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EMPIRICAL RESEARCH

A Comparison of Adolescents Engaging in Self-Injurious Behaviors With and Without Suicidal Intent: Self-Reported Experiences of Adverse Life Events and Trauma Symptoms

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Abstract Research comparing adolescents engaging in suicidal and non-suicidal self-injury (NSSI), both separately and in combination, is still at an early stage. The purpose of the present study was to examine overlapping and distinguishable features in groups with different types of self-injurious behaviors, using a large community sample of 2,964 (50.6 % female) Swedish adolescents aged 15–17 years. Adolescents were grouped into six categories based on self-reported lifetime prevalence of self-injurious behaviors. Of the total sample, 1,651 (55.7 %) adolescents reported no self-injurious behavior, 630 (21.2 %) reported NSSI 1–4 times, 177 (6.0 %) reported NSSI 5–10 times, 311 (10.5 %) reported NSSI $\geq$ 11 times, 26 (0.9 %) reported lifetime prevalence of suicide attempt and 169 (5.7 %) adolescents reported both NSSI and suicide attempt. After controlling for gender, parental occupation and living conditions, there were significant differences between groups. Pairwise comparisons showed that adolescents with both NSSI and suicide attempt reported significantly more adverse life events and trauma symptoms than adolescents with only NSSI, regardless of NSSI frequency. The largest differences (effect sizes) were found for interpersonal negative events and for symptoms of depression and posttraumatic stress. Adolescents with frequent NSSI reported more adversities and trauma symptoms than those with less frequent NSSI. There were also significant differences between all the NSSI groups and adolescents without any self-injurious behavior. These findings draw attention to the importance of considering the cumulative exposure of different types of adversities and trauma symptoms when describing self-injurious behaviors, with and without suicidal intent.

Keywords Non-suicidal self-injury · Suicide · Adolescents · Adverse life events · Trauma symptoms

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Introduction

Self-injurious behaviors (SIB) among adolescents are of grave concern, with the highest risk of initial suicide attempts (SA) occurring in the late teens (Kessler et al. 1999). In Sweden, suicide is the most common cause of death for both girls and boys in the age group 15–24 years (Jiang et al. 2010). Non-suicidal self-injury (NSSI) is especially prevalent in adolescents, with some studies showing rates as high as in the 20–40 % range with checklist questionnaires in community samples (Lloyd-Richardson et al. 2007; Lundh et al. 2011a; Muehlenkamp et al. 2012; Zetterqvist et al. 2012). Consequently, studying NSSI and suicidal behaviors in adolescents is especially informative (Hamza et al. 2012). A history of NSSI has shown to predict not only future NSSI but also suicide attempts in clinical samples of depressed adolescents (Asarnow et al. 2011; Wilkinson et al. 2011) as well as in a community sample (Guan et al. 2012), and is thus not to be dismissed as a trivial behavior in adolescents.

The research area of self-injury has a history of definitional challenges (Andover et al. 2012). The accepted definition of NSSI is the deliberate, self-inflicted destruction of body tissue without suicidal intent. Suicide attempt is defined as a potentially self-injurious behavior in which there is some intent to die from the behavior (Nock 2010). Although intent can be ambiguous, many argue that it is both possible and meaningful to distinguish between self-injurious behavior on the basis of intent to die (e.g., Muehlenkamp 2005; Nock and Kessler 2006; Wilkinson 2011). Even though there are similarities, arguments have been put forward that NSSI and suicidal self-injury need to be differentiated. In addition to the difference in intent, where the term NSSI in itself distinguishes these behaviors from suicide attempts (Jacobson and Gould 2007), differences also have been reported for lethality, methods, prevalence, frequency and function (Muehlenkamp 2005; Walsh 2005). Ignoring intent in describing self-injury could lead to an overestimation of the prevalence of suicide attempts and prevent correct identification of specific risk factors for the respective behaviors (Nock and Kessler 2006).

