

Characteristics and Co-occurrence of Adolescent Non-Suicidal Self-Injury and Suicidal Behaviours in Pediatric Emergency Crisis Services

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Abstract During the potentially tumultuous adolescent period, non-suicidal self-injury (NSSI) and suicide attempts are relatively common, particularly amongst youth who present to mental health services. These phenomena frequently co-occur but their relationship is unclear. This study evaluated clinical data from 468 youth between the ages of 12 and 17 years (63.5% female) to determine the incidence of NSSI 24 h prior to presentation at emergency crisis services, evaluated the overlap between NSSI and suicide attempt, and examined the characteristics of different types of self-harm. Half of the adolescents presenting to emergency crisis services had self-harmed within the previous 24 h, with most of these (91%) classified as NSSI only. The percentage of youth with a suicide attempt was 5% and the co-occurrence of these two behaviours was 4%. Group differences in depressive symptoms, suicidal ideation and impulsivity were identified, with the co-occurring NSSI and

suicide attempt group presenting with the highest level of psychopathology. This study underscores the necessity of assessing suicidal ideation and NSSI in all youth presenting to mental health services.

Keywords Adolescents · Non-suicidal self-injury · Suicide · Emergency crisis services

Introduction

Non-suicidal self-injury (NSSI) is the purposeful and repetitive destruction of body tissue without conscious lethal intent, using methods not socially sanctioned (Favazza 1998; Jacobson et al. 2008; Muehlenkamp and Gutierrez 2004; Nock and Kessler 2006). Rates of NSSI in adolescence range between 14 and 40% in community populations and from 38 to 67% in psychiatric inpatient samples, suggesting that NSSI is a significant issue for youth (Heath et al. 2008; Muehlenkamp and Gutierrez 2004; Nixon et al. 2002; Nixon et al. 2008; Ross and Heath 2002). Of additional concern is the demonstrated relationship between NSSI and suicidal behaviours, including both completed and attempted suicides (Lofthouse et al. 2008; Nock and Kessler 2006; Whitlock and Knox 2007). Completed suicides, suicide attempts, and NSSI can all be grouped under the larger umbrella term of deliberate self-harm behaviours (DSH), as will be done throughout the remainder of this article.

Although research has shown that NSSI and suicide attempts frequently co-occur, the nature of their relationship is greatly debated (Jacobson et al. 2008; Laye-Gindhu and Schonert-Reischl 2005; Lloyd-Richardson et al. 2007; Lofthouse et al. 2008). Stemming from the shared risk factors associated with attempted suicide and NSSI, some

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experts claim that these constructs exist on a continuum of self-harm, where suicide is the final and most severe point of the spectrum. Such risk factors include but are not limited to childhood sexual abuse, depression, interpersonal and family conflicts, isolation and loneliness, impulsivity, and having a psychiatric diagnosis (Maris et al. 2000; Walsh 2006). Substantial research also corroborates the conceptualization of NSSI and suicide attempts as distinct concepts, indicated by differences found between adolescent suicide attempters and self-injurers in both severity and symptomatology of depression, in reported suicidal ideation, and in attitudes towards life (Muehlenkamp 2005; Muehlenkamp and Gutierrez 2004). Differences between suicide attempters and non-suicidal self-injurers have also been identified regarding the behaviour's intent and lethality, the methods used and the chronicity of self-harming behaviour, as well as the underlying cognitions and prevalence rates of the behaviours in both adolescent and adult samples (Nock and Kessler 2006; Walsh 2006). Research has failed to identify a clear association between occurrence of NSSI and number of lifetime suicide attempts, though using multiple self-injurious methods and engaging in the behaviour for longer periods of time have both been related to a higher number of lifetime suicide attempts (Nock et al. 2006; Whitlock et al. 2008). As such, additional research concerning the relations between NSSI and attempted suicide is needed.

Despite the complex interactions between attempted suicide and NSSI, research investigating the co-occurrence of the behaviours is limited to date. As indicated by Stanley et al. (2001), adults with a history of both attempted suicide and NSSI report more depression, hopelessness, aggressiveness, anxiety and impulsiveness than suicide attempters with no history of NSSI; individuals who have both attempted suicide and engaged in NSSI reported higher suicidal ideation than those who had only attempted suicide. However, Stanley's sample was comprised of adult female patients diagnosed with borderline personality disorder, limiting the generalizability of results to adolescent, non-psychiatric, co-ed populations. Similarly, Guertin et al. (2001) found that adolescent psychiatric outpatients who had attempted suicide and engaged in NSSI reported higher depression, loneliness, anger and risk-taking behaviours than adolescent outpatients who had attempted suicide with no history of NSSI. Further, youth reporting both NSSI and suicide attempts in this sample were more likely to have a psychiatric diagnosis of depression, dysthymia or oppositional defiant disorder. Although these investigations provide important descriptive information regarding NSSI and suicide attempting individuals, they fail to address fully the co-occurrence of these behaviours. Additional investigations comparing individuals reporting only NSSI or suicide attempt and those not engaging in any type of self-harm are

required to further characterize individuals displaying these behaviours.

