Published in final edited form as:

J Clin Child Adolesc Psychol. 2010 ; 39(4): 470–480. doi:10.1080/15374416.2010.486302.

Variations in Risk and Treatment Factors Among Adolescents Engaging in Different Types of Deliberate Self-Harm in an Inpatient Sample

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Abstract

This study employs a framework adopted by Jacobson et al. (2008) to explore differences in risk and treatment factors in a sample of 476 adolescent inpatients grouped with relation to their involvement in deliberately self-harmful (DSH) behavior. Participants were assigned to groups indicating no DSH, non-suicidal self-injury (NSSI) only, suicide attempts (SA) only, and NSSI +SA. Groups were compared with respect to their status on a variety of background risk factors (e.g., maltreatment, presenting psychopathology, family history) and in-treatment behaviors (e.g., critical incidents resulting from self-injurious gestures) linked to DSH. Findings generally supported the conclusions drawn by Jacobson et al. (2008) in terms of the overall severity of youth exhibiting NSSI+SA, with some important similarities observed between the NSSI-only and NSSI +SA groups.

Youth suicidality is a serious public health issue. For example, in 2007, 15% of high school students in the United States reported that they “seriously considered” suicide during the prior 12 months, while about 7% reported at least one suicide attempt and 2% reported at least one attempt requiring medical attention (Centers for Disease Control, 2008). Recent studies on the prevalence of non-suicidal self-injury show similar rates, with about 14% of youth reporting deliberate self-injury at some point in their lifetimes (Ross & Heath, 2002). Empirically supported treatments and reliable assessment strategies exist for youth showing deliberate self-harm, which includes suicides, attempted suicides, parasuicides or suicidal gestures, and a variety of less destructive acts including cuts or burns made to the self (e.g., Miller, Rathus, & Linehan, 2007; Muehlenkamp, 2005; Nock & Prinstein, 2004; Shaffer & Pfeffer, 2001; Spirito & Esposito-Smythers, 2008). Despite advances made in the assessment and treatment of these behaviors, gaps remain. Different forms of deliberate self-injury show different prevalence rates, different profiles of risk, and different degrees of persistence (Borges et al., 2008; Nock & Kessler, 2006; Prinstein et al, 2008). Yet relatively little research has explored different forms of deliberate self-harm in concert, particularly with respect to the characteristics of youth who have engaged in either suicidal acts or non-suicidal self-injurious acts, or both.

Recently, Jacobson, Muehlenkamp, Miller, and Turner (2008) presented evidence from a study of adolescents who received outpatient services showing meaningfully different symptom and diagnostic profiles across groups who showed only non-suicidal self-harm, suicide attempts, both in combination, or no self harm at all. This study replicates and extends Jacobson et al.’s (2008) approach in a sample of youth admitted for inpatient

treatment by investigating group differences with respect to behavior during treatment, as well as a variety of risk markers collected at intake.

Risk factors for suicidality are well-known in the clinical literature (see King & Merchant, 2008, for review), as much empirical work has been done to identify the correlates of both suicidal ideation and attempts (e.g., Dubow, Kausch, Blum, Reed, & Bush, 1989). This information has been codified in the practice parameters of the American Academy of Child and Adolescent Psychiatry (Shaffer & Pfeffer, 2001). Major individual risk factors include being male, a history of previous attempts, and current mood disorder along with current elevated agitation. Social-contextual risk factors include isolation or poor quality social support, maltreatment by caretakers, and victimization by peers.

Although the literature on risk factors for non-suicidal self-injury (NSSI) is relatively less elaborated, extant studies suggest similar profiles of risk for this kind of deliberate self-harm with evidence indicating greater risk overall in cases of co-occurring patterns of NSSI and suicide attempts (SA). Based on clinical interviews conducted with 89 adolescent inpatients, Nock, Joiner, Gordon, Lloyd-Richardson, and Prinstein (2006) observed that 70% of adolescents reporting histories of NSSI also reported previous SA. These youth reported more extensive histories of NSSI via a greater variety of methods and less pain associated with self-harmful acts.

The consensus in the extant literature on the patterns and correlates of NSSI and SA appears to be that despite their differences, most notably with respect to the underlying intent to die present in SA but not NSSI (see Hooley, 2008), NSSI and SA can and frequently do co-occur. However, NSSI and SA are unique syndromes with some shared and some nonshared correlates. For example, studies by Muehlenkamp and Gutierrez (2004, 2007) used data from normative samples of adolescents to examine the extent to which underlying depression, suicidal ideation, and attitudes towards life and death account for similarities or differences in NSSI and SA. Muehlenkamp and Gutierrez (2004) observed in a sample of 390 youth that adolescents who engage in either NSSI or SA showed elevated levels of depression, suicidal ideation, and negative attitudes towards life in comparison to adolescents who engage in neither. There were no significant differences in depression or suicidal ideation between the NSSI and SA groups, but the NSSI group reported less negative attitudes towards life than did the SA group.

In an extension of this study, Muehlenkamp and Gutierrez (2007) observed in a sample of 540 adolescents that youth who engage in both NSSI and SA show different patterns of suicidal ideation, depression, and attitudes towards life in comparison to youth who engage only in NSSI. The NSSI+SA group reported significantly more anhedonia and negative self-evaluation, and significantly fewer reasons for living (the SA-only group was too small for reliable inferential analysis). These findings suggest that youth who engage in NSSI and SA probably are at greatest risk for continued deliberate self-harm and that youth who fall into this category potentially are showing the greatest overall levels of psychopathology and associated risk among youth engaging in one or the other form of deliberate self-harm.

As Muehlenkamp and Gutierrez (2007) noted, research on unique and overlapping NSSI and SA thus far has been somewhat limited with respect to investigating underlying shared etiological factors between the two forms of deliberate self-harm. Indeed, the current literature base in this area has relied mostly on larger community samples such as those reported above or relatively smaller samples of psychiatric inpatients. For example, in a study of 95 adolescents, Guertin, Lloyd-Richardson, Spirito, Donaldson, and Boergers (2001) observed that adolescents with histories of NSSI+SA had elevated risk and psychopathology profiles compared to adolescents with histories only of SA. Larger samples

with elevated risk for deliberate self-harm are needed for fuller hypothesis testing regarding the shared and unique features of youth showing different configurations of NSSI and SA.

