

The Relationship Between Self-Injurious Behavior and Suicide in a Young Adult

Population¹

Janis Whitlock, MPH, PhD^{1,2}

Kerry L. Knox, PhD³

From Cornell University, the Family Life Center Center,¹ Department of Human Development²,
University of Rochester, Department of Community and Preventive Medicine, Rochester, NY³

Submitted May 3, 2006

Resubmitted October 5, 2006

Accepted October 26, 2006

Archives of Pediatrics and Adolescent Medicine

For correspondence, please contact:

Janis Whitlock, MPH, PhD

Family Life Development Center

Beebe Hall

Cornell University

Ithaca, NY 14853

Telephone: (607) 254-2894; Facsimile: (607) 255-8562

E-Mail: jlw43@cornell.edu

¹ This research was supported by Cornell University's School of Human Ecology Seed and Innovation Grant fund. The second author was supported in part by a K01 award. The statements and opinions expressed are the authors and are not a reflection of the study's funder.

ABSTRACT

Objectives: To test the hypothesis that self-injurious behavior (SIB) signals an attempt to cope with psychological distress that may co-occur or lead to suicidal behaviors in individuals experiencing more duress than they can effectively mitigate.

Design: Analysis of a cross-sectional data set of college-age students.

Setting: Two universities in the northeastern United States in the spring of 2005.

Participants: A random sample of 8,300 students at two universities was invited to participate in a web-based survey; 3,069 (36.9%) responded. Data cleaning resulted in 2,875 usable cases.

Main Outcome Measures: Main outcome was suicidality; adjusted odds ratios for suicidality by SIB status when demographic characteristics, history of trauma, distress, informal help-seeking, and attraction to life are considered.

Results: One quarter of the sample reported SIB, suicidality, or both; 40.3% of those reporting SIB also report suicidality. SIB status was predictive of suicidality when controlling for demographic variables (AOR 6.2, 95% CI, 4.9-7.8). Addition of trauma and distress variables attenuated this relationship (AOR 3.7, 95% CI, 2.7-4.9). Compared to respondents reporting only suicidality, those also reporting SIB were more likely to report suicide ideation (AOR 2.8, 95% CI, 2.0-3.8), plan (AOR 5.6, 95% CI, 3.9-7.9), gesture (AOR 7.3, 95% CI, 3.4-15.8), and attempt (AOR 9.6, 95% CI, 5.4-17.1). Lifetime SIB frequency exhibits a curvilinear relationship to suicidality.

Conclusions: Since it is well established that SIB is not a suicidal gesture, many clinicians assume that suicide assessment is unnecessary. Our findings suggest that presence of SIB should trigger suicide assessment.

INTRODUCTION

Self-injurious behavior (SIB) is defined¹ as self-inflicted destruction of the body for purposes not socially sanctioned and without suicidal intent. Typically associated with clinical populations, there are few epidemiological studies of SIB in community populations. Extant studies are limited by small or potentially biased samples. Available evidence suggests that approximately 4% of the general adult population and 21% of clinical populations reports at least occasional SIB. Estimates of SIB prevalence in college and high school studies range from 12% to 38% percent.^{2 3-5} A recent representative study of college students, using the same data on which these analyses are based, showed a 17% lifetime prevalence rate.⁶

Several researchers have postulated that SIB is a mechanism employed to compensate for inadequate affect regulation in situations perceived as stressful^{7:8}. Although primarily derived from clinical populations, the affect-regulation theory helps to explain SIB in community populations as well since many report it as method of coping with unwanted negative emotion^{9:10}. If so, individuals vulnerable to SIB may also be at heightened risk for suicidality when trauma or psychological distress overwhelms their capacity to cope effectively.

Most clinical and community studies show an average age of onset in mid to late adolescence followed by a decline in early adulthood.^{1;11;12} In high school and college students, between 34-45% of individuals with SIB indicate that they also experience suicidal ideation.^{6;13} While there is consistent evidence that SIB and suicide co-occur:^{14-16 17;18} the nature of this relationship is less clear. SIB and suicide appear to share several important correlates including depression, alcohol or substance abuse, psychological pain, cognitive constriction, and dysregulation of the serotonin and noradrenergic systems.¹⁹⁻²⁸ However, SIB and attempted and completed suicide are widely recognized to exhibit key differences in motivation, lethality, hopelessness, intent to die, and attraction to life even when an individual displays both forms of behavior.^{6;14;15}

Two distinct models dominate conceptualization of the relationship between SIB and
Self-Injurious Behavior and Suicide in Young Adults

suicidal behaviors. One model views SIB as part of a constellation of suicidal behaviors (see Skegg, 2005²⁹ for review). The other model views individuals who self injure and those who are suicidal as two different populations.^{1;14;30;31} Typically the latter model is used to argue that SIB is most commonly utilized as a way to regulate negative affect and to *avoid* suicide.

