

Family Support Mediates the Association Between Substance Use Severity and Suicidal Ideation in Early Adult Emergency Department Patients

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Published online: 18 June 2013

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Abstract Suicidality and its etiology in non-treatment-seeking substance abusers is understudied. We address this gap by examining data collected in 2009–2010 on suicidal ideation (SI) in early adult, urban emergency department patients ($N=505$). Prevalence of past year SI was 15 %. A positive, indirect effect of cocaine use severity, but not alcohol or marijuana use severity, on likelihood of SI mediated through family support was found. Implications and future directions for ED practices and suicide risk etiology among this population are discussed, as well as study limitations. Funding provided by the Substance and Mental Health Services Administration (SAMHSA).

Keywords Suicidal ideation · Screening and brief intervention · Non-treatment-seeking substance users · Substance use severity · Emergency department · Family support

In the United States, approximately 34,000 people kill themselves per year and almost 400,000 receive treatment at emergency departments (EDs) for self-inflicted injuries (CDC 2010; McCaig and Newar 2006). Among early adults under the age of 35, suicide is a leading cause of death (CDC 2010); and for those who abuse alcohol and drugs, the risk for completed suicide is alarmingly high (Wilcox et al. 2004). Harmful patterns of substance abuse that develop during adolescence and early adulthood tend to stabilize by age 30 (Fillmore et al. 1991); thus studying the etiology of suicide in early adult, non-treatment-seeking substance abusers—who represent the vast majority of substance abusers—is critical for prevention efforts. The current study therefore focuses on the suicidality of early adults (18–34 years-old) screened positive for substance abuse at the ED, and considers the interpersonal theory of suicide behavior (Van Orden et al. 2010) in testing an etiological model of suicide risk for this population.

EDs are important sites in which to screen for suicidality in patients whose chief complaint is not necessarily psychiatric. Of patients that present to an ED for reasons unrelated to mental health, 12 % endorse passive suicidal ideation, 8 % admit to wanting

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to kill themselves, and 2 % report a current intent to kill themselves (Claassen and Larkin 2005). Furthermore, estimates suggest that 40 % of individuals that complete suicide were seen at an ED within 12 months prior to their death (Gairin et al. 2003).

Screening for suicidal ideation (SI) in the ED may be an important way to obtain critical information about risk for suicidal behavior. SI is an integral part of theories on suicide behavior (e.g., Joiner 2005), and longitudinal studies find it to be a strong predictor and precursor to suicide attempts (e.g., Reinherz et al. 2006). Also, ED patients that present with SI have high rates of returning with further ideation or actual suicide attempts (Larkin et al. 2008a), and their recidivism rates compare to those of patients that initially present with an attempt (Larkin et al. 2008b).

Numerous studies have examined the link between clinically significant patterns of substance abuse and suicide (e.g., Wilcox et al. 2004). These studies typically operationalize substance abuse and suicide using categorical cut-off criteria for substance use disorders and retrospective lifetime reports, respectively. It has been concluded that substance use disorders are related to suicidality even after controlling for comorbid internalizing disorders (Hills et al. 2009). Other studies indicate that having a substance abuse disorder is a strong independent predictor of SI among both clinical (Sokero et al. 2003) and nonclinical populations (Arria et al. 2009). However, few studies have examined the association between suicidality and substance use at levels that are below a threshold for clinical diagnosis or measured using a continuum of severity (e.g., Conner et al. 2011). Understanding how substance use, measured along a continuum from less to more severe, connects to suicidality may therefore increase sensitivity in detecting suicide risk and further elucidate the association.

The Role of Social Support

Severe substance abuse is known to be associated with social isolation. This isolation is often linked to negative social consequences that accumulate with increased levels of substance use. Indeed, it has been posited that social isolation is an indirect path between high severity of substance use and suicide (Hufford 2001). Additionally, according to Joiner's (2005) interpersonal-psychological theory of suicidal behavior, the feelings of social alienation and a low sense of belongingness accrued from social isolation set the stage for thoughts about suicide. Low family support, more than other domains of support, shares a strong association to suicidality for young people (Flouri and Buchanan 2002), and has been conceptualized as an indicator of low belongingness (Joiner et al. 2009). Furthermore, other sources of support (e.g., romantic partners) are more likely than family members to also engage in risky behaviors (Boyd and Mieczkowski 1990), limiting their capacity for a protective influence. Family members may pull away from a relationship with an individual as they become tired or "fed up" with his or her problematic substance use, thereby increasing a sense of isolation and heightening suicidal thoughts.