Suicidal behavior and NSSI tend to co-occur (Asarnow et al. 2011; Hamza et al. 2012; Plener et al. 2009). Nock et al. (2006), for example, found that as many as up to 70 % of adolescents in a clinical sample who reported NSSI also reported a lifetime prevalence of suicide attempts. However, the vast majority of adolescents in community samples engaging in NSSI do not report suicide intent (Hilt et al. 2008; Lloyd-Richardson et al. 2007; Muehlenkamp 2005). Wilkinson (2011) stated that epidemiological studies need to delineate suicidal from non-suicidal self-injury when examining common and distinct antecedents, correlates and outcomes of these behaviors, a standpoint supported by Andover et al. (2012) in a recent review article. The authors concluded that more studies are needed that examine the associations between self-injury with and without suicidal intent. In so doing, it is important to study larger samples of self-injurious groups, especially in community samples (Brausch and Gutierrez 2010). Recent research that has differentiated suicidal from non-suicidal self-injury in adolescents has found that the NSSI+SA group had higher levels of pathology compared to the NSSI group (Andover et al. 2012; Cloutier et al. 2010). More depressive symptoms (Dougherty et al. 2009; Muehlenkamp and Gutierrez 2007; Jacobson et al. 2008; Taliaferro et al. 2012), hopelessness (Dougherty et al. 2009; Taliaferro et al. 2012), suicidal ideation (Brausch and Gutierrez 2010; Dougherty et al. 2009; Muehlenkamp and Gutierrez 2007) and history of physical abuse (Asarnow et al. 2011; Taliaferro et al. 2012) were found in the NSSI+SA group compared to the NSSI group in both community and clinical samples. In addition, fewer reasons for living (Muehlenkamp and Gutierrez 2007) and less parental support (Brausch and Gutierrez 2010) also have been reported by individuals with NSSI+SA in community samples. In clinical groups of adolescents, the NSSI+SA group was found to have more extensive histories of NSSI (Boxer 2010; Jacobson et al. 2008), posttraumatic stress disorder (Jacobson et al. 2008) and family conflict (Asarnow et al. 2011) and were more likely to show symptoms of borderline personality disorder (Muehlenkamp et al. 2011). In the light of these results, the SA and NSSI groups tend to fall between the no-SIB and NSSI+SA group (Asarnow et al. 2011), with multiple forms of self-injury (NSSI+SA) representing a more severe group with more psychological distress compared to adolescents who engage in NSSI alone (Hamza et al. 2012), in both community and clinical samples. The prevalence rate of adolescents that report both NSSI and SA range between 14 and 31 % in clinical samples (Asarnow et al. 2011; Boxer 2010; Jacobson et al. 2008; Muehlenkamp et al. 2011) and between 3 and 7 % in community samples (Brausch and Gutierrez 2010; Muehlenkamp and Gutierrez 2007; Plener et al. 2009; Taliaferro et al. 2012). Further investigation is needed to ascertain why some individuals with NSSI also try to commit suicide.

Although less is known about NSSI, an association with childhood maltreatment has been found for both adolescent suicidal behavior and NSSI (e.g., Bridge et al. 2006; Gould et al. 2003; King and Merchant 2008; Lang and Sharma-Patel 2011; Weierich and Nock 2008; Zoroglu et al. 2003). Bruffaerts et al. (2011) found sexual and physical abuse to be the strongest risk factors for both the onset and persistence of suicidal behavior, especially during adolescence. In addition to experiences of potentially traumatic adversities, studies also have shown that symptoms of distress, such as depression, posttraumatic stress and dissociation, are associated with both NSSI and suicidal self-injury in adolescents (Bridge et al. 2006; Gould et al. 2003; Lundh et al. 2011b; Weierich and Nock 2008; Zoroglu et al. 2003).

In this context, NSSI can be viewed as a form of coping behavior, regulating affective and social experiences (Nock and Prinstein 2005), whereas the intention of a suicide attempt is to permanently end distress and suffering. A further elucidation of self-injuring adolescents' burden of childhood adversities and development of trauma/distress symptoms could be an important step towards understanding why some adolescents perform more frequent NSSI, and in addition also try to commit suicide. Whether different SIB groups, with and without suicide intent, both separately and in combination, differ regarding different types of potential traumatic experiences and trauma symptoms has not, to our knowledge, been examined before in adolescents. It, therefore, could be an important

contribution to this research field to further clarify the distinct and common characteristics of different types of self-injury in adolescents. Nock and Kessler (2006) found that the risk of suicide attempt was increased significantly in the presence of multiple sexual abuse and higher rates of physical assault, and polyvictimization previously has shown to be associated with an increase in trauma symptoms (Finkelhor et al. 2007). Similarly, a recent study showed that the lifetime accumulation of interpersonal, non-interpersonal and adverse family circumstances was related independently to trauma-related symptoms in adolescents (Nilsson et al. 2012). Thus, it seems that the cumulative exposure to both interpersonal and non-interpersonal traumatic events is an important factor in the mental health of adolescents. If so, examining the cumulative exposure of different types of adversities and trauma symptoms in addition to thoughts of self-injury as well as observing demographics may be expected to contribute to a broader understanding of the characteristics of SIB groups, with and without suicide intent.

