Published in final edited form as:

J Adolesc. 2009 October ; 32(5): 1159–1172. doi:10.1016/j.adolescence.2009.01.012.

The Relationship Between Early Suicide Behaviors And Mental Health: Results From A Nine-Year Panel Study

RYAN MACDONALD, Ph.D.,

Mercy Medical Center, The Prevention and Research Center, 227 St. Paul Place, Baltimore, MD 21202-2001, ryan.macdonald@mdmercy.com

JOHN TAYLOR, Ph.D., and

Florida State University, Department of Sociology, Tallahassee, FL 32306-2270

DIANA CLARKE, Ph.D.

Johns Hopkins University Bloomberg School of Public Health, Department of Mental Health, 624 N. Broadway, Baltimore, MD 21205-1900

Keywords

Suicide Ideation; Suicide Attempts; Depression; Drug Dependence

INTRODUCTION

Suicide is a major public health concern in the United States, especially among young people. A recent study reported rates of 12.9 per 100,000 for males and 2.7 per 100,000 for females aged 15–19 (National Vital Statistics Reports, 2005). This study also found that suicide is the third leading cause of death among 15–19 year olds. Findings from the National Comorbidity Survey Replication indicate that 3.3 percent of the study respondents had seriously considered suicide in the year prior to interview (Kessler et al. 2005). Some studies report that the rate of attempted to completed suicides among adolescents is quite low and less than 2 percent of with a prior attempt make a second attempt (Dorpat & Ripley, 1967; van Aalst et al. 1992). Other studies suggest much higher rates of repeated attempts. For example, two studies (Larsson et al. 1991; Lewinsohn et al. 1996) found that about 50 percent of adolescents who had attempted suicide also reported that they had made repeat attempts. Despite this rather large disparity in research findings, research suggests that the vast majority of those who ideate or attempt suicide survive into adulthood (Vajani et al. 2001). However, relatively little is known about the long-term mental health consequences of suicide behavior. Moreover, little distinction has been made in prior research regarding the independent effects of suicide ideation and suicide attempts. The present paper attempts to bridge this gap by examining two waves of prospective data from a community-based sample of young people residing in South Florida.

Direct correspondence to Ryan MacDonald, Mercy Medical Center, The Prevention and Research Center, 227 St. Paul Place, Baltimore, MD 21202-2001; ryan.macdonald@mdmercy.com.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

BACKGROUND

Evans and colleagues (2005) note that suicidality or suicidal phenomena is a multidimensional construct that include suicide attempts, suicide ideation (thoughts about suicide), intentional or deliberate self-harm, suicide plans, and death by suicide. Consistent with this view the Centers for Disease Control and Prevention (CDC) write that suicidal behavior "...exists along a continuum from thinking about ending one's life ("suicidal ideation"), to developing a plan, to non-fatal suicidal behavior ("suicide attempt"), to ending one's life ("suicide") (www.cdc.gov/ncipc/dvp/suicide/Suicide-def.htm). The CDC defines ideation as "thoughts of harming or killing oneself." The CDC defines the measurement of the severity of suicidal ideation as estimating "the frequency, intensity, and duration of these thoughts and suicide attempts as a non-fatal, self-inflicted destructive act with explicit or inferred intent to die." In their review of suicidality, Evans et al. (2005) identified 128 population-based studies over the past 30 years and summarized the findings in a meta-analysis. They found a lifetime prevalence of 30 percent for suicide ideation and 9.7 percent for suicide attempts.

However, there is little research assessing the relationship between suicidality and subsequent mental health problems. This is so because most prior research has assessed suicide as the outcome of interest. Clearly completed suicide cannot be a subsequent predictor of anything; therefore, the vast majority of previous research has focused on identifying the precursors and correlates of completed suicide. In their review of the literature, Gunnell and Frankel have observed suicidality to be most highly correlated with completed suicide and that upwards of 50 percent of completers having a prior history of suicidality (Gunnell and Frankel, 1994). Results from a community-based study by Rosenberg et al. (2005) suggest an association between suicidality and substance abuse, sexual assault, depression, and violence. However, little is known about how these different dimensions of suicidality are related to *subsequent* non-fatal outcomes.

Clinical research on suicidality indicates it is associated with an array of adverse mental health problems (Felts, Cherneir, & Barnes, 1992; De Man, 1999; Jacobs, Brewer, & Klein, 1999; Roberts, Roberts, & Chen, 1998; Fisher, 1999; Lewinsohn, Rohde, & Seeley, 1994; Field, Diego, & Sanders, 2001; Hallfors et al. 2004 (for review see Gould et al. 2003)). A large proportion of this literature also suggests that apart from a prior suicide attempt, depression is most frequently associated with suicide. It is now well established that the expression of suicidal thoughts are a correlate of major depressive disorder. For example, a recent study of suicidal young adults, Shahar et al. (2006) found evidence for a synchronous association between suicidality, depression, and hopelessness, and that these three responses may constitute a single syndrome. Also, an array of stressful life circumstances including: recent life events and lifetime traumas have been linked to suicidality (Huff, 1999; Yang & Lester, 1995; Miller & Taylor, 2005). In sum, these collected findings suggest that suicidal behaviors may be an important marker or proxy for other well-established predictors of mental health.