Recently, Jacobson and colleagues (2008) examined data from a large ($N = 227$) racially/ethnically diverse (70% Hispanic, 20% Black/African-American) and mostly (68%) female sample of adolescents who presented to an outpatient adolescent depression and suicide program affiliated with an urban hospital in the northeast. The authors analyzed data from self-report questionnaires and semistructured clinical interviews administered during routine intake procedures for the treatment program. Based on responses to the Lifetime Parasuicide Count (Comtois & Linehan, 1999, cited by Jacobson et al., 2008), youth were classified into one of four groups representing different configurations of deliberate self-harm (DSH): none (no DSH), NSSI only, SA only, and combined NSSI+SA. These classifications were made regardless of the specific form or frequency of self-harm, but rather with attention to the suicidal intent of the behavior. Thus, as Jacobson et al. (2008, p. 366) described, a youth who engaged in a mix of self-harmful behaviors, some with suicidal intent and some without, would be classified as NSSI+SA. About half of their sample ($n = 119$) was classified as no-DSH, with roughly equal distribution of youth across the three DSH groups ($ns = 30-40$).

Through analyses of group differences, Jacobson et al. (2008) discovered symptom and diagnosis-specific features of DSH. For example, only borderline personality features were predictive of membership in the NSSI group, whereas major depression and PTSD were predictive of membership in the SA and NSSI+SA groups relative to no-DSH. Further, with regard to indicators of suicidal ideation and depressive symptoms, the NSSI group mirrored the no-DSH group. Jacobson et al. (2008) acknowledged limitations to their study, including the potential for underpowered analyses, a reliance on cross-sectional data, and a sample comprised predominantly of Hispanic girls. Yet their analysis represents a significant step forward for research on self-injurious behavior given their use of data from a relatively large outpatient sample and application of a clinically meaningful group classification scheme to infer differences among youth showing various configurations of self-injury. The present study extends Jacobson et al.'s (2008) approach to a larger, higher-risk sample of adolescent inpatients.

The present study is part of a larger translational action research project conducted jointly by academic researchers and the professional clinical staff of a public, secure inpatient psychiatric hospital for children and adolescents. In this study the complete, archived clinical records of youth admitted consecutively over a 28-month period were analyzed to address the issue of whether youth showing different configurations of deliberately self-harmful behaviors also manifested different patterns of behavior during treatment and showed different degrees of background risk factors upon admission. As with Jacobson et al. (2008), analyses were mainly exploratory; however, it was hypothesized that youth who had engaged in both NSSI and SA prior to admission would show the highest levels of DSH during inpatient treatment as evidenced by their involvement in critical incidents spurred by DSH behavior, the amount of time they spent on "special precautions" for DSH, and the amount of time their treatment plans were modified temporarily by more restrictive management plans for DSH behaviors. Further, the NSSI+SA group was expected to show the highest levels of pre-treatment risk across a variety of risk markers including, for example, maltreatment experiences, out-of-home placement histories, broadband indicators of psychopathology, and intellectual functioning.

Method

Participants

As noted the data analyzed for this study were drawn from the database of a larger project ($N = 484$) examining various forms of aggressive behavior in the youth psychiatric population (Boxer, 2007; Boxer & Terranova, 2008). Participants for this study were the 476 youths (98.3% of full sample) who did not receive any Axis I diagnoses of pervasive developmental disorders (PDD; autism, Asperger's disorder, etc). Youth with such diagnoses were excluded to minimize the influence of any potentially stereotypic behavior patterns common to the PDD diagnostic profile on the documentation of deliberate self-harm prior to and during treatment. Of the remaining youth, most (64%) had primary diagnoses of mood disorder (depression, anxiety, bipolar, or unspecified mood disorders), 15% had primary diagnoses of thought disorder (psychotic disorders including schizophrenia, thought disorder, or schizoaffective disorder), 12% behavior disorder (conduct, oppositional-defiant, disruptive, or attention deficit-hyperactivity disorders), 4% post-traumatic stress disorder, and 5% other disorders (e.g., adjustment disorders, reactive attachment disorder).

The analysis sample was comprised of youths ages 10–17 years (mean age in years at admission = 13.9, $SD = 2.1$; 250 boys, 226 girls) admitted consecutively to a secure, publicly funded inpatient psychiatric hospital in the Midwest. In the state where this hospital is located, the facility traditionally has served as the “last resort” treatment center for youth in the public mental health system and thus most inpatients are admitted with high levels of chronic emotional and/or behavioral difficulties and low levels of overall functioning. The sample was ethnically/racially diverse (boys: 45.2% Black/African-American, 46% White/Caucasian, 2.4% Hispanic/Latino/a, 1.2% Native American, 5.2% Other or Mixed-Racial; girls: 45.6% Black/African-American, 41.6% White/Caucasian, 2.7% Hispanic/Latino/a, 0.9% Native American, 9.2% Other or Mixed-Racial). Participants represented a wide range of economic backgrounds per US Census 2000 data on participants' home ZIP codes (median home values from \$27,800 to \$309,800; percent of local population in poverty from 2% to 39%; median household incomes from \$17,680 to \$87,740). Participants came from a variety of custodial situations: homes with two biological parents or one biological/one step-parent (26.2%), single parents only (34.5% biological mother, 3.8% biological father), grandparents (5.7%), adoptive parents (12.2%), foster parents (3.6%), extended families (10.7%), or another configuration (3.3%). Mean length of stay in the facility was 96 days ($SD = 116.9$); median length of stay was 36 days with a range of 1 to 636 days.

Measures/Sources of Data

This study relied on existing clinical records. Data were obtained from a variety of sources: intake reports completed by teams consisting of a psychiatrist, psychologist, social worker, and psychiatric nurse; a computerized critical incident database maintained by the hospital's Chief Information Officer with data extracted from incident reports filed by nurses, child care workers, and/or psychiatrists; daily observation logs completed by child care workers; medical notes and orders made by unit psychiatrists during the course of treatment; and treatment logs and plans maintained by therapists. Intake clinicians were required to assess risk for self-harm during treatment by inquiring about histories of this behavior at intake, including a clear accounting of the number of suicide attempts ever made. Except for information contained in the critical incident database, all data were collected and coded by master's-level clinical psychology interns working in the host facility. All data were de-identified by the host facility before being transferred to the author in order to adhere to the Health Information Portability and Accountability Act (HIPAA).