We posit an alternative to both of these models. We hypothesize that while individual SIB acts are rarely, if ever, undertaken with suicidal intent, SIB signals an attempt to cope with psychological distress that may co-occur or lead to suicidal behaviors in individuals experiencing more duress than they can effectively mitigate. If so, suicidal behaviors would be likely to either co-exist or evolve over time if SIB begins to fail as a functional coping mechanism. Consistent with this, we expected that: (1) SIB status would predict suicidality independent of demographic characteristics associated with either; (2) SIB respondents who were also suicidal would exhibit higher levels of conditions known to be associated with distress and fewer protective factors than SIB only or suicidality only individuals; (3) SIB frequency would bear a positive linear relationship to suicidality, and (4) SIB status would significantly predict all forms of suicidal behaviors rather than solely ideation. These hypotheses were tested using combined data from two college student populations.

METHODS

Sample

Participants were drawn from a random sample of 8,300 undergraduate and graduate students (33.7% of the total combined population) from two northeastern Universities. All were sent an advance postcard inviting them to participate in a web-based survey in the spring of 2005. Soon after, each received a personalized e-mail with a link to the survey. A total of 3,069 (36.9%) individuals completed the survey. Cases in which a majority of the responses were missing or in which SIB or suicide status was indeterminable were omitted (n=194), resulting in a total of 2,875 (34.6%) retained for analysis. Sample demographics were largely representative of the overall student population although there were significantly more females in the sample

population than in the population from which they were drawn (56.3% vs. 47.6%). Of these, 490 (17%) had practiced SIB and 423 (14.9%) reported suicidality (n=715 unduplicated responses).

Study Design and Questionnaire

The survey was administered on a secure Internet server requiring 10-25 minutes to complete. The web-based survey allowed for complex skip patterns viewable only by those for whom the questions were relevant. The survey also allowed participants to immediately make the screen go blank if they were interrupted or feared being observed. Links to local resources were placed on the bottom of every page and a “distraction” toggle allowed anyone who needed a break to see an unrelated web page. The study was approved by Committee for Human Subjects at both institutions. All participants provided on-line assent before taking the survey and were free to discontinue participation at any time by closing their web browser.

The survey consisted of four broad conceptual domains: a) socio-demographic characteristics, b) mental health indicators, c) risk and protective factors, and d) help-seeking history and preferences. There was a mix of epidemiological and psychological survey items. Multiple existing scales were reviewed and, where possible, the survey contained validated items. The survey was field tested with 25 students, 13 of whom were known to be self-injurious. Measures for which rates are well documented, such as lifetime prevalence of suicidality, were consistent with other available data.³² Examination of discriminate and convergent validity in between variable analyses within the survey also showed very predictable relationships patterns. For example, the attraction to life scale was inversely correlated to the K6 ($r=-.64$) and positively associated with life satisfaction ($r=.67$) at $p<.001$. Although too numerous to report here (validity and reliability of this tool is the subject of a future paper) there were no unexpected correlations in any of the discriminate and convergent validity tests.

Assessment of Self-Injurious Behavior

All respondents received an initial screening question for SIB: “have you ever done any of the following with the intention of hurting yourself?” This was followed by a list of 16 SIB behaviors identified through examination of existing SIB surveys,³³ a review of existing literature, and on-going interviews with mental health providers and self-injurers. A later question asked respondents who indicated having practiced SIB whether they had done so “to practice suicide” or “to commit suicide.” Fourteen observations were omitted from the SIB category for purposes of analyses since, by definition, SIB is an act undertaken without suicidal intent.

Assessment of Suicidality

Lifetime suicidality was measured using a binary response item³⁴ which asked “Have you ever seriously considered suicide or attempted suicide?” Individuals who answered affirmatively were asked to select any of eight statements that applied to them. For purposes of these analyses, these statements were clustered into four following categories: a) ideation (“I thought seriously about it”), b) plan (“I had a general plan but did not carry it out”, “I had a method but did not carry it out”), c) gesture (“I wrote a suicide note but did not leave it where it could be found”, “I wrote a suicide note and did leave it where it could be found”), and d) attempt (“I made a serious attempt but no medical intervention occurred”, “I made a serious attempt that received medical attention”). Respondents with multiple responses were placed into only one of these categories based on the most serious of their response selections, since understanding lethality may be a critical discriminating factor among self-injurious individuals. Respondents could also select the statement, “Although I considered suicide, I was not that serious about it.” This statement was not categorized, but was used independently to examine whether SIB status affected the selection of this response.