To date, only two studies have addressed such distinctions between adolescents with no self-harm, with NSSI only, with suicide attempts only, and with both NSSI and suicide attempt. Muehlenkamp and Gutierrez (2007) sampled 540 American high school students, contrasting depressive symptoms, suicidal ideation, and reasons for living between the four groups. Adolescents with no history of self-harming behaviours reported less depression and suicidal ideation, and more reasons for living than all three deliberate self-harm groups (suicide attempt only, NSSI only, NSSI and suicide attempt). Individuals endorsing both NSSI and suicide attempt reported more depression and suicidal ideation, and fewer reasons for living than those only engaging in NSSI. Participants who endorsed only NSSI and those engaging in both NSSI and suicide attempts did not differ on these constructs from those who solely attempted suicide, explained as resulting from the small sample of suicide attempters ($n = 10$). Another recent study examined the clinical diagnoses, levels of suicidal ideation and severity of depressive symptoms in 227 adolescent outpatients at an American hospital setting (Jacobson et al. 2008). Results suggested that individuals who both attempted suicide and engaged in NSSI had self-injured for longer periods of time than those in the other groups. Additionally, individuals who attempted suicide and engaged in NSSI were more likely to have a psychiatric diagnosis such as major depression or post-traumatic stress disorder; the only psychiatric diagnosis related to NSSI alone was borderline personality disorder. Lastly, engaging in only NSSI was associated with rates of suicide ideation and depression similar to individuals reporting no self-harming behaviours as opposed to those who had attempted suicide with or without endorsing NSSI, suggesting that patients' reasons for engaging in NSSI differed from motivations for attempting suicide. Further investigation is necessary to verify results from these studies, to clarify the relationships between types of deliberate self-harm, and to more accurately describe the characteristics of individuals in each of the four categories.

Objectives and Hypotheses

The present study had three main objectives. The first objective was to determine the incidence of NSSI among youth presenting to ED crisis services. The second objective was to investigate the co-occurrence of NSSI and attempted suicide within this sample of youth. Finally, our third objective sought to evaluate differences between groups engaging in various self-harming behaviours in

demographic characteristics, clinical characteristics using both self-report and clinician ratings, and in mental health service needs. It was hypothesized that the percentage of youth reporting NSSI will resemble that reported in past research using clinical samples but will be lower than studies reporting lifetime rates. It was also expected that the combined group of self-injuring and suicide attempting patients will present with the highest level of clinical symptomatology followed by the suicide attempt group, the NSSI group and the noDSH group.

The current study offers several contributions to existing literature regarding co-occurrence of attempted suicide and NSSI. Previous research has assessed either lifetime rates of NSSI and suicide attempts or the rates of these behaviours throughout the previous year (e.g. Jacobson et al. 2008; Nock et al. 2006; Whitlock and Knox 2007), while less is known about current self-harming behaviours (Lofthouse and Yager-Schweller 2009). Additionally, the majority of prior research has investigated NSSI and attempted suicide in inpatient, outpatient, or community samples of adolescents. Although some investigations have previously addressed NSSI in emergency department (ED) settings (e.g. Bennewith et al. 2005; Bergen and Hawton 2007; Harris et al. 2005), a contrast of correlates specifically associated with either the co-occurrence of suicide attempts and NSSI or the endorsement of one of the behaviours alone was not an objective laid out in these studies. To compensate for the limitations listed above, the present study investigates current deliberate self-harm behaviours of adolescents presenting to a hospital's ED crisis services. This research incorporates both self-reported and clinician rated NSSI and suicide attempts occurring in the 24 h prior to hospital presentation. Recent research on self-harm (Lilly et al. 2008) has demonstrated that those assessed with self injury in an ED have high rates of repetition and a third of those switch methods of self-harm. Clinically, this study is important as the results may have implications for how youth with NSSI are assessed and followed when presenting to emergency services.

Method

Design

The data from this cohort study was drawn from an ongoing clinical database which contains both demographic and clinical data and represents secondary use of clinical data.

Participants

There were 11,642 youth between the ages of 12 and 17 who presented to the hospital's ED between April 2005 and April

2006. Of these, 498 (4.3%) were directed to emergency crisis services and therefore eligible for inclusion in this research. Thirty cases were omitted due to missing data, leaving 468 participants for data analyses; eliminated cases did not differ significantly from those included on any key variables. The majority of the sample was female (63.5%) with an overall sample mean age of 14.81 years ($SD = 1.49$). The majority (84.8%) of included cases represented first time visits to emergency crisis services, while the remaining 15.2% had used these services at least once prior to April 2005. Only data from each patient's first emergency crisis service visit during the selected time frame were included in analyses.

