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Substance Use Disorders and Poverty as Prospective Predictors of Adult First-Time Suicide Ideation or Attempt in the United States

Ronald G. Thompson Jr., Ph.D.^{1,3}, Dana Alonzo, Ph.D.², Mei-Chen Hu, Ph.D.¹, and Deborah S. Hasin, Ph.D.^{1,3,4}

¹Department of Psychiatry, Columbia University, New York, New York 10032, USA

²Graduate School of Social Service, Fordham University, West Harrison, New York 10604, USA

³New York State Psychiatric Institute, New York, New York 10032, USA

⁴Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, New York 10032, USA

Abstract

This study examined whether substance use disorders and poverty predicted first-time suicide ideation or attempt in United States national data. Respondents without prior histories of suicide ideation or attempt at Wave 1 of the NESARC (N=31,568) were analyzed to determine the main and interactive effects of substance use disorders and poverty on first-time suicide ideation or attempt by Wave 2, three years later. Adjusted for controls, poverty (AOR=1.35, CI=1.05–1.73) and drug use disorders (AOR=2.10, CI=1.07–4.14) independently increased risk for first-time suicide ideation or attempt at Wave 2. SUD and poverty did not interact to differentially increase risk for first-time suicide ideation or attempt, prior to or after adjustment for controls. This study reinforces the importance of substance use disorders and poverty in the risk for first-time suicide ideation or attempt. Public health efforts should target messages to drug users and the impoverished that highlight their increased risk for first-time suicide.

Keywords

suicide ideation or attempt; substance use disorders; poverty; NESARC

INTRODUCTION

Suicide continues to be a major public health concern in the United States (US), where in the last decade the annual suicide rate has risen to approximately 38,000 suicide deaths per year (Centers for Disease Control and Prevention, 2010). Suicide is the 10th leading cause of death in the US, with the annual incidence of suicide in the general population at

Corresponding Author: Ronald G. Thompson, Jr., Ph.D., Department of Psychiatry, College of Physicians and Surgeons, Columbia University, 1051 Riverside Drive, Box 123, New York, NY 10032, USA. Tel.: +1 646-774-7910; fax: +1 212 543 5913. rgt2101@cumc.columbia.edu.

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approximately 13 suicide deaths for every 100,000 persons (Centers for Disease Control, 2010). Suicidal ideation and attempt are associated with increased risk for suicide death, and occur in approximately 3.9% and 0.6%, respectively, of the general population (SAMHSA, 2013). The lifetime prevalence of suicide attempts in the US has not decreased over the past decade (Baca-Garcia et al. 2010; Centers for Disease Control and Prevention 2008; Goldsmith et al. 2002) and the yearly age-adjusted rate of suicide increased between 1997 and 2007 (Centers for Disease Control and Prevention 2009). This suggests a need to further investigate potentially preventable risk factors for suicidal ideation or attempt at the national level, as well as how these risk factors interact to differentially influence the likelihood of suicidal ideation or attempt, to inform the development of effective prevention and treatment.

Substance use disorders (SUD), particularly alcohol use disorders (AUD), have been identified as important preventable and treatable risk factors for suicide (Comtois et al. 2004; Conner et al., 2010; Dalton et al. 2003; Darke et al. 2004; Ilgen et al., 2010; Lopez et al. 2001; Potash et al. 2000; Roy 2002; Roy et al. 1990; Tiet et al. 2006; Vijayakumar et al. 2011; Weiss et al. 2005), with rates of lifetime suicide attempts being as high as 40–60% among patients with SUD (SAMHSA, 2010). Additionally, prior studies have found that approximately one third of patients seeking treatment for SUD reported suicidal ideation within the two weeks prior to seeking services (Ilgen et al. 2007). However, relatively little is known at the national level about the prospective impact of drug use disorders (DUD) on suicidal behavior (Darke & Ross, 2002; Erinoff et al. 2004; Substance Abuse and Mental Health Services Administration 2009), as the majority of such studies on SUD and suicide ideation or attempt have focused solely on problematic alcohol use, have not included problematic drug use, infrequently employed reliable and valid DSM diagnostic measures for AUD or DUD (Vijayakumar et al. 2011), and seldom controlled for the influence of sociodemographic and psychiatric covariates (Bolton et al. 2010).

