Published in final edited form as:
J Clin Psychiatry. 2012 June ; 73(6): 813–820. doi:10.4088/JCP.11m07196.

Familial and Individual Correlates of Nonsuicidal Self-Injury in the Offspring of Mood-Disordered Parents

Lara J. Cox, MD, MSc, **Barbara H. Stanley, PhD**, **Nadine M. Melhem, PhD**, **Maria A. Oquendo, MD**, **Boris Birmaher, MD**, **Ainsley Burke, PhD**, **David J. Kolko, PhD**, **Jamie M. Zelazny, BSN, MPH**, **J. John Mann, MD**, **Giovanna Porta, MS**, and **David A. Brent, MD**
New York University, New York (Dr Cox); New York State Psychiatric Institute, New York (Drs Stanley, Burke, and Mann); Columbia University, New York, New York (Drs Stanley, Oquendo, and Mann); and University of Pittsburgh, Pittsburgh, Pennsylvania (Drs Melhem, Birmaher, Kolko, and Brent and Mss Zelazny and Porta).

Abstract

Objective—To examine the demographic and clinical correlates of nonsuicidal self-injury.

Method—This is a cross-sectional analysis of a longitudinal cohort study of the familial transmission of suicidal behavior, conducted at referral centers in Pittsburgh, Pennsylvania, and New York, New York. Participants included 291 probands with *DSM-IV* mood disorder, one-half of whom had attempted suicide, and 507 of their offspring. The primary outcome assessed was nonsuicidal self-injury in offspring. Psychosocial correlates of nonsuicidal self-injury were determined by comparing personal, parental, and familial characteristics of offspring with and without nonsuicidal self-injury, assessed using a variety of interview and self-report measures at study entry. Data were collected between August 1998 and August 2007.

Results—Of 507 offspring, 7.7% (n = 39) had engaged in nonsuicidal self-injury. The most salient correlates of nonsuicidal self-injury on multivariate logistic regression were diagnosis of depression (OR = 3.78, $P < .001$) and greater aggression (OR = 1.07, $P = .01$), depressive symptoms (OR = 1.59, $P = .009$), and suicidal ideation (OR = 1.24, $P = .004$). Parental history of abuse, as well as family histories of suicide attempt and nonsuicidal self-injury, was noncontributory.

Conclusions—Nonsuicidal self-injury is associated with the presence and severity of depression, suicidal ideation, and behavioral dysregulation. On multivariate analysis, only individual predictors remained significant; this result is distinct from that for correlates of suicide attempt reported in this sample, for which familial variables played a significant role.

Nonsuicidal self-injury is the direct, deliberate infliction of pain and tissue damage by an individual on his or her own body in the absence of suicidal intent, psychosis, mental retardation, or developmental delay.[1] A wide variety of self-damaging acts may be classified as nonsuicidal self-injury, the most common of which include cutting or burning one's own

Corresponding author: David A. Brent, MD, Western Psychiatric Institute and Clinic, 3811 O'Hara St BT 311, Pittsburgh, PA 15213 (brentda@upmc.edu).

Potential conflicts of interest: **Drs Cox, Stanley, Melhem, Burke**, and **Kolko** and **Ms Zelazny** and **Porta** report no financial conflicts of interest.

Previous presentations: Poster presented at the 56th Annual Meeting of the American Academy of Child and Adolescent Psychiatry; October 27–November 1, 2009; Honolulu, Hawaii; and at the Doris Duke Clinical Research Fellow Meeting; June 1–3, 2010; Dallas, Texas.

Ms Ma reports no financial conflicts of interest.

skin.[1] Nonsuicidal self-injury is a significant and common public health problem in adolescents, with community studies reporting a prevalence of nonsuicidal self-injury at around 20%[2,3] and studies of adolescent psychiatric inpatients reporting rates as high as 82%.[4]

A number of factors have shown consistent relationships to nonsuicidal self-injury. These include mood disorders,[5,6] increased severity of depressive symptoms,[5,7] and additional clinical characteristics like impulsivity.[8] Family features, particularly a history of child maltreatment, have also been found to be related to nonsuicidal self-injury.[9,10] These characteristics may be linked by a common thread of emotional dysregulation, which is frequently observed among individuals with nonsuicidal self-injury.[11,12] In fact, the most commonly cited function of nonsuicidal self-injury is to achieve emotional regulation in the face of negative affect.[4]

Despite many common risk factors, the nature of the relationship between nonsuicidal self-injury and suicide attempts is an ongoing area of controversy. Some suggest that any act of self-injury should be considered part of a spectrum of suicidal behavior,[13] while others differentiate nonsuicidal self-injury and suicide attempt based on whether there is intent to die or if the behavior is intended to serve a different function. The latter view is supported by the disparate rates of co-occurrence of nonsuicidal self-injury and suicide attempt, particularly in community samples, in which fewer than 1 in 5 of those who engaged in nonsuicidal self-injury also have a history of a suicide attempt.[14,15] In contrast, the behaviors are much more likely to co-occur in clinically referred samples.[16,17] This finding suggests that nonsuicidal self-injury and suicide attempt may be unique entities that share some common correlates and risk factors. Greater likelihood and increased severity of these overlapping features would therefore lead to an amplified rate of co-occurrence, as is seen in the psychiatric inpatient setting. Examination of youths who are not themselves clinically referred but who are at risk for the development of a mood disorder could help to clarify the extent to which suicide attempt and nonsuicidal self-injury are distinct entities.

