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SUBSTANCE USE SEVERITY PREDICTS SUICIDAL IDEATION IN EARLY ADULT EMERGENCY DEPARMENT PATIENTS: THE ROLE OF FAMILY SUPPORT

by

NICHOLAS TARANTINO

Under the Direction of Gabriel P. Kuperminc

ABSTRACT

Alcohol and drug abuse are strong predictors of suicide. While screening methods have proven effective at identifying and treating substance abuse in non-treatment-seeking users (e.g., screening and brief intervention [SBI]), less attention has been given to the co-occurrence of suicidality among this population, including its correlates and etiology. The current study addresses this gap by presenting data from early adult emergency department (ED) patients (mean age = 27; N = 505), screened for substance abuse and suicidal ideation. Prevalence of past year ideation was high (15%). Results demonstrated a significant and positive indirect effect of cocaine use severity on likelihood of suicidal ideation, mediated through family support. The implications for SBI practices in the ED and suicide etiology among non-treatment-seeking substance abusers are discussed.

INDEX WORDS: Substance abuse, Substance use severity, Screening and brief intervention, Emergency department, Early adult, Social support, Suicidal ideation

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NICHOLAS TARANTINO

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Master of Arts

in the College of Arts and Sciences

Georgia State University

2012

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1 INTRODUCTION

In the United States 34,000 people kill themselves per year and almost 400,000 receive treatment at emergency departments (EDs) for self-inflicted injuries (CDC, 2010a; McCaig & Newar, 2006). Further, suicidality is common: 5% of the general population will attempt suicide and more than one in six will experience suicidal ideation at some point in their lives (Kessler, Borges, & Walters, 1999). Among early adults (under the age of 35), it is a leading cause of death (CDC, 2010a); and for those who abuse alcohol and drugs, the risk for completed suicide is alarmingly high (Wilcox, Conner, & Cain, 2004). Nevertheless not every early adult with a substance abuse problem will ultimately attempt or think about suicide. There are contextual and individual factors that predispose or protect individuals from the serious psychological distress associated with these outcomes. Additionally, other factors are thought to act as an indirect pathway, or mediator, within the association between alcohol or drug abuse and suicidality. Studying these processes in early adulthood is critical for prevention efforts since harmful patterns of substance abuse that development during early adulthood tend to stabilize by age 30 (Fillmore et al., 1991).

One protective factor against suicidality is social support (D'Attilio, Campbell, Lubold, Jacobson, & Richard, 1992; Sokero et al., 2003; Arria et al., 2009; Wilcox et al., 2010). For substance abusers its effects might operate in two ways. First, since social support has been recognized as a buffer to deleterious health outcomes caused by life stressors (Cobb, 1976), including its protective role in substance abuse treatment (e.g., Alcoholics Anonymous), it is likely that having access to social support attenuates psychological distress (such as suicidality) caused by the negative consequences of substance abuse. Alternatively, substance abuse may be directly related to low levels of social support (or increased social isolation and feelings of social

alienation; Kendal, 1983), which has been implicated in suicide risk (Joiner, 2005). Thus, social support may act as either a buffer or a pathway in the association between substance abuse and suicide risk.

To address how social support influences suicide risk in substance abusers, the current study focuses on early adults (18- 34 years old) that were screened for alcohol and drug abuse at one of two urban emergency departments (EDs) in the state of Georgia as part of a larger alcohol and drug use screening, brief intervention, and referral for treatment program. Based in theoretical frameworks that consider the interplay of stressful life events and social support (Cassel, 1974) and social alienation and suicide (Joiner, 2005), this study examines substance use severity as a predictor of suicidal ideation, a significant marker of suicide risk (Institute of Medicine, 2002). Two mechanisms through which social support may play a role in the associations between severity of use and suicidal ideation were considered: (a) as a "buffer" or protective factor against suicidal ideation for early adults exhibiting severe use and (b) as a mediator of the association between severity of substance use and suicidal ideation. Since previous research has narrowly focused on select subgroups (e.g., psychiatric inpatients or individuals with a substance use disorder) when examining these mechanisms, the current study strives to increase the generalizability of theoretical claims and to underscore the need for suicide prevention in underserved populations (i.e., non-treatment-seeking substance abusers).

1.1 Screening for Suicidality and Substance Use in the ED

Routine screening for substance abuse at hospital EDs has become part of large-scale initiatives aimed at capturing a non-treatment-seeking population of substance abusers at-risk for poor health outcomes (SAMHSA, 2010). It is estimated that one in four of all patients that present to the ED exceed the limits for risky alcohol use set by the National Institute of Alcohol

Abuse and Alcoholism (Academic ED SBIRT Research Collaborative, 2007). Empirical evidence has supported the effectiveness of these initiatives in providing treatment and prevention services for patients with a range of alcohol and drug-related problems through an inclusive and population-based approach (Madras et al., 2009). EDs are also an avenue to screen for suicidality and intervene in patients whose chief complaint is not necessarily psychiatric (Folse & Hahn, 2009; Claassen & Larkin, 2005; Ilgen et al., 2009; King, O'Mara, Hayward, & Cunningham, 2009). As modeled by Larkin & Beautrais (2010), an ED population includes individuals who are at heightened risk for suicide through both distinct and overlapping characteristics (including substance abuse). Moreover, estimates suggest that 40% of individuals that complete suicide are seen at an ED within twelve months prior to their death (Gairin, House, & Owens, 2003). Of patients that present at the ED for reasons unrelated to mental health, researchers have found that 12% endorse passive suicidal ideation, 8% admit to wanting to kill themselves, and 2% report a current intent to kill themselves (Claassen & Larkin, 2005). These proportions may be even higher for young adult ED populations (Folse & Hahn, 2009) and for ED patients abusing alcohol and drugs (Ilgen et al., 2009). Indeed, a decade ago the National Strategy for Suicide Prevention (2001) called routine screening in the ED, however, researchers suggest that EDs are still underutilized for this purpose (Larkin & Beautrais, 2010).

The ED is also a setting that is able to reach low-resource populations due to the large percentage of ED patients that do not have a primary care provider and/or insurance, and rely heavily on ED services for all their healthcare needs (McCaig & Burt, 2003; Folse, O'Mara, Hayward, & Cunningham, 2006). However, most studies of suicide risk among early adults sample from groups of college students (e.g., Arria et al. 2009; Wilcox et al. 2010) or from populations with a history of treatment for mental health-related issues (e.g., Brent, O'Mara,

Hayward, & Cunningham, 1988; Sokero et al., 2003), which decreases generalizability. More so than other groups, African-American males—who historically have faced barriers to seeking and receiving help for mental health problems due to cultural attitudes and socioeconomic disadvantage —are underrepresented, despite growing rates of suicide in this population (Joe & Marcus, 2003). Thus, the current sampling of low-resourced early adults ED patients (primarily identified as African-American or Black) increases generalizability by assessing suicide risk among those who are (a) not seeking substance abuse treatment and (b) an underrepresented group with less known about their suicide risk etiology.