Research has also linked poverty, another potentially preventable and treatable condition, to suicide ideation and attempt (Agerbo et al. 2007a; Agerbo et al. 2002; Agerbo et al. 2006; Agerbo et al. 2007b; Blakely et al. 2003; Kposowa 2001; Ma et al. 2009; Mortensen et al. 2000). For example, epidemiological studies have shown that adult suicide deaths tend to concentrate in disadvantaged communities (Middleton et al. 2006; Rehkopf et al. 2006). Further, prior studies have found that neighborhood disadvantage was independently associated with adult suicide deaths even after controlling for individual level socio-economic characteristics (Cubbin et al. 2000). However, findings regarding the relationship between poverty and suicide ideation or attempt are inconsistent. This may be due to the fact that multiple indicators of poverty have been used across prior studies, including household income, employment status, educational attainment, and neighborhood of residence (Beautrais et al. 1996; Borges et al. 2006; Burrows et al. 2010; Chan et al. 2009; Hawton et al. 2001; Joe et al. 2006; Joe et al. 2008; Kessler et al. 1999; Lemstra et al. 2009; Ma et al. 2009; Nock et al. 2008; Page et al. 2009; Posada-Villa et al. 2009; Taylor et al. 2005; ten Have et al. 2009), making it difficult to make comparisons between studies. Yet, even among those studies using only absolute household income as an indicator of poverty, findings are inconsistent with some finding inverse associations between poverty and suicide ideation

(Chan et al. 2009; Cohen et al. 2010; Lemstra et al. 2009) or attempt (Ma et al. 2009), and others finding the reverse (Joe et al. 2009; ten Have et al. 2009).

However, despite their associations with each other and suicidal behavior, no study has prospectively examined the independent and combined effects of SUD and poverty on the risk for first-time suicide ideation or attempt, including whether poverty moderates the relationship between SUD and subsequent first-time suicide ideation or attempt. Prospective, general population studies using standardized diagnostic measures that can control for relevant covariates are necessary to establish temporality between SUD, poverty, and first-time suicide ideation or attempt and inform public health policy and clinical interventions to reduce poverty and suicide ideation or attempt, as well as efforts to address SUD among suicidal individuals.

To gain a better understanding of the relationships among SUD, poverty, and the subsequent occurrence of first-time adult suicide ideation or attempt, data from a large, longitudinal, nationally representative survey of adults are needed that include standardized diagnostic measures for SUD. In such data, we examined the main and interactive effects of SUD and poverty at a baseline interview on first-time suicide ideation or attempt by 3-year follow-up. Individuals who initially reported no current or prior suicide ideation or attempt were analyzed to determine, controlling for sociodemographic and clinical characteristics: (1) whether current (past year) DSM-IV SUD (alcohol, drug, both alcohol and drug) at baseline increased the likelihood of first-time suicide ideation or attempt at any point over the 3-year follow-up; (2) whether poverty at baseline increased the likelihood of first-time suicide ideation or attempt at any point during the 3-year follow-up; and (3) whether baseline SUD and poverty interacted to differentially increase risk for first-time suicide ideation or attempt during the 3-year follow-up.

METHODS

Sample

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) is a longitudinal survey of a US representative sample with Wave 1 (W1) face-to-face interviews conducted in 2001–2002 (N=43,093; (Grant et al. 2004)) and Wave 2 (W2) re-interviews in 2004–2005 (N=34,653; (Grant et al. 2009)). The target population included those residing in households and group quarters aged 18 years and older. The survey response rate was 81%. Blacks, Hispanics, and young adults (ages 18–24 years) were oversampled with data adjusted for oversampling and non-response. The weighted data were then adjusted to represent the United States civilian population based on the 2000 census. Field methods included extensive interviewer training, supervision, and quality control (Grant et al. 2004). The W2 design involved re-interviews (Grant et al. 2009) with 34,653 of the 43,093 W1 respondents. Of the 8,440 W1 respondents who were not included in W2, 3,134 were not eligible for a W2 interview because they were institutionalized, mentally/physically impaired, on active duty in the armed forces throughout the W2 interview period, deceased, or deported. The remaining respondents not re-interviewed (5,306) could not be located or, less often, refused. Non-respondents were similar to those re-interviewed in terms of alcohol and drug use disorders, though at baseline, significantly more non-respondents were in