In the present study, we examine whether two dimensions of suicidality, suicide attempts and suicide ideation predict mental health problems in the context of exposure to social stress and depressive symptomatology. We address these issues by examining nine-year prospective data that span from preadolescence to young adulthood. Specifically, we examine how suicide attempts and suicide ideation in preadolescence predict variation in young adult drug dependence and depressive symptomatology. In addition we examine the mediating effects of depressive symptoms and stress exposure.

METHOD

Sample

The study sample was drawn from a previous longitudinal investigation based in the Miami-Dade public school system (Vega & Gil, 1998). This study was designed to assess risk and protective factors associated with male adolescent deviant behavior and substance use. For the original study, all 48 of the county's public middle schools and all 25 public high schools participated, as did alternative schools. Time 1 data were obtained from students in grades 6 and 7 during the 1990/1991 school year, when the mean age of the sample was 11.6 years of age. Two additional waves of data collection were conducted during the 1991/1992 and 1992/1993 school years. Consent forms were sent to parents of the total population of 9,763 male students scheduled to enter grades 6 and 7, and to 669 female students from six schools selected to approximate the ethnic composition of all middle schools in the county. Completed questionnaires were obtained from 7,386 of the 10,432 prospective participants at Time 1. Detailed analyses provided assurance that Time 1 participants were highly representative of the population from which they were drawn (Vega & Gil, 1998). A detailed description of this study is provided elsewhere (Vega and Gil (1998).

Funding was received to add an additional two waves of data collection. Wave 4 data collection was conducted in 1998–2000. Within the confines of ethnicity criteria, all female participants in the earlier investigation and a random sample of 1,300 male participants were selected for follow-up. Information on 1,264 of these male prior participants ultimately was released to the field staff. To supplement the sample of females, we employed as the sampling pool the Miami-Dade County grades 6 and 7 class rosters from the year of Wave 1 data collection. We randomly selected the names of 1,000 new girls from this pool, and stratified them to achieve the target ethnic distributions. The first 909 of these girls ultimately were sought by field staff members. Overall, 70.1 percent of those we searched for and attempted to recruit to the study were interviewed. By far the greatest loss (41.8 percent) occurred in the new sample of females, who had no previous involvement in the study.

Although a significant number of the target sample had left the area to attend college or for other reasons, we succeeded in interviewing 76.4 percent of subjects studied previously. At the time of the Time 4 follow-up interview, 93 percent of the sample were between 19 and 21 years old.

Comparisons of persons interviewed with the random sample drawn from the original study population revealed no statistically significant differences on a wide array of early adolescent behaviors and family characteristics that are likely to be relevant to mental health and substance use risks. The variables that were compared included socioeconomic status of origin, race/ethnicity, gender, and associations with deviant peers.

The Time 4 sample was drawn so as to achieve roughly equal representation of non-Hispanic whites, African Americans, persons of Cuban heritage, and "other Hispanics." Thus, the sub sample assessed in the present paper consisted of 391 (30.4%) white non-Hispanic, 340 (26.2%) African American, 296 (23.0%) Cuban, and 260 (20.2%) non-Cuban Hispanics. In this paper we consider those who had participated in both waves of interviews for a total sample size of 1286. It should also be noted that because of the initial study design, the sample is disproportionately male with 943 males compared to 343 females. A full description of the context and design associated with the first wave of the research has been reported by elsewhere (Warheit, 1998), and a summary of the findings has been published by Vega and Gil (1998). A detailed summary of second wave of data collection has also been published (Turner & Gil, 2002).

Measures

Time 4 Drug Dependence is defined by Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV; American Psychiatric Association, 1994, p. 176). These criteria require endorsement of three or more symptoms indicating that the individual continues to use a substance despite significant drug related problems including physical tolerance, withdrawal, and compulsive use. We did not include consideration of DSM-IV drug abuse because of uncertainty about how meaningful that diagnosis may be among late adolescents and young adults. The criteria for abuse are met by a single recurring problem associated with use and, in our view, qualifying for the diagnosis may be as much a function of one's social context, in terms of opportunities, demands and supports, as of the individual's behavior. Dependence reflects a more severe substance problem than abuse, and persons are classified with abuse of a particular substance only if they are not dependent on that substance. Though some have argued that the DSM-IV symptoms for dependence may be more typically experienced in adult populations, we view this outcome variable as appropriate for this study population. Given the age (mean = 20.1), and the high prevalence of lifetime use (63.9%) within this sample at T-4, assessing drug problems in terms of dependence provides a conservative estimate of psychosocial pathology. DSM-IV drug dependence was assessed using interview modules based on the Michigan Composite International Diagnostic Interview (CIDI). In each analysis presented, the drug dependence outcome variable is the lifetime DSM-IV dependence involving sedatives, tranquilizers, stimulants, analgesics, inhalants, marijuana, cocaine, hallucinogens, or heroin.

Data on the lifetime occurrence of substance use disorders were obtained through computer assisted personal interviews that allowed estimation of DSM-IV diagnoses. Our basic study instrument was the Michigan Composite International Interview (CIDI) that was employed in the National Comorbidity Survey (NCS) (Kessler et al. 1994). The CIDI is a fully structured interview, based substantially on the Diagnostic Interview Schedule (DIS) (Robins et al. 1981) and designed to be administered by non-clinicians trained in its use (Robins et al. 1988; World Health Organization 1990). We assessed drug dependence using the Michigan CIDI as updated by the NCS researchers to cover DSM-IV criteria.