Measures

Non-Suicidal Self-Injury

NSSI was measured using the *Childhood Acuity of Psychiatric Illness* (CAPI; Lyons 1998). This tool is a clinician rated measure of acute risk behaviours (including items measuring Suicidal Ideation or Gesture, Self-Mutilation Behaviour, Aggressive Behaviour Toward People, Aggressive Behaviour Toward Objects) and psychiatric symptoms (Impulsivity, Reality Assessment, Non-Compliance, Depression, Anxiety, Sleep Disruption, Activity Level and Sexualized Behaviour) of youth aged 5–18 years based on the previous 24-h time frame. Inter-rater reliability (.78–.85) and internal consistency for the total scale score (.87) have both been demonstrated (Lyons 1998). Concurrent validity is evident through correlations between total CAPI scores and total CBCL scores (.73) and the Global Assessment of Functioning (–.28). All clinician raters for the present study received training on the CAPI and obtained a required minimum reliability of .70 on a test vignette compared to recommended ratings before using the measure to assess patients.

The Self-Mutilation item of the CAPI was used to indicate the presence of NSSI behaviour in the 24 h prior to ED presentation. Crisis Workers rated the degree of NSSI engaged in based on information obtained from intake interviews. Occurrence of NSSI was rated on a 4-point scale, ranging from 0 to 3, with scores signifying no self-injury (0-none), mild evidence of self-injury, including nails often bleeding or cuts prevented from healing (1-mild), repeated self-injury that may have required first aid or a few stitches (2-moderate), or significant head banging, self-biting, or self-cutting that risks significant medical consequences (3-severe).

Suicide Attempts

The occurrence of attempted suicide was assessed by Crisis Workers based on the perceived presence or absence of the behaviour in the 24 h preceding presentation to emergency

crisis services. Following a detailed intake interview, Crisis Workers recorded whether a suicide attempt had occurred as well as the method used for the attempt. This information was used in collaboration with the assessment of NSSI in categorizing individuals into the self-harm groups as explained below. (Note that the Suicidal Ideation or Gesture item from the CAPI was not used as categorizing criteria because the item does not distinguish between gesture and ideation).

Risk Behaviours and Psychiatric Symptoms

The CAPI was used to assess risk behaviours and psychiatric symptoms, which indicates areas in which patients may require a greater need for mental health services. As described for the Self-Mutilation item above, ratings for each item are made on a 4-point scale, ranging from 0 to 3 corresponding to intensity (none, mild, moderate, severe) following a coding manual with a description for each level of each item. The ratings on the CAPI items also correspond to action levels: (0) no evidence—there is no need for action; (1) watchful waiting/prevention—this need should be monitored, or efforts to prevent it from returning or getting worse should be initiated; (2) action—an intervention is required because the need is interfering in some notable way with the individual's, family's or community's functioning; and (3) immediate/intensive action—this need is either dangerous or disabling. Therefore, a score of a 2 or 3 would indicate a need for service.

Depressive Symptoms

The *Childhood Depression Inventory* (CDI; Kovacs 1992) is a self-report measure of depressive symptoms for children and youth between 7 and 17 years of age. Test–retest reliability ratings are acceptable but vary depending on the length of time between assessments (.82 at 2 weeks; .74 to .83 at 3 weeks; see Kovacs 1992). Internal consistency has been demonstrated in various samples with reliability coefficients ranging from .71 to .89. Concurrent validity has been shown through strong correlations with related constructs. The measure also demonstrates good explanatory and predictive value (Kovacs 1992).

Demographic and Clinical Characteristics

These descriptive items were drawn from an ongoing clinical database created and used by the crisis intervention team using a standardized data collection sheet.

Procedures

The present study addressed retrospective data collected on an ongoing basis from the institution's ED crisis services.

All patients presenting to this service were seen by a Crisis Worker or an ED physician when no Crisis Worker was available, or if the presenting patient required medical stabilization prior to mental health assessment; patients were subsequently seen by an on-call psychiatrist if necessary. During assessment, Crisis Workers conducted an intake interview with all patients and administered a standard battery of psychometric measures (including the CAPI and CDI). Although detailed socioeconomic and racial information were not collected, this hospital setting serves a population of 1,100,300, with 10.8% of patients from low-income families, and 13.1% from visible minorities (Champlain LHIN 2006). Data collection and research protocol were reviewed and approved by the institution's Research Ethics Board.