poverty, younger, Hispanic, male, less educated, unmarried, urban, in states with high costs of living, and Southern. The W2 response rate was 86.7%, reflecting 34,653 completed interviews. The cumulative response rate at W2 was the product of W2 and W1 response rates, or 70.2%. The mean interval between W1 and W2 interviews was 36.6 (s.e.=2.62) months. W2 data were weighted to reflect design characteristics of the NESARC and then adjusted to be representative of the civilian population of the United States. The research protocol, including informed consent procedures, received full ethical review and approval from the U.S. Census Bureau and U.S. Office of Management and Budget. Specific aspects of methodology, sampling, and weighting procedures for the NESARC are described in detail elsewhere (Grant et al. 2004). For the present study, the sample was limited to those with no history of suicide ideation or attempt at W1 (N=31,568).

Measures

The interview used in the NESARC was the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV Version (AUDADIS-IV; (Grant et al. 2003; Grant et al. 1995; Ruan et al. 2008)). This fully structured instrument was designed for and administered by experienced lay interviewers. The AUDADIS-IV covers detailed information on suicide and associated behaviors, as well as DSM-IV diagnoses of substance use and psychiatric disorders.

Outcome

First-Time Suicide Ideation or Attempt: Two items were used to determine first-time suicide ideation or attempt between W1 and W2: (1) “Since the last interview, have you thought about committing suicide?” and (2) “Since the last interview, have you attempted suicide?” Participants who answered ‘yes’ to either question were classified as experiencing first-time suicide ideation or attempt.

Predictors

Poverty: Baseline poverty was calculated using 2001 federal poverty guidelines, determined by household income and family size (Federal Register, 2001). For the 48 continental U.S. states, the poverty level was defined as $(\$5570 + [\text{number of persons in the respondent's household} \times \$3020])$. Thus, for example, a family of 4 was considered to be in poverty if the respondent's household income was less than $(\$5570 + (4 \times \$3020) = \$17,650)$ per year. Formulations for Alaska and Hawaii were slightly higher, following federal guidelines.

Substance Use Disorders: Past year SUD were measured at baseline by the AUDADIS-IV (Grant et al. 2003). Computer diagnostic programs implemented the DSM-IV criteria for diagnosis using AUDADIS-IV data. Test-retest reliability of AUDADIS-IV alcohol and drug dependence diagnoses ranges from good to excellent ($\kappa = 0.70-0.84$). Four variables were created for analyses: (1) alcohol use disorders (AUD; alcohol abuse or dependence) only; (2) drug use disorders (DUD; drug abuse or dependence) only; (3) both AUD and DUD; and (4) neither AUD nor DUD. Diagnoses of alcohol abuse and dependence were combined, as were diagnoses of drug abuse and dependence, since both abuse and dependence are associated with current and lifetime suicide ideation and attempt (Berglund et al. 1998; Hufford 2001; Murphy et al. 1990; Preuss et al. 2003; Roy et al. 1986; Sher 2006).

Covariates—Gender, age, race/ethnicity, education level, marital status, having any psychiatric disorder (Goldsmith et al. 2002; Goldston et al. 2009; Grant et al. 2003; Moscicki et al. 2010; U.S. Department of Health and Human Services (HHS) Office of the Surgeon General and National Action Alliance for Suicide Prevention September 2012), geographical region, urbanicity, and state cost of living (Council for Community and Economic Research 2001; Koo et al. 2000; Zumalt et al. 2003) were included as controls, as they are likely to be associated with SUD and poverty and may influence estimates of SUD and poverty among individuals who report suicide ideation or attempt (Substance Abuse and Mental Health Services Administration 2009).

Data Analysis

Descriptive proportions of baseline SUD, poverty, and controls were summarized by first-time suicide ideation or attempt status at W2. The proportion of individuals experiencing first-time suicide ideation or attempt was calculated with 95% confidence intervals (CI) for subgroups formed by crossing poverty with SUD (AUD only, DUD only, both AUD and DUD, neither AUD nor DUD). Bivariate associations between each predictor and first-time suicide ideation or attempt were estimated using odds ratios (OR), obtained from separate logistic regressions. Multivariable logistic regression was used to obtain adjusted odds ratios (AOR), representing the unique effects of SUD and poverty on first-time suicide ideation or attempt, adjusted for all control variables.