One method for measuring suicidality in the ED is through assessing suicidal ideation. Suicidal ideation 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, Tanner, Berger, Beardslee, & Fitzmaurice, 2006). Because suicide behavior occurs on a continuum of severity, from passing thoughts to near-lethal/lethal behavior, understanding less life-threatening expressions of suicidality which may progress into more lethal behaviors, will help prevent completed suicide. Unique to the ED, patients that present with suicidal ideation have high rates of returning with further ideation or actual suicide attempts (Larkin, Beautrais, Gibb, & Laing, 2008), and their rates of recidivism compare to those of patients that initially present with an attempt (Larkin, Smith, & Beautrais, 2008). While more complex assessments of suicidality exist (e.g., Beck & Steer, 1991; Reynolds, 1988), brief assessment tools—even one to four item screeners—have proven effective in identifying suicidality in primary care clinics and EDs (e.g., Ilgen et al., 2009, Wintersteen, 2010; Folse & Hahn, 2009), and through quick identification alleviate some of the burden associated with completing more extensive measures in an oftentimes stressful setting.

1.2 Severity of Substance Use and Suicidality

The majority of empirical studies that have tested the link between substance use and suicide have focused on clinically significant patterns of use, specifically, categorical cut-off criteria for use disorders (Diagnostic and Statistical Manual of Mental Disorders [DSM]-IV) and used retrospective lifetime reports (e.g., Harris & Barraclough, 1997; Wilcox et al., 2004). Many studies have demonstrated that a diagnosis of alcohol or drug dependence is related to suicidality even after controlling for comorbid internalizing disorders (Hill, Afifi, Cox, Bienvenu, & Sareen, 2009; Hill, Cox, McWilliams, & Sareen, 2005; Verona, Sachs-Ericsson, & Joiner, 2005; Grant & Hasin, 1999). Disordered using is also a strong independent predictor of suicidal ideation among both clinical (Sokero et al., 2003) and nonclinical populations (Arria et al., 2009). There is, however, insufficient research examining the association of suicidality with levels of substance use severity that are below a threshold for clinical diagnosis, or measured using a continuum of severity. Measuring severity of use in this manner is an important tool for nonclinical providers and lends itself to a broader, more inclusive breadth of users as seen in the general population. For instance, increased frequency or quantity of alcohol consumption is linked to an increased likelihood of suicidal ideation (Pages, Russo, Roy-Byrne, Ries, & Cowley, 1997; Dawson, 1998; Conner, Li, Meldrum, Duberstein, & Conwell, 2003; Conner, Gunzler, Tang, Tu, & Maisto, 2011); and heavy marijuana use, but not less frequent use, is associated with depressive symptoms (Degenhardt, Hall, & Lynskey, 2003).

1.3 The Role of Social Support

The detrimental effects of severe substance abuse may be countered by the presence of social support, an important factor related to quality of life. Wilcox (1981) presents results that support the buffer hypothesis of social support which posits that with high levels of social

support, individuals are less likely to experience psychological distress as a result of life stressors—a finding supported by subsequent research (Cohen & Edwards, 1988; Cohen & Wills, 1985; Penninx et al., 1997). Having access to social support may therefore diminish the association between severity of substance use and suicidality. Social support however comes from various sources and some sources matter more than others. For adolescents and early adults, low family support when compared to other sources (e.g., peers) has a stronger association with suicidality (Flouri & Buchanan, 2002; Morano, Cilser, & Lemerond, 1993). Additionally, among substance abusers, other sources of support may be more likely than family members to also engage in risky behaviors, limiting their capacity for a protective influence. For example, there's evidence that initiation to crack cocaine use often occurs among romantic partners, as opposed to family members who are largely named as positive sources of social support (i.e., supportive of drug treatment; Boyd & Mieczkowski, 1990). The current study assesses the primary source of support for early adults, and compares those who choose family over other sources.

Alcohol and drug abuse will also directly affect social networks and family support. The resulting social isolation related to an accumulation of negative social consequences from use may be an indirect path between severe patterns of use and suicidality (Kendel, 1983; Hufford, 2001). 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 so than other domains of support, can indicate the presence of social alienation, especially for younger adults (Joiner et al., 2009). Problematic substance use often pushes family members away from the individual (e.g., families are tired or "fed up" with him/her), and this may progress the social isolation process and

heighten the risk for suicide. Alternatively, early adults with severe substance use may choose to spend less time with earlier sources of support (family) and more time with peer groups and partners who also use, thus further isolating severe users from positive, healthy supports.

1.4 Potential Confounds

Contextual and demographic factors may also explain differences in rates of suicidal ideation seen in early adult ED patients. Suicide has been linked to unemployment (Pages et al., 1997). Unstable housing, including homelessness, is also associated with suicidality (Eynan et al., 2002). And historically, race or ethnicity (with blacks and African-Americans less likely to commit suicide and experience suicidality than other racial and ethnic groups; CDC, 2010b) and gender (females are more likely to report suicidal ideation than males; Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002) are as well. These potential confounds will be statistically controlled in multivariate regression models.

1.5 Current Study's Hypotheses

First, it is hypothesized that early adult patients screened for substance use that present to the ED with suicidal ideation will have high rates alcohol, marijuana, and cocaine use (powdered or crack-cocaine), and the severity of use for each will be positively associated with suicidal ideation. These three substances were chosen for the current study because of their high prevalence of use in the general population (alcohol and marijuana only) and in the current sample. Second, two competing social support models will be examined: (1) family support may moderate the effect of severity of use on suicidal ideation—such that, its association with suicidal ideation will be stronger for patients without family as a primary source of social support and weaker for patients endorsing family support. Alternatively, (2) family support may mediate the association between substance use severity and suicidal ideation.

2 METHOD

2.1 Participants

Adult participants over the age of 17 (N = 1,695) were recruited from the emergency departments of two large urban hospitals in 2009: Grady Health System in Atlanta, GA, and the Medical Center of Central Georgia in Macon. Participants were part of a pilot sample of patients recruited for the evaluation of Georgia BASICS (Brief Assessment, Screening, Intervention, and Continuum of Care System), a 2008 state grantee of a SAMHA initiative to promote screening, brief intervention, and referral for treatment (SBIRT) programs across the United States. The study was approved by Institutional Review Boards at the two hospital sites and Georgia State University. Adult patients that entered either emergency department were prescreened for any 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 to ED admittance. Patients that screened positive at intake were then given a more comprehensive health assessment of psychosocial functioning, substance use severity, healthcare utilization, health status and demographics, and informed consent was obtained. Trained Health Education Specialists at the two sites conducted these assessments. The current study examines 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 variables of interest. For analyses, listwise deletion was used to account for missing data since the majority of participants with *any* missing data on the main variables of interest were missing all or most of their responses to the remaining main variables and the four categorical demographic variables (in other words, the majority of

their survey was incomplete). In addition, two participants did not report a male or female gender (both identified as transgender) and were excluded. Data from the remaining 505 patients were used for data analysis.

Slightly over two-thirds (*n* = 338; 67%) of the sample identified as Black or African-American. Most of the remaining participants identified their race as White (*n* = 152; 30%). Ethnic identification as Hispanic or Latino was 5.7%. Sixty-one percent (*n* = 308) were male and the mean age was 26.54 (*SD* = 4.51). Approximately half the sample was unstably housed and half was unemployed. Of the those unstably housed, the majority indicated that they lived in someone else's house with remaining participants living in a shelter, an institution or residential treatment, halfway house, other housing, or on the street. Over half of early adults unemployed were looking for work, 18% were not looking for work, and 16% were disabled. See Table 1 for means/percentages of demographic variables.