Eligible patients were divided into four groups, based on the categories used in previous research (see Jacobson et al. 2008; Muehlenkamp and Gutierrez 2007). Group membership was assigned by the following: first, the occurrence of suicide attempt was indicated by the Crisis Worker upon presentation to emergency crisis services; second, clinician ratings on the CAPI's Self-Mutilation Behaviour item of 1 or more were used to indicate the occurrence of NSSI in the previous 24 h. The resulting groups were: no deliberate self-harm group (in which neither suicide attempt nor NSSI occurred; $n = 234$), suicide attempt only group (in which a suicide attempt had occurred but NSSI had not; $n = 22$), NSSI only group (in which no suicide attempt had occurred but NSSI had occurred; $n = 193$), and combined suicide attempt and NSSI group (in which both suicide attempt and NSSI had occurred; $n = 19$).

Data Analysis

Data were analyzed using SPSS version 16.0. Chi-square, t -test, and one-way ANOVA analyses were conducted for comparisons of relevant demographic and clinical characteristics between the four groups, and between the overall groupings of DSH (formed by collapsing the three groups endorsing suicide attempt or NSSI or both) and noDSH. Additional chi-squares were run to compare the four groups on the collapsed CAPI ratings of low and high risk. Specifically, CAPI item ratings were grouped into *high* (rating of 2 or 3), indicating moderate to severe evidence of the behaviour or symptom and a need for services and *low* (rating of 0 or 1), indicating no or mild evidence of the behaviour or symptom and no need for services. ANCOVA analyses were used to compare mean t -scores on the CDI across the groups of no DSH, NSSI only, suicide attempt only, and co-occurring suicide attempt and NSSI, as well as by the overall DSH and noDSH groups; sex and age were included as covariates on all appropriate analyses. All tests were two-tailed.

Results

Incidence and Co-occurrence of NSSI and Suicide Attempts

Based on clinician ratings on the CAPI’s Self-Mutilation item, 212 patients (45.3%) had engaged in NSSI in the 24 h prior to arrival at ED crisis services. Mild evidence of self-injury (CAPI score of 1), including cuts prevented from healing or nails often bleeding, was present in 62.3% of self-injuring patients; repeated self-injury that may have required first aid or a few stitches (CAPI score of 2) was present in 34.9% of these patients; significant head banging, self-biting, or self-cutting that risks significant medical consequences (CAPI score of 3) was present in 2.8% of self-injurers. Analysis of clinicians’ report of suicide attempts identified 47 patients (9.4%) as presenting to ED crisis services due to an attempted suicide. Ingestion was most frequently identified as method used for the suicide attempt (70.7%), followed by hanging/strangulation (19.5%). Other reported suicide attempt methods included gun use (4.9%), running into traffic (2.4%), and cutting (2.4%). Based on these data, half of all participants ($n = 234$) were assigned to the noDSH group, and half ($n = 234$) to the DSH group. Of those in the overall DSH group, 193 (91.2%) were in the NSSI only category, 22 (4.7%) were in the suicide attempt

only group, and 19 (4.1%) comprised the co-occurring suicide attempt and NSSI group.

Demographic and Mental Health Service Variables

A series of chi-square and one-way ANOVAs assessed group differences in demographic and clinical characteristics. Analyses were run across the four groups, and across the two broader categories of DSH and noDSH (see Table 1). A sex difference was found for group membership, with more females than males exhibiting DSH. A one-way ANOVA between group and age revealed that age varied significantly between groups ($F(3,464) = 2.85, p < .05$); post-hoc Tukey’s tests showed that adolescents in the suicide attempt only group were significantly older than those in the NSSI only group (Tukey’s HSD = $-.91, p < .05$). Patients in the suicide attempt only group more often came from intact families, required medical attention, were taking psychotropic medications, and had more previous psychiatric admissions compared to the other groups. More individuals in the co-occurring suicide attempt and NSSI group had a history of involvement with a child and youth protection agency (Children’s Aid Society; CAS), were currently in counselling, and were subsequently admitted to the hospital’s Inpatient Psychiatric Unit as a result of their ED crisis service visit.

Table 1 Group differences of demographic and clinical characteristics across DSH groups