To investigate whether the relationship between SUD and first-time suicide ideation or attempt was different among those in poverty versus not in poverty, the interaction effect between SUD and poverty on the risk for first-time suicide ideation or attempt was conducted on the additive (risk difference [RD]) scale which represents synergy from a causal framework perspective (Greenland et al. 2008; Schwartz 2006). Specifically, interaction contrasts (IC) were formed (Greenland et al. 2008) comparing RD or adjusted RD (ARD) of first-time suicide ideation or attempt for SUD by poverty. Unadjusted and adjusted ICs for each SUD category were computed using the marginal predicted RD (Bieler et al. 2010), obtained from logistic regression, including the cross product of poverty and the 4-category SUD variable and control variables for adjusted estimates. The IC was tested against zero using a Wald-type t-test, where a significantly positive IC ($p\text{-value} < .05$) indicated whether a particular SUD differentially influenced risk for first-time suicide ideation or attempt when poverty was present versus when it was not. To adjust for the complex sample characteristics of the NESARC, all analyses were conducted using SUDAAN software, which uses Taylor series linearization to account for the design effects of the NESARC and also implements adjusted risk differences and interaction contrasts through the new PRED_EFF command.

RESULTS

Prevalence of first-time suicide ideation or attempt at W2 was 2.2%. Of the 15.1% in poverty at W1, 3.4% reported first-time suicide ideation or attempt at W2. Of the 6.5% with AUD only at W1, 3.5% reported first-time suicide ideation or attempt at W2. Of the 0.6% with DUD only, 5.9% reported first-time suicide ideation or attempt. Of the 0.8% with both

AUD and DUD, 6.5% reported first-time suicide ideation or attempt (Table 1). Poverty (OR=1.74, CI=1.42–1.43), AUD only (OR=1.77, CI=1.25–2.49), DUD only (OR=3.06, CI=1.57–5.94), and both AUD and DUD (OR=3.38, CI=1.83–6.22) were independently associated with first-time suicide ideation or attempt (Table 2).

After adjustment for sociodemographic and clinical variables, poverty (AOR=1.35, CI=1.05–1.73) and DUD (AOR=2.10, CI=1.07–4.14) remained as significant independent predictors of increased prospective odds of first-time suicide ideation or attempt at W2 (Table 2). SUD and poverty did not interact to differentially influence risk for first-time suicide ideation or attempt, prior to or after adjustment for controls (Table 3).

DISCUSSION

This study examined whether SUD and poverty increased the prospective likelihood of first-time suicide ideation or attempt over 3 years among a nationally representative sample. Individuals with DUD were at two times the likelihood as those with no SUD to report first-time suicide ideation or attempt over the three-year period. Compared to individuals not in poverty, those in poverty were at a 35% increased likelihood of first-time suicide ideation or attempt. Further, these relationships remained strong and significant after controlling for the effect of salient covariates. However, poverty did not moderate the association of SUD to first-time suicide ideation or attempt.

The finding that, after adjusting for controls, AUD did not remain a significant predictor of suicidal ideation or attempt is not consistent with the abundance of studies that demonstrate a strong and significant relationship between AUD and suicide ideation or attempt. Perhaps, the differing finding is due to the failure of prior studies to account for the influence of relevant sociodemographic, geographic, and psychiatric covariates. For example, in the current study, a strong relationship was found between psychiatric disorders and first-time suicide ideation or attempt. As alcohol and psychiatric disorders often co-occur, the association between AUD and suicide ideation or attempt may have been attenuated by the influence of psychiatric disorders.

Further, the combined effect of both AUD and DUD on first-time suicide ideation or attempt was expected to be greater than the effect of each alone. However, this was not the case after adjusting for controls. This finding may be due to: an antagonistic (versus synergistic) interaction effect between AUD and DUD in relation to first-time suicide ideation or attempt; the much smaller sample size of those with DUD; or loss at follow-up of those in poverty and with both AUD and DUD. The result may also reflect the influence of substance abuse treatment during the 3-year follow-up period that may have increased functioning (including the ability to cope with poverty), thereby decreasing the effect of the W1 substance status and its influence on first-time suicide ideation or attempt. Future studies on specific SUD and suicide ideation or attempt should examine AUD and DUD separately, include larger subsamples of those with DUD only, consider the influence of poverty on study attrition, and analyze the effects of poverty and SUD on receiving substance abuse treatment.