Demographic Correlates

Demographic characteristics and known or putative conditions co-morbid with SIB and/or suicidality were included in analyses, including gender, age, race/ethnicity, and, sexual orientation. Following U.S. census codes, race/ethnicity codes included: non-Hispanic black, non-Hispanic white, and Hispanic. An Asian/Asian American category was included as well. The “other” category included American Indian / Alaskan Native, Middle Eastern or East Indian, Native Hawaiian or Pacific Islander, Bi-racial/ethnic or Multi-racial/ethnic. These were collapsed into four broader categories including: Caucasian, Black, Asian, and Other. Gender included three options: male, female, and trans-gendered/non-gendered; only two individuals selected the last category. Sexual orientation included four response options: straight, gay or lesbian, bisexual, and questioning; all that applied could be selected. For these analyses, the 51 respondents who chose two or more sexual orientations were categorized as “questioning.”

Indicators of Trauma and Distress

Respondent reports of several risk factors included: eating disorders, history of sexual, emotional, or physical abuse, and psychological and physical distress. Physical distress was measured using a binary variable reflecting the presence of four DSM-IV characteristics of disordered eating which was coded positively if respondents indicated that they had ever repeatedly: a) severely restricted eating, b) binged or purged, c) over-exercised to lose or manage weight, or d) used laxatives to lose or manage weight. Psychological distress in the past 30 days was assessed using the K-6 scale^{35; 36} (Chronbach’s alpha =.78).⁴⁷ Presence or absence of abuse history was measured using three questions developed for this study, “Have you ever been in a physically abusive relationship (including family relationships, romantic relationships, acquaintances, or friendships)?”, “Have you ever experienced sexual touching or penetration against your will?”, and “Have you ever been in a relationship that was emotionally abusive (including family relationships, romantic relationships, acquaintances, or friendships)?”

Protective Factors

Two protective factors were included in analyses: attraction to life and informal helpseeking. The attraction to life scale was taken from the Multi-Attitude Suicide Tendency scale.³⁷ Four items with the highest factor loading were selected from the original seven-item scale. All four items loaded above 0.7 in the current study and showed acceptable reliability (Chronbach's alpha = .77). The informal help-seeking variable was derived from the question: "Who do you feel comfortable getting help from when you feel anxious, sad, or depressed?" Respondents were presented with 17 options and asked to select all that applied. These were then totaled to create the informal help-seeking variable.

Statistical Analyses

All analyses were conducted in SPSS version 13 (SPSS Inc., Chicago, Ill.). Descriptive statistics and crude and adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were used to examine the relationship between SIB, suicidality, and correlates. Both bivariate and multinomial logistic regression analyses were employed. To examine the extent to which SIB status predicted suicidality, the first analysis used binary logistic regression to examine the relationship between demographic characteristics, trauma and distress indicators, and protective factors and suicidality which was coded as absent or present. The second analysis sought to differentiate respondents with SIB only from respondents who reported both SIB and suicidality. Using the group reporting SIB only as the referent group, multinomial logistic regression was then employed to examine three SIB and suicide-related conditions categories: a) SIB only b) SIB and suicidality, and c) suicidality only. The analysis examined the extent to which these groups differed from the SIB only group on demographic characteristics, trauma and distress indicators, and protective factors. The last analysis was intended to determine whether suicidal SIB respondents differed from suicidal non-SIB respondents in terms of specific suicidal characteristics or lethality. To accomplish this logistic regression analysis was conducted between SIB status (SIB / no SIB) and four binary-coded measures of suicidality: a) ideation, b) Self-Injurious Behavior and Suicide in Young Adults

plan, c) gesture, and d) attempt. Since population parameters for key demographic characteristics were known, all logistic regression analyses were weighted to control for gender differences in the sample and the population and to equalize differences in response rates in each university. Univariate statistics reported in Table 1 were not weighted.

