidal ideation. However, many studies of risk factors utilize community-based samples (e.g., school or primary care; Borges et al., 2008; Nrugham et al., 2008; Ribeiro et al., 2018) and caution should be exercised in generalizing to clinical samples, in which traditional suicide risk factors have sometimes not been found to be predictive (King et al., 2015; Yen et al., 2013). High-risk, treatment-receiving populations differ from community-based populations in many important ways, one being that the former tend to exhibit less variability in terms of the risk factors identified in community populations (e.g., depression). In such populations, the presence of depression and other traditional risk factors are the norm, rather than the exception. In that regard, our findings are in line with the view that risk profiles differ based on the population and reflect the challenges of accurately predicting suicide-related outcomes in traditionally high-risk populations. Additionally, recent research suggests the link between depression and suicidal ideation may be more modest than previously thought, with a meta-analysis finding a modest effect size for depressive symptoms predicting suicidal ideation (Ribeiro et al., 2018). It is important to note, however, that this study used a brief measure of depression. Although this has benefits for feasibly collecting data from a large sample, future studies should seek to replicate findings in relation to clinical depression.

Prior mental health treatment was also not predictive of first-onset suicidal ideation. Additionally, psychiatric service utilization was uncommon within this sample (13.95%). Collectively, these two findings are consistent with prior epidemiologic research reporting that less than half of those with suicidal thoughts accessed mental health care in the past year (Bruffaerts et al., 2011). Furthermore, these findings suggest that preventative services are underutilized, even within this traditionally high-risk sample. Addressing this significant underutilization is critical for preventing first-onset ideation and the progressively worsening course that often follows (Goldston et al., 2015).

Finally, it is also worth mentioning that although intimate partner violence had the second-largest effect size in univariate analyses (medium-to-large effect), it was not significant in the final multivariate model. Considering the substance-related variables that remained significant in the multivariate model, one possibility is that the effect observed for intimate partner violence in univariate analyses may be driven by conflict related to substance use difficulties. As it was not possible to evaluate this in the current study, it would need to be explored in future research.

#### 4.1. Limitations

Although this study has numerous strengths, it is not without limitations. First, the data for this study were drawn exclusively from a high-risk sample of individuals in treatment for substance use, and thus the results may not be generalizable to other high-risk populations, such as psychiatric inpatients or non-substance-using populations. However, seeing as substance use is a growing problem in the United

States, as reflected by the increasing number of deaths from drug overdoses (Centers for Disease Control and Prevention, 2016b), therefore research focusing on this population remains a priority. Second, this sample was receiving treatment for substance use, and therefore the findings might be less applicable to substance users not in treatment, for whom the magnitude of the observed effects may differ. Indeed, the effect sizes may be even greater in untreated substance users, as treatment for substance use may mitigate risk for suicidal ideation. Third, certain diagnoses (e.g. PTSD, Oquendo et al., 2005) that have been associated with suicidal ideation were not included in these analyses and should be evaluated in future research. Finally, the average age of onset of first lifetime suicidal ideation is late adolescence to early 20's (Kessler et al., 1999), whereas this study had a slightly older sample with a mean age of 31.49. Future research should broaden examination of risk for first-onset ideation to other age groups, particularly adolescents, as there is a sharp increase in the risk for this outcome during this developmental period (Kessler et al., 1999; Nock et al., 2008b). Insofar as the relation between risk factors and suicidality may change as a function of age (Kasen et al., 2011; McGirr et al., 2008), such research is important for developing population-specific characterizations of risk.

#### Conflicts of interest

None of the authors report any conflicts of interest.

#### Acknowledgements

Preparation of this manuscript was supported in part by the National Institute of Mental Health of the National Institutes of Health under Award Number R01MH101138. The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agency.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpsychires.2018.09.019>.

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