The DSM-IV defines dependence as the co-occurrence of three or more of the following symptoms during the prior twelve months for any of the following substances: sedatives, tranquilizers, stimulants, marijuana, cocaine, and hallucinogens.*

1. Did you ever continue to use X while taking medicine you knew was dangerous to mix with alcohol or drugs, or when you had a serious that could be made worse by taking alcohol or drugs?
2. Have you ever tried to stop or cut down on X but found you could not?
3. Have you ever tried to quit or cut down on X.
4. Did you ever have a period of a month or more when you spent a great deal of time using X, getting it, or getting over its effects?
5. Did you ever use much larger amounts of X than you intended to when you began, or did you use X for a longer period of time than you intended to?
6. Did you ever find that you had to use more of X than usual to get the same effect or that the same amount had less effect on you than before?
7. Did stopping or cutting down on X ever make you sick or cause other problems?

*Also included in the survey were items assessing stimulant, analgesic, inhalant, and heroin dependence. No respondents in this sample met criteria for these disorders.

8. Have you ever given up or greatly reduced important activities in order to get, or use X, like sports, work, or seeing family or friends?

Time 4 Depressive Symptomatology—Time 4 depression was measured using the Center for Epidemiology Studies Depression scale (Radloff, 1977). The version of the CES-D used in this study is different from most prior assessments in two ways. Rather than asking respondents to report symptoms that occurred over the past week, respondents were asked about their symptoms over the past month. This corresponds to the shortest time period for which DSM-IV depressive disorder can be estimated. Additionally, rather than asking respondents to report the number of days per week they experienced each of the 20 symptoms, respondents were given response categories of “not at all,” “occasionally,” “frequently,” and “almost all of the time.”

Moreover, in analyses presented in this paper, response categories of “not at all” and “occasionally” were combined. The reasons for this collapse are twofold (Taylor & Turner, 2002). First, although occasional experiences of symptoms may estimate some level of discomfort for respondents, such experience does not interfere with core role performance—a potentially deleterious outcome of elevated levels of depressive symptoms. Second, when response patterns were compared between Non-Hispanic Whites and African Americans data revealed that minority adolescents might have underreported the occasional experience of symptoms. In analyses, there was a substantial race difference in the odds ratio of “occasionally” to “frequently” and “all the time” responses. These differences were observed within as well as across levels of socioeconomic status suggesting that the tendency to report occasional symptoms decreases with increasing exposure to negative life situations. Reliability analyses for this sample produced a Cronbach’s Alpha of .82.

Time 1 Suicide Attempts are measured by a single question in Time 1 that asks respondents, “Have you ever tried to kill yourself?” Responses were coded 1 for yes and 0 for no to create a dichotomous variable.

Time 1 Suicide Ideation is measured by a single item in Time 1 asking the respondent to address the statement “I think about killing myself.” Respondents were asked to choose from the responses, “Very true or often true,” “somewhat or sometimes true,” and “not true.” Responses of “Very true” and “somewhat true” were combined to create a dichotomous response indicating any suicidal thoughts versus no suicidal thoughts. The measure employed here is a conceptually similar to the previously stated CDC definition. However, our assessment of these thoughts and behaviors is limited to the frequency of their occurrence. Unlike the CDC definitions, we do not measure the duration or intensity of these experiences.

For most constructs multi-item measures are preferred because they allow assessments of inter-item correlation and internal consistency. Also, multi-item measures are more likely to capture all of the underlying facets of the construct of interest (Baumgartner & Hamburg 1996). However, there are theoretical and empirical arguments for employing single-item measures. Bergkvist and Rossiter (2007), for example, argue that a single-item measure is appropriate when the item represents a construct that is easily and uniformly imagined. In this circumstance adding additional items runs the risk of tapping into a separate construct. We believe that this is the case with respect to the variable attempted suicide. In contrast, additional items could have provided information on the frequency and intensity of suicide ideation. This information is important because it has potential implications for intervention efforts.

Time 1 Depressive Symptoms was assessed using a shortened version of the Center for Epidemiology Studies Depression scale (Radloff, 1977). The scale was composed of 4 items as follows: I felt sad, I could not get going, I did not feel like eating; my appetite was poor,

and I felt depressed. Response categories were rarely (less than once a week), some of the time (1 to 2 days a week), occasionally (3 to 4 days a week), and most of the time (5 to 7 days a week). Responses for the four questions were combined to create a scale with a mean of 2.51 and a standard deviation of 2.66. The Cronbach's alpha for this measure was .74.

Stress Exposure is a count of 34 major and potentially traumatic events. Items include such things as: failing a grade in school, witnessing a death, having been physically abused, or having been shot. The 34-item count represents a more comprehensive measure of major and potentially traumatic events than is common in most previous research (Wheaton, 1994). In order to establish the temporal ordering between stress exposure and suicide behaviors, stress events were divided into two separate measures—those events occurring prior to T-1 interview and ones occurring after T-1 and up to 2 years prior to the T-4 interview. The majority of individuals report having experienced no traumatic events. This has resulted in a positively skewed distribution of events. The count of stressful life events has been standardized into a z-score and results should be interpreted in terms of standard deviations from the mean.