2.2 Measures

Demographics. Participants self-reported their age, race and ethnicity, gender, employment status, and housing stability. Unstable housing was assessed by asking where a participant is currently living (past 30 days; e.g., own/rent home, someone else's home, shelter, street, institution). 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 a dichotomous variable was created for analyses (0 = employed either full- or part-time; 1 = unemployed). Participants were asked to identify their race. Since the majority of participants identified as Black or African American (61%), a dichotomous variable was created (1 = Black/African American; 0 = other).

Substance use severity was assessed using the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST; WHO ASSIST Working Group, 2002). The ASSIST is a validated and reliable measure designed as a screening tool to assess level 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 severity of use) to 39 (high severity of use). 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, Atkinson D, Avula, & Luckey, 2005). Tool developers did not elaborate on the decision to include specific items; however, they remark the tool contains "client-level data items that have been selected from widely used data collection instruments [e.g., the Addiction Severity Index and the McKinney Homeless Program reporting system]". For this item, participants were asked, "To whom to you turn to when you're in trouble", given the following responses and asked to choose only one source of support (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 family support is a more significant indicator of suicidality than other sources of support, and its theorized underpinnings to suicidal ideation (i.e., low

belongingness; Joiner et al, 2009), any indication of family was coded as an affirmative response (1) to family support 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, Chan, & Funk, 2006), a valid and reliable scale highly correlated with the full 1.5 to 2 hour long GAIN-Initial (used to identify psychiatric/behavioral disorders). Responding "yes" to the suicidal ideation question would not only categorize the participant with suicidal ideation for the purposes of the current study, it would also categorize him/her for an internalizing disorder with 97% sensitivity and 74% specificity, as would an affirmative response to any of the scale's five items (Dennis et al., 2006). Specifically, the question asked participants if they experienced significant problems with thoughts about ending their life or committing suicide in the past twelve months (0 = no; 1 = yes). Furthermore, the question elaborated on suicidal ideation by noting 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."

2.3 Plan of Analysis

Bivariate analyses were conducted to examine the associations of suicidal ideation with demographic variables (age, gender, race, unstable housing, and employment status), family support, and substance use predictors (alcohol, marijuana, and cocaine use severity). Mediation analyses examined the significance of indirect effects for each substance use severity predictor on suicidal ideation through family support. Demographic variables included in the model were gender, race, unstable housing, and unemployment to control for individual differences. Two additional logistic regressions including a model where substance use severity variables predicted family support, and another where suicidal ideation was regressed on family support,

were conducted. Bias corrected estimates of unstandardized regression coefficients were examined to determine the significance of indirect effects using bootstrapping procedures (Preacher & Hayes, 2008). This procedure was chosen over other tests of indirect effects (e.g., Sobel test) because of its effect estimates for covariates, ability to examine effects on dichotomous outcomes, and improved statistical power. Lastly, for moderation analyses a series of three independent, two-step hierarchical logistic regressions predicting suicidal ideation were performed to examine the significance of the interaction effect of each substance use severity variable by family support (e.g., alcohol use severity X family support) on suicidal ideation. The conditional effects of substance use severity on suicidal ideation at levels of the moderator (i.e., family as primary source of support vs. family not as a primary source of support), were tested using an SPSS macro developed by Hayes and Matthes (2009).

3 RESULTS

3.1 Descriptives

Means for substance use severity were lowest for cocaine use (M = 2.10, SD = 6.50), and higher for marijuana (M = 6.50, SD = 8.40) and alcohol use (M = 9.20, SD = 8.36), with scores on all three scales ranging from 0 to 39. ASSIST guidelines suggest a low-risk severity cut-off score of 11 for alcohol and 4 for marijuana and cocaine; meaning any score at or above these scores indicates some level of risk for problems related to use. Approximately one third of the sample met the alcohol cut-off, half met it for marijuana, and 11% for cocaine. 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. Prevalence of suicidal ideation in the past year was 14.9% (n = 75).

3.2 Bivariate Correlations

Bivariate correlations (Table 1) show that age was positively associated with alcohol and cocaine use severity. Males had higher severity scores on alcohol and marijuana use than females and were more likely to be unstably housed. Black or African-American participants had lower alcohol use severity and higher marijuana use severity than other racial groups and were more likely to be unemployed. 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. Alcohol, marijuana, and cocaine use severity were significantly and positively associated with one another. Choosing family as a primary source of support was unrelated to any demographic characteristic and negatively related to cocaine use severity. Lastly, those indicating suicidal ideation were more likely to be unstably housed and unemployed; they were more likely to choose primary sources of support other than family; and they had higher alcohol and cocaine use severity—compared to patients without suicidal ideation.

3.3 Mediation Analyses

Overall, the logistic regression model including all predictors and suicidal ideation as the outcome proved significant (model χ^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 was nonsignificant, χ^2 = 6.25 [8, 497] p = .62; Peng, Lee, & Ingersoll, [2002]) and deemed adequate. Shown in Table 2, of the substance use severity predictors, only

cocaine use severity (CUS) was significantly associated with family support (direct effect) and suicidal ideation (direct effect) controlling for demographics and alcohol and marijuana use severity. 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 suicidal ideation. Family support was also related to suicidal ideation (Figure 1); those who choose family as primary source of support were 55% less likely to endorse suicidal ideation than those who did not. In addition, when family support was accounted for in the logistic regression predicting suicidal ideation, the association of CUS with suicidal ideation (direct effect) decreased so that for each unit increase in CUS, one would expect a 5% (rather than 6%) growth in likelihood of suicidal ideation. This decrease in odds, attributed to the indirect effect of CUS on suicidal ideation via family support, was significantly different from 0 (b = .012, SE = .00, CI_{95} = .003, .024), lending support to partial mediation (see Table 2). Significant indirect effects on suicidal ideation through family support were not found for alcohol or marijuana use severity. Figure 1 displays unstandardized regression coefficients, standard errors, and the direction of model effects for CUS.

Of the demographic variables included in the logistic regression equation, gender and housing stability were significant controlling for family support and substance use severity predictors (not included in tables). Female participants were almost twice as likely to endorse suicidal ideation 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).

3.4 Moderation Analyses

Three independent two-step hierarchical logistic regressions predicting suicidal ideation were computed, each including a primary substance use severity predictor (alcohol, marijuana, or

cocaine) in Step 1, and the two-way interaction of this predictor and family support in Step 2. Each step for each model also contained the covariates of gender, race, unstable housing and unemployment. None of the three two-way interactions (i.e., substance use severity X family support) proved significant, thus conditional effects of the predictor at levels of the proposed moderator were not explored further. As with mediation analyses, only the demographic variables of gender (female) and unstably housing remained significant, positive predictors of suicidal ideation.

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**

Note: Age (0 = under 25, 1 = 25 and over); Male (0 = female, 1 = male); Black (0 = other, 1 = Black/African American); Unstably housed (0 = housed, 1 = unstably housed); Unemployed (0 = employed, 1 = unemployed); Family support (0 = no, 1 = yes); Suicidal ideation (0 = no, 1 = yes).