Therefore, the aim of this study is to examine the correlates of a history of nonsuicidal self-injury in a sample of individuals who are the offspring of mood-disordered parents. Approximately one-half of the parents had a history of suicide attempt, 20% had a history of nonsuicidal self-injury, and 18% had a history of both. In previous reports, correlates and predictors of suicide attempt in these offspring have been identified. These include parental history of suicide attempt and sexual abuse, as well as offspring sexual abuse and increased impulsive aggression and self-reported depressive symptoms.[18,19] In the present study, characteristics of offspring and at least 1 of their parents were examined with respect to the occurrence of nonsuicidal self-injury in the offspring. We hypothesized that the presence and severity of mood disorder would predispose to nonsuicidal self-injury, as would impulsivity and history of abuse. Given prior work with this sample, it was also predicted that family discord and lack of cohesion would predispose to nonsuicidal self-injury. Because we are positing that nonsuicidal self-injury and suicidal behavior are distinct entities, we also hypothesized that a parental history of nonsuicidal self-injury but not suicide attempt would be related to nonsuicidal self-injury in offspring.[18,19]

METHOD

Participants

Participants were recruited as part of the Familial Pathways to Early-Onset Suicide Attempts study, a 2-site longitudinal cohort study designed to examine the familial transmission of suicidal behavior.[18,20] Participants included 291 mood-disordered probands and 507 of their offspring (of 528 offspring in total) for whom data were available on history of nonsuicidal

self-injury. All probands had a lifetime history of mood disorder, including depressive and/or bipolar spectrum disorders. Probands were recruited from inpatient units, and outpatient clinics or partial hospitalization programs or by advertisement in Pittsburgh, Pennsylvania, and New York, New York. Probands were included if they met *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (*DSM-IV*) criteria for a major or minor depressive episode and were not actively physically ill. Suicide attempters were classified as those participants who had engaged in "self-injurious behavior with intent to die," with a Medical Damage Lethality Scale rating greater than or equal to 2.[21] Nonsuicidal self-injury in the proband was neither an inclusionary nor exclusionary condition for entry into the study. Written informed consent/assent was obtained from all participants, as approved by the institutional review boards of the institutions involved.

Assessment

All the measures used in this report are listed in Table 1.[21–46] All participants above the age of 18 years were assessed for the presence of current and lifetime *DSM-IV* psychiatric disorders using the Structured Clinical Interview for *DSM-IV*.[23] Axis II disorders were diagnosed using the Structured Clinical Interview for the *DSM-IV* Diagnosis of Personality Disorders (SCID-II).[25] The Family History Research Diagnostic Criteria (modified to *DSM-IV*) was used to assess biological coparents not directly interviewed and was completed by either the proband or another biological relative.[24] Offspring between the ages of 10 and 17 years were assessed with respect to Axis I disorders using the Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version (K-SADS-PL).[22] History of suicidal behavior in all participants 10 years and older was assessed using the Columbia University Suicide History Form and Medical Damage Lethality Scale.[21] For those who had attempted suicide, suicidal ideation was rated using the Scale for Suicidal Ideation[45] and intent by the Suicide Intent Scale.[46]

In participants older than 14 years, the Buss-Durkee Hostility Inventory[27] was used to assess impulsive aggression. For participants aged 10 to 13 years (n = 109), the Children's Hostility Inventory[26] was the equivalent measure. The Barratt Impulsivity Scale[29] was used to measure impulsivity in participants aged 18 years and over (n = 230), and the 5-item impulsivity subscale of the Iowa-Conners Parent Physical Report[28] was used for participants younger than 18 years (n = 112). The Iowa-Conners Parent Physical Report was later replaced with the Emotionality, Activity, Sociability, and Impulsivity scales (n = 132).[30] Aggression was rated in all participants using the Brown-Goodwin Lifetime History of Aggression.[31] Self-reported depressive symptoms and hopelessness were assessed using the Beck Depression Inventory[38] and Beck Hopelessness Scale,[35] respectively. For children between the ages of 10– and 13 years (n = 106), the downward extensions of these measures, the Children's Depression Inventory,[37] and the Children's Hopelessness Scale,[34] were used. Anxiety was assessed using the Screen for Childhood Anxiety-Related Disorders.[36] The Hamilton Depression Rating Scale (HDRS)[33] was used to assess self-reported depressive symptoms in participants aged 18 years and older; in those younger than 18 years, the children's version of the HDRS (n = 11), which was later replaced by the Children's Depression Rating Scale-Revised (n = 253),[32] was used.

In participants aged 18 years and older, history of physical and sexual abuse was assessed from the Childhood Experiences Questionnaire,[40] the Abuse Dimensions Inventory,[41] and by several screening questions in the demographic questionnaire. The Psychosocial Schedule[39] was used to assess histories of physical and sexual abuse for participants aged 10 to 17 years. Parent-child attachment style was rated using the Parental Bonding Instrument (PBI).[42] Family functioning was evaluated using the Family Adaptability and Cohesion Evaluation Scale-II, which was filled out by the child.[43] Lifetime history of nonsuicidal self-injury was assessed using the Self-Injurious Behavior Scale.[44]

Diagnostic Procedure

All interviewers were at least master's-level clinicians or psychiatric nurses who had received extensive training in the use of semistructured interviews. Within- and cross-site reliabilities on the SCID-I and SCID-II, K-SADS-PL, Suicide History Form, and the Brown-Goodwin Lifetime History of Aggression were high, with intraclass correlation coefficients ranging from 0.82 to 0.98 and κ'values from 0.86 to 0.95.[20] The assessors of offspring were blind to the clinical status of probands, and the assessors of probands were blind to the clinical status of offspring. Best-estimate diagnoses were made by consensus and used all available sources in diagnostic consensus conferences. Any discrepancies between informants were resolved by re-interviewing both informants until consensus was reached.