The Present Study

This study elaborates further on the research examining differences between groups of SIB with and without suicide intent, using four groups (no-SIB, NSSI, SA and NSSI+SA) for comparison (Asarnow et al. 2011; Boxer 2010; Cloutier et al. 2010; Jacobson et al. 2008; Muehlenkamp and Gutierrez 2007), and extends the research to a large community sample of adolescents. The large sample in the present study produces larger self-injurious groups and makes it possible to differentiate between NSSI groups on the basis of frequency. The main aims of the present study were thus to examine whether adolescents with no SIB, NSSI (1–4 times, 5–10 times, ≥11 times), SA and NSSI+SA differ, firstly with regard to self-injurious thoughts, secondly with regard to demographic variables and thirdly with regard to self-reported experience of several different adverse life events and trauma symptoms, such as depression, anxiety, anger, posttraumatic stress and dissociation. Based on previous research and a cumulative perspective on adversities, it was hypothesized that the groups would differ, with the no-SIB group reporting less self-injurious thoughts, socioeconomic disadvantage and fewer adverse life events and symptoms than the NSSI groups, and that the NSSI groups in their turn would report less than the NSSI+SA group, who would be the most disadvantaged. It was also hypothesized that adolescents with more frequent NSSI would be more disadvantaged than those with less frequent NSSI.

Method

Participants

The participants consisted of 3,097 adolescents aged 15–17 years in their first year of high school. The sample was a community sample taken from the county of Östergötland in the south east of Sweden. Data from Statistics Sweden (2011) indicated that Östergötland in the year 2010 was fairly representative of Sweden as a whole in terms of gender distribution, education level, proportion of inhabitants under 17 years of age and proportion of children living with both parents, but the income level and proportion of inhabitants with foreign background was slightly lower. In order to achieve a sample size of 3,000, 70 % of the approximately 6,000 students in their first year of high school in Östergötland in each of the 17 national education programs (The National Agency for Education 2010) and the so-called individual program (adolescents who lacked formal competence to begin high school) were selected through a randomization process of school classes (expecting a drop-out rate of approximately 20 %). Randomization was performed using www.random.org. When a selected school class or school declined to participate in the study, the next school class in the order given by randomization was contacted until a sufficient sample size had been reached. Special classes for students with pervasive developmental disorders, such as autism and mental retardation, were excluded from the study, as were adolescents who had recently come to Sweden as refugees or immigrants.

In the spring of 2011, there was a total of 48 high schools in eleven of Östergötland's 13 municipalities. Thirty-six schools from eight municipalities were included in the study. Four schools declined to participate due to concern that the subject of self-injury might have a negative influence on the adolescents. Another four schools reported lack of time and resources as reasons not to participate. One school did not reply, two were not selected in the randomization process and one school only had four pupils in their first year. There was a total of 294 school classes in the 17 education programs and the individual program. Two hundred and six classes were chosen by randomization, resulting in 3,960 students. Out of these, 3,097 students filled in the questionnaires, resulting in a response rate of 78.2 %. Drop-out reasons were reported by teachers and other students: unknown 346 (40.1 %), reported illness 265 (30.7 %), truancy 87 (10.1 %), unwillingness to participate 50 (5.8 %) and other 115 (13.3 %). Of the 3,097 students who filled in the questionnaires, 124 were excluded in the present study (14 had missing data on all self-injury items, four were obviously not truthful in their answers, 97 had missing data on

questionnaires Linköping Youth Life Experience Scale (LYLES) and/or Trauma Symptom Checklist for Children (TSCC) and nine were not possible to group into self-injurious status groups due to missing data on crucial self-injurious items). This resulted in 2,973 individuals for further analysis. The total sample (with corresponding national data for 16-year-olds from Statistics Sweden [2011] and The National Agency for Education [2010] presented in brackets) consisted of 49.3 % [51.2 %] boys and 50.7 % [48.8 %] girls. The percentage of adolescents born outside Sweden was 8.0 % [8.8 %] and 61.6 % [59.2 %] lived with both parents. Of the 17 national education programs, 53.9 % [52.2 %] of adolescents participated in theoretical programs and 46.1 % [47.8 %] in vocational programs. Of the total sample, 84.8 % [84 %] reported that their mothers were working and 86.4 % [92 %] said that their fathers were working.

Excluded Cases

The 97 individuals who were excluded due to missing data on LYLES and TSCC differed from those included in the analyses on self-injurious status with more excluded individuals belonging to groups reporting both NSSI+SA and SA ($p = .053$), resulting in a nonsignificant trend. The excluded group did not differ with regard to gender but there were significant differences in type of education ($p < .001$), with fewer adolescents in theoretical programs and more from the so-called individual program; parental occupation status ($p = .001$), with fewer adolescents reporting that both parents were working; living conditions ($p < .001$), with fewer adolescents living with both parents; perceived financial situation in the family ($p = .03$), with more adolescents perceiving financial difficulties; both country of origin and parents' country of origin ($p < .001$), with fewer born in Sweden and more born outside Europe.