Demographic	DSH ^a n(%)	NoDSH ^b n(%)	χ^2 ^f	NSSI ^c n(%)	SA ^d n(%)	SA+NSSI ^e n(%)	χ^2 ^g
Age	14.74(1.34)	14.88(1.63)	.92	14.64(1.36)	15.55(1.30)	14.89(.94)	2.85*
Sex							
Male	53(22.6)	118(50.4)	38.93***	40(20.7)	9(40.9)	4(21.1)	42.43***
Female	181(77.4)	116(49.6)		153(79.3)	13(59.1)	15(78.9)	
Family intact	83(35.6)	111(47.8)	7.14**	65(33.9)	12(54.5)	6(31.6)	10.76*
CAS involved	66(28.4)	38(16.3)	9.87**	50(26.2)	7(31.8)	9(47.4)	14.49**
History of abuse	54(23.2)	48(20.7)	.42	46(24.0)	2(9.1)	6(31.6)	–
Current substance abuse	63(27.0)	51(21.9)	1.67	54(28.1)	6(27.3)	3(15.8)	3.10
Current counselling	114(48.9)	81(34.8)	9.60**	89(46.4)	10(45.5)	15(78.9)	17.27**
Current psychotropic meds	81(44.3)	50(30.7)	7.07**	62(40.5)	12(75.0)	7(50.0)	14.62**
Medical attention required	53(22.6)	32(13.7)	6.23**	29(15.0)	15(68.2)	9(47.4)	52.2***
Repeat ED visits	42(17.9)	29(12.4)	2.81	35(18.1)	2(9.1)	5(26.3)	–
Previous psychiatric admission	51(21.9)	21(9.0)	14.78***	38(19.8)	7(31.8)	6(31.6)	18.46***
Patient admitted	56(24.1)	33(14.1)	7.59**	40(20.9)	8(36.4)	8(42.1)	14.95**

Age lists M (SD), F . NoDSH no deliberate self-harm group, DSH all deliberate self-harm groups combined, NSSI non-suicidal self-injury only group, SA suicide attempt only group, SA+NSSI non-suicidal self-injury and suicide attempt group

^a $n = 234$, ^b $n = 234$, ^c $n = 193$, ^d $n = 22$, ^e $n = 19$, ^f χ^2 statistic for comparison between noDSH and DSH groups, ^g χ^2 statistic for comparison between noDSH, NSSI, SA, and NSSI+SA groups

– Unable to compute χ^2 as at least 25% of cells have expected count <5

* $p < .05$, ** $p < .01$, *** $p < .001$

Group Differences on Clinical Measures

An ANCOVA was used to analyze differences in CDI total t -scores between noDSH and DSH groups, controlling for sex and age. A significant main effect was found for group membership ($F(1,360) = 32.89, p < .001, \text{partial } \eta^2 = .08$), with those in the DSH group scoring significantly higher on the CDI (Marginal $M = 78.12, SE = 1.06$) than those in the noDSH group (Marginal $M = 69.27, SE = 1.11$). A further ANCOVA was performed to determine group differences by type of DSH for CDI total t -scores, while controlling for sex and age effects. A significant main effect was found for group membership ($F(3,358) = 11.61, p < .001, \text{partial } \eta^2 = .09$). Post-hoc pairwise comparisons with Bonferroni adjustment showed the noDSH group had lower CDI scores (Marginal $M = 69.24, SE = 1.11$) than both the NSSI (Marginal $M = 78.56, SE = 1.17$; Mean Difference = $-9.31, p < .001$) and co-occurring suicide attempt and NSSI groups (Marginal $M = 79.41, SE = 3.48$; Mean Difference = $-10.17, p < .05$), but not the suicide attempt only group (Marginal $M = 73.03, SE = 3.49$; Mean Difference = $-3.78, p = 1.00$).

Chi-square analyses examined group differences in identified severity and need for service ratings on CAPI risky behaviours and symptoms items. Ratings differed between the four DSH groups on Suicidal Ideation, Impulsivity and Depression. The overall categories of DSH and noDSH differed in need for service concerning Suicidal Ideation, Aggressive Towards People, Aggressive Towards Objects, Depression, and Anxiety (see Tables 2, 3).

Discussion

Of adolescent patients seen by Crisis Workers, 45.3% reported engaging in NSSI in the 24 h prior to arriving at emergency crisis services. This percentage of NSSI resembles those reported in past research using clinical samples (Heath et al. 2008). Lifetime prevalence of NSSI in this population is likely even higher than the observed proportion of recent NSSI in this study as previous self-injury, occurring outside of the 24 h prior to admission, was not captured. It is not surprising that the percentages of youth reporting NSSI are similar between this ED crisis services sample and clinical samples because both populations represent individuals requiring psychiatric or psychological assistance for a mental health issue. Given that adolescents with psychiatric diagnoses and mental health issues are at increased risk for NSSI (Jacobson and Gould 2007; Muehlenkamp 2005), it follows that the occurrence of NSSI would be high in the current sample. Although the numbers of youth reporting only NSSI bears resemblance to previous clinical samples, there are sufficient differences from both clinical and community populations to justify further research using ED populations of youth.