RESULTS

Study Population

Overall, the sample contained more females than males and 73% of the entire group was between the ages of 18 and 24. Two thirds of the sample (66.7%) was White with Asian / Asian American being the next most represented ethnic/racial category (17.4%). Respondents identifying as heterosexual accounted for 92.1% of the total sample with 2.2% identifying as gay or lesbian, 3.0% identifying as bisexual, and 2.7% indicated that they were questioning their sexual orientation. As shown in Table 1, 24.9% (n=715) of the sample ever reported SIB, suicidality or both. Of those reporting SIB, suicidality or both, the majority (47.3%; 10.1% of total sample) practiced only SIB, 27.6% (6.9% of total sample) reported SIB and suicidality and 31.5% (7.8% of total sample) reported just suicidality. When SIB only is broken down by reported lifetime frequency, 27.7% (n=118) report single incidents, 50.1% (n=230) report 2-10 incidents, 16.4% (n=75) report 11-50 incidents, 7.7% (n=35) report over 50 incidents, and in 6.5% (n=32) cases SIB frequency was unknown.

Insert Table 1 about here

Table 1 shows a pattern in keeping with our prediction that individuals reporting no SIB or suicide report lower levels of trauma and distress than those reporting SIB, suicidality or both. It also shows that individuals reporting both SIB and suicide also report higher levels of trauma and psychological and physical distress than SIB only, suicide only, and neither SIB nor suicide before all variables are taken into account.

The Relationship between Self-Injurious Behavior and Suicidality

The second analysis tested our first hypothesis: that SIB status would predict suicide status even when demographic variables were controlled. As shown in Table 2, SIB was strongly predictive of suicidality. Analyses which examine the relationship between reported lifetime SIB frequency and suicide suggest that the relationship to suicidality increases as SIB activity increases until respondents report over 50 SIB incidents. Adjusted odds ratios (AORs) for demographics comparing individuals reporting any suicidality showed that suicidal individuals were more likely to be Black and to report their sexual orientation as bisexual. They were also more likely to exhibit heightened psychological distress in the last 30 days (a score over 13 is considered an indication of psychological distress), to report a greater lifetime prevalence of eating disorders, as well as to report history of emotional and sexual trauma. They were also less likely to report informal help-seeking and attraction to life.

Insert Table 2 about her

We also predicted that trauma, distress variables and protective factors would attenuate this relationship by accounting for some of the variance observed. To test this, variables were entered in blocks with demographic characteristics entered first followed by trauma variables and distress variables. The final block entered the two protective factors. Entry of demographic variables had no effect on the relationship between self-injury and suicide (AOR 6.2, 95% CI, 4.9-7.8). Addition of trauma and psychological and physical distress variables significantly attenuated the relationship between SIB status and suicidality (AOR 3.7, 95% CI, 2.7-4.9). As shown in the final model, addition of the protective factors weakened the relationship between SIB and suicide only modestly (AOR 3.4, 95% CI, 2.5-4.6).

Close examination of differences between SIB only respondents and those reporting any suicidality (not shown) were consistent with the hypothesis that respondents reporting both SIB
Self-Injurious Behavior and Suicide in Young Adults

and suicide would report more history of trauma, more psychological and physical distress, and fewer protective factors. Compared to SIB only respondents, SIB-suicide respondents report higher rates of sexual abuse (AOR 2.9, 95% CI, 1.4-5.4), emotional abuse (AOR 1.9, 95% CI, 1.1-3.1), and disordered eating (AOR 1.8, 95% CI, 1.1-2.9). They also reported less informal help-seeking (AOR .8, 95% CI, .7-.9) and attraction to life (AOR .7, 95% CI, .5-.9).

Examination of differences between SIB only and suicide only show that those reporting suicidality only were significantly more likely to be Black (AOR 5.4, 95% CI, 1.6-17.9), or Asian (AOR 2.7, 95% CI, 1.5-4.7) than Caucasian. They were also significantly more likely to be older than 24 than between 18-20 (AOR 2.3, 95% CI, 1.37-4.0) and report less attraction to life (AOR .7, 95% CI, .6-.9).

Insert Table 3 about her

The last hypothesis examined the extent to which SIB and suicide overlap for some individuals. We hypothesized that among respondents reporting suicidality, those also reporting SIB would be equally likely to report all forms of suicidal behavior, not solely ideation. AORs (Table 4) support this hypothesis and show that SIB status significantly predicts suicide ideation, plan, gesture, and attempt. Indeed, the strength of the AORs increased as the reported suicide-linked behaviors became more serious and therefore potentially more lethal. Examination of differences in the statement “Although I considered suicide, I was not that serious about it” when controlling for all other demographic variables show no difference between SIB and non-SIB respondents. Results also show that females were 2.2 times (95% CI, 1.2-3.4) more likely to report attempting suicide than males. In comparison to students identifying as straight, students reporting as gay or lesbian were 4.2 times (95% CI, 1.2-14.1) more likely to report attempting suicide, while students identifying as bisexual or questioning were more likely to report planning suicide (AOR 4.0, 95% CI 2.1 7.6). These findings are consistent with existing research.^{38;39}