Procedure

The headmaster/headmistress of each school was given information about the study and they gave their consent for the school to participate. One week prior to our visit in the classroom, teachers distributed written information about the study. Students and parents were informed that participation was voluntary, and if the students wished to participate in the study they should show up in class the following week when the data collection would take place. According to the Swedish Ethical Review Act (2003), active consent is not required from parents when adolescents are 15 years of age or older. Parents were informed that they were welcome to contact the research group if they had any questions or did not want their child to participate. Data collection was performed in the classroom, with desks placed sufficiently far apart to ensure anonymity. The questionnaires consisted of twelve pages and took approximately 25–30 minutes to complete. The questions on the first two pages were demographic in character, followed by five pages of questions on SIB. The last five pages consisted of questions on adverse life events and trauma symptoms.

Ethical Issues

The study was approved by the Regional Ethical Review Board of Linköping (Dnr, 2010/195-31). During the data collection, students were encouraged to seek professional help if needed. Additionally, every student was given written information to take home listing contact information to several counseling alternatives in their home town.

Measures

Non-Suicidal Self-Injury

The Functional Assessment of Self-Mutilation (FASM) (Lloyd et al. 1997). FASM assesses the methods, frequency and function of self-reported deliberate NSSI. Respondents are asked whether they have engaged in any of eleven different forms of NSSI during the past year or at any time previously. The frequency of NSSI and whether medical treatment was received also is assessed. Participants also are asked the length of time they had contemplated the behavior(s), at what age their NSSI first began, whether any of the NSSI was performed under the influence of drugs or alcohol, the degree of physical pain experienced during NSSI, and whether any of these behaviors was a suicide attempt. FASM contains 22 statements assessing the functions of NSSI, which respondents rate on a four-point Likert scale, ranging from "never" to "often". The functions of NSSI were not used in the present study. FASM previously has been used in normative (Lloyd et al. 1997) and psychiatric samples (Guertin et al. 2001). FASM has shown acceptable psychometric properties in adolescent samples (Guertin et al. 2001; Penn et al. 2003), with adequate internal consistency for both minor and moderate/severe forms of NSSI ($\alpha = .65$–$.66$). There is also support for the concurrent validity of FASM demonstrating significant associations with measures of recent SA, hopelessness and depressive symptoms (Nock and Prinstein 2005).

The Swedish version of FASM was translated into Swedish using a back-translation procedure and tested in a pilot study with 84 adolescents. A three-week test–retest procedure was also administered and was completed by 71 adolescents. The psychometric properties of the Swedish

version have been fully described in another article by Zetterqvist et al. (2012). The reliability of the Swedish version of FASM was tested with acceptable/good psychometric properties concerning internal consistency for the present sample. Cronbach's alpha for the present sample on all NSSI items was $\alpha = .84$. Results for the subscales referred to in Guertin et al. (2001) for severe and moderate forms of NSSI was $\alpha = .74$ –.76.

Self-Injurious Thoughts and Behaviors

The Self-Injurious Thoughts and Behaviors Interview-Short Form-Self Report (SITBI-SF-SR). SITBI-SF-SR was developed from SITBI (Nock et al. 2007), a structured interview that assesses a wide range of self-injurious thoughts and behaviors. SITBI's psychometric properties have been evaluated, suggesting strong interrater reliability (average $\kappa = .99$, $r = 1.0$) and test–retest reliability (average $\kappa = .70$, intraclass correlation coefficient = .44) over a six-month period. Concurrent validity has been demonstrated with strong correspondence between SITBI and other measures of suicidal ideation (average $\kappa = .54$), SA (average $\kappa = .65$), and NSSI (average $\kappa = .87$). The self-report version used in this study assesses presence, frequency, and characteristics of suicidal ideation, suicide plans, suicide gestures, suicide attempts and NSSI. Each area begins with a general screening question:"Have you ever had thoughts of non-suicidal self-injury (NSSI; that is, thoughts of purposely hurting yourself without wanting to die, for example thoughts of cutting or burning?)" with follow-up questions concerning age of debut, frequency and intensity during lifetime, last year, last month and last week.

The Swedish version of the SITBI-SF-SR also was translated into Swedish using a back-translation procedure and tested in a pilot study with a test–retest procedure. The psychometric properties have been described fully in another article (Zetterqvist et al. 2012).

Potentially Traumatic Life Events and Adversities

Linköping Youth Life Experience Scale (LYLES) is an instrument for gauging potentially traumatic life events, including adverse childhood circumstances. It has been developed from Life Incidence of Traumatic Experiences (Greenwald and Rubin 1999). LYLES contains 23 main questions with more detailed secondary items; 18 items are considered non-interpersonal (such as being in a car accident, staying in hospital), 13 items interpersonal (such as having been exposed to physical or sexual abuse or threatened), and 10 items ask questions about more long-standing adverse childhood circumstances (such as alcohol abuse in family, parent in jail). LYLES is intended to cover several important types of potentially traumatic events and circumstances during an adolescent's lifespan. There are subquestions on several items to cover the respondent's proximity to the event, i.e., whether the person has experienced the event himself/herself or witnessed it. The scores for the different non-interpersonal and interpersonal events are added and the sum represents the content of the total scale *Sum of events or polytraumatization*. The total number of times an adverse circumstance has occurred provides the sum used in the subscale *Sum of times*. LYLES has been evaluated on Swedish adolescents from the normative population. Its psychometric properties have been shown to be satisfactory with test–retest $r = .79$ and kappa item per item ranging between $k = .44$ and 1.0 (Nilsson et al. 2010).