Comparing the study findings to other research using the broader definition of DSH, we note that exactly half of participants exhibited DSH in the 24 h prior to admission, while the other half did not. These proportions are also similar to those identified in past research using clinical samples (e.g. DSH: 48%, noDSH: 52%; Jacobson et al. 2008) but differ slightly from previous investigations of

Table 2 Frequencies and group differences in high vs. low CAPI risky behaviour ratings

Risk behaviours	DSH ^a n(%)	NoDSH ^b n(%)	χ^2 ^f	NSSI ^c n(%)	SA ^d n(%)	SA+NSSI ^e n(%)	χ^2 ^g
Suicidal ideation or gesture							
Low	131(56.0)	188(80.3)	31.99***	119(61.7)	7(31.8)	5(26.3)	48.48***
High	103(44.0)	46 (19.7)		74(38.3)	15(68.2)	14(73.7)	
Aggressive towards people							
Low	190(81.2)	171(73.1)	4.37*	156(80.8)	18(81.8)	16(84.2)	4.49
High	44(18.8)	63(26.9)		37(19.2)	4(18.2)	3(15.8)	
Aggressive towards objects							
Low	207(88.5)	176(75.2)	13.82***	172(89.1)	20(90.9)	15(78.9)	–
High	27(11.5)	58(24.8)		21(10.9)	2(9.1)	4(21.1)	

NoDSH no deliberate self-harm group, DSH all deliberate self-harm groups combined, NSSI non-suicidal self-injury only group, SA suicide attempt only group, SA+NSSI non-suicidal self-injury and suicide attempt group

^a $n = 234$, ^b $n = 234$, ^c $n = 193$, ^d $n = 22$, ^e $n = 19$, ^f χ^2 statistic for comparison between noDSH and DSH groups. ^g χ^2 statistic for comparison between noDSH, NSSI, SA, and NSSI+SA groups

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* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3 Frequencies and group differences in high vs. low CAPI symptoms ratings

Symptoms	DSH ^b n(%)	NoDSH ^a n(%)	χ^2 ^f	NSSI ^c n(%)	SA ^d n(%)	SA+NSSI ^e n(%)	χ^2 ^g
Impulsivity							
Low	162(69.2)	173(73.9)	1.27	144(74.6)	11(50.0)	7(36.8)	17.82***
High	72(30.8)	61(26.1)		49(25.4)	11(50.0)	12(63.2)	
Reality assessment							
Low	222(95.7)	221(94.8)	.18	183(95.3)	20(95.2)	19(100.0)	–
High	10(4.3)	12(5.2)		9(4.7)	1(4.8)	0(0.0)	
Non-compliance							
Low	171(73.1)	166(70.9)	.27	143(74.1)	18(81.8)	10(52.6)	5.14
High	63(26.9)	68(29.1)		50(25.9)	4(18.2)	9(47.4)	
Depression							
Low	98(41.9)	143(61.1)	17.32***	82(42.5)	8(36.4)	8(42.1)	17.62**
High	136(58.1)	91(38.9)		111(57.5)	14(63.6)	11(57.9)	
Anxiety							
Low	181(77.4)	160(68.4)	4.78*	150(77.7)	16(72.7)	15(78.9)	5.04
High	53(22.6)	74(31.6)		43(22.3)	6(27.3)	4(21.1)	
Sleep disruption							
Low	133(57.1)	147(62.8)	1.60	109(56.8)	11(50.0)	13(68.4)	3.09
High	100(42.9)	87(37.2)		83(43.2)	11(50.0)	6(31.6)	
Activity level							
Low	206(88.0)	201(85.9)	.47	171(88.6)	19(86.4)	16(84.2)	.83
High	28(12.0)	33(14.1)		22(11.4)	3(13.6)	3(15.8)	
Sexualized behaviour							
Low	199(89.2)	207(93.7)	2.78	167(90.3)	21(100.0)	11(64.7)	–
High	24(10.8)	14(6.3)		18(9.7)	0(0.0)	6(35.3)	

NoDSH no deliberate self-harm group, DSH all deliberate self-harm groups combined, NSSI non-suicidal self-injury only group, SA suicide attempt only group, SA+NSSI non-suicidal self-injury and suicide attempt group

^a n = 234, ^b n = 234, ^c n = 193, ^d n = 22, ^e n = 19, ^f χ^2 statistic for comparison between noDSH and DSH groups, ^g χ^2 statistic for comparison between noDSH, NSSI, SA, and NSSI+SA groups

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* p < .05, ** p < .01, *** p < .001

community samples where, as expected, fewer individuals endorsed self-harm behaviours (e.g., DSH: 25%, noDSH: 75%; Muehlenkamp and Gutierrez 2007). Furthermore, the 4% of our sample that presented with a combination of NSSI and attempted suicide is lower than previously identified in clinical samples of youth (e.g. 17%; Jacobson et al. 2008), but comparable to those identified in prior community samples (e.g. 7%; Muehlenkamp and Gutierrez 2007). The noted differences between the current study and past research involving community and clinical populations would suggest that further research on youth presenting to the ED is required.