COMMENT

We hypothesized that SIB signals a coping strategy to deal with psychological distress that may co-occur or lead to suicidal behaviors in individuals experiencing more distress than they can ultimately effectively mitigate. Consistent with our hypotheses, this study showed that SIB was a strong predictor of suicidality, that individuals who evidenced SIB and suicidality were significantly more likely to score higher on trauma and distress variables and lower on protective factors than those exhibiting only SIB only, and that risk of suicidality increased as SIB frequency increased. We also found that a reported history of SIB predicted all forms of suicidal behavior, not solely ideation. Assuming that the temporal sequence is as we hypothesize here, namely that SIB precedes or co-occurs with suicide, these findings suggest that in individuals employing SIB as a means of coping with undesired affect, suicide may become a viable consideration if psychological distress overwhelms their capacity to functionally cope using SIB or other methods, such as substance use.

Finding that the association between SIB incidents and suicide peaks at 11-50 incidents after which the risk declines invites several possible interpretations. The one most consistent with our hypotheses suggests that SIB, alone or in addition to other mechanisms, effectively mitigates sustained or sporadic distress for enduring periods of time among some individuals. The fact that a majority (60%) of those reporting SIB evidenced no suicidality at all supports this theory and helps to explain why so many individuals in the study population using SIB remain undetected by informal and formal support systems.^{13:6} An alternative explanation for the curvilinear relationship between SIB frequency and suicidality is that high levels of SIB include individuals for whom SIB becomes habitual, compulsive, and initiated in response to stimuli not directly linked to current affective state. Although not explored here, the trend raises questions with clinical implications worthy of further investigation.

Our finding that SIB predicted all forms of suicidality and that the magnitude of the association increased as the seriousness of the suicidality increased is consistent with Joiner's
Self-Injurious Behavior and Suicide in Young Adults

(2005⁴⁰) theory that engagement in SIB may inadvertently embolden and prepare individuals for more lethal suicide-related behaviors than those who do not engage in SIB. However, because we cannot discern temporal sequence of SIB relative to suicide in these analyses, the applicability of Joiner's theory to this data is limited. Our findings do, however, point to the need for effective means of distinguishing deliberately self-injurious individuals likely to exhibit suicidal behavior from those unlikely to exhibit suicidality.

This study is not without limitations. Reliance on data from two universities and a less than ideal response rate suggests the possibility of systematic bias among non-respondents. Nevertheless, the response rate in this study was higher than reported for national surveys conducted on college campuses.⁴¹ Moreover, because population parameters were known we were able to use weighted analyses that may compensate for any systematic bias. Comparison to the results reported from the 2005 National College Health Assessment study demonstrates that our sample was more diverse than the national sample, containing more graduate students, international students, males, and minority students⁴² Finally, reliance on single item measures may not capture experiences of interest with a high degree of specificity, nor did these analyses differentiate between a number of potentially important temporal issues such as age of onset and cessation for SIB and suicidality.

SIB is present at concerning levels among community adolescents and young adults. Since it is well established that SIB is not a suicidal gesture in and of itself, many clinicians assume that suicide assessment is unnecessary. Our study suggests that while SIB may serve as a functional, if maladaptive, coping mechanism employed to avoid suicide, it may also serve as a harbinger of all forms of suicidality in subset of individuals. Until clinical tools capable of differentiating levels of risk for suicidality or serious physical harm in SIB patients are developed, our findings suggest that the presence of SIB should trigger suicide assessment. The variance accounted for in the link between SIB and suicide by trauma and distress variables also suggests that presence of SIB should trigger psychological assessment and referral.