Data Analysis

Analyses were conducted using Stata v. 11.0 for Windows (StataCorp LP, College Station, Texas). Data from the 2 sites were combined for all analyses, given that previous analyses using the same data set had shown that site differences did not moderate the relationship between predictor variables and outcomes.[18,20] When multiple measures were used for a single variable, data from that variable were pooled for analysis by calculating standardized z scores. Baseline characteristics of offspring and probands were compared using *t* tests for continuous variables and χ^2 or Fisher exact tests for dichotomous variables. All tests of significance were 2-tailed, with $\alpha = .05$.

For multivariate analyses, an imputed dataset was generated by the chained-equations method, using the Imputed by Chained Equations command line package available at Internet Documents in Economics Access Service. Unique equations for each imputed variable were generated by examining a correlation matrix and including all significant correlates of the variable to be imputed. Those variables that differentiated between groups on univariate analyses were entered into a multivariate logistic regression model in order to identify the most parsimonious set of predictors of nonsuicidal self-injury. A backward stepwise method was used for model fitting, and data were clustered by family unit. Model fit was evaluated using the classification table and receiver operating characteristic (ROC) curve of the predicted probabilities.

RESULTS

Frequency of Self-Harm Behaviors, Demographics, and Abuse History

Of 507 offspring for whom data were available on nonsuicidal self-injury, 39 (7.7%) had engaged in nonsuicidal self-injury. There were no statistically significant differences between those who had engaged in nonsuicidal self-injury and those who had not based on age, sex, or race (Table 2). With regard to suicide attempt, 6.4% of those with no history of nonsuicidal self-injury had attempted suicide as compared to 12.8% of those who had engaged in nonsuicidal self-injury; this difference was not statistically significant (Fisher exact test, $P = .18$). Offspring with a history of nonsuicidal self-injury were more likely than those without such a history to have a history of physical or sexual abuse.

Offspring Diagnostic and Clinical Characteristics

Offspring with a history of nonsuicidal self-injury were more likely than those without such a history to have a diagnosis of depression, alcohol or substance abuse, or an eating disorder (Table 3). The mean number of Axis I diagnoses was higher among offspring with a history of nonsuicidal self-injury. Among those offspring who received the SCID-II, a much higher rate of Cluster B disorders was found in those with a history of nonsuicidal self-injury (30.4% vs 7.7%, Fisher exact test, $P = .004$). Those with nonsuicidal self-injury had higher levels of interview- and self-reported depressive symptoms, hopelessness, impulsivity,

impulsive aggression, and aggression and displayed a trend toward greater lifetime suicidal ideation.

Familial Variables

Offspring with nonsuicidal self-injury reported lower levels of care on the PBI[42] (Table 4). No other familial variables, including parental diagnoses or clinical characteristics, differentiated between groups. Of note, nonsuicidal self-injury in offspring was not found to be related to parental nonsuicidal self-injury, parental suicide attempt, or parental history of abuse.

Logistic Regression

Table 5 presents the logistic regression predicting the presence of nonsuicidal self-injury. In the final model, offspring diagnosis of depression and higher levels of aggression, self-reported depression, and lifetime suicidal ideation were significant predictors of nonsuicidal self-injury. This model correctly classified 92.6% of offspring; an ROC curve of the predicted probabilities was also plotted, with an area under the curve of 0.83 (SE = 0.03, 95% CI, 0.77–0.89).

DISCUSSION

The goal of this study was to examine the correlates of nonsuicidal self-injury in a sample potentially at-risk for the development of a mood disorder. The prevalence of nonsuicidal self-injury in offspring of patients with mood disorders was 7.7%. We hypothesized that those with a history of nonsuicidal self-injury would be more likely to have a mood disorder and to show greater severity of mood-related symptoms and higher levels of impulsivity and aggression and to come from more adverse family backgrounds, as manifested by higher rates of physical or sexual abuse, and lower perceived care in their families. Also, as hypothesized, a family history of a suicide attempt did not predict offspring nonsuicidal self-injury, but counter to our hypothesis, nonsuicidal self-injury did not show familial transmission. We place these findings in the context of the extant literature and limitations of this study.

Consistent with previous work and the stated hypotheses, nonsuicidal self-injury was associated with a diagnosis of a *DSM-IV* mood disorder as well as with greater levels of negative affect, including depressive symptoms, hopelessness, and lifetime suicidal ideation.[7,16,47] The finding of increased rates of mood disorders and greater severity of mood-related symptoms in individuals with nonsuicidal self-injury is consistent with the most frequently cited function of nonsuicidal self-injury, which is to reduce tension or to interrupt negative emotional states.[4,14,48]

Impulsivity and impulsive aggression were additional indicators of the behavioral disturbances found with nonsuicidal self-injury, consistent with our hypotheses. Though at least 1 laboratory study found an inconclusive relationship between behavioral measures of impulsivity and nonsuicidal self-injury,[49] self-reported impulsivity has a well-established association to this behavior.[6,8] Impulsive aggression, defined as “a tendency to respond with hostility or aggression to frustration or provocation,”[50] has been shown to aggregate in families and to serve as a predictor of suicidal behavior.[20] These relationships, as well as the one found in this study between nonsuicidal self-injury and aggression, may represent an underlying tendency to behavioral manifestations of the emotional dysregulation found with this behavior[11,51–53] and may help to explain the co-occurrence of nonsuicidal self-injury and suicide attempts reported here and in other studies.[14,16]

We hypothesized that more adverse family environment would be associated with nonsuicidal self-injury, and did find, in fact, that youths with nonsuicidal self-injury reported lower scores on the care subscale of the Parental Bonding Instrument (PBI). Higher scores on the care subscale indicate a parent-child relationship characterized by empathy and affection, while lower scores are indicative of coldness or indifference. It has been suggested that parental indifference or neglect can lead to the development of emotional dysregulation in children,[51] and previous work has found lower PBI-care scores in adolescents with nonsuicidal self-injury.[9]

Nonsuicidal self-injury was also associated with a history of physical or sexual abuse in offspring, as per our original hypothesis. Previous work has found relationships between childhood abuse, emotional dysregulation, and nonsuicidal self-injury.[1,52] One potential explanation for this finding is that physical abuse also leads to difficulty with emotion regulation and to a view of the body as an object for self-punishment. This hypothesis is consistent with one of the most frequently described functions of nonsuicidal self-injury.[9,10]

As hypothesized, parental suicide attempt was not associated with child nonsuicidal self-injury, supporting the view that suicide attempts and nonsuicidal self-injury are distinct behaviors. However, contrary to our hypotheses, we were not able to demonstrate that nonsuicidal self-injury ran in families.