History of deliberate self-harm (DSH)—Coders rated the presence and extent of non-suicidal self-injury (NSSI; excluding suicide attempts) and suicide attempts (SA). For *NSSI*, coders were instructed to attend to any mention of self-directed aggressive behavior emitted intentionally to cause harm (e.g., cutting self with object, scratching self with fingernails, choking self, head-banging). Coders used a three-point rating system to indicate the extent of this behavior, with codes reflecting developmental persistence (0 = none mentioned, 1 = form of aggression noted during a single developmental period, and 2 = form of aggression noted during two or more developmental periods). Discrete developmental periods considered were early childhood (ages 0–4), middle childhood (ages 5–10), early adolescence (ages 11–13), and middle adolescence (ages 14–17). Higher scores thus reflected greater persistence of the behavior. For *SA*, coders were instructed to tally the number of attempts noted in the intake assessment.

Deliberate self-harm during inpatient treatment—The management and expression of DSH during treatment was measured by a number of indicators: (1) *Critical incidents of deliberate self-harm*: number of seclusions and restraints (critical incidents) in which a youth was involved due to deliberate self-harm (from the computerized incident database maintained by the hospital's information office).¹ (2) *Special precautions for deliberate self-harm*: percentage of time youth was maintained on 1:1 supervision by child care staff due to psychiatrist determination of elevated risk for self-directed aggressive behavior (from medical orders; number of days on precautions divided by number of days in treatment). (3) *Behavior management plans for deliberate self-harm*: amount of time a special treatment plan, more restrictive than the regular treatment plan, was in force to target self-directed aggressive behavior (from treatment logs; number of days plan was in force divided by number of days in treatment). All three of these indicators were log-transformed for inferential analyses in order to reduce skewness.

Background risk factors—Coders also extracted information regarding a variety of identified risk markers for DSH, including: 1) *Maltreatment* (physical, sexual, and emotional abuse as well as neglect; coded as 0 = none noted, 1 = form of maltreatment mentioned, but no legal status noted, and 2 = form of maltreatment noted as 'substantiated'; see Author citation for evidence of validity). 2) *Prior out-of-home placements* (counts of previous placements in psychiatric hospitals, residential treatment centers, foster homes, and juvenile detention). 3) *Global Assessment of Functioning (GAF) score* (American Psychiatric Association, 1994, 2000) assigned at intake. GAF scores range from 0 to 100, with lower scores indicating greater impairment; a midrange score of 50 represents "serious symptoms" or "serious impairment in social, occupational, or school functioning" (APA, 1994). Studies suggest that GAF scores can be assigned with acceptable degrees of inter-rater reliability during initial diagnostic assessments (e.g., Söderberg, Tungström, & Armelius, 2005). GAF scores at intake were assigned by psychiatrists as part of their diagnostic assessment. 4) *Family history of mental illness or criminal behavior* (rated as 0 = none noted, 1 = noted in only one family member who was not a first-degree relative, and 2 = noted in two or more family members or in at least one first-degree relative); and 5) *externalizing, internalizing, and critical problems* indicated by the Devereaux Scales of Mental Disorders (DSMD; Naglieri, LeBuffe, & Pfeiffer, 1994). Per the manual (Naglieri et

¹*Seclusion* involves moving an individual into an unfurnished room and preventing him or her from exiting until the he or she is deemed no longer to be at risk for harming self or other. *Restraint* refers to a restricting an individual's movement via three possible methods. *Physical restraint* involves staff limiting movement by holding a youth. *Mechanical restraint* involves the use of some apparatus to limit movement (e.g., strapping a youth to a bed). *Chemical restraint* involves the use of medication to reduce agitation. Chemical restraint is not applied as such at the host facility and thus none of the incidents recorded for this study involved that form of restraint. Incidents occur when a member of the treatment staff determines that a youth's behavior is presenting the threat of imminent harm to him- or herself or another person. There are no other circumstances at the host facility that allow the use of seclusion or restraint.

al., 1994), these scales have established high levels of internal reliability (coefficient alphas ranging from .88–.98) as well as criterion validity (verified discrimination between hospitalized and control samples of youth). DSMD scales were completed by the individual who admitted the child to the hospital (typically the primary caregiver). The DSMD generates T scores to indicate levels of psychopathology (i.e., $M = 50$, $SD = 10$); scores greater than 60 indicate clinical case status in the general population, and scores greater than 70 are considered highly significant with respect to clinical levels of psychopathology (Naglieri et al., 1994). DSMD scales were completed by the individual who admitted the child to the hospital (following standard intake protocols, this was most often the child's primary caregiver).

Procedures

All procedures were reviewed and approved by human subjects research committees at the host facility, the state agency overseeing activities at the facility, and the author's university. Information contained in the inpatient charts was coded by clinical psychology interns trained and supervised by the author. Three coders first coded independently a set of 55 cases (11% of the sample) which overlapped with 55 cases from a pilot feasibility study in which the coding scheme was developed (Boxer, Bhandari, & Bow, 2003). Because those 55 cases had been coded using a system very similar to the one implemented in the current study, the 55 were used to establish interrater reliability among the coders and with the codes assigned during the feasibility study. Reliability analyses indicated that all three interns were coding at adequate levels of agreement with the feasibility study (all codes > 70% agreement; most codes > 80% agreement) and at very high levels with one another (intraclass correlation coefficients > .90). Next, the interns coded the remaining 429 cases separately (distributed across coders; one coded 110 cases, one 115, and the other 204).

It should be noted that all information extracted by coders was based on counts of incidents, placements, and interventions; recording of the presence and developmental persistence of events based on the wording in clinical assessment narratives; or the verbatim recording of different clinical indicators such as GAF scores. As interns in the host facility, the coders were thoroughly familiar with the structure and format of the clinical records and thus knew precisely where to look in each chart for the necessary information. Coders were not tasked with making qualitative inferences about youths' functioning or behavior, nor were they tasked with making judgments about whether information in clinical files was veridical to youths' actual lived experiences. Rather, they were instructed explicitly to focus only on information available in the charts. Coders also were in regular contact with the author to discuss issues arising during the coding process and maintain fidelity to the coding scheme, and met periodically with an expert clinical research consultant to problem-solve difficult case questions. Critical incident data were extracted from the facility's computerized database and provided directly by the facility's Chief Information Officer.