Sociodemographic Status—Gender was a dummy variable coded 1 for females. Ethnicity includes Non-Hispanic whites, Cubans, Non-Cuban Hispanics, and African Americans. This measure was based on respondent self-report. In regression analyses where ethnicity is a dummy variable, Non-Hispanic white is the reference group. Parental socioeconomic status was measured using the reported income, occupational prestige, and education of respondents' parents. The items were standardized, summed, and then divided by the number of dimensions reported.

RESULTS

Table 1 presents the distribution of suicide ideation, suicide attempts, drug dependence and depressive symptoms across selected social statuses. Despite nearly 20 percent of the sample reporting suicidal thoughts, no significant gender or socioeconomic status group differences were observed. The lone significant contrast in suicide ideation was observed between Cubans and African Americans (12.4 percent and 26.1 percent respectively, $p < .05$ level). In contrast, there were no statistically significant social status differences in suicide attempts.

Consistent with previous research, Table 1 shows that males were nearly twice as likely as females to meet criteria for lifetime drug dependence and females had significantly higher mean levels of depressive symptom scores compared to males. We also found that, relative to other ethnic groups, African Americans reported the highest mean depression scores and the lowest prevalence of drug dependence. Although there were no significant socioeconomic differences in drug dependence, we observed monotonic increases in depressive symptoms as socioeconomic status decreased.

Table 2 assessed the linkages between suicidal thoughts and behaviors and subsequent mental health problems. Here odds ratios and means were calculated to assess the magnitude of the relationship between suicide attempts and suicide ideation, respectively, on drug dependence and depressive symptoms. These findings indicated significantly elevated odds of drug dependence in young adulthood among those with suicidal thoughts (1.7) and actions (1.9). Table 2 also shows higher levels of mean distress scores among those who reported ideating and attempting suicide compared to those who did not.

Collectively, the findings indicated an increased risk for drug dependence and depressive symptoms among those with suicidal thoughts and behaviors. However, it may be that suicidality is an artifact of other early adversities. As stated earlier, past research has shown that depression is most commonly associated suicide and suicide behaviors. In addition, both

stress and depression may be part of a larger domain of suffering which may also include suicidal thoughts and behaviors. The findings in Tables 3 through 6 addressed these potential explanations.

Table 3 presents the results of a binary logistic regression to examine the relationship between suicide attempts and drug dependence. The focal relationship is shown in the baseline model (equation 1). Significantly elevated risk of drug dependence was shown to be associated with individuals who report attempting suicide. However, this relationship was reduced to non-significance when the effects of T-1 depression were controlled for in equation 3. Moreover, controlling on stress exposure between T-1 and T-4 (equation 5) fully explained away the focal relationship and the direction of the coefficient is reversed.

In Table 4 we observed a similar pattern of findings with respect to depressive symptoms. Although significant at the zero order and with controls for demographics in models 1 and 2, the focal relationship was reduced by more than 40 percent and became modestly significant when time 1 depression was included in model 3 (from 1.43 to .82). Adding stress exposure prior to the T-1 interview did not appreciably alter the coefficient for suicide attempts. In contrast, this coefficient was reduced to non-significance after controlling for the effects of stress exposure occurring after T1 in models 5 and 6. These findings suggest that early stressful experiences did little to alter the relationship between suicide behaviors and later mental health. However, stress exposure occurring after suicide attempts was both strongly related to the outcomes of interest and was an important mediator of the focal relationship. Thus, it appears that attempting suicide was a precursor to later stress exposure and not the opposite.

Table 5 examined the relationship between suicide ideation and drug dependence. A significant relationship was observed in the baseline model. Additional models (2–5) showed that potential explanatory variables decreased the magnitude of the coefficient for suicide ideation by as much as 30 percent, but it remained statistically significant. This relationship was observed in the final model where all study variables were simultaneously controlled. Table 6 presents parallel analyses with depressive symptoms as the outcome variable. As in the previous table model 1 showed a significant relationship between suicide ideation and depressive symptoms. Again, models 2 through 5 reduced the magnitude of the coefficient by as much as 30 percent, but the coefficient remained statistically significant. Finally, in much the same way as table 5, we observed a significant relationship as shown in model 6 between suicide ideation and depressive symptoms with all study variables controlled.

DISCUSSION

We believe the results presented in this study are important for three reasons. First, they indicate strikingly high rates of suicide ideation and suicide attempts within this community-based sample. Findings presented here were similar to those reported in the review by Evans et al. (2005), however, the mean age of our sample was almost 5 full years younger (11 compared to 16 years old), suggesting that the onset of suicide behaviors emerge in at much earlier ages than previous research would suggest. These findings are in accord with a previous study that demonstrated the presence of suicidal thoughts and behaviors in children as young as 8 (Mishara, 1999). Collectively, these findings suggest that intervention efforts need to be in place prior to the transition to adolescence. Second, zero-order relationships suggest that suicidality among pre-adolescents has enduring mental health consequences. Though some of the observed associations were explained by prior depression and stress, our findings indicate that early suicide thoughts and behaviors predict a wide array of subsequent adversity. Finally, the findings presented here suggest that suicide ideation and suicide attempts are distinct risk factors for later mental health outcomes.