These findings show both convergence with and divergence from previous reports examining the correlates and predictors of suicidal behavior in this sample. Both nonsuicidal self-injury and suicide attempt have been found to be associated with high levels of suicidal ideation, the diagnosis of depression, and increased impulsive aggression. However, familial characteristics, specifically parental history of suicide attempt and of sexual abuse, are much stronger correlates and predictors of suicide attempt than of nonsuicidal self-injury.[18,19] Nonsuicidal self-injury, on the other hand, does not appear to display a pattern of familial transmission. Taken together, the extant findings about nonsuicidal self-injury support the view that both nonsuicidal self-injury and suicide attempt share an underlying problem with negative affect and its regulation. These commonalities may explain both their co-occurrence and the most frequently cited motivations for each behavior. Individuals with nonsuicidal self-injury often engage in the behavior in order to manage their negative affect,[4,14] whereas suicide attempters may seek a permanent end to the experience of distressing emotions.[53,54] However, familial characteristics play a much greater role in the development of suicide attempt; in particular, the familial transmission of suicide attempt above and beyond the transmission of mood disorder was evident,[20] while no familial transmission of nonsuicidal self-injury was noted, and family history of a suicide attempt did not increase the risk for nonsuicidal self-injury.

This study has several limitations. First, the number of individuals with nonsuicidal self-injury was relatively small, precluding analyses of the relationships between clinical correlates and the severity or number of episodes of self-injury. Second, these analyses are cross-sectional and cannot provide information about the relationship of risk factors to the development of nonsuicidal self-injury over time or the longitudinal relationship between nonsuicidal self-injury and suicide attempt. Third, there are a number of domains that may assist in differentiating between these 2 behaviors, such as motivation and pain tolerance, which were not assessed in this study. And finally, the correlates of nonsuicidal self-injury found in an at-risk sample may not be generalizable to other samples, such as those found in the community.

However, this sample, one at high risk for the development of depression and self-injurious behaviors, is also a source of one of the study's strengths. One difficulty in interpreting the

literature on nonsuicidal self-injury is that the results of community and clinical studies diverge due to the differing prevalence and severity of psychopathology in the samples. This sample falls between clinical and community, as the offspring were not clinically referred but had much higher loading for psychopathology than a community sample, since all participants were the offspring of mood-disordered parents. Another strength is that precise, consistent, and widely accepted definitions of nonsuicidal self-injury and suicide attempt were used, allowing for clear differentiation between the 2 behaviors. The use of assessment by interview rather than by self-report might explain why these participants' reported prevalence of nonsuicidal self-injury is lower than in some community studies. This is also one of the very first multigenerational studies of nonsuicidal self-injury.

In these cross-sectional analyses, nonsuicidal self-injury was most closely associated with the presence and severity of mood disorder, along with increased impulsivity and impulsive aggression and high levels of lifetime suicidal ideation. No familial transmission of nonsuicidal self-injury was evident, and a family history of suicide attempt was not related to an increased risk of nonsuicidal self-injury. On multivariate analyses, only individual-level predictors remained significant. This outcome is in contrast to previous findings in this sample, which demonstrated familial transmission of suicide attempt along with significant relationships between offspring attempt and multiple familial variables. Therefore, these 2 behaviors appear to be distinct. However, their shared diathesis of mood and behavioral dysregulation may explain why, in some studies, nonsuicidal self-injury co-occurs with and predicts suicidal behavior. These hypotheses about the interrelationships between nonsuicidal self-injury and suicide attempt will be further examined in the longitudinal follow-up of this sample.[55]

Acknowledgments

The authors thank Grace Ma, MS, University of Pittsburgh, for her assistance with database management for this project.

Dr Mann has received grants for brain imaging studies unrelated to this study from Novartis and GlaxoSmithKline. **Dr Oquendo** has received unrestricted educational grants from AstraZeneca, Janssen, Bristol-Myers Squibb, Pfizer, Eli Lilly, and Shire. Her family owns stock in Bristol-Myers Squibb. **Dr Birmaher** has participated in forums sponsored by Forest, Shire, and Jazz; has received royalties from Random House and Lippincott Williams & Wilkins. **Dr Brent** has received royalties from Guilford Press and is on the editorial board of Up to Date.

Funding/support: This study was funded in part by National Institute of Mental Health (NIMH) grants MH56612, MH56390, MH55123, MH66371, MH62185 and MH018951; the NIMH Clinical and Translational Science Institute Multidisciplinary Predoctoral Fellowship program, grant 5TL1RR024155-04 to Lara Cox; the Clinical and Translational Science Institute and Institute for Clinical Research Education, University of Pittsburgh, Pennsylvania; Doris Duke Clinical Research Fellowship grant to the University of Pittsburgh to fund Clinical Research Fellow Dr Cox; and the Doris Duke Charitable Foundation, New York, New York.