Results

Demographic Indicators

Following Jacobson et al. (2008), the sample was divided into groups based on their histories of deliberately self-harmful behavior: none reported ($n = 146$, 30.7%); self-directed aggression only, no suicide attempts noted (NSSI; $n = 119$, 25%); suicide attempts only, no other self-harm noted (SA; $n = 64$, 13.4%); and a combined group with both forms of deliberate self-harm noted (NSSI+SA; $n = 147$, 30.9%). The NSSI+SA group showed greater persistence over time of NSSI compared to the NSSI group ($t [264] = 2.03$, $p < .05$, $d = .250$). Table 1 shows the breakdown of these four groups by sex, average age, race/ethnicity status, and length of stay in treatment. Boys were overrepresented in the "none"

group ($\chi^2 [1] = 10.96, p < .01$), whereas girls were overrepresented in the NSSI+SA group ($\chi^2 [1] = 4.25, p < .05$). There were no significant group differences in age at admission. Racial/ethnic minority youth were overrepresented in the “none” group ($\chi^2 [1] = 13.26, p < .001$) and in the SA group ($\chi^2 [1] = 6.25, p < .05$). There were significant group differences in length of stay ($F [3,475] = 10.76, p < .001$); youth in the NSSI and NSSI+SA groups spent more time in treatment than did youth in the “none” and SA groups per post-hoc Tukey HSD comparisons (all pairwise $p < .01$). In all but the NSSI+SA group, youth were significantly more likely than not to *avoid* critical incidents during treatment (all $p < .05$); yet almost half of the youth in the NSSI+SA group were involved in at least one incident. However, the groups did not differ in mean times to first critical incident.

Variation in Treatment Variables as a Function of Deliberate Self-harm Group Status

As noted above the NSSI and NSSI+SA groups spent significantly more time in treatment than did the other two groups. Information on other variables recorded during treatment is presented in Table 2. Analyses of covariance (ANCOVA) were applied to control for the identified influence of sex and racial/ethnic minority status on group membership. In each analysis two sets of inferential tests were conducted beyond the omnibus F . First, single- df planned contrasts were used to test the hypothesis that the NSSI+SA group would produce higher scores on the outcome variables compared to the pooled NSSI and SA groups. Next, pairwise comparisons were computed to evaluate patterns of outcome across all four groups.

For analysis of critical incidents, an additional control variable linked to length of stay (LOS) also was included. LOS is a robust covariate of incident involvement during inpatient hospitalization given the reciprocal relation between LOS and incidents; that is, LOS might be the “cause” of greater incident involvement due to increased opportunity, it also can be the “effect” of incident involvement as discharges are delayed until extreme acting-out behaviors are under control (Boxer, 2007). Indeed, in the present analysis LOS and critical incidents involving self-harm were correlated significantly ($r = .43, p < .001$). To retain a meaningful indicator of LOS while reducing the potential suppression of effects accruing from this substantial covariation, the time in treatment covariate used here is time in days from admission to first incident. For youth with no incidents, this equated to total length of stay in days, and for youth with at least one incident this variable ranged from 0 to 184 days ($M = 23.77, SD = 35.32$). This indicator of time reduced the correlation between time and incident involvement substantially ($r = -.11, p < .05$; change in correlation also was significant at $p < .001$). Operationalizing time in this manner is similar conceptually to an event history analytic approach (e.g., Cox regression; Allison, 1984), but specifies time-to-incident as a static predictor rather than generating a time-varying and thus dynamic hazard rate (Boxer, 2007).

Omnibus F tests via ANCOVA revealed modest but statistically significant effects of group on critical incidents ($F [3,475] = 7.69, p < .001$, partial $\eta^2 = .05$) and special precautions ($F [3,475] = 3.79, p < .05$, partial $\eta^2 = .02$) but not behavior management plans ($F [3,475] = 2.04, p = .108$, partial $\eta^2 = .01$). For critical incidents, the planned single- df contrast supported the hypothesis of elevated in-treatment problem behaviors for the NSSI+SA group relative to the NSSI/SA groups, though this effect was quite modest ($F = 3.91, p = .049$, partial $\eta^2 = .01$). Pairwise comparisons suggested, however, similarities between the NSSI+SA and NSSI groups relative to the SA and no self-harm groups. The NSSI+SA and NSSI groups were involved in significantly more incidents than were the other two groups, but were not significantly different from one another. Planned contrasts and pairwise comparisons suggested different patterns for special precautions and behavior management plans. The SA group spent a significantly greater percentage of time on special precautions for self-harm than did the NSSI and no self-harm groups ($p < .05$) but not the NSSI+SA group. The NSSI+SA group was significantly different only from the no self-harm group.

For behavior management plans, the only significant ($p < .05$) contrast showed a pairwise difference between the elevated score of the NSSI+SA group relative to the no self-harm group.²

Variation in Background Risk Variables as a Function of Deliberate Self-harm Group Status

Table 3 shows descriptive data on the background risk variables by self-harm group. A similar analytic strategy as described above was applied to examine group differences in risk status (ANCOVA controlling sex and racial/ethnic minority status; single-*df* contrast plus pairwise comparisons). Note that in addition to scores reflecting the extent of various forms of maltreatment separately, Table 3 also includes a percentage reflecting the proportion of youth in each category who experienced any of the four types of maltreatment to any extent. This indicator has been proven robust in accounting for general mental health status (Boxer & Terranova, 2008) and was analyzed via χ^2 analysis.

With respect to the maltreatment indicators, omnibus *F* tests indicated significant groupwise variation for physical abuse ($F = 11.46, p < .001$, partial $\eta^2 = .07$), sexual abuse ($F = 7.93, p < .001$, partial $\eta^2 = .05$), emotional abuse ($F = 6.03, p < .001$, partial $\eta^2 = .04$), and neglect ($F = 3.20, p < .05$, partial $\eta^2 = .02$). The planned contrasts comparing the NSSI+SA group directly to the NSSI/SA groups were significant in the predicted direction for physical abuse ($F = 6.01, p = .015$, partial $\eta^2 = .01$) and sexual abuse ($F = 12.30, p = .000$, partial $\eta^2 = .03$). With the exception of sexual abuse, pairwise comparisons suggested a pattern of group differences aligning the NSSI+SA and NSSI groups more closely and at higher risk levels than the SA and no self-harm groups. This pattern was reflected in tests of the “any maltreatment” indicator across groups: any maltreatment was significantly more likely than not in the NSSI+SA ($p = .002$) and NSSI ($p = .001$) groups, whereas the reverse was observed for the SA ($p = .046$) and no self-harm groups ($p = .003$).