With respect to attempted suicide independent of NSSI, the current sample’s finding of 5% is much lower than previously found in clinical samples of youth (e.g. 16%; Jacobson et al. 2008), and higher than reported in previous community samples of adolescents (e.g. 1.9%;

Muehlenkamp and Gutierrez 2007). The relatively low number of patients attempting suicide in this ED sample could reflect an increasing tendency for care providers to send youth to the ED for intervention, prior to the point at which suicide is attempted. In part this notion is supported by evidence that a moderate proportion of youth in the current sample (31.4%) reported experiencing suicidal ideation, similar to rates found in previous studies of youth receiving mental health services (Cheung and Dewa 2007; Marttunen et al. 1992; Shaffer et al. 1996). Alternatively, the low numbers of youth reporting attempted suicide in the current sample may have resulted from a triage effect, such that suicide attempters were immediately seen by ED physician for medical stabilization and thus did not undergo mental health assessment through the emergency crisis service. If this were the case, then a number of suicide attempters would not have met the designated criteria

for inclusion in the current sample, as there was no assessment by the Crisis Workers. The capacity to compare current results with previous examinations of ED populations (e.g. Hawton et al. 2003) is limited due to the 24 h time frame imposed upon the identification of both NSSI and suicide attempts. Additional ED research would benefit from including both recent and lifetime measurement of self-harm.

Notable group differences were identified between various demographic and clinical variables. More females than males endorsed all self-harming behaviours, and individuals who had only attempted suicide were significantly older than patients in the other groups. Adolescents who attempted suicide independently of NSSI more often lived with intact biological families, needed medical attention upon presentation at the ED, were currently taking psychotropic medication, and had more prior psychiatric admissions than other patients. Patients who presented with both NSSI and attempted suicide in the previous 24 h were more likely to be involved with a child and youth protection agency (CAS), to currently be in counselling, and to be admitted to the Inpatient Psychiatry Unit from the ED. Identified differences support past evidence that self-harming individuals have co-occurring mental health issues and employ more mental health and family-based services (e.g. Jacobson and Gould 2007; Muelenkamp 2005). These results also suggest that individuals with a history of both NSSI and attempted suicide may be in greater need of such services than are patients presenting with only one of these behaviours.

Adolescents exhibiting no self-harming behaviours indicated lower levels of depression on the self-report measure than participants engaging in recent deliberate self-harm. Specifically, individuals with no self-harm showed fewer depressive symptoms than those demonstrating NSSI alone, or those who had both engaged in NSSI and had attempted suicide, regardless of age and gender. This finding was mirrored in results from clinician ratings of depression. Such results expand upon research by Muehlenkamp and Gutierrez (2007), and are in line with findings from Jacobson et al. (2008), who found that individuals engaged in NSSI and attempted suicide were more often diagnosed with depression than were participants in the remaining three groups. However, Jacobson's study also found suicide attempters more likely to suffer from depression than self-injurers. Failure to replicate these findings in the current project may be attributable to measurement differences between the two studies. Jacobson's investigation measured lifetime suicide attempts, whereas the present research identified suicide attempters based on attempts occurring in the 24 h prior to arrival at ED crisis services. Thus, the immediacy of the type of self-harm engaged in would likely relate to the individuals'

subjective experience of mood issues. Additionally, Jacobson's study assessed suicide attempts using a semi-structured interview, providing more detail regarding the targeted attempt than did the clinical report of occurrence of suicide attempt used in the current study. Similarly, the self-report index of depression used in this study is an assessment of depressive symptoms and does not provide formal psychiatric diagnosis as was available in the Jacobson study, potentially accounting for some variation in findings. Moreover, the current measure of depressive symptoms may demonstrate participant bias, with respondents reporting more depressive symptomatology than present in actuality, due to their currently being in crisis or resulting from a desire for hospital admission.

Analysis of group differences in the clinician-rated depression item from the CAPI yielded slightly different results, showing that individuals with no self-harm behaviours and those who endorsed NSSI alone did not differ, yet both groups endorsed fewer symptoms of depression than individuals attempting suicide only and those who had both attempted suicide and engaged in NSSI. Most likely the different results between self-report and clinician rated depression in this study are illustrative of additional measurement differences. The clinician rating of depression in the present study was a single item from the CAPI, based on the integration of information obtained from a comprehensive clinical interview with the patient and the Crisis Worker, whereas self-report depressive symptom scores were calculated from responses to a number of items. Thus, self-report scores may have provided a more detailed depiction of the patient's depressive symptomatology, perhaps accounting for increased ability to distinguish between the groups of patients.