REFERENCES

1. Gratz KL. Risk factors for deliberate self-harm among female college students: the role and interaction of childhood maltreatment, emotional inexpressivity, and affect intensity/reactivity. Am J Orthopsychiatry. 2006; 76(2):238–250. [PubMed: 16719643]
2. Ross S, Heath N. A study of the frequency of selfmutilation in a community sample of adolescents. J Youth Adolesc. 2002; 31(1):67–77.
3. Muehlenkamp JJ, Gutierrez PM. Risk for suicide attempts among adolescents who engage in non-suicidal self-injury. Arch Suicide Res. 2007; 11(1):69–82. [PubMed: 17178643]
4. Nock MK, Prinstein MJ. A functional approach to the assessment of self-mutilative behavior. J Consult Clin Psychol. 2004; 72(5):885–890. [PubMed: 15482046]

5. Nock MK, Joiner TE Jr, Gordon KH, et al. Non-suicidal self-injury among adolescents: diagnostic correlates and relation to suicide attempts. Psychiatry Res. 2006; 144(1):65–72. [PubMed: 16887199]
6. Garrison CZ, Addy CL, McKeown RE, et al. Nonsuicidal physically self-damaging acts in adolescents. J Child Fam Stud. 1993; 2(4):339–352.
7. Jacobson CM, Muehlenkamp JJ, Miller AL, et al. Psychiatric impairment among adolescents engaging in different types of deliberate self-harm. J Clin Child Adolesc Psychol. 2008; 37(2):363–375. [PubMed: 18470773]
8. Herpertz S, Sass H, Favazza A. Impulsivity in selfmutilative behavior: psychometric and biological findings. J Psychiatr Res. 1997; 31(4):451–465. [PubMed: 9352472]
9. Bureau JF, Martin J, Freynet N, et al. Perceived dimensions of parenting and non-suicidal self-injury in young adults. J Youth Adolesc. 2010; 39(5):484–494. [PubMed: 19882378]
10. Muehlenkamp JJ, Kerr PL, Bradley AR, et al. Abuse subtypes and nonsuicidal self-injury: preliminary evidence of complex emotion regulation patterns. J Nerv Ment Dis. 2010; 198(4):258–263. [PubMed: 20386254]
11. Gratz KL, Roemer L. The relationship between emotion dysregulation and deliberate self-harm among female undergraduate students at an urban commuter university. Cogn Behav Ther. 2008; 37(1):14–25. [PubMed: 18365795]
12. Williams F, Hasking P. Emotion regulation, coping and alcohol use as moderators in the relationship between nonsuicidal self-injury and psychological distress. Prev Sci. 2010; 11(1):33–41. [PubMed: 19707873]
13. O'Carroll PW, Berman AL, Maris RW, et al. Beyond the Tower of Babel: a nomenclature for suicidology. Suicide Life Threat Behav. 1996; 26(3):237–252. [PubMed: 8897663]
14. Lloyd-Richardson EE, Perrine N, Dierker L, et al. Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. Psychol Med. 2007; 37(8):1183–1192. [PubMed: 17349105]
15. Brausch AM, Gutierrez PM. Differences in non-suicidal self-injury and suicide attempts in adolescents. J Youth Adolesc. 2010; 39(3):233–242. [PubMed: 19941045]
16. Brent DA, Emslie GJ, Clarke GN, et al. Predictors of spontaneous and systematically assessed suicidal adverse events in the treatment of SSRI-resistant depression in adolescents (TORDIA) study. Am J Psychiatry. 2009; 166(4):418–426. [PubMed: 19223438]
17. Esposito-Smythers C, Birmaher B, Valeri S, et al. Child comorbidity, maternal mood disorder, and perceptions of family functioning among bipolar youth. J Am Acad Child Adolesc Psychiatry. 2006; 45(8):955–964. [PubMed: 16865038]
18. Brent DA, Oquendo M, Birmaher B, et al. Familial pathways to early-onset suicide attempt: risk for suicidal behavior in offspring of mood-disordered suicide attempters. Arch Gen Psychiatry. 2002; 59(9):801–807. [PubMed: 12215079]
19. Melhem NM, Brent DA, Ziegler M, et al. Familial pathways to early-onset suicidal behavior: familial and individual antecedents of suicidal behavior. Am J Psychiatry. 2007; 164(9):1364–1370. [PubMed: 17728421]
20. Brent DA, Oquendo MA, Birmaher B, et al. Familial transmission of mood disorders: convergence and divergence with transmission of suicidal behavior. J Am Acad Child Adolesc Psychiatry. 2004; 43(10):1259–1266. [PubMed: 15381893]
21. Mann JJ, McBride PA, Brown RP, et al. Relationship between central and peripheral serotonin indexes in depressed and suicidal psychiatric inpatients. Arch Gen Psychiatry. 1992; 49(6):442–446. [PubMed: 1376106]
22. Kaufman J, Birmaher B, Brent D, et al. Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL): initial reliability and validity data. J Am Acad Child Adolesc Psychiatry. 1997; 36(7):980–988. [PubMed: 9204677]
23. First, MB.; Spitzer, RL.; Gibbon, M., et al. Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) (Version 2.0). Washington, DC: American Psychiatric Press; 1996.
24. Andreasen NC, Endicott J, Spitzer RL, et al. The family history method using diagnostic criteria: reliability and validity. Arch Gen Psychiatry. 1977; 34(10):1229–1235. [PubMed: 911222]