Significant group differences also were evident for two of the prior placement indicators, hospitalizations ($F = 8.10, p < .001$, partial $\eta^2 = .05$) and residential treatment ($F = 6.99, p < .001$, partial $\eta^2 = .04$). Single-*df* contrasts confirmed that the NSSI+SA group experienced significantly greater numbers of both types of placement in comparison to the NSSI/SA groups (hospitalizations: $F = 13.09, p = .000$, partial $\eta^2 = .03$; residential treatment: $F = 12.03, p = .001$, partial $\eta^2 = .03$). There was no significant group variation in foster placements and juvenile detention stays.

No significant group variation was observed in intake GAF scores or in family histories of mental illness. A group effect was found for family histories of criminality ($F = 6.32, p < .001$, partial $\eta^2 = .04$), although the planned single-*df* contrast was not significant. Pairwise tests revealed that the NSSI group had scores that were significantly elevated above all other groups ($ps = .000-.038$). The NSSI+SA group was significantly higher than the no self-harm group ($p = .021$), but not the SA group. Group variation also was evident for internalizing problems ($F = 3.92, p < .01$, partial $\eta^2 = .03$). Although the single-*df* contrast was not significant, pairwise comparisons showed that the no self-harm group had significantly lower scores than all three of the other groups ($p = .003-.039$). There were no group differences found for externalizing and critical problems.³

²Exploratory analyses of interaction effects (using $p < .05$) among sex, racial/ethnic status (white/nonwhite), and NSSI/SA grouping on treatment variables did not reveal any significant moderation by the demographic factors.

Discussion

In this study the clinical records of 476 youth admitted to a secure, public psychiatric inpatient facility were analyzed to examine differences among subgroups of inpatients with different configurations of deliberately self-harmful behavior in their histories. Following the grouping strategy of Jacobson et al. (2008), youth were classified with respect to histories of no self-harmful behavior, non-suicidal self-injury (NSSI) only, suicide attempts (SA) only, or NSSI and SA combined (NSSI+SA). Although analyses principally were exploratory, the directional hypothesis underlying inferential analyses proposed that NSSI+SA youth would show the greatest degree of pre-admission risk and in-treatment self-directed aggressive behavior. Although this expectation generally held, particularly in direct contrasts between the NSSI+SA group and the pooled NSSI and SA groups, another interesting pattern also was evident. That is, on several indicators, the NSSI and NSSI+SA groups seemed closely aligned by comparison to the SA and no self-harm groups. This study adds important evidence to the growing literature base examining the shared and nonshared features of NSSI and SA, especially in regard to refining current theory regarding the development and maintenance of NSSI. This study also underscores the utility of systematic efforts to extract and analyze “real world” data collected initially for routine clinical needs.

Across a number of indicators, youth with histories of NSSI and SA appeared to engage in the highest levels of self-directed aggressiveness during inpatient treatment, and to possess the greatest degree of pre-admission risk. The NSSI+SA group was most likely to be involved in at least one critical incident associated with deliberate self-harm during treatment, had experienced the highest level of sexual abuse, and had experienced the greatest number of prior hospitalizations and residential treatment placements. Interestingly, however, for some indicators, the NSSI+SA group was not differentiable statistically from the NSSI group. These two groups engaged in similarly elevated numbers of critical incidents during treatment, both significantly higher than the SA and no self-harm groups. The NSSI and NSSI+SA groups were equally likely to have experienced any kind of maltreatment, and showed similar histories of physical and emotional abuse and neglect. Despite these similarities, one important point of difference should be emphasized. Following Jacobson et al. (2008) and Nock et al. (2006), the NSSI+SA group had more extensive histories of NSSI even though the groups did not differ in ages of admission.

Findings regarding behavior during treatment are difficult to integrate into the existing literature base, because the majority of research on aversive behaviors emitted during inpatient psychiatric treatment has been focused largely on diagnostic and demographic predictors of aggressive incidents, broadly defined (see, e.g., Day, 2002). However, a study published by Vivona and colleagues (1995) based on a sample of 89 adolescent inpatients observed differences in rates of self-directed aggression during treatment as the function of caretaking history. Specifically, youth who had endured frequent disruptions in their primary

³Exploratory analyses of interaction effects among sex, racial/ethnic status (white/nonwhite), and NSSI/SA grouping on background risk variables suggested some qualification for the main effect analyses of NSSI/SA grouping. Sex by NSSI/SA grouping effects were observed for sexual abuse ($p < .05$, partial $\eta^2 = .02$) and DSMD internalizing problems ($p < .05$, partial $\eta^2 = .02$). With respect to sex, girls in the NSSI+SA group had the most extensive histories of sexual abuse, with scores significantly higher than the No-DSH and SA-only groups; there were no significant differences for boys. Boys in the SA-only group had the highest DSMD internalizing scores, with scores significantly higher than the No-DSH and NSSI-only groups; there were no significant differences for females (all $p < .05$).

With respect to race/ethnicity (i.e., minority status), minority status by NSSI/SA grouping effects were observed for emotional abuse ($p < .05$, partial $\eta^2 = .02$) and DSMD internalizing problems ($p < .05$, partial $\eta^2 = .03$). Nonwhites in the NSSI-only group had the most extensive histories of emotional abuse, with scores significantly higher than the No-DSH and SA-only groups. Nonwhites in the combined group also had significantly higher scores on emotional abuse than did the No-DSH group. There were no significant differences for whites. Whites in the SA-only group had the highest DSMD internalizing scores, scoring significantly higher than whites in the NSSI-only and No-DSH groups. Whites in the combined group scored significantly higher than did whites in the NSSI-only and No-DSH groups (all $p < .05$).

caretaker arrangement were more likely to engage in self-directed aggression during treatment. Interestingly, this was the only factor measured at intake that differentiated the forms of aggression exhibited during treatment. Otherwise, self- and other-directed aggressive incidents were predicted by histories of antisocial behavior, maltreatment, and foster care placements.