Additionally, and contrary to expectations, poverty did not moderate the association of SUD to first-time suicide ideation or attempt, prior to or after adjustment for controls. That is, the influence of SUD on first-time suicide ideation or attempt was not attenuated by being in poverty. It is possible that those who were unable to be re-interviewed at W2 (due to being institutionalized, mentally/physically impaired, impossible to locate, deceased) were also those at highest risk for co-occurring poverty and substance use, as well as suicide ideation or attempt (due to significantly more being in poverty, younger, male, Hispanic, less educated, unmarried). Future studies should make an effort to examine the relationship between SUD and poverty to first-time suicide ideation or attempt specifically among higher risk populations (e.g., those in substance abuse treatment, institutionalized, homeless).

Given study findings, individuals with SUD (DUD in particular) and those in poverty should be informed of their increased risk for later suicide ideation or attempt and provided access to suicide and substance abuse risk reduction efforts and programs and services to improve financial status. Substance abuse treatment providers should address how patient current socioeconomic status may increase future risk of suicide ideation or attempt. Thus, public health efforts should be directed to health professionals who encounter substance abuse, poverty, and/or suicidal behaviors in their clinical practices to increase their awareness of DUD and poverty as risk factors for suicide ideation or attempt, educate them about opportunities to discuss substance abuse, financial issues, and suicide behaviors and motivate patients to change risk behaviors, and inform patients of how to obtain additional assistance. National substance use and suicide prevention campaigns should target messages to drug users and the impoverished that highlight their increased risk for suicide ideation or attempt in the near future, even if they never considered suicide in the past.

In order to guarantee effective treatment for suicide ideation or attempt, a more integrated, public health oriented approach to suicide prevention, that takes into account the role of SUD and poverty, as well as genetic, social, and environmental factors, and provides a continuum of care from prevention through long-term intervention is required. That is, the disconnection among practice, programming and policy arenas of substance use disorders, income support, and psychiatric treatments must be resolved at both the systems and individual levels. Service delivery systems focused on substance abuse or psychiatric problems and suicide operate in relative isolation, each system with its own priorities, etiological views, treatment philosophies, therapeutic styles, administrative structures, funding streams, and policies. Because of this separation of systems, cross training among providers is often limited. Thus, many providers are left ill equipped to effectively identify and treat co-occurring problems and individuals with co-occurring problems are left untreated. Hopefully, study findings will draw attention to the need for more integrated service delivery and policy systems to prevent and treat suicide ideation or attempt.

In the present study, first-time suicide ideation and suicide attempt were merged into one outcome variable for several reasons. First, histories of suicide ideation and suicide attempt are both robust predictors of future attempted, and completed, suicide (Hawton & van Heeringen, 2009). Second, despite significant increases in service utilization among suicidal individuals, the rates of suicidal ideation and attempts have remained virtually unchanged over the last decade (Baca-Garcia et al., 2010; Baca-Garcia et al., 2011). Third, the highest

risk of suicide attempt is in the first year after onset of ideation, whether or not a plan has been made (Nock et al., 2008). Fourth, process models of suicide attempt, that posit suicide as a continuum of risk from suicide ideation to suicide plan to suicide attempt (Crosby et al., 1999; Kessler et al., 1999; LeMaster et al., 2004), have not adequately explained the relationship between first-time suicide ideation and suicide attempt and have failed to identify which suicide ideators are at greatest risk for becoming suicide attempters (i.e., acting on such thoughts) (Dhingra, Boduszek, & O'Connor, 2015). Further, approximately one third of American adults who report previous suicide attempts deny having prior suicide ideation or suicide plan (Crosby et al., 1999; LeMaster et al., 2004). Moreover, in one study, rates of suicide attempts were greater than rates of suicidal ideation (LeMaster et al., 2004). Fifth, determining the common predictors for either first-time suicide ideation or attempt is consistent with, and allows for comparison to, the majority of cross-national studies that have examined predictors of suicidal behavior (Inder et al., 2014; Nock et al., 2008; WHO, 2014). Finally, determining the mutual predictors of first-time suicide ideation or attempt can inform the development and testing of effective and efficient national and global prevention and treatment efforts (Inder et al., 2014; Nock et al., 2008).