There are at least three possible explanations that account for these findings. First, it may be that those who reported attempting suicide at T-1 might have been lost to mortality in later attempts. This possibility would result in underestimates of the salience of suicide attempts in our analyses. Although we do not have data on the specific cause of death, we do know that 17 study participants died between T-1 and T-4. We do not believe that this attrition compromised the findings presented here.

Second, it is probable that individuals who reported a suicide attempt were targets for later intervention efforts, and that these intervention efforts, in turn, reduced the risk for later substance dependence and depression. This possibility may account for the relatively weak associations between suicide attempts and later mental health problems compared to those observed between suicide ideation and these outcomes. From this perspective ideation may pose a greater health threat because it is not always an easily detected problem and because these ideas may not be communicated to others. In addition, suicidal ideation may be detected but not intervened upon if it does not meet the threshold of severity utilized by many health services or helping agencies.

To date, only a handful of studies have attempted to distinguish variation in the intensity and frequency of suicide ideation in general populations (Casey et al. 2006; 2008). However these studies did not attempt to assess linkages between suicide ideation and other health outcomes. Joiner and colleagues (2003) assessed longitudinal data from a clinical sample and found that suicide ideation was linked to completed suicide, but only among those who had developed suicide plans. In sum, more research is needed to address this neglected area of research.

Finally, the observed associations may simply be the result of the relatively low prevalence of suicide attempts compared to suicide ideation. At minimum, we believe that the findings presented underscore the importance of examining suicide behaviors in community samples.

Two study limitations must be acknowledged. First, the composition of the sample may undermine the generalizability of these findings to other populations. Although our data were drawn from a large community-based sample, Miami-Dade County is in many ways unique compared to other large metropolitan areas. We are confident that the findings presented here are generalizable to South Florida, but we are much less confident that they extend to populations residing in different geographical regions. Also, the use of a single item self-reported measure of both suicide ideation and suicide attempts does not allow us to capture the entire spectrum of suicide behaviors. Despite these limitations, we believe this study makes an important contribution to the study of suicide behaviors across a critical developmental time. We encourage future research to continue these efforts.

We believe that the findings presented here have important implications for future intervention efforts. They underscore the utility of identifying individuals who think about but do not act on their thoughts about suicide. These individuals could be targeted for prevention and early intervention efforts. Such intervention efforts could be undertaken before participants reach ages that are associated with drug use initiation. Finally, the present study suggests the usefulness of extending analyses to identify the socially modifiable contingencies of early adolescent suicide behaviors.

Future research should focus on disaggregating normal and abnormal pre-adolescent thoughts about suicide. A more complete measure across the same time frame would add substantially to the current research. In addition, research should explore other outcomes in young adulthood such as level of education, job status, marital status, etc. It is almost certain that early thoughts and behaviors of suicide have detrimental effects on other domains of life apart from mental health and substance use problems. We encourage future research to continue these efforts.

Acknowledgments

This work is supported by Grant 5 R01 DA 10772-03 from the National Institute on Drug Abuse to R. Jay Turner. An earlier version of this work was presented at the Annual Meeting of the Society for the Study of Social Problems in Philadelphia, PA and the Annual Meeting of Southern Sociological Society in Charlotte, NC.

References

- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Vol. 4. Washington DC: APA; 1994.
- Baumgartner H, Homberg C. Applications of structural equation modeling in marketing and consumer research: A review. *International Journal of Research in Marketing* 1996;13:139–161.
- Bergkvist L, Rossiter JR. The predictive validity of multiple-item versus single item measures of the same construct. *Journal of Marketing Research* 2007;XLIV:175–184.
- Casey P, Dunn G, Kelly BD, Birkbeck G, Dalgard OS, Lehtinen V, Britta S. Factors associated with suicide ideation in the general population. *The British Journal of Psychiatry* 2006;189:410–415. [PubMed: 17077430]
- Casey P, Dunn G, Kelly BD, Lehtinen V, Dalgard OS, Dowrick C, Ayuso-Mateos JL. The prevalence of suicide ideation in the general population: Results from the Outcome Depression International Network (ODIN) study. *Social Psychiatry and Psychiatric Epidemiology* 2008;43:299–304. [PubMed: 18264810]
- Centers for Disease Control and Prevention. www.cdc.gov/ncipc/dvp/suicide/Suicide-def.htm.
- De Man AF. Correlates of suicide ideation in high school students: the importance of depression. *Journal of Genetic Psychology* 1999;160:105–114. [PubMed: 10048215]
- Dorpat TL, Ripley HS. The relationship between attempted suicide and committed suicide. *Comprehensive Psychiatry* 1967;8:74–79. [PubMed: 6040467]
- Evans E, Hawton K, Rodham K, Deeks J. The prevalence of suicidal phenomena in adolescents: a systematic review of population-based studies. *Suicide and Life-Threatening Behavior* 2005;35:239–250. [PubMed: 16156486]
- Felts WM, Cherner T, Barnes R. Drug use and suicide ideation and behavior among North Carolina public school students. *American Journal of Public Health* 1992;82:870–872. [PubMed: 1585967]
- Field T, Diego M, Sanders CE. Adolescent suicidal ideation. *Adolescence* 2001;36:241–248. [PubMed: 11572303]
- Fisher A. Mood disorder in suicidal children and adolescents: recent developments. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 1999;40:315–324.
- Gould MS, Greenberg T, Velting D, Shaffer D. Youth suicide risk and preventive interventions: A review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry* 2003;42:386–405. [PubMed: 12649626]
- Gunnell D, Frankel S. Prevention of suicide: aspirations and evidence. *British Medical Journal* 1994;308:1227–1233. [PubMed: 8080520]
- Hallfors DD, Waller MW, Ford CA, Halpern CT, Brodish PH, Iritani B. Adolescent depression and suicide risk: Association with sex and drug behavior. *American Journal of Preventive Medicine* 2004;27:224–231. [PubMed: 15450635]
- Hawton K. Assessment of suicide risk. *British Journal of Psychiatry* 1987;150:145–153. [PubMed: 3307975]
- Huff CO. Source, recency, and degree of stress in adolescence and suicide ideation. *Adolescence* 1999;34:81–89. [PubMed: 10234369]
- Jacobs, DG.; Brewer, M.; Klein-Benheit, M. Suicide assessment: An overview and recommended protocol. In: Jacobs, DG., et al., editors. *The Harvard Medical School Guide to Suicide Assessment and Intervention*. San Francisco: Jossey-Bass; 1999.
- Joiner TE Jr, Steer RA, Brown G. Worst-point suicidal plans: A dimension of suicidality predictive of past suicide attempts and eventual death by suicide. *Behavioral Research and Therapy* 2003;41:1469–1480.