Current Study

To address our limited understanding of suicide risk in non-treatment-seeking substance users varying in levels of severity, the current study examined substance use severity and SI in early adult patients presenting to one of two urban EDs. Based on previous findings that implicate substance use severity as a predictor of suicidality (e.g., Conner et al. 2011), we

first hypothesized that severity of use—either alcohol, marijuana, or cocaine use—would be positively associated with SI. Second, based on the interpersonal theory of suicide behavior (Van Orden et al. 2010) and substance abuse literature suggesting that suicidality is an outcome brought on by severe patterns of use and the resulting negative interpersonal consequences of this use (e.g., Hufford 2001), we predicted that family support would mediate the association between substance use severity and SI, such that severity would be negatively associated with family support (i.e., higher severity = low/no family support), which in turn, would be associated with increased likelihood of SI.

Method

Study Overview

Adult participants over age 17 ($N=1,695$) were recruited from the EDs of two large urban hospitals in Georgia in 2009. Participants were part of a pilot sample of patients recruited for the evaluation of a screening, brief intervention, and referral for treatment (SBIRT) program. The study was approved by Institutional Review Boards at the two hospital sites and Georgia State University. Adult patients that entered either ED were prescreened for binge drinking (five or more drinks in one sitting for males; four or more drinks in one sitting for females), illegal drug use, or prescription drug misuse in the prior 12 months. Patients that screened positive were then given a more comprehensive health assessment by trained Health Education Specialists.

Participants

This study used intake data from a cross-sectional subsample of early adult participants aged 18 to 34 years old ($N=538$) who prescreened positive at either site's ED, completed the comprehensive health assessment, and consented to study participation. Proportions of missing data ranged from 4 % (alcohol use severity) to 6 % (cocaine use severity) on the main study variables. Two participants did not report a male or female gender (both identified as transgender) and were excluded. Using listwise deletion to remove cases with missing data resulted in a final sample of $N=505$. Mean age of the sample was 27 ($SD=4.51$; range = 18 to 34 years old), and most participants identified as African-American or Black (67 %) and male (61 %; see Table 1).

Measures

Demographics Participants self-reported their age, race/ethnicity, gender, employment status, and housing stability. Unstable housing was assessed by asking where a participant has been living for the past 30 days; e.g., own/rent home, someone else's home, shelter, street, institution. If unsure about how to respond, participants were instructed to choose "own/rent home" if they were living in their parents'/caregivers' home. A dichotomous variable was created for stable (0 = living in their own home) versus unstable housing (1 = any other living arrangement). Unemployment was examined by asking if a participant is currently employed full-time, part-time, or is unemployed and dichotomized (0 = employed either full- or part-time; 1 = unemployed). Since the majority of participants identified as Black or African American (67 %), with a lesser proportion identifying as White (30 %) or another race (e.g., American Indian; 3 %), a dichotomous variable was created for race (1 = Black/African American; 0 = other).

Table 1 Bivariate correlations between demographic, predictor, and outcome variables ($N=505$)

Variable	n (% yes) or $M (SD)$	1	2	3	4	5	6	7	8	9
1. Age: 25 and over	312 (63 %)									
2. Male	297 (60 %)	-.03								
3. Black	326 (66 %)	.09*	-.03							
4. Unstably housed	240 (49 %)	-.18**	-.09*	.03						
5. Unemployed	251 (51 %)	-.11*	-.05	.16**	.27**					
6. Alcohol use severity	9.21 (8.36)	.05	.20**	-.13**	.00	.00				
7. Marijuana use severity	6.55 (8.42)	-.03	.15**	.15**	.08	.20**	.19**			
8. Cocaine use severity	2.16 (6.55)	.13**	.04	-.04	.15**	.15**	.26**	.15**		
9. Family support	242 (49 %)	-.06	.05	-.06	-.08	-.08	-.01	-.01	-.19**	
10. Suicidal ideation	75 (15 %)	-.03	-.07	-.06	.14**	.10*	.12**	.07	.26**	-.17**

Family support (0 = no, 1 = yes)