25. First, MB.; Gibbon, M.; Spitzer, RL., et al. Structured Clinical Interview for DSM-IV Axis II Personality Disorders: SCID-II. Washington, DC: American Psychiatric Press; 1997.
26. Kazdin AE, Rodgers A, Colbus D, et al. Children's Hostility Inventory: measurement of aggression and hostility in psychiatric inpatient children. J Clin Child Psychol. 1987; 16(4):320–328.
27. Buss AH, Durkee A. An inventory for assessing different kinds of hostility. J Consult Psychol. 1957; 21(4):343–349. [PubMed: 13463189]
28. Pelham WE, Milich R, Murphy DA, et al. Normative data on the IOWA Conners teacher rating scale. J Clin Child Psychol. 1989; 18(3):259–262.
29. Barratt ES. Factor analysis of some psychometric measures of impulsiveness and anxiety. Psychol Rep. 1965; 16(2):547–554. [PubMed: 14285869]
30. Buss, AH.; Plomin, R. A Temperament Theory of Personality Development. New York: Wiley; 1975.
31. Brown GL, Goodwin FK. Human aggression and suicide. Suicide Life Threat Behav. 1986; 16(2): 223–243. [PubMed: 2428140]
32. Poznanski, EO.; Mokros, HB. Children's Depression Rating Scale-Revised. Los Angeles, CA: Western Psychological Services: 1996.
33. Hamilton M. A rating scale for depression. J Neurol Neurosurg Psychiatry. 1960; 23(1):56–62. [PubMed: 14399272]
34. Kazdin AE, Rodgers A, Colbus D. The hopelessness scale for children: psychometric characteristics and concurrent validity. J Consult Clin Psychol. 1986; 54(2):241–245. [PubMed: 3700812]
35. Beck AT, Weissman A, Lester D, et al. The measurement of pessimism: the hopelessness scale. J Consult Clin Psychol. 1974; 42(6):861–865. [PubMed: 4436473]
36. Birmaher B, Khetarpal S, Brent D, et al. The Screen for Child Anxiety Related Emotional Disorders (SCARED): scale construction and psychometric characteristics. J Am Acad Child Adolesc Psychiatry. 1997; 36(4):545–553. [PubMed: 9100430]
37. Kovacs M. The Children's Depression, Inventory (CDI). Psychopharmacol Bull. 1985; 21(4):995–998. [PubMed: 4089116]
38. Beck AT, Ward CH, Mendelson M, et al. An inventory for measuring depression. Arch Gen Psychiatry. 1961; 4:561–571. [PubMed: 13688369]
39. Lukens E, Puig-Antich J, Behn J, et al. Reliability of the psychosocial schedule for school age children. J Am Acad Child Psychiatry. 1983; 22(1):29–39. [PubMed: 6826995]
40. Wagner AW, Linehan MM. Relationship between childhood sexual abuse and topography of parasuicide among women with borderline personality disorder. J Pers Disord. 1994; 8(1):1–9.
41. Chaffin M, Wherry JN, Newlin C, et al. The Abuse Dimensions Inventory: initial data on a research measure of abuse severity. J Interpers Violence. 1997; 12(4):569–589.
42. Parker G, Tupling H, Brown LB. A parental bonding instrument. Br J Med Psychol. 1979; 52(1):1–10.
43. Olsen, DH.; Portner, J.; Lavee, Y. Family Adaptability and Cohension Evaluation Scales (FACES-II). Minneapolis, MN: University of Minnesota Press; 1985.
44. Posner K, Oquendo MA, Gould M, et al. Columbia Classification Algorithm of Suicide Assessment (C-CASA): classification of suicidal events in the FDA's pediatric suicidal risk analysis of antidepressants. Am J Psychiatry. 2007; 164(7):1035–1043. [PubMed: 17606655]
45. Beck AT, Kovacs M, Weissman A. Assessment of suicidal intention: the Scale for Suicide Ideation. J Consult Clin Psychol. 1979; 47(2):343–352. [PubMed: 469082]
46. Beck, AT.; Lettieri, DJ.; Resnick, HLP., et al. The Prediction of Suicide. Bowie, MD: Charles Press Publishers; 1974.
47. Nock MK, Prinstein MJ. Contextual features and behavioral functions of self-mutilation among adolescents. J Abnorm Psychol. 2005; 114(1):140–146. [PubMed: 15709820]
48. Bridge JA, Goldstein TR, Brent DA. Adolescent suicide and suicidal behavior. J Child Psychol Psychiatry. 2006; 47(3–4):372–394. [PubMed: 16492264]

49. Janis IB, Nock MK. Are self-injurers impulsive?: results from two behavioral laboratory studies. Psychiatry Res. 2009; 169(3):261–267. [PubMed: 19758706]
50. Brent DA, Mann JJ. Family genetic studies, suicide, and suicidal behavior. Am J Med Genet C Semin Med Genet. 2005; 133C(1):13–24. [PubMed: 15648081]
51. Buckholdt KE, Parra GR, Jobe-Shields L. Emotion regulation as a mediator of the relation between emotion socialization and deliberate self-harm. Am J Orthopsychiatry. 2009; 79(4):482–490. [PubMed: 20099939]
52. Gratz KL, Chapman AL. The role of emotional responding and childhood maltreatment in the development and maintenance of deliberate self-harm among male undergraduates. Psychol Men Masc. 2007; 8(1):1–14.
53. Boergers J, Spirito A, Donaldson D. Reasons for adolescent suicide attempts: associations with psychological functioning. J Am Acad Child Adolesc Psychiatry. 1998; 37(12):1287–1293. [PubMed: 9847501]
54. Michel K, Valach L, Waeber V. Understanding deliberate self-harm: the patients' views. Crisis. 1994; 15(4):172–178. [PubMed: 7729149]
55. Cox LJ, Stanley BH, Melhem NM, et al. A longitudinal study of non-suicidal self-injury in youth at high risk for mood disorder. 2011 In press.

Clinical Points

- Both suicidal behavior and nonsuicidal self-injury share some common risk factors, namely, mood disorder, impulsivity, and impulsive aggression,
- Familial factors appear to play a more significant role in suicidal behavior than in nonsuicidal self-injury.
- Treatment of mood disorder is a critical intervention that may reduce subsequent occurrences.