Trauma Symptoms

The Trauma Symptom Checklist for Children (TSCC) (Briere 1996) is a self-report questionnaire developed to identify symptoms of traumatic stress in children and adolescents aged 8–17 years. The questionnaire consists of 54 items and the respondents rate their answers on a four-point Likert scale from 0 (never) to 3 (almost always). The results are divided into six subscales: anxiety, depression, anger, posttraumatic stress, sexual preoccupation and dissociation, with 9–10 items in each. TSCC has been translated into Swedish and evaluated on Swedish children and adolescents (Nilsson et al. 2008). Good reliability such as internal consistency (Cronbach's alpha) for the total scale .94 (ranging in the clinical scales .78–.83) and test–retest for the total scale $r = .81$ (ranging in the clinical scales .67–.81) has been found. The confirmatory 6-factor analysis explained 50.7 % of the variance. Other validity measures such as concurrent validity and criterion-related validity also were shown to be satisfactory. The normative sample of Swedish children and adolescents showed lower means on the subscales than has been reported in previous studies from a number of other countries. The Swedish version of TSCC has been shown to be a screening instrument with satisfactory psychometric properties that is capable of identifying trauma symptoms among children and adolescents (Nilsson et al. 2008). The subscale sexual concern was not used in this study. Internal consistency was good for the subscales used in the present sample: $\alpha = .88$ (depression), $\alpha = .83$ (anxiety), $\alpha = .86$ (anger), $\alpha = .89$ (posttraumatic stress) and $\alpha = .86$ (dissociation). In accordance with the TSCC manual (Briere 1996), individuals with six or more missing items on the total scale and three or more missing on each subscale were excluded from analyses. Single

missing items were replaced with the average value on that subscale.

Demographic Information

A demographic questionnaire was created for the purpose of the study assessing demographic characteristics such as gender, type of education, own and parents' country of origin, perception of family's economy, living conditions and parents' occupation. Adolescents self-reported demographic information in fixed answer categories. Demographics were used to describe the sample and compare the different SIB groups and further to examine whether any demographic variables should be controlled for in the further analyses of group differences.

Self-Injurious Groups

Adolescents were grouped into one of six categories based on self-reported lifetime prevalence and frequency of SIB on SITBI-SF-SR and FASM and two additional questions developed for the purpose of this study ("Have you ever intentionally taken an overdose of medicine or swallowed other substances with the intention of hurting yourself?" and "If so, was it your intention to kill yourself when you performed the act?").

No Self-Injurious Behavior

Adolescents reporting no lifetime prevalence of self-injurious behavior were classified in this group.

NSSI (1–4 times, 5–10 times, ≥11 times)

Adolescents reporting NSSI with no intent to die on FASM past year or lifetime prevalence, and/or lifetime prevalence on general NSSI question from SITBI-SF-SR and reporting no suicide attempts were classified in this group. Respondents were further grouped into three categories depending on frequency of NSSI as reported in FASM.

Suicide Attempt

Adolescents reporting no NSSI and answering in the affirmative to lifetime prevalence of suicide intent were classified in this group. Suicide attempt was defined as some intent to end life (Nock 2010), and a non-zero rule (O'Carroll et al. 1996) was applied where both contradictory and full intent to die answers were classified as suicide attempts, as in Jacobson et al. (2008).

NSSI and Suicide Attempt

Adolescents reporting NSSI with no intent to die on FASM past year or lifetime prevalence, and/or lifetime prevalence on general NSSI question from SITBI-SF-SR as well as answering in the affirmative to lifetime prevalence of suicide intent were classified in this group.

Data Analysis

Categorical data was analyzed with descriptive statistics using frequencies and cross-tabulation with Chi square (χ^2). Phi coefficient and Cramers's V was calculated for effect size (ES) using Cohen's (1988) criteria of .10 for small effect, .30 for medium effect and .50 for large effect for Phi and .07, .21 and .35, respectively, for Cramer's V. Internal consistency was assessed using Cronbach's alpha (α). Separate One-way Analysis of Covariance (ANCOVA) was used for analyses of group differences using self-injurious status as independent variable and subscales non-interpersonal events, interpersonal events and adverse childhood circumstances from LYLES and subscales depression, anxiety, anger, posttraumatic stress and dissociation from TSCC as dependent variables. Gender, parental occupation status (both parents working or at least one parent unemployed or on long-term sick leave) and living conditions (living with both parents or with only one parent/alone/sibling/at institution) were covariates. ES was calculated for group comparison using partial eta squared (η^2), with Cohen's (1988) guidelines for small (.01), medium (.06) and large (.138) ES. Post hoc pairwise analyses were performed using Bonferroni adjustment for multiple comparisons. All statistical analyses were performed using the SPSS 19.0 software package (SPSS Inc, Chicago, IL).