* $p < .05$; ** $p < .01$

Substance use severity was assessed using the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST; WHO ASSIST Working Group 2002). The ASSIST is a valid and reliable measure designed to screening for levels of substance use risk and severity as indicated by lifetime use, frequency of use, urges to use, interference with psychosocial functioning, negative consequences as a result of use, social pressure to cut down or abstain, and difficulties in cutting down or abstaining. Each substance use severity measured included an 8-item scale with two to five weighted response options per item. Individual scores for each substance endorsed ranged from 0 (no recent use or lifetime difficulties with use; i.e., no risk for problems related to use) to 39 (high severity of use; i.e., high risk for problems related to use). An ASSIST score between 4 and 26 (or 11 and 26 for alcohol) indicates moderate risk and 27 or higher, high risk. Internal consistency of this measure was $\alpha = .76$ for alcohol, $.75$ for marijuana, and $.89$ for cocaine.

Family support was assessed by asking participants to report their primary source of support. A single item was drawn from the CSAT Government Performance and Results Act (GRPA) evaluation tool in a section pertaining to social connectedness (Mulvey et al. 2005). For this item, participants were asked, “To whom do you turn to when you’re in trouble” and asked to choose only one source of support from the following responses (the most common or *primary* source of support): family, clergy member, friends, no one, or other. Some participants (6 %) indicated more than one source. Based on prior findings that absence of family support is a more significant indicator of suicidality than absence of other sources of support, and its theorized underpinnings to SI (i.e., as an indicator of low belongingness; Joiner et al. 2009), any indication of family was coded as an affirmative response to family support (1) and any response that did not include family was coded as negative (0).

Suicidal ideation was assessed using a single item taken from the 5-item Internalizing Disorder Risk Scale of the Global Appraisal of Individual Needs- Short Screener (GAIN-SS;

Dennis et al. 2006). Participants indicated whether they experienced significant problems with thoughts about ending their life or committing suicide in the past 12 months (0 = no; 1 = yes). The item noted that these problems were considered significant when, "...they keep coming back; keep you from meeting your responsibilities; or when they make you feel like you can't go on". The use of a single dichotomous item is consistent with previous examinations of suicidality and self-injurious thoughts and behaviors (e.g., Litzman et al. 2010).

Plan of Analysis

Three independent mediation analyses using multiple logistic regressions examined the significance of indirect effects for each substance use severity predictor on SI via family support. Demographic variables (gender, race, unstable housing, and unemployment) were included in each model to control for individual differences. Bias corrected estimates of unstandardized regression coefficients were examined to determine the significance of indirect effects using bootstrapping procedures and SPSS macros developed by Preacher and Hayes (2008).

Results

Descriptive Statistics

Descriptives are shown in Table 1. Males had higher severity scores on alcohol and marijuana use than females. Black or African-American participants had lower alcohol use severity and higher marijuana use severity than other racial groups. Unemployed participants reported higher marijuana use and cocaine use severity than those who were employed, and those who were unstably housed reported higher cocaine use severity than those stably housed.

A minority of participants reported any level of cocaine use severity (18 %) but most indicated some level of severity for alcohol and marijuana use (87 % and 52 %, respectively).

Half of the sample selected their family as a primary source of support. The remaining sources of support chosen by participants included: friends (17 %), other sources (18 %; e.g., boyfriends/girlfriends and God), no one (13 %) and clergy members (1 %). One percent either refused to answer the social support question and/or did not know who to choose as a primary source of support.

Mediation Analyses

A logistic regression model including all predictors and SI as the outcome proved significant (model $\chi^2=49.09$ [8, 497], $p<.001$) and correctly classified 86 % of cases. Additional model fit indices were also explored (Nagelkerke $R^2=.16$; Hosmer and Lemeshow [H-L] test, $\chi^2=6.25$ [8, 497] $p=.62$) and deemed adequate. Of the substance use severity predictors, only cocaine use severity (CUS) was significantly associated with family support (direct effect) and SI (direct effect) controlling for demographics and alcohol and marijuana use severity (see Table 2 and Fig. 1). Specifically, for each unit increase in CUS score (indicating a higher severity of use), a participant was 8 % less likely to endorse family as a primary source of support and 6 % more likely to endorse SI. Family support was also related to SI (Fig. 1); those who chose family as primary source of support were 55 % less likely to endorse SI than those who did not. When family support was included as a mediator, the indirect association between CUS and SI was significantly different from zero ($b=.012$, $SE=.00$,