REFERENCES

- (1) Favazza A.R., Conterio K. Female habitual self-mutilators. *Acta Psychiatrica Scandinavica* 1989; 79(3):283-289.
- (2) Gratz KL. Measurement of deliberate self-harm: preliminary data on the Deliberate Self-Harm Inventory. *Journal of Psychopathology and Behavioral Assessment* 2001; 23:253-263.
- (3) Muehlenkamp JJ, Gutierrez PM, Osman A, Barrios LC. Validation of the positive and negative suicide ideation (PANS) inventory in a diverse sample of young adults. *J Clinical Psychology* 2005; 61(4):431-445.
- (4) Stanley G, Gameroff MJ, Michalsen BA, Mann JJ. Are suicide attempters who self-mutilate a unique population? *Am J Psychiatry* 2001; 158:427-432.
- (5) Kokaliari E. *Deliberate Self-injury: An Investigation of the Prevalence and Psychosocial Meanings in a Non-clinical Female College Population* [Smith College School for Social Work; 2005.
- (6) Whitlock JL, Eckenrode JE, Sliverman D. Self-injurious behavior in a college population. *Pediatrics* 2006.
- (7) Esposito C, Spirito A, Boergers J, Donaldson D. Affective, behavioral, and cognitive functioning in adolescents with multiple suicide attempts. *Suicide & Life-Threatening Behavior* 2003; 33(4):389-399.
- (8) Chapman AL, Gratz KL, Brown MZ. Solving the puzzle of deliberate self-harm: The experimental avoidance model. *Behaviour Research and Therapy* 2006; 44:371-394.
- (9) Ross S, Heath N. A study of the frequency of self-mutilation in a community sample of adolescents. *Journal of Youth and Adolescence* 2002; 31(1):66-77.
- (10) Klonsky ED. The functions of non-suicidal skin-cutting in college students. under review 2006.
- (11) Stanley BGMJMVMJJ. Are suicide attempters who self-mutilate a unique population? *The American Journal of Psychiatry* 2001; 158(3):427-432.
- (12) Briere J, Gil E. Self-mutilation in clinical and general population samples: Prevalence, correlates, and functions. *The American Journal of Orthopsychiatry* 1998; 68(4):609-620.
- (13) Hawton K, Rodham K, Evans E, Weatherall R. Deliberate self-harm in adolescents: self report survey in schools in England. *BMJ* 2002; 325(7347):1207-1211.
- (14) Linehan MM. Suicidal people. one population or two? *Ann NY Acad Sci* 1986; 487:16-33.
- (15) Brown MZ, CKA & LMM. Reasons for suicide attempts and nonsuicidal self-injury in women with borderline personality disorder. *Journal of Abnormal Psychology* 2002; 111(1):198-202.

- (16) Nock MK, Joiner TE, Gordon KH, Loyd-Richardson E, Prinstein M. Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. in press 2006.
- (17) Guertin T, Lloyd-Richardson E, Spirito A, Donaldson D, Boergers J. Self-mutilative behavior in adolescents who attempt suicide by overdose. *J Am Acad Child Adolesc Psychiatry* 2001; 40(9):1062-1069.
- (18) Muehlenkamp JJ, Gutierrez PM. An investigation of differences between self-injurious behavior and suicide attempts in a sample of adolescents. *Suicide Life Threat Behavior* 2004; 34:12-24.
- (19) Bennett S, Coggan C, Adams P. Problematising depression: young people, mental health and suicidal behaviours. *Social Science & Medicine* 2003; 57(2):289-299.
- (20) Linehan MM, Armstrong HE, Suarez A, Allmon D, Heard HL. Cognitive-behavioral treatment of chronically parasuicidal borderline patients. *Arch Gen Psychiatry* 1991; 48:1060-1064.
- (21) Linehan MM, Tutek DA, Heard HL, HE. A. Interpersonal outcome of cognitive behavioral treatment for chronically suicidal borderline patients. *American Journal of Psychiatry* 1994; 151:1771-1776.
- (22) Salkovskis PM, Atha C, Storer D. Cognitive-behavioural problem solving in the treatment of patients who repeatedly attempt suicide. A controlled trial. *Br J Psychiatry* 1990; 157(6):871-876.
- (23) Upadhyaya AK, Conwell Y, Duberstein PR, Denning D, Cox C. Attempted suicide in older depressed patients: effect of cognitive functioning. *American Journal of Geriatric Psychiatry* 1999; 7(4):317-320.
- (24) Andrus JK, Fleming DW, Heumann MA, Wassell JT, Hopkins DD, Gordon J. Surveillance of attempted suicide among adolescents in Oregon, 1988. *American Journal of Public Health* 1991; 81:1067-1069.
- (25) Mann JJ, Wateraux C, Haas GL, Malone KM. Toward a clinical model of suicidal behavior in psychiatric patients. *American Journal of Psychiatry* 1999; 156(2):181-189.
- (26) Mann JJ. Searching for Triggers of Suicidal Behavior. *American Journal of Psychiatry* 2004; 161(3):395-397.
- (27) Oquendo MA, Malone KM, Ellis SP, Sackeim HA, Mann JJ. Inadequacy of Antidepressant Treatment for Patients With Major Depression Who Are at Risk for Suicidal Behavior. *American Journal of Psychiatry* 1999; 156(2):190-194.
- (28) Yates TM. The developmental psychopathology of self-injurious behavior: Compensatory regulation in posttraumatic adaptation. *Clinical Psychology Review* 2004; 24:35-74.
- (29) Skegg K. Self-harm. *The Lancet* 2005; 366:1471-1483.