In the present study, youth in the NSSI and NSSI+SA groups had the highest numbers of incidents of self-directed aggression. This probably is a function of NSSI. As Nock (2009; see also Nock & Prinstein, 2004) has theorized, NSSI has both emotion and social functions: in the presence of extreme stress from aversive affective arousal, NSSI might provide internal relief, whereas in the presence of stress resulting from intense social demands, NSSI might serve to communicate personal needs. Nock's view of NSSI squares with the findings reported here, given the typical challenges and demands faced by adolescents housed in the very restrictive setting of secure inpatient treatment. The ability of adolescents in the inpatient population to cope constructively with those demands is undermined by their emotional and behavioral disturbance in addition to their relatively disadvantaged intellectual functioning and seeming unawareness regarding how to manage difficult situations (Boxer, Terranova, Savoy, Patel, & Armilla, 2007). Future studies might consider the extent to which inpatients rely on self-harmful gestures or behaviors to cope with difficult emotional or social situations during treatment.

However, there is also the potential for deliberately self-harmful behavior evidenced during treatment to indicate a certain degree of fearlessness or lack of concern for the consequences of aversive behavior. Theory by Nock (2009) and Joiner (2005) describes deliberately self-harmful behavior as part of a developmental process that enhances the individual's capacity for NSSI as well as SA. Nock et al. (2006) observed that inpatients who engaged in NSSI +SA reported relatively less pain in response to self-injury; Joiner et al. (2005) found that multiple prior SA predicted increasingly more lethal future SA behaviors. These ideas are consistent with contemporary developmental approaches to very severe antisocial behavior (see Frick, 2006), which in part consider the role played by trait-like callousness and unemotionality (i.e., "CU traits"; Frick, 2006) as key risk factors for engaging in severe aggressive acts. CU traits interfere with normal socialization mechanisms that inhibit aggression and promote prosocial responding (e.g., Oxford, Cavell, & Hughes, 2003); youth with CU traits also show less emotional reactivity and deficits in emotion processing (Kimonis, Frick, Muñoz, & Aucoin, 2008) that theoretically "allow" extreme, uninhibited aggressive acts. This parallels Nock's and Joiner's ideas of individual factors in youth who exhibit NSSI and SA that facilitate undercontrolled, uninhibited and self-directed harmful responding. Longitudinal studies examining these disinhibitory processes over time in high-risk adolescents might be revealing, particular with regard to investigating the temporal ordering of NSSI and SA given the proposition following Joiner's ideas that NSSI might serve as a precursor to SA.

The NSSI and NSSI+SA groups also showed similar patterns of maltreatment history. As with behavior during treatment, this observation suggests a specific role for NSSI and connects well to current theory on deliberately self-harmful behavior. A wealth of empirical evidence ties childhood maltreatment, particularly physical and sexual abuse, to adolescent NSSI and SA (King & Merchant, 2008). This relation appears largely due to two key factors. The first factor is the potential for childhood abuse to produce significant global psychopathology, especially internalizing difficulties (Salzinger, Rosario, Feldman, & Ng-Mak, 2007). The second factor is the potential for victims of abuse to habituate youth to pain and the anticipatory anxiety associated with pain (Joiner et al., 2007). NSSI and SA are hallmark behaviors of borderline personality syndrome (American Psychiatric Association, 2000; Jacobson et al., 2008), a clinical syndrome for which childhood maltreatment has

been shown to serve as a robust risk factor (e.g., Johnson, Cohen, Brown, Smailes, & Bernstein, 1999). Long-term studies on the development of borderline personality problems and associated NSSI and SA, investigating these mediating links, would be essential for refining the theorized developmental pathway from maltreatment to NSSI/SA.

Implications for Research, Policy, and Practice

A variety of specific suggestions for future research were noted above. However, some limitations to this study should be noted. First, given the number of inferential analyses performed, the risk of Type I error is possible and thus findings must be interpreted with some caution along these lines. This is especially the case for analyses examining sex and racial/ethnic status moderating effects, which were primarily exploratory in nature. Second, despite the prospective design of the current study with respect to examining in-treatment behavior, it is not possible to infer the temporal sequence of NSSI and SA. In terms of research on the development of deliberately self-harmful behavior, methodology permitting analysis of this sequence is critical for advancing theory.

Further, as mentioned earlier, data in this study were collected as part of a translational action research project in a “real world” psychiatric facility. Although this means certain limitations to the quality of the data (e.g., the coding scheme was applied *a posteriori*, to clinical record data generated by a mix of seasoned practitioners who did not rely on standardized protocols), these limitations probably are offset by the ecological validity of the design. Still, as noted by Jacobson et al. (2008), it continues to be important to assess characteristics (e.g., frequency, lethality, duration) of NSSI in detail in order to draw inferences regarding the severity and extent of the behavior as a clinical syndrome. Despite limitations, the findings reported here are consistent with findings reported in controlled studies with standardized measures and assessment activities. Researchers working in or in partnership with real-world clinical facilities should consider ways in which to maximize the utility of existing clinical data to study very high-risk behaviors.

With respect to practice and policy, it seems clear that major advances have been made in our understanding of the predictors of and processes inherent in NSSI and SA, and in recognizing that youth who display both forms of deliberately self-harmful behavior are most likely at greatest risk for serious self-injury. Effective treatments exist for NSSI and SA, particularly in the context of borderline personality features (e.g., intense emotional dysregulation, interpersonal problems). Linehan’s (1993) Dialectical Behavior Therapy is an empirically supported treatment model developed initially for adults that has shown utility for adolescents as well (Miller, Rathus, & Linehan, 2007; Spirito & Esposito-Smythers, 2008).

The current study in combination with previous similar work such as Jacobson et al.’s (2008) analysis clearly underlines the importance of determining whether youth presenting with histories of NSSI or SA have engaged in only one or both forms of those behaviors, and ascertaining whether these youth have experienced any forms of maltreatment. Surely these are more or less routine tasks for seasoned clinicians, but the evidence base at this point suggests that these components of assessment should be considered part of clinical training in assessment of adolescent psychopathology as well. Finally, given emerging developmental theory on deliberate self-harm (e.g., Nock, 2009), the present study provides additional evidence for the design of prevention efforts striving to provide targeted treatment to youth at their first signs of any sort of deliberately self-harmful behavior.

Acknowledgments

This study was funded by a grant from the National Institute of Mental Health (MH72980).