Table 1

Interview & Self-Report Measures

Age Group (Proband and Offspring)				
Domain Assessed	**All**	**10–13**	**14–17**	**18+**
Current and Lifetime Axis I Disorders (DSM-IV)		Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version[22, 35]	Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version[22, 35]	Structured Clinical Interview for DSM-IV[23, 36] Family History Research Diagnostic Criteria[24, 37a]
Current and Lifetime Axis II Disorders (DSM-IV)				Structured Clinical Interview for the DSM-IV Diagnosis of Personality Disorders[25, 33]
History of Suicidal Behavior	Columbia University Suicide History Form and Medical Damage Lethality Scale[21, 22]			
Impulsive Aggression		Children's Hostility Inventory[26, 31]	Buss-Durkee Hostility Inventory[27, 32]	Buss-Durkee Hostility Inventory[27, 32]
Impulsivity		Iowa-Conners Parent Physical Report, Impulsivity Subscale[28, 29] Emotionality, Activity, Sociability, and Impulsivity scales[30, 28]	Iowa-Conners Parent Physical Report, Impulsivity Subscale[28, 29] Emotionality, Activity, Sociability, and Impulsivity scales[30, 28]	Barratt Impulsivity Scale[29, 30]
Aggression	Brown-Goodwin Lifetime History of Aggression[31, 27]			
Depressive Symptoms		Children's Depression Rating Scale-Revised[32, 23]	Children's Depression Rating Scale-Revised[32, 23]	Hamilton Depression Inventory, adult version[33, 24]
Hopelessness		Children's Hopelessness Scale[34, 41]	Beck Hopelessness Scale[35, 38]	Beck Hopelessness Scale[35, 39]
Anxiety		Screen for Childhood Anxiety-Related Disorders[36, 25]	Screen for Childhood Anxiety-Related Disorders[36, 25]	
Self-Reported Depressive Symptoms		Children's Depression Inventory[37, 40]	Beck Depression Inventory[38, 26]	Beck Depression Inventory[38, 26]
History of Physical and Sexual Abuse			Psychosocial Schedule[39, 44]	Childhood Experiences Questionnaire[40, 42] Abuse Dimensions Inventory[41, 43]

Age Group (Proband and Offspring)				
Domain Assessed	**All**	**10–13**	**14–17**	**18+**
				Demographic questionnaire
Parent-Child Attachment Style		Parental Bonding Instrument[42, 45]	Parental Bonding Instrument[42, 45]	Parental Bonding Instrument[42, 45*a*]
Family Functioning		Family Adaptability and Cohesion and Evaluation Scale-II[43, 46]	Family Adaptability and Cohesion and Evaluation Scale-II[43, 46]	Family Adaptability and Cohesion and Evaluation Scale-II[43, 46*a*]
Lifetime History of Non-Suicidal Self-Injury	Self-Injurious Behavior Scale[44, 54]			
Suicidal Ideation	Scale for Suicidal Ideation[45] Suicide Intent Scale[46]			

[a] Offspring only.

[b] Biological coparents not directly interviewed.

Abbreviation: DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.

Table 2

Offspring Demographic Characteristics, Abuse History, and Self-Harm History at Baseline

Offspring Variables	No NSSI (N=468)	NSSI at Baseline (N=39)	Test	df	*p*
Baseline Age (Mean ± SD)	19.4 ± 8.6	20.3 ± 6.9	$t = -0.66$	505	0.51
Gender (% Female)	46.4 (217 of 468)	56.4 (22 of 39)	$\chi^2 = 1.46$	1	0.23
Race (% White)	69.5 (310 of 446)	78.4 (29 of 37)	$\chi^2 = 1.29$	1	0.26
Suicide Attempt (% Yes)	6.4 (30 of 468)	12.8 (5 of 39)	FET	---	0.18
History of Physical or Sexual Abuse (% Yes)	21.7 (47 of 217)	48.0 (12 of 25)	$\chi^2 = 8.44$	1	0.004

Abbreviations: FET = Fisher exact test, NA = not applicable, NSSI = nonsuicidal self-injury.

Table 3

Offspring Diagnostic and Clinical Variables by Nonsuicidal Self-Injury (NSSI) Status

Offspring Variables	No NSSI (N=468)	NSSI at Baseline (N=39)	Test	df	*p*
DSM-IV Diagnoses (%Yes)					
Depression (MDD, Dysthymia, Depression NOS)	31.6 (146 of 462)	71.8 (28 of 39)	$\chi^2 = 25.63$	1	<.001
Bipolar Disorder	3.5 (16 of 463)	7.7 (3 of 39)	FET	---	0.18
Anxiety Disorder	26.1 (121 of 463)	36.8 (14 of 38)	$\chi^2 = 2.05$	1	0.15
PTSD	7.8 (35 of 447)	5.3 (2 of 38)	FET	---	0.76
Alcohol or Substance Abuse	17.9 (82 of 458)	42.1 (16 of 38)	$\chi^2 = 12.96$	1	<.001
ADHD[a]	17.5 (49 of 280)	20.0 (4 of 20)	FET	---	0.76
Disruptive Behavior Disorder[a]	16.9 (45 of 267)	25.0 (4 of 16)	FET	---	0.49
Eating Disorder	2.8 (12 of 428)	15.8 (6 of 38)	FET	---	0.002
Number of Axis I Diagnoses (Mean ± SD)	1.1±1.2	2.0±1.1	$t = -4.57$	505	<.001
Cluster B Personality Disorder[b]	7.7 (15 of 195)	30.4 (7 of 23)	FET	---	0.004
Clinical Characteristics (M±SD)					
Depressive Symptoms[c]	−0.1 ± 0.9	0.7±1.2	$t = -4.21$	42.1	<.001
Hopelessness[c]	−0.1±0.9	0.4±1.1	$t = -3.22$	476	0.001
Impulsivity[c]	−0.1±1.0	0.6±1.1	$t = -3.89$	453	<.001
Impulsive Aggression[c]	−0.1±1.0	0.5±0.9	$t = -3.38$	455	0.001
Aggression	17.7±6.1	21.4±6.1	$t = -3.33$	401	0.001
Anxiety	16.2±11.8	19.6±11.2	$t = -1.06$	248	0.29
Self-Reported Depressive Symptoms[c]	−0.1±0.9	0.9±1.3	$t = -4.46$	38.7	<.001
Suicidal Ideation at Baseline	0.04±0.4	0.4±1.8	$t = -1.27$	36.3	0.21
Highest Lifetime Suicidal Ideation	0.1±0.8	1.2±3.3	$t = 2.02$	37.4	0.051