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

Table 2.

*Mediation Analyses: Direct Effects of Substance Use 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*	*b*	*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

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

*Controlling for race, gender, unstable housing, and unemployment.

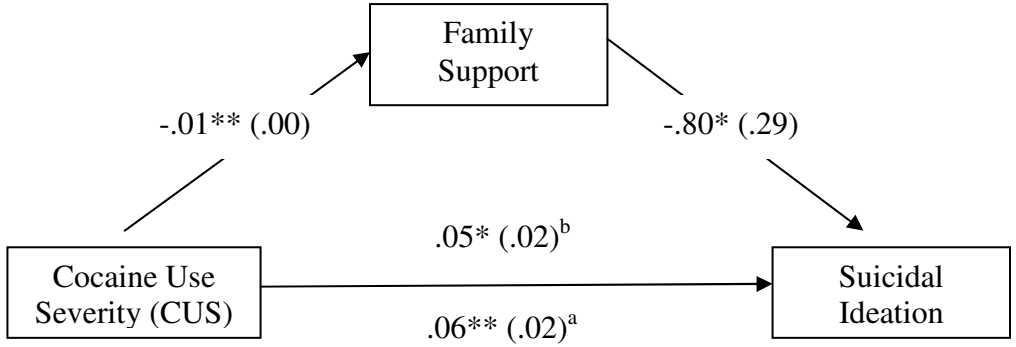

Figure 1. *Mediating Effect of Family Support on the Association between Cocaine Use Severity and Suicidal Ideation Controlling for Alcohol and Marijuana Use Severity, and Demographics.*

Note: Unstandardized regression coefficients and standard errors in parentheses are reported.

[a]Direct effect of CUS on suicidal ideation.

[b]Total effect of CUS on suicidal ideation via family support.

*$p < .01$; ** $p < .001$

4 DISCUSSION

This study considered associations between substance use severity and suicidality (defined in the current study as suicidal ideation), and examined the role of family support as a potential moderator or mediator of this association. 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 suicidal ideation in the past year was relatively high (15%). In comparison, the rate of past year suicide ideation in the general populations of developed countries including the US, has been estimated at 2% (Borges et al., 2010). The rate observed in the current study also surpasses estimates of recent suicidal ideation among adult ED patients seen for nonpsychiatric reasons (8%-11%; Ilgen et al., 2009; Claasen & Larkin, 2005). Compared to substance using populations, it was higher than a nationally representative sample of current drinkers (defined as drinking at least 12 drinks in the past year; 6%) but lower than a sample of opiate dependent individuals (24%). The current rate of ideation is what one would expect—higher than general ED samples and lesser risk substance users but still lower than substance dependent samples—given that participants reported a range of substance use severity levels.

Related to the study's hypotheses, alcohol and cocaine use severity were correlated with suicidal ideation, although when included in a multivariate model, only CUS remained a significant predictor of ideation. This may indicate the strong and unique association between cocaine use and suicidality, above and beyond alcohol use and other demographic predictors. For example, Garlow and colleagues (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 suicidal ideation (44%) when compared to patients with an alcohol use disorder

alone (24%), or even those with both cocaine and alcohol use disorders (35%). Comparatively, our study suggests that an ED patient with a low-risk CUS score (ASSIST = 4) would have a 19% probability of endorsing suicidal ideation; those meeting the high-risk score cut-off indicative of disordered using would have a 62% probability; and those with the highest severity score would have a 70% probability of endorsing ideation—even controlling for alcohol use severity. The higher probabilities reported in the current study compared to those reported by Garlow et al. are probably due to Garlow and colleagues' use of a stricter threshold for suicidal ideation, one that includes a specific plan for committing suicide.

Why is there a potent connection between cocaine use and suicidality? In the current study, it is partially explained by family support. First, the results show how a higher CUS score predicts a lower likelihood of endorsing family as a primary source of support, an association not seen among the other substance use predictors. It is possible that compared to the other substances, cocaine use may be viewed by family members as more deviant and/or dysfunctional (see Blow et al., 2011 for comparisons on the functionality of alcohol, marijuana, and cocaine users), 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. Second, there was a strong negative association between the presence of family support and suicidality. For early adults the absence of family connections may correspond to feelings of low belongingness, which is implicated in suicide risk (Joiner et al., 2009). Selecting family over other sources may also indicate a higher quality of social support, a factor shown to have a greater effect on psychological distress reduction than other dimensions of social support (i.e., quantity; Wilcox, 1981). Lastly, when these associations are considered together, the significance of an indirect effect of CUS on suicidal ideation via family support partially supports the proposed mediation

hypothesis, one thought to exist between severe patterns of substance use and suicidality. This effect was small; however, it should be noted that this estimate was adjusted for effects of other common predictors of suicide outcomes such as the demographic variables and alcohol use severity. 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 & Sher, 2007), and aggression/impulsivity (Conner & Duberstein, 2004), may further explain the effect of CUS on suicidal ideation. Moreover, the restricted measure of family support used in the current study 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. For instance, evidence has shown 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). Our current sample contained a continuum of user severities, from those abstinent to those with highly problematic use. 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 alcohol use severity at various levels on suicidal ideation, through changes in family support. Moreover, the progression to low social support or social isolation for alcohol users as compared to cocaine users may be slower due to the reasons discussed previously (e.g., level of functionality), and thus, among early adults the associations may not be as prominent as they would be in later adulthood. Future research should address this question by looking for differences in the associations between severity of substance use by type, and level of social support across the lifespan (from adolescence into adulthood). The study's focus on suicidality among early adults made meaningful examination of age-related effects impractical.

Unlike alcohol and cocaine, no association was established between marijuana use severity and suicidal ideation. This finding stands in contrast to a study of urban, adult ED patients which found that any past 30 day marijuana use was associated with suicidal ideation (Ilgen et al., 2009). To explore this difference, I replicated the method used by Ilgen et al. (i.e., Chi-square test of differences in suicidal ideation for those without or with past 30 day marijuana use) and found small differences between the two groups in the expected direction (14 and 17% prevalence of suicidal ideation, respectively); however this difference was nonsignificant and smaller than Ilgen et al. (7 and 13%). The higher report of suicidal ideation among the current participants for both groups most likely reflects the substance abuse screening criteria used in the current study. Because the majority of participants screened positive for alcohol abuse at intake, with a significant minority screening positive for at-risk levels of cocaine abuse, it is possible that marijuana use is less associated with suicidal ideation in the presence of more potent substance abuse predictors (i.e., alcohol and cocaine). Moreover, the extant literature on marijuana use and affective outcomes like suicidal ideation 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.