Table 2 Mediation analyses: direct effects of substance predictors on mediator (family support; FS) and direct, total, and indirect effects of substance use severity on suicidal ideation (SI)

	Direct effect on FS		Direct effect on SI		Total effect on SI		Indirect effect on SI		
	OR	95 % CI	OR	95 % CI	OR	95 % CI	<i>b</i>	SE	95 % CI
Alcohol use severity	1.00	.98, 1.03	1.03	.99, 1.06	1.03	1.00, 1.06	-.001	.003	-.007, .004
Marijuana use severity	1.00	.98, 1.03	1.02	.98, 1.05	1.02	.98, 1.05	.000	.003	-.006, .005
Cocaine use severity	.92	.89, .97	1.06	1.03, 1.09	1.05	1.02, 1.08	.012	.001	.003, .024

Controlling for demographics

OR odds ratio, CI confidence interval, *b* unstandardized regression coefficient, SE standard error; OR's are significant when CIs do not include 1.00; *b*'s are significant when CIs do not include zero

$CI_{95}=.003, .024$), lending support to partial mediation (see Table 2). Significant indirect effects of alcohol or marijuana use severity on SI through family support were not found.

Of the demographic variables included in the mediation model regressing SI on CUS via family support (Fig. 1), gender and housing stability were also significant. Female participants were almost twice as likely to endorse SI as males ($OR=1.93, CI_{95}=1.11, 3.35$). Similarly, unstably housed participants were almost twice as likely as others to endorse ideation ($OR=1.92, CI_{95}=1.09, 3.37$).

Discussion

Results demonstrate that among early adult, routine ED patients who screened positive using a low threshold for alcohol or drug abuse (e.g., as little as one episode of binge drinking or drug use in the past year), the rate of SI in the past year was high (15 %). In comparison, the rate of past year SI in the general populations of developed countries, including the US, has been estimated at 2 % (Borges et al. 2010). The current rate also surpasses estimates of recent SI among adult ED patients seen for nonpsychiatric reasons (8–11 %; Ilgen et al. 2009; Claassen and Larkin 2005) and was higher than a nationally representative sample of drinkers (6 %; Grant and Hasin 1999). Moreover, Garlow et al. (2003) found that among patients referred for substance abuse treatment, those reporting a cocaine use disorder (an indication of a high severity of use) had the highest rate of SI (44 %) when compared to patients with an alcohol use disorder alone (24 %), or even those with both cocaine and

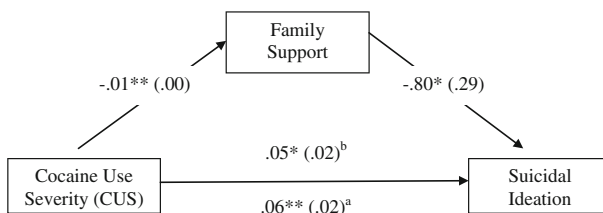


Fig. 1 Mediating effect of family support on the association between cocaine use severity and suicidal ideation controlling for alcohol and marijuana use severity, and demographics. Note: Unstandardized regression coefficients and standard errors in parentheses reported. ^aDirect effect of CUS on suicidal ideation. ^bTotal effect of CUS on suicidal ideation via family support. * $p<.01$; ** $p<.001$

alcohol use disorders (35 %). Comparatively, our study suggests that an ED patient meeting the high-risk score cut-off consistent with a cocaine use disorder (ASSIST score of 27 or higher) would have a 62 % probability of SI.

Support was found for partial mediation of CUS on SI via family support. A higher CUS score predicted a lower likelihood of endorsing family as a primary source of support, an association not seen among the other severity predictors. It is possible that compared to the other substances, cocaine use may be viewed by family members as more deviant and/or dysfunctional (Blow et al. 2011), and thus, family members may distance themselves from a cocaine-abusing member more so than a member with a drinking problem or one who uses marijuana. As predicted, there was a strong negative association between the presence of family support and suicidality. When these associations are considered together, there was a small, but statistically significant indirect association of CUS on SI via family support. It should be noted that this estimate was adjusted for effects of other common predictors of suicidality. The presence of other proximal and distal variables implicated in suicidality among substance abusers—such as depression (Conner et al. 2011), childhood sexual abuse (Makhija and Sher 2007), and drug withdrawal (Sofuoglu et al. 2003)—may further explain the effect of CUS on SI. The restricted measure of family support used in the current study also likely limited the size of effects which could be found in the mediation model.