- Kaplan DW, Feinstein RA, Fisher MM, Klein JD, Olmedo LF, Rome ES, Yancy WS. Suicide and suicide attempts in adolescents. *Pediatrics* 2000;105:871–874. [PubMed: 10742340]
- Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EN. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry* 2005;62:593–602. [PubMed: 15939837]
- Kessler RC, McGonagle SZ, Nelson CB, Hughes M, Eshleman S, Wittchen HU, Kendler KS. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Study. *Archives of General Psychiatry* 1994;51:8–19. [PubMed: 8279933]
- Larsson BM, Melin L, Breitholtz L, Anderson G. Short-term stability of depressive symptoms and suicide attempts in Swedish adolescents. *Acta Psychiatrica Scandinavica* 1991;83:385–390. [PubMed: 1853732]
- Lewinsohn PM, Rohde P, Seeley JR. Psychosocial risk factors for future adolescent suicide attempts. *Journal of Consulting and Clinical Psychology* 1994;62:297–305. [PubMed: 8201067]
- Lewinsohn PM, Rohde P, Seeley JR. Adolescent suicide ideation and attempts: Prevalence, risk factors, and clinical implications. *Clinical Psychology: Science and Practice* 1996;3:25–46.
- Miller TR, Taylor DM. Adolescent suicidality: who will ideate, who will act? *Suicide and Life-Threatening Behavior* 2005;35:425–435. [PubMed: 16184697]
- Mishara BL. Conceptions of death and suicide in children ages 6–12 and their implications for suicide prevention. *Suicide and Life-Threatening Behavior* 1999;29:105–118. [PubMed: 10407964]
- National Vital Statistics Reports. 2005;53:17.
- Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychosocial Measurement* 1977;1:385–401.
- Roberts RE, Roberts C, Chen R. Suicidal thinking among adolescents with a history of attempting suicide. *Journal of the American Academy of Child and Adolescent Psychiatry* 1998;37:1294–1300. [PubMed: 9847502]
- Robins LN, Helzer JE, Croughan J, Ratcliff KL. National Institute of Mental Health Diagnostic Interview Schedule: Its history, characteristics, and validity. *Archives of General Psychiatry* 1981;45:1069–1077. [PubMed: 2848472]
- Robins LN, Wing HU, Wittchen HU, Helzer JE. The Composite International Diagnostic Interview: An epidemiological instrument suitable for use in conjunction with different diagnostic systems in different culture. *Archives of General Psychiatry* 1988;45:1067–1077.
- Rosenberg HJ, Jankowski MK, Sengupta A, Wolfe RS, Wolford GL II, Rosenberg SD. Single and multiple suicide attempts and associated health risk factors in New Hampshire adolescents. *Suicide and Life-Threatening Behavior* 2005;35:547–557. [PubMed: 16268771]
- Shahar G, Bareket L, Rudd MD, Joiner TE. In severely suicidal young adults, hopelessness, depressive symptoms, and suicidal ideation constitute a single syndrome. *Psychological Medicine* 2006;36:1–10.
- Taylor J, Turner RJ. Perceived discrimination, social stress, and depression in the transition to adulthood: Racial contrasts. *Social Psychology Quarterly* 2002;65:213–225.
- Turner RJ, Gil A. Psychiatric and substance use disorders in South Florida: Racial/ethnic and gender contrasts in a young adult cohort. *Archives of General Psychiatry* 2002;59:43–50. [PubMed: 11779281]
- Vajani M, Annest JL, Crosby AE, Alexander JD, Millet LM. Nonfatal and fatal self-harm injuries among children aged 10–14 years—United States and Oregon, 2001–2003. *Suicide and Life-Threatening Behavior* 2007;37:493–506. [PubMed: 17967116]
- van Aalst JA, Shotts SD, Vitsky JL, Bass SM, Miller RS, Meador KG, Morris JA Jr. Long-term follow-up of unsuccessful violent suicide attempts: Risk factors for subsequent attempts. *Journal of Trauma* 1992;33:457–464. [PubMed: 1328663]
- Vega, WA.; Gil, AG. *Drug Use and Ethnicity in Early Adolescence*. New York: Plenum; 1998.
- Warheit, GJ. Context and design. In: Vega, WA.; Gil, AG., editors. *Drug Use and Ethnicity in Early Adolescence*. New York: Plenum; 1998.
- Welch SS. A review of the literature on the epidemiology of parasuicide in the general population. *Psychiatric Services* 2001;52:368–375. [PubMed: 11239107]