[a]Variables assessed only in offspring aged < 18 years.

[b]Variables assessed only in offspring aged ≥ 18 years.

[c]Variables standardized to produce z scores.

Abbreviations: FET = Fisher exact test, MDD = major depressive disorder, NA = not applicable, NOS = not otherwise specified.

Table 4

Family Characteristics by Offspring Nonsuicidal Self-Injury (NSSI) Status

Family Variables	No NSSI (N=468)	NSSI at Baseline (N=39)	Test	df	*p*
Parent Demographics					
Greater than HS Education (% Yes)	62.5 (292 of 467)	73.0 (27 of 37)	$\chi^2 = 1.61$	1	0.20
Socioeconomic Status (M±SD)	43.9±11.9	44.6±13.9	$t = 0.23$	195	0.82
Parent History (% Yes)					
NSSI	21.4 (81 of 378)	25.7 (9 of 35)	$\chi^2 = 0.35$	1	0.56
Suicide Attempt	53.8 (243 of 452)	60.0 (21 of 35)	$\chi^2 = 0.51$	1	0.48
Parent DSM-IV Diagnoses (% Yes)					
Depression (MDD, Dysthymia, Depression NOS)	81.8 (383 of 468)	82.1 (32 of 39)	$\chi^2 = 0.001$	1	0.97
Bipolar Disorder	19.9 (90 of 452)	17.9 (7 of 39)	$\chi^2 = 0.09$	1	0.77
Anxiety Disorder	66.5 (298 of 448)	68.4 (26 of 38)	$\chi^2 = 0.06$	1	0.81
PTSD	30.7 (138 of 450)	35.1 (13 of 37)	$\chi^2 = 0.32$	1	0.57
Alcohol or Substance Abuse	49.2 (222 of 451)	52.6 (20 of 38)	$\chi^2 = 0.16$	1	0.69
Eating Disorder	10.6 (48 of 452)	10.5 (4 of 38)	FET	---	>0.99
Cluster B Personality Disorder	17.5 (76 of 434)	18.4 (7 of 38)	$\chi^2 = 0.20$	1	0.89
Parent Clinical Characteristics (Mean ± SD)					
Depressive Symptoms	16.6±10.9	18.1±8.6	$t = -0.81$	503	0.42
Hopelessness	9.9±5.9	10.0±5.3	$t = -0.10$	481	0.92
Impulsivity	55.5±19.5	54.6±17.9	$t = 0.28$	477	0.78
Impulsive Aggression	35.6±13.7	33.6±11.7	$t = 0.84$	478	0.40
Aggression	19.1±5.9	20.3±5.4	$t = -1.10$	434	0.27
Self-Reported Depressive Symptoms	21.7±12.7	21.5±11.0	$t = 0.08$	475	0.93
Suicide Intent: Most Lethal Attempt	15.0±4.6	15.5±6.0	$t = -0.43$	259	0.67
Suicide Intent: Most Recent Attempt	14.5±4.9	15.2±6.4	$t = -0.61$	261	0.54
Suicidal Ideation at Baseline	6.4±9.5	4.7±7.7	$t = 1.06$	466	0.29
Highest Lifetime Suicidal Ideation	7.1±9.9	6.1±9.3	$t = 0.61$	495	0.55
Family Characteristics (Mean ± SD)					
PBI: Care	20.8±10.9	14.5±10.3	$t = 2.37$	158	0.02
PBI: Overprotection	15.1±8.5	16.8±8.8	$t = -0.79$	158	0.43

J Clin Psychiatry. Author manuscript; available in PMC 2013 January 15.

Family Variables	**No NSSI (N=468)**	**NSSI at Baseline (N=39)**	**Test**	**df**	***p***
FACES score	49.6±9.1	49.9±10.2	$t = -0.13$	227	0.9
Parental Abuse History (% Yes)					
Parent Physical or Sexual Abuse	58.9 (222 of 377)	64.5 (20 of 31)	$\chi^2 = 0.38$	1	0.54

Abbreviations: DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition;
FET = Fisher exact test; HS = high school; MDD = major depressive disorder; NA = not applicable; NOS = not otherwise specified.

Table 5

Multivariate Logistic Regression of Offspring Non-Suicidal Self-Injury Status at Baseline[a]

Offspring Characteristic	OR	95% CI	*t*	*p*
Depression (MDD, Dysthymia, Depression NOS)	3.78	1.80 – 7.94	3.51	<.001
Aggression	1.07	1.02 – 1.13	2.53	0.01
Self-Reported Depressive Symptoms[b]	1.59	1.12 – 2.25	2.62	0.009
Highest Lifetime Suicidal Ideation	1.24	1.07 – 1.43	2.86	0.004

[a] This model is the result of analyses performed on an imputed dataset

[b] Variable standardized to produce *z* scores.