No support was found for a buffer hypothesis of social support on suicidal ideation using moderation analyses. One immediate explanation for this finding is the connection found between substance use severity and family support. The correlation between the independent variable (CUS) and moderator (family support) reduces statistical power to detect an interaction effect and solutions to this problem (e.g., mean-centering) do not apply to interactions between continuous and categorical variables. Moreover, logistic regression analysis requires a significantly larger sample size than other forms of analysis (e.g., linear regression) to establish

adequate power (Hsieh, Block, & Larsen, 1998), making it even harder to detect an effect. A second explanation for the lack of support for moderation is that among individuals living in centers of poverty (much like the current sample), social support does not always buffer the association between life stressors and mental health outcomes (Mulia, Schmidt, Bond, Jacobs, & Korcha, 2008). As Mulia et al. (2008) note, quality of social support is likely affected by economic hardship and scarce resources. Family support reported in the current study therefore may not be powerful enough to protect against suicidality due in part to the impact of economic and household strains on the family; and, the use of a single-item measure of family support (family as a primary source of support vs. family not as a primary source) was insensitive to the degree and quality of family support received.

Of the potential confounds examined, only gender (identifying as female) and unstable housing remained significant predictors of suicidal ideation controlling for substance use severity, family support, and the remaining demographic variables. A link between unemployment and suicidality was not found and may be explained by the age of the current participants. Blakely and colleagues (2003) reported age-related differences in the association between unemployment and suicide, with those middle-aged carrying the strongest, positive association, followed by older adults and then young adults. The finding that African-American or Black participants were not significantly less likely to report suicidal ideation than other racial groups (primarily White) is surprising given the historically low-rates of suicidality seen in this group. Ilgen et al.'s (2009) study of suicidal ideation in urban ED patients similarly found no significant racial differences (Black vs. "other") and as the authors' note, the economic disadvantage experienced by the majority of their participants (regardless of race) likely minimizes group differences. Also, the recent rise in suicidality among black Americans—

particularly in young black males (Joe & Marcus, 2003)—is partially explained by an increase in its acceptability among this group (Joe, Romer, & Jamieson, 2005). Moreover, substance abuse reported by the current participants may be a leveling factor of racial discrepancies seen in the rates of suicidal ideation.

The current study was 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. Other studies have found that high levels of family support, rather than family as a primary source of support, are more predictive of suicidal ideation than average and low levels of family support, even in the presence of protective influences (high feelings of mattering; e.g., Joiner et al., 2009). The dichotomization of the current variable of family support may also be neglecting the strength of other sources support to compensate for low family support and/or unhealthy family support (e.g., abusive parents), thus biasing the results (with those indicating "family not as a primary source of support" being less likely to endorse suicidal ideation than those who chose family as primary source but had low or unhealthy family support). It should be noted 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).

Of primary concern are alternative interpretations of the main analyses. Theory alongside longitudinal studies, posit both chronological and causal possibilities for the direction of effects—alcohol and drugs are used as a coping strategy to relieve symptoms associated with self-harm (e.g., self-medication hypothesis; Khantzian, 1985), or patterns of earlier substance

abuse result in later psychological distress (e.g., Conner et al., 2011). The second effect examined, severity of use predicting family support, is also debated. Many studies of adolescent development document the role of social support (parental support) in obstructing adolescent substance abuse (e.g., Wills et al., 2004), whereas research on adults points to substance abuse as a preceding cause of socially isolating life events (e.g., divorce and family conflict; Bell, Keeley, Clements, Warheit, & Holzer, 1976; Humphreys, Moos, & Cohen, 1997). In contrast, social isolation (or low social support) and feelings of social alienation are rarely considered consequences of suicidality but rather as among the strongest predictors of completed suicide. Indeed a longitudinal study attempted to untangle some of these complex associations, finding a directional pathway from low contact with social supports, to low perceived social support, to depression, to increases an alcohol use, in addition to a feedback loop that showed that increases in alcohol use were related to decreased contact with family and friends, and so on (Peirce, Frone, Russell, Cooper, & Mudar, 2000). Research with this adult sample with a wide age range (age 19 and older) took place over 7 years and 3 waves. Cross-sectional analyses in the current study prohibited an examination of causal inferences between these variables, including how they change over time. A next step for future research should be to incorporate other types of substance abuse (e.g., cocaine abuse) into similar longitudinal studies to test this seemingly transactional process.

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 that exists on suicide risk etiology within an understudied population. Using the brief measures available it also presents evidence for a theory-guided hypothesis. The lack of similar studies has garnered 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 and prevent suicidality (Prinstein, 2008). Regarding this call to action, research should next untangle the components of family support and its meaning to the individual, addressing the hypothesized theoretical underpinnings. Indeed, according to a recent re-organization of theory, suicidal ideation consists both of a sense of "thwarted belongingness" and feelings of "perceived burdensomeness" (Van Orden et al., 2010); and while the current study addressed an indicator of thwarted belongingness, low family support, that was associated with substance use severity, indicators of elevated perceived burdensomeness proposed by Van Orden and colleagues (2010) are also often associated with substance abuse—e.g., self-blame and low self-esteem, and distress caused by job loss, homelessness, and incarceration. Further, in light of its cross-sectional limitation, longitudinal investigations should be undertaken to resolve the direction of effects examined in the current study (e.g., does substance abuse occur before or after decreases in family support and the emergence of suicidal ideation?) to suggest causality.

Noticeably, the present study was able to identify suicidal ideation in substance abusers through routine 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 & 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. Given the results of this study, it is recommended that more attention be paid to the suicide risk of SBI patients, including those presenting to the ED for routine healthcare. Suicide prevention efforts should target family as an area of intervention, particularly for adolescents and early adults. The adaptation of more comprehensive measures of

family support for use in the ED to reach non-treatment-seeking substance abusers (a large majority of substance abusers) will also facilitate these efforts and advance theory development.

Lastly, as cocaine use severity was found to be predictive of suicidal ideation, it is also predictive of a moderate risk for an internalizing disorder, reflecting a “possible diagnosis” (see Method section on GAIN-SS). Comorbidity between these health risks is high (e.g., cocaine dependence and major depressive disorder; Grant, 1995) and similar to suicidal ideation, studying the mechanisms that contribute to comorbidity is critical. Therefore, the current study offers a glimpse of one possible mechanism, driven by an interpersonal theory of suicide, which connects severe patterns of cocaine use to internalizing disorder risk, implicating the role of family support in this association.

REFERENCES

Academic ED SBIRT Research Collaborative. (2007). The impact of screening, brief intervention, and referral for treatment on emergency department patients' alcohol use. *Annals of Emergency Medicine, 50*, 699-710.

Arria, A. M., O'Grady, K. E., Caldeira, K. M., Vincent, K. B., Wilcox, H.,C., & Wish, E. D. (2009). Suicide ideation among college students: a multivariate analysis. *Archives of Suicide Research, 13*, 230-246.

Beck, A. T., & Steer, R. A. (1991). Beck Scale for Suicide Ideation: Manual. San Antonio, TX: Harcourt Brace.

Bell, R. A., Keeley, K. A., Clements, R. D., Warheit, G. J. & Holzer, C. E. (1976). Alcoholism, life events, and psychiatric impairment. *Annals of the New York Academy of Sciences*, *273,* 467–480.

Blakely, T. A., Collings, S. C. D., & Atkinson, J. (2003). Unemployment and suicide. Evidence for a causal association? *Journal of Epidemiology and Community Health, 57*, 594–600.