Results

Self-Injurious Groups

Of the total sample of 2,973 adolescents, nine adolescents reported having swallowed substances/taken an overdose with the purpose of harming themselves without suicide intent and without reporting any other form of self-injurious behavior. These adolescents were excluded from analyses due to the fact that they did not meet criteria for either the accepted NSSI definition or suicide attempt and they could not be classified in the no SIB group. This resulted in 2,964 adolescents for further analyses. Of these, 1,651 (55.7 %) reported no SIB, 630 (21.2 %) reported NSSI 1–4 times, 177 (6.0 %) reported NSSI 5–10 times,

Table 1 Frequency and percentage of lifetime prevalence of different types of self-injurious thoughts and gestures among groups of self-injurers, $n = 2921–2956$

	No SIB $n = 1636–1646$	NSSI 1–4 times $n = 620–629$	NSSI 5–10 times $n = 172–176$	NSSI ≥ 11 times $n = 303–310$	SA $n = 25–26$	NSSI+SA $n = 165–169$	X^2, p ($df = 5$)
Suicide thoughts	192 (11.7)	204 (32.4)	70 (39.8)	175 (56.5)	25 (96.2)	166 (98.2)	831.21 (<.001)
Suicide plans	13 (0.8)	29 (4.6)	15 (8.6)	56 (18.1)	16 (61.5)	138 (82.1)	1354.04 (<.001)
Suicide gestures	26 (1.6)	48 (7.7)	16 (9.3)	45 (14.9)	7 (28.0)	88 (53.3)	593.93 (<.001)
NSSI thoughts	73 (4.4)	239 (38.2)	76 (43.2)	182 (59.1)	7 (28.0)	147 (87.0)	1007.20 (<.001)

SIB self-injurious behaviors, *NSSI* non-suicidal self-injury, *SA* suicide attempt

311 (10.5 %) reported NSSI ≥ 11 times, 26 (0.9 %) reported SA and 169 (5.7 %) adolescents reported lifetime prevalence of both NSSI and suicide attempt. Of the adolescents ($N = 195$) who reported having made a suicide attempt, 169 (86.7 %) also reported lifetime prevalence of NSSI. However, the majority of adolescents (86.9 %) who reported lifetime prevalence of NSSI did not report a concurrent suicide attempt.

Age of Onset

Of the 169 adolescents who reported both NSSI and suicide attempt, 122 reported their debut age for both behaviors. The reported mean age for NSSI debut was 13.4 years (*SD* 2.2) and 13.8 years (*SD* 1.9) for suicide attempt. Thirty-six (29.5 %) adolescents reported that they had begun engaging in NSSI and made their first suicide attempt at the same age. Twenty-two (18.0 %) adolescents reported that they had made their first suicide attempt prior to engaging in NSSI. Sixty-four (52.5 %) individuals reported that they started with NSSI and then made their first suicide attempt at an older age. Consequently, adolescents starting with NSSI and progressing to suicide attempts were in a majority.

Group Comparison of Self-Injurious Thoughts

The different SIB groups varied concerning lifetime prevalence of suicide thoughts, plans, gestures and thoughts of NSSI (see Table 1). Suicide thoughts were not infrequent in adolescents without self-injurious behavior, with 192 (11.7 %, $N = 1,646$) adolescents reporting lifetime prevalence of suicide thoughts, whereas suicide plans were less prevalent in this group, reported by only 13 adolescents (0.8 %, $N = 1,636$). The lowest prevalence rates of suicide thoughts, plans, gestures and thoughts of NSSI were reported by adolescents in the no SIB group ($p < .001$). Rates were higher in the NSSI groups and the SA group, with the highest rates reported by adolescents who reported both NSSI and suicide attempt. NSSI+SA reported significantly more suicide thoughts, plans, gestures and thoughts of NSSI than the three different NSSI groups ($p < .001$). There were also significant differences ($p < .001$) between NSSI 1–4 times and NSSI ≥ 11 times with more suicide thoughts, plans, thoughts of NSSI and suicide gestures ($p = .001$) in the most frequent NSSI group. Among those who had actually performed NSSI, 59.1 % in the NSSI ≥ 11 times group reported having thought about performing NSSI. More than half (56.5 %, $N = 310$) of those who reported NSSI ≥ 11 times reported suicide thoughts and 56 (18.1 %, $N = 309$) adolescents reported having made a suicide plan. This co-occurrence also was seen in the SA group, in which seven adolescents (28.0 %, $N = 25$) reported thoughts of NSSI. Thus, suicidal thoughts were fairly prevalent in adolescents with NSSI, as were thoughts of performing NSSI in adolescents who had made a suicide attempt without engaging in NSSI.