The absence of a similar relationship for alcohol use severity may be due to non-linear associations between severity of use and both social support and psychological distress. It has been found that those who abstain from any alcohol use have lower social support and higher stress than both moderate and high risk users (Curry et al. 2000). A closer examination of curvilinear, rather than linear, effects may reveal a complex association that takes into account fluctuations in the direct and indirect effects of various levels of alcohol use severity on SI via changes in family support. Moreover, the progression to low family support for alcohol users as compared to cocaine users is likely to be slower because cocaine use can be more impairing initially and is also seen as more deviant. This would explain why, among early adults the associations are not as prominent as they might be in later adulthood. Future research is needed to address these questions by examining differences in the associations between severity of substance use by type and level of social support across the lifespan.

Unlike alcohol and cocaine, marijuana use severity was not correlated with SI and stands in contrast to a study of urban, adult nonpsychiatric ED patients (Ilgen et al. 2009). The extant literature on marijuana use and affective outcomes like SI provides mixed results (see Moore et al. 2007 for review), indicating a need for further research on the intervening variables (mediators and moderators) of this association.

Limitations of this study include its cross-sectional design, which prohibits causal conclusions. Alternative interpretations of the present mediation findings merit consideration. For example, the temporal ordering of the proposed associations, from increased severity of use to low family support to suicidal ideation, is debatable. Alcohol and drugs are thought to be used as a coping strategy to relieve psychological distress (Khantzian 1985); thus early adults with SI may turn to more severe patterns of use. Also, studies of adolescent development document the role of family support in obstructing adolescent substance abuse (e.g., Wills et al. 2004), so increased family support may lead to declines in substance use severity; whereas research on adults points to substance abuse as a preceding cause of socially isolating life events (e.g., divorce and family conflict; Bell et al. 1976; Humphreys et al. 1997). Indeed a longitudinal study that attempted to untangle some of these complex associations found a pathway from low contact with social supports, to low perceived social support, to depression, to increases in alcohol use (Peirce et al. 2000). In addition, those researchers identified a feedback loop in which increases in alcohol use were related to

decreased contact with family and friends. Future research should incorporate other types of substance abuse (e.g., cocaine abuse) into similar longitudinal studies focused on suicidality to test this transactional process. Lastly, the study's use of a brief measure of family support (necessary for the larger study) likely restricted the magnitude of an effect reported.

The current study was also limited in its use of brief measurements of the study's constructs of interest. The measurements chosen for the larger study were necessarily brief, given that they were to be administered in a fast-paced setting with an overburdened hospital staff. Thus, it was not feasible to include more comprehensive measures, particularly for suicidal ideation or family support (as they were not of primary importance to larger study). It should be noted, however, that while it is often the case that single-item measures of suicidal ideation are used for epidemiological studies, theory-driven investigations similar to the current study have also used a dichotomous outcome of suicidal ideation (e.g., Conner et al. 2011). Despite these limitations, the current study's focus on suicidality in a non-treatment-seeking population of urban, early adult substance abusers adds to the sparse research on suicide risk etiology within this understudied population. The lack of similar theory-driven studies has garnered recent criticism among researchers, leading to the conclusion that more work needs to be done in order to test existing theories and apply this knowledge to predict suicidality (Prinstein 2008).

Noticeably, the present study was able to identify SI in substance abusers through routine alcohol and drug screening practices implemented under a larger screening and brief intervention (SBI) program. Considering that SBI for substance abuse has a 30 year history in clinical practice and research (e.g., Skinner and Holt 1983) and is becoming a standard of care, the absence of literature focused on the co-occurring presence of suicidality among those screened for substance abuse is discouraging. Though further research is needed, the results of the present study suggest that more attention be paid to the suicide risk of SBI patients, including those presenting to the ED for routine healthcare. Moreover, suicide prevention efforts should target family as an area of intervention, particularly for adolescents and early adults abusing cocaine and crack.

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