Blow, F. C., Walton, M. A., Barry, K. L., Murray, R. L., Cunningham, R. M., Massey, L. S., Chermack, S. T., & Booth, B. M. (2011). Alcohol and drug use among patients presenting to an inner-city emergency department: a latent class analysis. *Addictive Behavior, 36*(8), 793-800.

Borges, G., Nock, M. K., Haro Abad, J. M., Hwang, I., Sampson, N. A., Alonso, J., Andrade, L. H., Angermeyer, M. C., Beautrais, A., Bromet, E., Bruffaerts, R., de Girolamo, G., Florescu, S., Gureje, O., Hu, C., Karam, E. G., Kovess-Masfety, V., Lee, S., Levinson, D., Medina-Mora, M. E., Ormel, J., Posada-Villa, J., Sagar, R., Tomov, T., Uda, H., Williams, D. R., & Kessler, R. C. (2010). Twelve-month prevalence of and risk factors

for suicide attempts in the World Health Organization World Mental Health Surveys. *Journal of Clinical Psychiatry, 12,* 1617-1628.

Boyd, C.J., & Mieczkowski, T. (1990). Drug use, health, family and social support in “crack” cocaine users. *Addictive Behaviors, 15,* 481-485.

Brent, D. A., Perper, J. A., Goldstein, C. E., Kolko, D. J., Allan, M. J., Allman, C. J., & Zelenak, J. P. (1988). Risk factors for adolescent suicide. A comparison of adolescent suicide victims with suicidal inpatients. *Archives of General Psychiatry, 45*, 581-588.

Cassel, J. (1974). Psychosocial processes and "stress": Theoretical formulation. *International Journal of Health Services, 6*, 471 - 482.

Centers for Disease Control and Prevention (CDC). (2010a). Web-based Injury Statistics Query and Reporting System (WISQARS) [Online]. National Center for Injury Prevention and Control, CDC. Retrieved from: www.cdc.gov/injury/wisqars/index.html.

Centers for Disease Control and Prevention (CDC). (2010b). Suicide rates among persons ages 10 years and older, by race/ethnicity, United States, 2002-2006. National Suicide Statistics at a Glance. Retrieved from: http://www.cdc.gov/ViolencePrevention/suicide/statistics/rates01.html.

Claassen, C.A, & Larkin, G.L. (2005). Occult suicidality in an emergency department population. *British Journal of Psychiatry, 186,* 352-352.

Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine, 38*, 300-314.

Cohen, S. & Edwards, J. R. (1988). Personality characteristics as moderators of the relationship between stress and disorder. In: R.W.J. Neufeld, Editor. *Advances in the investigation of psychological stress*, Wiley, New York, 235–283.

Cohen, S. & Wills, T. (1985). Stress, social support and the buffering hypothesis. *Psychological Bulletin, 98*, 310–357.

Conner, K. R. & Duberstein, P. R. (2004). Predisposing and precipitating factors for suicide among alcoholics: empirical review and conceptual integration. *Alcoholism: Clinical and Experimental Research, 28*, 6S-17S.

Conner, K. R., Gunzler, D., Tang, W., Tu, X. M., & Maisto, S. A. (2011). Test of a clinical model of drinking and suicidal risk. *Alcoholism: Clinical and Experimental Research, 35*, 60-68.

Conner, K. R., Li, Y., Meldrum, S., Duberstein, P., & Conwell, Y. (2003). The role of drinking in suicidal ideation: analyses of Project MATCH data. *Journal of Studies on Alcohol and Drugs, 64*, 402-408.

Curry, S. J., Ludman, E., Grauthaus, L., Donovan, D., Kim, E., & Fisherman, P. (2000). At-risk drinking among patients making routine primary care visits. *Preventive Medicine: An International Journal Devoted to Practice and Theory, 31*, 595-602.

D'Attilio, J. P., Campbell, B. M., Lubold, P., Jacobson, T., & Richard, J. A. (1992). Social support and suicide potential: preliminary findings for adolescent populations. *Psychological Reports, 70*, 76-78.

Dawson, D. A. (1997). Alcohol, drugs, fighting and suicide attempts/ideation. *Addiction Research & Theory, 5*, 451-472.

Degenhardt, L., Hall, W., & Lynskey, M. (2003). Exploring the association between cannabis use and depression. *Addiction, 98*, 1493-1504.

Demidenko, E. (2007). Sample size determination for logistic regression revisited. *Statistics in Medicine*, *26*, 3385-3397.

Dennis, M. L., Chan, Y. F., & Funk, R. R. (2006). Development and validation of the GAIN Short Screener (GAIN-SS) for psychopathology and crime/violence among adolescents and adults. *The American Journal on Addictions, 15*, 80-91.

Eynan, R., Langley, J., Tolomiczenko, G., Rhodes, A., Links, P., Wasylenki, D., et al. (2002). The association between homelessness and suicidal ideation and behaviors: results of a cross-sectional survey. *Suicide and life-threatening behavior, 32*, 418-427.

Fillmore, K. M., Hartka, E., Johnstone, B. M., Leino, V., Motoyoski, M., & Temple, M. (1991). A meta-analysis of life course variation in drinking. *British Journal of Addiction, 86,* 1221–1268.

Flouri, E., & Buchanan, A. (2002). The protective role of parental involvement in adolescent suicide. *Crisis: The Journal of Crisis Intervention and Suicide Prevention, 23*, 17–22.

Folse, V. N., Eich, K. N., Hall, A. M., & Ruppman, J. B. (2006). Detecting suicide risk in adolescents and adults in an emergency department: a pilot study. *Journal of Psychosocial Nursing and Mental Health Services, 44*, 22-29.

Folse, V.N. & Hahn, R. L. (2009). Suicide risk screening in an emergency department: engaging staff nurses in continued testing of a brief instrument. *Clinical Nursing Research, 18*, 253-271.

Gairin, I., House A., & Owens, D. (2003). Attendance at the accident and emergency department in the year before suicide: retrospective study. *British Journal of Psychiatry, 183,* 28-33.

Garlow, S. J., Purselle, D., & D'Orio, B. (2003). Cocaine use disorders and suicidal ideation. *Drug and Alcohol Dependence, 70,* 101-104.

Grant, B.F. (1995). Comorbidity between DSM-IV drug use disorders and major depression: results of a national survey of adults. *Journal of Substance Abuse, 7*(4), 481-497.

Grant, B. F. & Hasin, D. S. (1999). Suicidal ideation among the United States drinking population: results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Studies on Alcohol and Drugs, 60*, 422-429.

Harris, E. C. & Barraclough, B. (1997). Suicide as an outcome for mental disorders. A meta-analysis. *British Journal of Psychiatry, 170,* 205-228.

Hayes, A. F., & Matthes, J. (2009). Computational procedures for probing interactions in OLS and logistic regression: SPSS and SAS implementations. *Behavior Research Methods, 41*, 924-936.

Hills, A. L., Afifi, T. O., Cox, B. J., Bienvenu, O. J., & Sareen, J. (2009). Externalizing psychopathology and risk for suicide attempt: cross-sectional and longitudinal findings from the Baltimore Epidemiologic Catchment Area Study. *Journal of Nervous and Mental Disease, 197*, 293-297.