- (30) Linehan, M.M. Behavioral treatments of suicidal behaviors: Definitional obfuscation and treatment outcomes. In: Maris RW, Canetto SS, Sara S, editors. Review of Suicidology. New York, NY: Guilford Press; 2000. 84-111.
- (31) Muehlenkamp JJ. Self-injurious behavior as a separate clinical syndrome. American Journal of Orthopsychiatry 2005; 75(2):324-333.
- (32) Economic Burden of Illness in Canada, 1993. 1993. Health Canada, Population and Public Health Branch (PPHB).
Ref Type: Report
- (33) Gutierrez PM OABFKB. Development and initial validation of the Self-Hrm Behavior Survey. Journal of Personality Assessment 2001; 77:475-490.
- (34) Savin-Williams RC RG. Suicide attempts among sexual-minority male youth. J Clin Child Adolesc 2003; 32:509-522.
- (35) Kessler, McGonagle et al. Lifetime and 12-month prevalence of DSM-III-R Psychiatric Disorders in the United States. Arch Gen Psychiatry 1994; 51:8-19.
- (36) Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E et al. Screening for Serious Mental Illness in the General Population. Arch Gen Psychiatry 2003; 60(2):184.
- (37) Orbach I Milstein I Har-Even D Apter A Tyano S Welizur A. A multi-attitude suicide tendency scale for adolescents. Psychological Assessment 1991; 3:398-404.
- (38) Muehrer P. Suicide and Sexual Orientation: A Critical Summary of Recent Research and Directions for Future Research. The American Association of Suicidology 1995; 25:72-81.
- (39) Remafedi G, French S, Story M. The relationship between suicide risk and sexual orientation: results from a population-based study. American Journal of Public Health 1998; 88(1):57-60.
- (40) Joiner TE. Why People die by Suicide. Cambridge: Harvard University Press; 2006.
- (41) American College Health Association. ACHA-National College Health Assessment 2004. http://www.acha.org/projects_programs/ncha_sampledata_public.cfm [2005 Available from:
URL:http://www.acha.org/projects_programs/ncha_sampledata_public.cfm
- (42) Spring 2003 reference group report. The American College Health Association National College Health Assessment (ACHA-NCHA). 53(5), 199-210. 2005.
Ref Type: Report

Table 1. Unweighted Univariate Statistics for Demographic and Trauma Variables Used in Analyses*

	SIB Only No. (%) (n=292)	SIB-Suicide No. (%) (n=196)	Suicide Only No. (%) (n=227)	Neither SIB nor suicide No. (%) (n=2160)
Sex				
Female	177 (60.6)	143 (73.0)	131 (58.2)	1167 (54.0)
Male	113 (38.7)	53 (27.0)	94 (41.8)	985 (45.6)
Age				
18-20	131 (44.8)	88 (44.7)	77 (34.4)	846 (39.2)
21-24	99 (33.9)	63 (32.0)	71 (31.7)	725 (33.5)
Over 24	61 (20.8)	46 (23.4)	76 (33.9)	573 (26.5)
Race				
Caucasian	213 (72.9)	131 (66.2)	121 (54.0)	1388 (64.2)
Black	6 (2.1)	10 (5.1)	16 (7.1)	74 (3.4)
Asian	37 (12.7)	26 (13.1)	54 (24.1)	374 (17.3)
Other	35 (12.0)	31 (15.7)	33 (14.7)	316 (14.7)
Sexual Orientation				
Straight	256 (87.7)	155 (78.3)	194 (86.2)	2027 (93.8)
Gay / Lesbian	7 (2.4)	5 (2.5)	9 (4.0)	42 (1.9)
Bisexual	17 (5.1)	21 (10.6)	14 (6.2)	32 (1.5)
Questioning	11 (3.8)	15 (7.6)	8 (3.6)	42 (1.9)
History of Abuse				
Sexual Abuse	42 (15.3)	57 (31.8)	38 (17.8)	181 (8.6)

Table 1 (con't). Unweighted Univariate Statistics for Demographic and Trauma Variables**Used in Analyses***

Emotional Abuse	109 (42.6)	106 (63.9)	90 (45.5)	390 (19.6)
Physical Abuse	23 (8.4)	39 (22.0)	28 (13.3)	92 (4.4)
Indicators of distress				
Possess one or More				
Characteristics of an Eating Disorder	93 (31.8)	99 (50)	74 (32.8)	398 (18.4)
Psychological Distress				
6-12	140 (40.8)	51 (26.3)	73 (32.3)	13397 (62.0)
13-18	1421 (48.8)	100 (51.0)	130 (57.1)	752 (34.8)
19-24	30 (10.3)	44 (22.7)	24 (10.6)	69 (3.2)

* Sum of subgroup numbers may not be equal to total N as a result of missing data.