Group Comparison of Demographic Variables

Adolescents With NSSI vs. NSSI+SA

The three NSSI groups were fairly similar (see Table 2), with no significant differences on demographic variables, except for comparison of NSSI 1–4 times to 5–10 times on type of education ($p = .03$, Cramer's V = .10). In general, the NSSI ≥ 11 times group reported a slightly higher level of socioeconomic disadvantage. The NSSI+SA group, therefore, was compared to the NSSI ≥ 11 times group to examine whether differences were significant when comparisons were made with the highest frequency NSSI group. There were significant differences in demographic variables with small to medium ES (Cohen 1988) for gender, with more girls than boys in the NSSI+SA group ($p < .001$, phi = .22); type of education, with less theoretical education in NSSI+SA group ($p < .001$, Cramer's V = .21); perception of family economy, with more adolescents in group NSSI+SA reporting some or serious financial difficulties ($p < .001$, phi = .18); living conditions, with fewer adolescents in the NSSI+SA group living with both parents (all the time or alternating) ($p < .001$, Cramer's V = .23) and parental occupation, with fewer adolescents in the NSSI+SA group reporting that both

parents worked ($p < .001$, Cramer's V = .19). Groups did not differ significantly regarding adolescents' country of origin or parents' country of origin.

Adolescents With NSSI vs. no SIB

A comparison of the same demographic variables for adolescents without any self-injurious behavior and the NSSI ≥ 11 times group also resulted in statistically significant differences, with more girls and more socioeconomic disadvantages reported in the NSSI ≥ 11 times group. However, the ES were small (Cohen 1988), ranging from phi = .08–.13 and Cramer's V = .06–.09, indicating that when comparing demographic variables there was little distinction between adolescents without any self-injurious behavior and the NSSI ≥ 11 times group. ES were also small when comparing adolescents without any self-injurious behavior to the NSSI 1–4 and 5–10 times groups, ranging from phi = .05–.10 and Cramer's V = .01–.07. Country of origin and parents' country of origin did not differ significantly between adolescents without any self-injurious behavior and any of the three NSSI groups. Although not large, the ES were consistently of a larger magnitude in comparisons between the NSSI and the NSSI+SA group than in comparisons between the NSSI and the no SIB group. Thus, demographic variables seemed to differ more between the NSSI groups and the NSSI+SA group than between the NSSI groups and adolescents without any self-injurious behavior.

Group Comparison of Adversities and Trauma Symptoms

Demographic information was first used to describe the sample and to see whether there were differences between SIB groups. Cross-tabulation analyses showed significant differences in gender and socioeconomic demographic variables (see Table 2). Based on these differences, gender, parental occupation and living conditions were therefore controlled for as covariates in the further analyses of group differences. Parental occupation and living conditions were chosen as covariates for methodological reasons. These demographic variables were assumed to best represent reliable measures of socioeconomic status. There was some concern as to how accurately adolescents perceive their family's financial situation and this was therefore not included as a covariate. With regard to ANCOVA assumptions, homogeneity of variance was tested using variance ratio (Pearson and Hartley 1954), finding support for equal variance. Furthermore, the relationship between the covariates and the outcome variables was the same for all groups, thus meeting the assumption of homogeneity of regression. Separate ANCOVA analyses showed that adjusted mean values for all subscales of adverse life events as well as all subscales of trauma symptoms differed significantly among the different SIB groups (see Table 3; Figs. 1, 2). ES indicated a large effect for interpersonal events, depression, anger, posttraumatic stress and dissociation and a medium effect for non-interpersonal events, adverse childhood circumstances and anxiety. With regard to adversities, the ES was largest for interpersonal events, indicating that experiences of events with an interpersonal component (such as threats, sexual and physical abuse) differentiate more between SIB groups than non-interpersonal events (such as being in a car accident, staying in hospital).

Adolescents with no SIB

Post hoc pairwise comparison showed that adolescents without self-injurious behavior differed from all other SIB groups with significantly less adverse life events reported ($p < .001$ for all groups except for the SA group regarding adverse childhood circumstances, $p = .005$) as well as symptoms of depression ($p < .001$), posttraumatic stress ($p < .001$) and dissociation ($p < .001$ for all groups except for the SA group: $p = .004$). Regarding anxiety and anger, the adolescents without any self-injurious behavior were significantly different from all other groups ($p < .001$), with the exception of the SA group (anxiety $p = 1.0$, anger $p = .11$). Thus, compared to the other SIB groups, adolescents without any self-injurious behavior reported the least experience of adversity and lowest level of symptoms of depression, posttraumatic stress and dissociation.