The author acknowledges the support provided at various phases of this project by Robert Bailey, James Bow, Joy Wolfe Ensor, Rashmi Bhandari, Ruth Robinson, Esther Petrovich, Elizabeth Rakstis, Vicki Alley, Dianne Tomaine, Judy Valentine, and Rowell Huesmann. Assistance with data coding was provided by Sara Chase, Jessica Luitjohan, Rebecca Gerhardstein, Sarah Savoy, and Andrew Terranova.

References

- Allison, PD. Event history analysis. Thousand Oaks, CA: Sage; 1984.
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. Text Revision. Washington DC: Author; 2000.
- Borges G, Angst J, Nock M, Ruscio A, Kessler R. Risk factors for the incidence and persistence of suicide-related outcomes: A 10-year follow-up study using the National Comorbidity Surveys. *Journal of Affective Disorders* 2008;105:25–33. [PubMed: 17507099]
- Boxer P. Aggression in very high-risk youth: Examining developmental risk in an inpatient psychiatric population. *American Journal of Orthopsychiatry* 2007;77:636–646. [PubMed: 18194044]
- Boxer, P.; Bhandari, RP.; Bow, JN. Exploration of factors predicting seclusion and restraint among child and adolescent psychiatric inpatients; Boston, MA. Poster presented at the annual meeting of the Association for the Advancement of Behavior Therapy; 2003 Nov.
- Boxer P, Terranova AM. Effects of multiple maltreatment experiences among psychiatrically hospitalized youth. *Child Abuse and Neglect* 2008;32:637–647. [PubMed: 18582936]
- Boxer, P.; Terranova, AM.; Savoy, SC.; Patel, K.; Armilla, B. Problem identification, treatment suggestions, and aggression in inpatient youth; Philadelphia, PA. Poster presented at the annual meeting of the Association of Behavioral and Cognitive Therapy; 2007 Nov.
- Centers for Disease Control and Prevention (CDC). Youth Risk Behavior Surveillance-United States, 2007. Morbidity and Mortality Weekly Report 2008 June 6;57
- Comtois, K.; Linehan, MM. Lifetime Parasuicide Count: Description and Psychometrics; Houston, TX. Paper presented at the 32nd annual meeting of the American Association of Suicidology; 1999 Apr.
- Day DM. Examining the therapeutic utility of restraints and seclusion with children and youth: The role of theory and research in practice. *American Journal of Orthopsychiatry* 2002;72:266–278. [PubMed: 15792066]
- Dubow EF, Kausch DF, Blum MC, Reed J, Bush E. Correlates of suicidal ideation and attempts in a community sample of junior high and high school students. *Journal of Clinical Child Psychology* 1989;18:158–166.
- Frick PJ. Developmental pathways to conduct disorder. *Child and Adolescent Psychiatric Clinics of North America* 2006;15:311–331. [PubMed: 16527658]
- Guertin T, Lloyd-Richardson E, Spirito A, Donaldson D, Boergers J. Self-mutilative behavior in adolescents who attempt suicide by overdose. *Journal of the American Academy of Child and Adolescent Psychiatry* 2001;40:1062–1069. [PubMed: 11556630]
- Hooley JM. Self-harming behavior: Introduction to the special series on non-suicidal self-injury and suicide. *Applied and Preventive Psychology* 2008;12:155–158.
- Jacobson CM, Muehlenkamp JJ, Miller AL, Turner JB. Psychiatric impairment among adolescents engaging in different types of deliberate self harm. *Journal of Clinical Child and Adolescent Psychology* 2008;37:363–375. [PubMed: 18470773]
- Johnson JG, Cohen P, Brown J, Smailes EM, Bernstein DP. Childhood maltreatment increases risk for personality disorders during early adulthood. *Archives of General Psychiatry* 1999;56:600–606. [PubMed: 10401504]
- Joiner, TE. Why people die by suicide. Cambridge, MA: Harvard University Press; 2005.
- Joiner TE, Conwell Y, Fitzpatrick KK, Witte TK, Schmidt NB, Berlim MT, et al. Four studies on how past and current suicidality relate even when “everything but the kitchen sink” is covaried. *Journal of Abnormal Psychology* 2005;114:291–303. [PubMed: 15869359]
- Joiner TE, Sachs-Ericsson NJ, Wingate LR, Brown JS, Anestis MD, Selby EA. Childhood physical and sexual abuse and lifetime number of suicide attempts: A persistent and theoretically important relationship. *Behaviour Research and Therapy* 2007;45:539–547. [PubMed: 16765909]