- Wheaton, B. Sampling the stress universe. In: Avison, W.; Gotlib, I., editors. *Stress and Mental Health: Contemporary Issues and Prospects for the Future*. New York: Plenum; 1994.
- World Health Organization. *Composite International Diagnostic Interview, Version 1.0*. Geneva: World Health Organization; 1990.
- Yang B, Lester D. Social stress and suicide: replicating an Asian study with American data. *Psychological Reports* 1995;76:553–554. [PubMed: 7667468]

TABLE 1
The Social Distribution of T-1 Suicide Behaviors, T-4 Lifetime Drug Dependence, and T-4 Depressive Symptoms

	Suicide Ideation		Suicide Attempts		Drug Dependence		Depressive Symptoms	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Mean	
<i>Gender</i>								
Males	141 (73.4)	763 (74.1)	54 (70.1)	785 (73.3)	166 (85.6)	776 (72.5)	2.86	
Females	51 (26.6)	266 (25.9)	23 (29.9)	286 (26.7)	28 (14.4)***	294 (27.5)	4.06***	
<i>Race/Ethnicity</i>								
White	56 (29.2)	308 (29.9)	22 (28.6)	334 (31.2)	62 (32.0)	304 (28.4)	2.66	
Cuban	31 (16.1)	251 (24.4)	17 (22.1)	251 (23.4)	55 (28.4)	241 (22.5)	3.07	
Non-Cuban Hispanic	37 (19.2)	209 (20.3)	15 (19.5)	208 (19.4)	48 (24.7)	208 (19.4)	2.92	
African American	66 (34.3)*	279 (27.1)	23 (29.9)	279 (26.1)	29 (14.9)***	317 (29.6)	4.07***	
<i>Socioeconomic Status</i>								
4 (High)	46 (24.0)	308 (29.9)	17 (22.1)	322 (30.1)	48 (24.7)	316 (29.5)	2.61	
3	61 (31.8)	256 (24.9)	25 (32.5)	272 (25.4)	57 (29.4)	268 (25.0)	2.94	
2	52 (27.1)	247 (24.0)	21 (27.3)	263 (24.6)	42 (21.6)	268 (25.0)	3.62	
1 (Low)	32 (16.7)	215 (20.9)	13 (16.9)	211 (19.7)	47 (24.2)	215 (20.1)	3.89***	
<i>Total</i>	192 (18.7)	1029 (81.3)	77 (7.2)	1071 (92.8)	194 (19.0)	1070 (81.0)	3.20	

* Notes: $p < .05$;

*** $p < .001$; Suicide Ideation $n = 1221$, Suicide Attempts $n = 144$.

TABLE 2
Odds Ratios and Mean Distributions of T-4 Drug Dependence and T-2 Depressive Symptoms by Suicide Behaviors

T-4 Drug Dependence	T-1 Suicide Ideation			T-4 Depressive Symptoms	
	Cell	Ns	OR	95% CI	T-1 Suicide Ideation
No	811	129	1.81**	(1.24–2.64)	No 2.87
Yes	95	26			Yes 4.04***
					T-1 Suicide Attempts
	Cell	Ns	OR	95% CI	
No	911	157	1.90*	(1.10–3.28)	No 3.02
Yes	58	19			Yes 4.45***

* Notes: $p < .05$;
** $p < .01$;
*** $p < .001$

TABLE 3
Logistic Regressions of T-4 Drug Dependence on T-1 Suicide Attempts

	1	2	3	4	5	6
Suicide Attempts	.64 [*] (.28)	.70 [*] (.28)	.26 (.32)	.25 (.32)	-.056 (.34)	-.05 (.34)
Female (eq. 1)		-.66 ^{***} (.21)	-.68 ^{***} (.22)	-.69 ^{***} (.22)	-.49 [*] (.22)	-.50 [*] (.23)
Cuban American		.04 (.22)	.11 (.23)	.11 (.23)	.18 (.24)	.18 (.24)
Hispanic American		-.08 (.24)	-.04 (.25)	-.06 (.25)	-.01 (.26)	-.02 (.26)
African American		-1.04 ^{***} (.28)	-.98 ^{***} (.28)	-1.03 ^{***} (.29)	-1.14 ^{***} (.29)	-1.15 ^{***} (.29)
Socioeconomic Status		-.10 (.09)	-.06 (.10)	-.04 (.10)	.02 (.10)	.03 (.10)
T-1 Depressive Symptoms			.11 ^{***} (.03)	.11 ^{***} (.03)	.09 ^{**} (.03)	.09 ^{**} (.03)
Stress Exposure Prior to T-1				.15+ (.08)		.07 (.09)
Stress Exposure After T-1					.59 ^{***} (.08)	.58 ^{***} (.085)
Constant	-1.76	-1.28	-1.69	1.71	-1.97	-1.97
-2 Log Likelihood	997.06	960.83	906.97	903.47	856.59	856.03
N	1145	1142	1092	1092	1092	1092