Hills, A. L., Cox, B. J., McWilliams, L. A., & Sareen, J. (2005). Suicide attempts and externalizing psychopathology in a nationally representative sample. *Comprehensive Psychiatry, 46*, 334-339.

Hsieh, F.Y., Block, D.A., & Larsen, M.D. (C). A Simple Method of Sample Size Calculation for Linear and Logistic Regression. *Statistics in Medicine, 17,* 1623-1634.

Hufford, M. R. (2001). Alcohol and suicidal behavior. *Clinical Psychology Review, 21*, 797-811.

Humphreys, K., Moos, R. H. & Cohen, C. (1997). Social and community resources and long-term recovery from treated and untreated alcoholism. *Journal of Studies on Alcohol, 58*, 231–238.

Ilgen, M. A., Walton, M. A., Cunningham, R. M., Barry K. L., Chermack, S. T., De Chavez, P., & Blow, F. C. (2009). Recent suicidal ideation among patients in an inner city emergency department. *Suicide and Life-Threatening Behavior, 39*, 508-517.

Institute of Medicine. (2002). Reducing suicide: A national imperative. Washington, DC: National Academies Press.

Joe, S., & Marcus, S. (2003). Datapoints: trends by race and gender in suicide attempts among U.S. adolescents, 1991-2001. *Psychiatric Services, 54*, 454-454.

Joe, S., Romer, D., & Jamieson, P. (2005).Race and gender differences in U. S. trends in suicide acceptability. *American Association of Suicidology Annual Meeting*. Bloomfield, Colorado.

Joiner, T. (2005). *Why people die by suicide*. Cambridge, MA: Harvard University Press.

Joiner, T. E., Van Orden, K. A., Witte, T. K., Selby, E. A., Ribeiro, J., Lewis, R., & Rudd, M. D. (2009). Main predictions of the interpersonal–psychological theory of suicidal behavior: Empirical tests in two samples of young adults. *Journal of Abnormal Psychology, 118*, 634–646.

Kendall, R.E. (1983). Alcohol and suicide. *Substance and Alcohol Actions/Misuse, 4*, 121-127.

Khantzian, E. J. (1985). The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *American Journal of Psychiatry, 142,* 1259-1264.

King, C.A., O'Mara R.M., Hayward C.N., & Cunningham , R. M. (2009). Adolescent suicide risk screening in the emergency department. *Academy of Emergency Medicine, 16*, 1234-1241.

Kessler, R. C., Borges, G., & Walters, E. E. (1999). Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Archives of General Psychiatry, 56*, 617-626.

Krug, E.G., Dahlberg, L.L., Mercy, J.A., Zwi, A., & Lozano, R. eds. (2002). World report on violence and health. Geneva: World Health Organization.

Larkin, G. L. & Beautrais, A. L. (2010). Emergency departments are underutilized sites for suicide prevention. *Crisis, 31*, 1-6.

Larkin, G. L., Beautrais, A. L., Gibb, S., & Laing, N. (2008). The epidemiology of presentations for suicidal ideation to the emergency department. *Academic Emergency Medicine, 15*, S208–S209.

Larkin, G. L., Smith, R. P., & Beautrais, A. L. (2008). Trends in US emergency department visits for suicide attempts, 1992–2001. *Crisis*, *29*, 73–80.

Madras, B. K., Comptom, W. M., Avula, D., Stegbauer, T., Stein, J. B., & Clark, H. W. (2009). Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: comparison at intake and 6 months later. *Drug and Alcohol Dependence, 99*, 280-295.

Makhija, N. & Sher, L. (2007). Childhood abuse, adult alcohol use disorders and suicidal behaviour. *QJM, 100*, 305-309.

McCaig, L. F. & Burt, C. W. (2003). National Hospital Ambulatory Medical Care Survey: 2001 emergency department summary. *Adv Data, 335,* 1-29.

McCaig, L. F. & Newar, E. N. (2006). National hospital ambulatory medical care survey: 2004 emergency department summary. Advance data from vital and health statistics. Hyattsville (MD): National Center for Health Statistics. Report no. 372.

Moore, T. H., Zammit, S., Lingford-Hughes A., Barnes, T. R., Jones, P. B., Burke, M., & Lewis, G. (2007). Cannabis use and risk of psychotic or affective mental health outcomes: a systematic review. *Lancet, 370*, 319-328.

Morano, C. D., Cisler, R. A., & Lemerond, J. (1993). Risk factors for adolescent suicidal behavior: Loss, insufficient familiar support, and hopelessness. *Adolescence, 28*, 851–865.

Mulia, N., Schmidt, L., Bond, J., Jacobs, L., & Korcha, R. (2008). Stress, social support and problem drinking among women in poverty. *Addiction, 103,* 1283-1293.

Mulvey, K., Atkinson, D., Avula, D., & Luckey, J. (2005). Using the Internet to Measure Program Performance. *American Journal of Evaluation, 26*, 587–597.

National Strategy for Suicide Prevention Goals and Objectives for Action. (2001). Center for Mental Health Services. Office of the Surgeon General. Rockville, MD: US Public Health Service.

Pages, K. P., Russo, J. E., Roy-Byrne, P. P., Ries, R. K., & Cowley, D. S. (1997). Determinants of suicidal ideation: the role of substance use disorders. *Journal of Clinical Psychiatry, 58*, 510-515.

Peirce, R. S., Frone, M. R., Russell, M., Cooper, M., & Mudar, P. (2000). A longitudinal model of social contact, social support, depression, and alcohol use. *Health Psychology, 19*, 28-38.

Peng, C. J., Lee, K. L., Ingersoll, G. M. (2002). An introduction to logistic regression analysis and reporting. *Journal of Educational Research, 96,* 3-14.

Penninx, B., van Tilburg, T., Deeg, D., Kriegsman, D., Boeke, A., & van Eijk, J. (1997). Direct and buffer effects of social support and personal coping resources in individuals with arthritis, *Social Science & Medicine, 44,* 393–402.

Preacher, K. J. & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40,* 879-891.

Prinstein, M. J. (2008). Introduction to the special section on suicide and nonsuicidal self-injury: A review of unique challenges and important directions for self-injury science. *Journal of Consulting and Clinical Psychology*, *76*, 1–8.

Project MATCH Research Group. (1997). Matching alcoholism treatments to client heterogeneity: Project MATCH posttreatment drinking outcomes. *Journal of Studies on Alcohol, 58*, 7-29.

Reinherz, H.Z., Tanner, J.L., Berger, S.R., Beardslee, W.R., & Fitzmaurice, G.M. (2006). Adolescent suicidal ideation as predictive of psychopathology, suicidal behavior, and compromised functioning at age 30. *American Journal of Psychiatry, 163,* 1226-1232.

Reynolds, W. M. (1988). Suicidal Ideation Questionnaire: Professional Manual. Odessa, FL: Psychological Assessment Resources.

Sokero, T. P., Melartin, T. K., Rytsälä, H. J., Leskelä, U. S., Lestelä-Mielonen, P. S., & Isometsä, E. T. (2003). Suicidal ideation and attempts among psychiatric patients with major depressive disorder. *Journal of Clinical Psychiatry, 64*, 1094-1100.