Table 2. Logistic Regression of Suicide status on Demographic Characteristics, Indicators of Trauma and Distress, Protective Factors and Self-Injurer Status*

Demographic Characteristics	Odds Ratio (95% CI)	
	<u>Univariate Model</u>	<u>Multivariate Model†</u>
Self-Injurer Status (any vs. no self-injury)	6.3 (5.1-7.9)	3.4 (2.5-4.6)
Self-Injurer Status by Lifetime Frequency		
No SIB incident	1.0	1.0
Single SI incident	2.5 (1.5-3.9)	1.3 (.7-2.5)
2-10 times	6.1 (4.3 – 8.2)	3.4 (2.3-5.0)
11 – 50 incidents	20.4 (12.3–33.7)	10.4 (5.3-20.2)
Over 50 incidents	12.5 (6.3-24.6)	9.3 (3.3-25.9)
Sex		
Male	1.0	1.0
Female	1.5 (1.2-1.8)	1.0 (.7-1.3)
Age		
18-20	1.0	1.0
21-24	1.0 (.8-1.3)	1.2 (.8-1.6)
Over 24	1.2 (.8-1.6)	1.4 (1.0-1.9)
Race		
Caucasian	1.0	1.0
Black	2.2 (1.2-3.3)	2.3 (1.2-4.5)
Asian	1.2 (.9-1.6)	1.3 (.9-1.9)
Other	1.1 (.8-1.4)	1.1 (.7-1.7)

Table 2 (con't). Logistic Regression of Suicide status on Demographic Characteristics, Indicators of Trauma and Distress, Protective Factors and Self

Sexual Orientation

Straight	1.0	1.0
Gay / Lesbian	1.7 (.9-3.2)	1.7 (.7-3.7)
Bisexual	4.9 (3.0-7.9)	3.7 (1.8-7.3)
Questioning	2.7 (1.6-4.6)	1.2 (.6-2.6)

History of Abuse

Sexual Abuse	3.2 (2.4-4.2)	1.8 (1.2-2.7)
Emotional Abuse	4.2 (3.4-5.3)	2.4 (1.8-3.2)
Physical Abuse	3.9 (2.8-5.4)	1.2 (.8-1.9)

Indicators of Distress

Psychological distress (K-6 score)	2.0 (1.8-2.2)	1.3 (1.1-.5)
Presence of Disordered Eating	2.7 (2.1-3.3)	1.7 (1.2-2.3)

Protective Factors

Informal help- seeking	.8 (.7-.8)	.9 (.8-.9)
Attraction to Life	.5 (.4-.6)	.6 (.5-.7)

* Derived from bivariate logistic regression analysis with demographics, indicators of trauma and distress, and protective factors entered as predictors of any suicidality. Results significant at $p < .05$ are bolded. CI indicates confidence interval.

† All effects were adjusted simultaneously for any SIB (versus no SIB), sex, age, race/ethnicity, sexual orientation, physical, emotional, and sexual abuse, psychological distress, disordered eating, social connection, and attraction to life.

Table 3. Bivariate Logistic Regression of Demographic and Self-Injurer Status on Suicidality *

Demographic Characteristics	Odds Ratio (95% CI)			
	Ideation	Plan	Gesture	Attempt
No.	189	143	31	60
SI Status				
Non Self-Injurer	1.0	1.0	1.0	1.0
Self-Injurer	2.8 (2.0-3.8)	5.6 (3.9-7.9)	7.3 (3.4-15.8)	9.6 (5.4-17.1)
X^{2/1}	39.5	91.8	27.8	70.8

*Based on bivariate logistic regression analysis with key sociodemographic and self-injury status variables treated as predictors of dichotomously coded suicidal behaviors. Effects were adjusted simultaneously for sex, age, sexual orientation, and race/ethnicity. CI indicates confidence interval. Results significant at $p < .001$ are bolded. .

Acknowledgements

We are grateful to John Eckenrode and Wendy Nilsen for substantive contributions to early drafts and to Amanda Purington, Brian Lukoff, Daniel Silverman, Gina Baral, and John Kolligian for making this study possible. The study PI, Janis Whitlock, has had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.