Suicide is a major global public health problem. An estimated 804,000 suicide deaths occurred worldwide in 2012, representing an annual global age-standardized suicide rate of 11.4 per 100,000 population (WHO, 2014). Although there is substantial cross-national variability in the prevalence of suicidal ideation, attempt, and deaths, strong and consistent common risk factors for suicide ideation and/or attempt worldwide have been identified. Such mutual risk factors include female gender, younger age, fewer years of education, unmarried status, and the presence of a mental disorder, with psychiatric comorbidity significantly increasing risk (Nock et al., 2008). Findings from the present study are consistent with those identified in cross-national studies.

Despite increased prevention efforts, it has been estimated that the annual number of deaths due to suicide is expected to reach nearly 1.53 million (one death every 20 seconds) around the world by the year 2020. Improvements in our ability to predict and prevent suicide ideation or attempt and suicide deaths are clearly needed, and require continued identification of risk and protective factors that influence such behaviors (Crawford et al., 2007). As such, to make an impact at the global level, it might be prudent to focus on common predictors for any and/or all risk behaviors for completed suicide. More sophisticated methods for synthesizing cross-national prevention, treatment, research, and policy based on common predictors of first-time suicide ideation or attempt are also in need of development (WHO, 2014).

In considering the above findings, both strengths and limitations should be considered. First, concerning limitations, the NESARC is based on respondent self-report that can be affected by recall bias and social desirability. However, measures were of the type commonly used in large epidemiological studies, and the NESARC employed a carefully structured interview to assess aspects of clinical history that agreed well with psychiatrist evaluations (Canino et al. 1999). Strengths include the use of well-validated diagnostic measures, a wide variety of salient covariates for use in multivariate analyses, and representative samples, with broad geographic coverage, of adults with first-time versus never suicidal ideation or attempt.

To our knowledge, this is the first study to prospectively examine the joint influences of SUD and poverty on adult first-time suicide ideation or attempt in national data. This study reinforces the importance of both poverty and SUD (particularly DUD) in the prospective risk for suicide ideation or attempt and can serve as a benchmark for future studies on the etiology of first-time suicide ideation or attempt.

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Table 1

Baseline (W1) characteristics of sample by suicide ideation/attempt status at Wave 2 (N=31,568)

Variable	Total Sample (N=31,568)	First-Time Suicide Ideation/Attempt 2001–2004 (N=707)		
Main Predictors	Unweighte d N	Unweighte d n	Weighted %	Chi-square, p-value
Poverty				
Yes	4,760	173	3.42	$\chi^2(1)=19.85,$ $p<.0001$
No	26,808	534	2.00	
Substance Use Disorders				
Neither Alcohol nor Drug Use Disorder	29,099	608	2.02	$\chi^2(3)=5.50,$ $p=.0016$
Alcohol Use Disorder Only	2,041	69	3.52	
Drug Use Disorder Only	191	13	5.93	
Both Alcohol and Drug Use Disorders	237	17	6.50	
Control Variables				
Age				
18–29 years	6,012	191	2.97	$\chi^2(3)=16.42,$ $p<.0001$
30–39 years	6,628	170	2.46	
40–49 years	6,430	171	2.67	
50+ years	12,498	175	1.34	
Race				
Non-Hispanic White	18,122	399	2.12	$\chi^2(4)=1.18,$ $p=.3285$
Non-Hispanic Black	6,142	120	2.05	
Native American	483	20	4.24	
Asian/Pacific Islander	914	22	2.22	
Hispanic	5,907	146	2.35	
Gender				
Male	13,544	273	1.94	$\chi^2(1)=6.75,$ $p=.0116$
Female	18,024	434	2.42	
Education				
Less than HS	5,266	148	2.64	$\chi^2(2)=2.79,$ $p=.0686$
HS grad	9,159	205	2.35	
At least some college	17,143	354	1.98	
Married/Live as Married				
Yes	17,100	306	1.80	$\chi^2(1)=22.46,$ $p<.0001$
No	14,468	401	2.88	
Live in Urban Area				
Yes	25,597	582	2.15	$\chi^2(1)=0.40,$ $p=.5306$
No	5,971	125	2.33	
State Cost of Living Above Average				
Yes	18,260	427	2.24	$\chi^2(1)=0.41,$ $p=.5253$