Substance Abuse and Mental Health Services Adminstration (SAMHSA). (2010). Screening, brief intervention, and referral for treatment. 2008 State Grantees, Georgia. Retrieved from http://sbirt.samhsa.gov/grantees/state_georgia.htm.

Verona, E., Sachs-Ericsson, N., & Joiner, T.E. (2004). Suicide attempts associated with externalizing psychopathology in an epidemiological sample. *American Journal of Psychiatry, 161*, 444-451.

WHO ASSIST Working Group. (2002). The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): development, reliability and feasibility. *Addiction, 97,* 1183-1194.

Wilcox, B. L. (1981). Social support, life stress, and psychological adjustment: a test of the buffering hypothesis. *American Journal of Community Psychology, 9*, 371-386.

Wilcox, H. C., Arria, A. M., Caldeira, K. M., Vincent, K. B., Pinchevsky, G. M., & O'Grady, K. E. (2010). Prevalence and predictors of persistent suicide ideation, plans, and attempts during college. *Journal of Affective Disorders, 127*, 287-294.

Wilcox, H. C., Conner, K. R., & Caine, E. D. (2004). Association of alcohol and drug use disorders and completed suicide: an empirical review of cohort studies. *Drug and Alcohol Dependence, 76*, S11-9.

Wills, T. A., Resko, J. A., Ainette, M. G., & Mendoza, D. (2004). Role of parent support and peer support in adolescent substance use: a test of mediated effects. *Psychology of Addictive Behaviors, 18,* 122-134.

Wintersteen, M. B. (2010). Standardized screening for suicidal adolescents in primary care. *Pediatrics, 125*, 938-944.

APPENDICES

A. ASSIST

WHO – ASSIST V3.0

Introduction Please read to the patient

Thank you for agreeing to take part in this brief interview about alcohol, tobacco products and other drugs. I am going to ask you some questions about your experience of using these substances across your lifetime and in the past three months. These substances can be smoked, swallowed, snorted, inhaled, injected or taken in the form of pills (show drug card).

Some of the substances listed may be prescribed by a doctor (like amphetamines, sedatives, pain medications). For this interview, we will not record medications that are used as prescribed by your doctor. However, if you have taken such medications for reasons other than prescription, or taken them ore frequently or at higher doses than prescribed, please let me know. While we are also interested in knowing about your use of various illicit drugs, please be assured that information on such use will be treated as strictly confidential.

NOTE: Before asking questions give ASSIST Response Card to Patient

Question 1

(If completing follow-up please cross check the patient's answers with the answers given for Q1 at baseline. Any differences on this question should be queried.)

In your life, which of the following substances have you ever used? (NON-MEDICAL USE ONLY)	**No** **Yes**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0 3
b. Alcoholic beverages (beer, wine, spirits, etc.)	0 3
c. Cannabis (marijuana, pot, grass, hash, etc.)	0 3
d. Cocaine (coke, crack, etc.)	0 3
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0 3
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0 3
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0 3
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0 3
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0 3
j. Other – specify	0 3

Probe if all answers were negative – "Not even when your were in school?"	If No to all items, stop interview If "Yes" to any of these items, ask Question 2 for each substance ever used.

Question 2

In the past three months, how often have you used the substances you mentioned (FIRST DRUG, SECOND DRUG, ETC.)?	**Never**	**Once or Twice**	**Monthly**	**Weekly**	**Daily or Almost Daily**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	3	4	5	6
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	3	4	5	6
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	3	4	5	6
d. Cocaine (coke, crack, etc.)	0	3	4	5	6
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	3	4	5	6
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	3	4	5	6
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	3	4	5	6
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	3	4	5	6
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	3	4	5	6
j. Other – specify	0	3	4	5	6

If never to all items in Question 2, skip to Question 6

If any substances in Question 2 were used in the previous three months, continue with Questions 3, 4 & 5 for each substance used.

Question 3

During the past three months, how often have you had a strong desire or urge to use (FIRST DRUG, SECOND DRUG, ETC.)?	Never	Once or Twice	Monthly	Weekly	Daily or Almost Daily
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	3	4	5	6
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	3	4	5	6
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	3	4	5	6
d. Cocaine (coke, crack, etc.)	0	3	4	5	6
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	3	4	5	6
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	3	4	5	6
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	3	4	5	6
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	3	4	5	6
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	3	4	5	6
j. Other – specify	0	3	4	5	6

Question 4

During the past three months, how often has your use of (FIRST DRUG, SECOND DRUG, ETC.) led to health, social, legal or financial problems?	Never	Once or Twice	Monthly	Weekly	Daily or Almost Daily
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	3	4	5	6
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	3	4	5	6
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	3	4	5	6
d. Cocaine (coke, crack, etc.)	0	3	4	5	6
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	3	4	5	6
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	3	4	5	6
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol,					

etc.)	0	3	4	5	6
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	3	4	5	6
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	3	4	5	6
j. Other – specify	0	3	4	5	6

Question 5

During the past three months, how often have you failed to do what was normally expected of you because of your use of (FIRST DRUG, SECOND DRUG, ETC.)?	**Never**	**Once or Twice**	**Monthly**	**Weekly**	**Daily or Almost Daily**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	3	4	5	6
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	3	4	5	6
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	3	4	5	6
d. Cocaine (coke, crack, etc.)	0	3	4	5	6
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	3	4	5	6
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	3	4	5	6
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	3	4	5	6
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	3	4	5	6
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	3	4	5	6
j. Other – specify	0	3	4	5	6

Ask Question 6 & 7 for all substances ever used (i.e. those endorsed in Question 1.

Question 6

Has a friend or relative or anyone else ever expressed concern about your use of (FIRST DRUG, SECOND DRUG, ETC.)?	**No, Never**	**Yes, in the 3 past months**	**Yes, but not in the past 3 months**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	6	3
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	6	3
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	6	3
d. Cocaine (coke, crack, etc.)	0	6	3
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	6	3
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	6	3
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	6	3
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	6	3
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	6	3
j. Other – specify	0	6	3

Question 7

Have you ever tired and failed to control, cut down, or stop using (FIRST DRUG, SECOND DRUG, ETC.)?	**No, Never**	**Yes, in the 3 past months**	**Yes, but not in the past 3 months**
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	6	3
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	6	3
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	6	3
d. Cocaine (coke, crack, etc.)	0	6	3
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	6	3
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	6	3

g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	6	3
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	6	3
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	6	3
j. Other – specify	0	6	3

B. GAIN-SS

Mental and Physical Health Problems and Treatment/Recovery

"The following questions are about common personal problems you may be experiencing. These problems are considered significant when you have them for two or more weeks, when they keep coming back, when they keep you from meeting your responsibilities, or when they make you feel like you can't go on. Please answer the next questions using yes or no."

GAIN 1. During the past 6 months, have you had significant problems …

	YYES	**NNO**
a. with feeling very trapped, lonely, sad, blue, depressed or hopeless about the future?		
b. with sleep trouble, such as bad dreams, sleeping restlessly or falling asleep during the day?		
c. with feeling very anxious, nervous, tense, scared, panicked or like something bad was going to happen?		
d. when something reminded you of the past, you became very distressed and upset?		
e. with thinking about ending your life or committing suicide?		
Subscale Score		