Additional analyses with CAPI items revealed other group distinctions in risky behaviours and symptoms. First, self-injurers demonstrated lower Suicidal Ideation and Gesture than both suicide attempters and suicide attempters who also engaged in NSSI, while there was no difference in Suicidal Ideation and Gesture between individuals engaging in NSSI only and those endorsing no deliberate self-harm. Similar to previous research, these differences suggest that the thought processes and intentions underlying NSSI and suicide attempts are distinct, substantiating the theory that there are varied motivations underlying the two behaviours (Muehlenkamp and Gutierrez 2004; Muehlenkamp and Gutierrez 2007; Nock and Kessler 2006). Nonetheless, assessment of suicidal ideation in individuals who engage in NSSI is essential, as roughly 40% of self-injurers presented with suicidal ideation at a level requiring intervention in the current investigation. Much effort has focused on distinguishing suicidal behaviour and NSSI, ensuring that the definition of NSSI excludes the intent to die, yet simultaneously failing to acknowledge the

possibility of behavioural co-occurrence. Thus, although suicidal ideation is not independently a reason for engaging in NSSI, empirical evidence from this and other research suggests the potential for co-occurrence of NSSI and suicide attempts (Guertin et al. 2001; Jacobson et al. 2008; Muehlenkamp and Gutierrez 2004; Nock et al. 2006). As such, suicidal thoughts and feelings should be assessed in self-injurers to minimize the potential risk for future suicide attempt in these individuals.

Group differences were also found for risky behaviours and symptoms exhibited by the presenting youth. Adolescents with no deliberate self-harm were rated as more Aggressive Towards Objects than youth endorsing NSSI alone or those endorsing NSSI who had also attempted suicide. Youth with NSSI often internalize their emotions, and frequently report the need to release pent up anger, tension or emotional pain as a reason for using NSSI (Gratz 2003). Self-injurers may be more likely to experience internalized rather than externalized aggression, and may expend this aggression physically upon themselves rather than on external objects, thus accounting for observed differences in Aggression Towards Objects. However it should be noted that there is no perfect consensus in previous research regarding the internalization of aggression in self-injurers (e.g. Nixon et al. 2002), and additional investigation is needed to substantiate this claim. Differences were also identified for Impulsivity symptoms, with the individuals who did not engage in any type of self-harm and those who engaged in NSSI only rated as less impulsive than both groups of suicide attempters. Although impulsiveness has previously been linked with NSSI, these associations have been established primarily using adult samples of inpatients treated for psychiatric illness, which may account for the different findings within the current sample (Herpertz et al. 1997). Results from the present study are supported by previous research showing that youth attempting or completing suicide were more impulsive than a comparison group of psychiatrically treated non-suicidal adolescents (McGirr et al. 2008; Zouk et al. 2006). Moreover, suicide attempts in adolescents have been associated with impulsivity (Esposito et al. 2003; Gorlyn 2005), whereas NSSI can be a very deliberate attempt to regulate emotional distress (Klonsky 2007; Nixon et al. 2002). However, results from the current study suggest that impulsivity should be considered as a risk factor for future suicide attempts in the assessment of individuals exhibiting NSSI.

In summary, the present study provides important information concerning the co-occurrence of NSSI and attempted suicide, and serves to identify characteristics and risk behaviours associated with both of these behaviours. These results also suggest that suicidality and NSSI should be assessed separately and thoroughly in presenting youth.

As Lilly et al. (2008) indicated in their study, a minority of patients with self injury received a psychosocial assessment at the time of presentation to emergency service. With many of these youth being discharged home, the importance of a comprehensive assessment and consideration of follow-up service requirements cannot be underestimated.

This study provides a unique contribution to the literature, but a number of limitations must be noted. First, the investigation lacked a measure of lifetime self-harm (including both NSSI and attempted suicide), measuring instead NSSI or attempted suicide occurring in the 24 h prior to presentation at the ED. Such a small time frame may have limited both the number of individuals found to endorse these behaviours (particularly co-occurring NSSI and suicide attempts), and also the capacity to compare current results with previous investigations. Additional measurement limitations stem from the nature of the NSSI assessment used. The single item measure of NSSI from the CAPI provided a broad definition of NSSI, and may have over identified the behaviour's occurrence. Second, although attempts were made to counteract potential self-report bias by including both self-report and clinician rated measures of depressive symptoms, no standardized diagnostic measures were used. Lastly, the ability to identify significant group differences may have been limited due to the small number of patients within some of the groups. A larger sample size would permit more sophisticated analyses such as multinomial logistic regression or interaction analyses that would help elucidate the relationship between NSSI and suicide attempt.

In conclusion, the incidence of recent NSSI in youth in the pediatric ED setting is high, with many youth presenting with co-occurring recent NSSI and recent attempted suicide. Future research in this area should examine both lifetime prevalence and recent expression of NSSI and attempted suicide, as well as previous and current service use, by means of longitudinal studies employing larger sample sizes. Further work also should include investigations of the co-occurrence of suicidal behaviour, mental health symptoms, and coping style profiles. Such information is vital to identifying individuals engaging in NSSI who are at additional risk for suicidal behaviour, and in determining the potential for early intervention and treatment. Further investigations should assess these concepts in clinical, emergency department, and community samples.

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