* Notes: $p < .05$

** $p < .01$

*** $p < .001$; Standard errors in parentheses.

TABLE 4
OLS Regressions of T-4 Depressive Symptoms on T-1 Suicide Attempts

	1	2	3	4	5	6
Suicide Attempts	1.43 ^{**} (.46)	1.39 ^{**} (.45)	.82+ (.47)	.79+ (.47)	.53 (.47)	.55 (.47)
Female (eq. 1)		1.39 ^{***} (.25)	1.33 ^{***} (.25)	1.35 ^{***} (.24)	1.54 ^{***} (.25)	1.53 ^{***} (.24)
Cuban American		.30 (.33)	.47 (.32)	.46 (.32)	.52+ (.32)	.51 (.31)
Hispanic American		.21 (.34)	.39 (.34)	.30 (.34)	.41 (.33)	.33 (.33)
African American		1.11 ^{**} (.32) [*]	1.07 ^{***} (.32)	.87 ^{**} (.32)	.87 ^{**} (.31)	.72 [*] (.31)
Socioeconomic Status		-.40 ^{**} (.13)	-.30 [*] (.13)	-.23+ (.12)	-.24+ (.12)	-.18 (.12)
T-1 CESD			.18 ^{***} (.04)	.17 ^{**} (.04) [*]	.15 ^{***} (.04)	.15 ^{***} (.04)
Stress Exposure Prior to T-1				.53 ^{***} (.11)		.45 ^{***} (.11)
Stress Exposure After T-1					.64 ^{***} (.12)	.56 ^{***} (.12)
Constant	3.02	2.33	1.77	1.73	1.60	1.59
R ²	.01	.05	.07	.09	.09	.10
N	1165	1162	1112	1112	1112	1112

Notes: +p<.10

* p<.05

** p<.01

*** p<.001; Standard errors in parentheses.

TABLE 5
Logistic Regressions of T-4 Drug Dependence on T-1 Suicide Ideation

	1	2	3	4	5	6
Suicide Ideation	.63*** (.19)	.75*** (.20)	.56* (.23)	.54* (.23)	.49* (.24)	.48* (.24)
Female (eq. 1)		-.70*** (.21)	-.69*** (.22)	-.70*** (.22)	-.49* (.22)	-.50* (.23)
Cuban American		.03 (.22)	.09 (.23)	.09 (.23)	.14 (.24)	.14 (.24)
Hispanic American		-.11 (.23)	-.08 (.25)	-.10 (.21)	-.07 (.26)	-.08 (.26)
African American		-1.02*** (.26)	-.93*** (.27)	-.98*** (.27)	-1.11*** (.28)	-1.12*** (.28)
Socioeconomic Status		-.11 (.10)	-.11 (.10)	-.09 (.10)	-.03 (.10)	-.02 (.10)
T-1 Depressive Symptoms			.07* (.03)	.07* (.03)	.05 (.03)	.05 (.03)
Stress Exposure Prior to T-1				.13+ (.08)		.05 (.08)
Stress Exposure After T-1					.60*** (.08)	.59*** (.08)
Constant	-1.81	-1.42	-1.65	-1.66	-1.92	-1.92
-2 Log Likelihood	1060.63	1020.64	933.82	921.04	879.10	878.81
N	1218	1215	1119	1119	1119	1119

Notes: + $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$; Standard errors in parentheses.

TABLE 6
OLS Regressions of T-4 Depressive Symptoms on T-1 Suicide Ideation

	1	2	3	4	5	6
Suicide Ideation	1.76*** (.31)	1.69*** (.30)	1.31*** (.33)	1.22*** (.33)	1.23*** (.33)	1.16*** (.33)
Female (eq. 1)		1.29*** (.25)	1.29*** (.25)	1.31*** (.24)	1.49*** (.25)	1.48*** (.25)
Cuban American		.25 (.32)	.43 (.32)	.43 (.32)	.48 (.32)	.48 (.31)
Hispanic American		.17 (.33)	.35 (.34)	.26 (.33)	.37 (.33)	.30 (.33)
African American		.92**	1.00**	.79*	.81**	.65*
Socioeconomic Status		(.31)	(.32)	(.31)	(.31)	(.31)
T-1 Depressive Symptoms		-.44*** (.12)	-.36** (.12)	-.28* (.12)	-.30* (.12)	-.23+ (.12)
Stress Exposure Prior to T-1			.12** (.05)	.11* (.05)	.09* (.05)	.09+ (.05)
Stress Exposure After T-1				.56*** (.10)	.61*** (.12)	.49*** (.11)
						.52*** (.12)
Constant	2.87	2.28	1.87	1.81	1.71	1.68
R ²	.03	.07	.07	.10	.09	.11
N	1238	1235	1140	1140	1140	1140

Notes: + $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$; Standard errors in parentheses.