- Kimonis ER, Frick PJ, Muñoz LC, Aucoin KJ. Callous-unemotional traits and the emotional processing of distress cues in detained boys: Testing the moderating role of aggression, exposure to community violence, and histories of abuse. *Development and Psychopathology* 2008;20:569–589. [PubMed: 18423095]
- King CA, Merchant CR. Social and interpersonal factors relating to adolescent suicidality: A review of the literature. *Archives of Suicide Research* 2008;12:181–196. [PubMed: 18576200]
- Linehan, MM. Cognitive-behavioral treatment of borderline personality disorder. New York: Guilford; 1993.
- Miller, AL.; Rathus, JH.; Linehan, MM. Dialectical behavior therapy with suicidal adolescents. New York: Guilford Press; 2007.
- Muehlenkamp JJ. Self-injurious behavior as a separate clinical syndrome. *American Journal of Orthopsychiatry* 2005;75:1–10.
- Muehlenkamp JJ, Gutierrez PM. An investigation of differences between self-injurious behavior and suicide attempts in a sample of adolescents. *Suicide and Life-Threatening Behavior* 2004;34:12–23. [PubMed: 15106884]
- Muehlenkamp JJ, Gutierrez PM. Risk for suicide attempts among adolescents who engage in non-suicidal self-injury. *Archives of Suicide Research* 2007;11:69–82. [PubMed: 17178643]
- Naglieri, JA.; LeBuffe, PA.; Pfeiffer, SI. Devereaux Scales of Mental Disorders. San Antonio, TX: The Psychological Corporation; 1994.
- Nock MK. Why do people hurt themselves? New insights into the nature and functions of self-injury. *Current Directions in Psychological Science* 2009;18:78–83. [PubMed: 20161092]
- Nock MK, Joiner TE, Gordon K, Lloyd-Richardson E, Prinstein MJ. Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. *Psychiatry Research* 2006;144:65–72. [PubMed: 16887199]
- Nock M, Kessler R. Prevalence of and Risk Factors for Suicide Attempts Versus Suicide Gestures: Analysis of the National Comorbidity Survey. *Journal of Abnormal Psychology* 2006;115:616–623. [PubMed: 16866602]
- Nock MK, Prinstein MJ. A functional approach to the assessment of self-mutilative behavior in adolescents. *Journal of Consulting and Clinical Psychology* 2004;72:885–890. [PubMed: 15482046]
- Oxford MC, Cavell TA, Hughes JN. Callous/unemotional traits moderate the relation between ineffective parenting and child externalizing problems: A partial replication and extension. *Journal of Clinical Child and Adolescent Psychology* 2003;32:577–585. [PubMed: 14710466]
- Prinstein MJ, Nock MK, Simon V, Aikins JW, Cheah CSL, Spirito A. Longitudinal trajectories and predictors of adolescent suicidal ideation and attempts following inpatient hospitalization. *Journal of Consulting and Clinical Psychology* 2008;76:92–103. [PubMed: 18229987]
- Ross S, Heath N. A study of the frequency of self-mutilation in a community sample of adolescents. *Journal of Youth and Adolescence* 2002;31:67–77.
- Salzinger S, Rosario M, Fledman RS, Ng-Mak D. Adolescent suicidal behavior: Associations with preadolescent physical abuse and selected risk and protective factors. *Journal of the American Academy of Child and Adolescent Psychiatry* 2007;46:859–866. [PubMed: 17581450]
- Shaffer D, Pfeffer C. Practice parameters for the assessment and treatment of children and adolescents with suicidal behavior. *Journal of the American Academy of Child and Adolescent Psychiatry* 2001;40 (suppl. 7):245–515.
- Söderberg P, Tungström S, Armelius BA. Reliability of Global Assessment of Functioning ratings made by clinical psychiatric staff. *Psychiatric Services* 2005;56:434–438. [PubMed: 15812093]
- Spirito, A.; Esposito-Smythers, C. Evidence-based therapies for adolescent suicidal behavior. In: Steele, R.; Roberts, M.; Elkin, TD., editors. *Handbook of evidence-based therapies for children and adolescents*. New York: Sage; 2008. p. 177-194.
- Vivona JM, Ecker B, Halgin RP, Cates D, Garrison WT, Friedman M. Self- and other-directed aggression in child and adolescent psychiatric inpatients. *Journal of the American Academy of Child and Adolescent Psychiatry* 1995;34:434–444. [PubMed: 7751257]

Table 1

Demographic Characteristics

Demographic indicators	None (n = 146)	NSSI (n = 119)	SA (n = 64)	NSSI+SA (n =147)
Sex				
Male	93 (64%)	65 (55%)	33 (52%)	61 (42%)
Female	53 (36%)	54 (45%)	31 (48%)	86 (58%)
Age at admission	14.04 (2.1)	13.62 (2.2)	13.66 (2.1)	14.1 (2.0)
Race/ethnicity				
Black/African-American	85 (58%)	48 (40%)	34 (53%)	49 (33%)
White	51 (35%)	59 (50%)	22 (34%)	77 (52%)
Hispanic/Latino/a	2 (1%)	2 (2%)	2 (3%)	6 (4%)
Other	8 (6%)	10 (8%)	6 (9%)	15 (11%)
Length of stay (days)	68.27 (99.3)	118.49 (134.3)	51.92 (64.9)	124.41 (124.3)
Any critical incident	33%	39%	22%	46%
Time to first incident (days)	36.97 (60.3)	45.91 (61.5)	31.63 (34.7)	47.39 (61.7)

Note. NSSI = non-suicidal self-injury only; SA = suicide attempts only; NSSI+SA = combined – both NSSI and SA.

Table 2

Group Differences on Treatment Indicators

Treatment indicators	None (n = 146)	NSSI (n = 119)	SA (n = 64)	NSSI+SA (n = 147)
Critical incidents	.23 (1.1)	1.33 (3.9)	.41 (1.4)	1.44 (4.2)
Special precautions	.21 (.3)	.25 (.3)	.34 (.3)	.28 (.3)
Behavior management plans	.01 (.1)	.03 (.1)	.02 (.1)	.04 (.2)

Note. NSSI = non-suicidal self-injury only; SA = suicide attempts only; NSSI+SA = combined – both NSSI and SA. Raw means are presented; log-transformed scores were used in inferential analysis.

Table 3**Group Differences in Background Risk Indicators**

Risk indicators	None (n = 146)	NSSI (n = 119)	SA (n = 64)	NSSI+SA (n = 147)
Maltreatment				
Physical abuse	.29 (.6)	.70 (.9)	.34 (.7)	.72 (.9)
Sexual abuse	.17 (.5)	.34 (.7)	.30 (.7)	.62 (.9)
Emotional abuse	.20 (.6)	.48 (.8)	.25 (.6)	.51 (.8)
Neglect	.36 (.7)	.59 (.9)	.47 (.9)	.57 (.9)
Any maltreatment	37.7%	64.7%	37.5%	62.6%
Prior out-of-home placements				
Hospitalization	1.66 (2.0)	2.20 (2.4)	1.95 (2.5)	3.16 (3.2)
Residential treatment	.49 (1.0)	.84 (1.8)	.34 (.7)	1.22 (2.1)
Foster care	.55 (1.5)	.85 (2.4)	.55 (1.1)	.97 (2.2)
Juvenile detentions	.19 (.6)	.39 (1.3)	.31 (.6)	.51 (1.2)
GAF score at intake	24.2 (5.5)	23.61 (4.6)	24.29 (4.3)	23.85 (4.7)
Family hx of mental illness	1.32 (.9)	1.60 (.7)	1.34 (.8)	1.43 (.8)
Family hx of criminality	.40 (.8)	.87 (1.0)	.59 (.9)	.64 (.9)
Psychopathology				
DSMD-internalizing	72.25 (14.8)	77.14 (12.9)	79.49 (15.6)	78.22 (14.8)
DSMD-externalizing	72.85 (13.9)	75.88 (14.4)	78.45 (15.8)	75.34 (15.8)
DSMD-critical problems	72.09 (16.7)	75.77 (15.5)	76.88 (17.9)	75.87 (16.3)

Note. NSSI = non-suicidal self-injury only; SA = suicide attempts only; NSSI+SA = combined – both NSSI and SA. Raw means are presented. GAF = Global Assessment of Functioning; hx = history; DSMD = Devereaux Scales of Mental Disorders.