Variable	Total Sample (N=31,568)	First-Time Suicide Ideation/Attempt 2001–2004 (N=707)		
Main Predictors	Unweighte d N	Unweighte d n	Weighted %	Chi-square, p-value
No	13,308	280	2.11	
Region				
Northeast	5,864	118	1.88	$\chi^2(3)=1.59,$ $p=.2003$
Midwest	6,810	158	2.36	
South	11,844	245	2.09	
West	7,050	186	2.44	
Any Psychiatric Disorder				
Yes	5,647	373	6.51	$\chi^2(1)=81.60,$ $p<.0001$
No	25,921	334	1.31	

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Table 2

Associations between first-time suicide attempt/thought at W2 and poverty, substance use disorders, and control variables (N=31,568)

Variable	Unadjusted	Adjusted ^b
	OR (95% CI)	OR (95% CI)
Main Predictors		
Poverty	1.74 (1.42–2.13)***	1.35 (1.05–1.73)*
Substance Use Disorders		
<i>(ref = Neither Alcohol nor Drug Use Disorder)</i>		
Alcohol Use Disorder Only	1.77 (1.25–2.49)***	1.31 (0.92–1.87)
Drug Use Disorder Only	3.06 (1.57–5.94) ***	2.10 (1.07–4.14)*
Both Alcohol and Drug Use Disorders	3.38 (1.83–6.22)***	1.57 (0.83–2.96)
Control Variables		
Age <i>(ref = 50+)</i>		
18–29 years	2.25 (1.75–2.90) ***	1.61 (1.23–2.10)***
30–39 years	1.86 (1.44–2.41) ***	1.68 (1.30–2.18)***
40–49 years	2.02 (1.55–2.64) ***	1.96 (1.50–2.56)***
Race <i>(ref = Non-Hispanic White)</i>		
Non-Hispanic Black	0.97 (0.73–1.30)	0.67 (0.50–0.90)**
Native American	2.05 (1.21–3.47)**	1.57 (0.92–2.71)
Asian/Pacific Islander	1.05 (0.57–1.92)	1.07 (0.60–1.89)
Hispanic	1.11 (0.86–1.44)	0.86 (0.64–1.16)
Gender <i>(ref = Male)</i>		
Female	1.25 (1.05–1.50)*	1.39 (1.16–1.67)***
Education <i>(ref = at least some college)</i>		
Less than HS	1.34 (1.03–1.75)*	1.33 (0.99–1.78)
HS graduate	1.19 (0.98–1.44)	1.19 (0.98–1.45)
Married/Live as Married	0.62 (0.51–0.75)***	0.75 (0.60–0.93)**
Live in Urban area	0.92 (0.71–1.19)	0.93 (0.73–1.20)
State Cost of Living Above Average	1.07 (0.87–1.30)	1.10 (0.86–1.41)
Region <i>(ref = Northeast)</i>		
Midwest	1.27 (0.98–1.64)	1.18 (0.91–1.54)
South	1.11 (0.86–1.45)	1.12 (0.82–1.52)
West	1.31 (0.98–1.75)	1.17 (0.87–1.59)
Any Psychiatric Disorder	5.24 (4.30–6.40)***	4.78 (3.89–5.87)***

Table 3

Tests for additive interaction between substance use disorders and poverty on first time suicide attempt/
thought* (N=31,568)

Variable	Effect When Not In Poverty	Effect When In Poverty	Test of Interaction
	RD% (SE) p-value	RD% (SE) p-value	IC% (SE) p-value
Substance Use Disorders <i>(ref = No Disorder)</i>			
Alcohol Use Disorder Only	0.7% (0.5%) 0.14	0.1% (0.1%) 0.95	-0.7% (1.1%) 0.55
Drug Use Disorder Only	2.5% (1.5%) 0.10	0.6% (2.5%) 0.80	-1.9% (2.9%) 0.52
Both Alcohol/Drug Use Disorders	0.5% (1.0%) 0.59	2.7% (2.5%) 0.29	2.1% (2.7%) 0.43

RD% = Risk Difference. For example the RD%=0.1% for substance use disorder in the Effect when in Poverty column means that the risk of first-time suicide attempt/thought is 0.1% higher when a person in poverty has an alcohol use disorder only compared to not having any substance use disorders but still being in poverty.

IC% = Interaction contrast Risk Difference (This is the difference in the RD effect when in poverty compared to when not in poverty).