Adolescents with NSSI+SA

The NSSI+SA group was significantly different ($p < .001$) from the NSSI groups regardless of frequency of NSSI (1–4, 5–10 or ≥11) with more interpersonal events, adverse childhood circumstances (with medium to large ES ranging from partial $\eta^2 = .06–.16$) and more trauma symptoms reported ($p < .001$, except for NSSI ≥ 11 times for anger $p = .001$) in the NSSI+SA group. With regard to non-interpersonal events, NSSI+SA reported significantly more than the NSSI 1–4 times ($p < .001$) and 5–10 times groups ($p = .006$), with small ES (partial $\eta^2 = .03$ and .03 respectively), but did not differ significantly from the NSSI ≥ 11 times group ($p = 1.0$). The largest ES was found for interpersonal events and symptoms of depression and posttraumatic stress. This was indicated by a large ES when comparing the NSSI+SA group to the NSSI 1–4 times and the 5–10 times groups (partial $\eta^2 = .20–.27$ for depression and .15–.22 for posttraumatic stress) and a medium ES when compared with the NSSI ≥ 11 times

Table 2 Demographic variables in groups of self-injurers, frequency and percentage, $n = 2797–2964$

	No SIB $n = 1560–1651$ a	NSSI 1–4 times $n = 593–630$	NSSI 5–10 times $n = 168–177$	NSSI ≥ 11 times $n = 295–311$ b	SA $n = 21–26$	NSSI+SA $n = 160–169$ c	X^2, p ($df = 1–2$)
Sex							
Male	901 (54.9)	290 (46.1)	82 (46.3)	138 (44.5)	10 (38.5)	37 (22.2)	a/b = 10.82 (= .001)
Female	741 (45.1)	339 (53.9)	95 (53.7)	172 (55.5)	16 (61.5)	130 (77.8)	b/c = 22.41 (< .001)
Type of education							
Theoretical	916 (55.5)	329 (52.2)	80 (45.2)	141 (45.3)	11 (42.3)	50 (29.6)	a/b = 10.86 (= .004)
Vocational	677 (41.0)	283 (44.9)	85 (48.0)	156 (50.2)	12 (46.2)	94 (55.6)	b/c = 21.73 (< .001)
Individual	58 (3.5)	18 (2.9)	12 (6.8)	14 (4.5)	3 (11.5)	25 (14.8)	
Country of origin							
Sweden	1522 (92.6)	577 (92.2)	161 (91.0)	281 (91.2)	19 (73.1)	154 (91.6)	n.s.
Europe[a]	28 (1.7)	17 (2.7)	7 (3.9)	7 (2.3)	0 (0.0)	7 (4.2)	
Outside Europe	94 (5.7)	35 (5.1)	9 (5.1)	20 (6.5)	7 (26.9)	7 (4.2)	
Parents' country of origin							
Sweden	1308 (79.6)	491 (77.9)	128 (72.3)	230 (74.2)	15 (60.0)	120 (71.0)	n.s.
Europe[a,b]	144 (8.8)	62 (9.9)	24 (13.6)	36 (11.6)	3 (12.0)	29 (17.2)	
Outside Europe[b]	190 (11.6)	77 (12.2)	25 (14.1)	44 (14.2)	7 (28.0)	20 (11.8)	
Perception of family's economy							
Fairly/very good	1364 (87.4)	474 (79.9)	136 (81.0)	222 (75.3)	15 (71.4)	93 (58.1)	a/b = 28.72 (< .001)
Some/serious difficulties	196 (12.6)	119 (20.1)	32 (19.0)	73 (24.7)	6 (28.6)	67 (41.9)	b/c = 13.50 (< .001)
Living conditions							
Both parents[c]	1357 (82.4)	487 (77.8)	129 (73.7)	225 (72.3)	16 (61.5)	85 (50.3)	a/b = 17.10 (< .001)
One parent	229 (13.9)	115 (18.4)	34 (19.4)	69 (22.2)	8 (30.8)	58 (34.3)	b/c = 26.36 (< .001)
Alone/with sibling/at institution	61 (3.7)	24 (3.8)	12 (6.9)	17 (5.5)	2 (7.7)	26 (15.4)	
Parents' occupation							
Working	1301 (81.6)	489 (80.8)	133 (77.8)	223 (74.8)	16 (66.7)	88 (56.4)	a/b = 7.38 (= .03)
Unemployed/long-term sick leave[b]	184 (11.6)	72 (11.9)	23 (13.4)	47 (15.8)	5 (20.8)	47 (30.1)	b/c = 16.83 (< .001)
Other[d]	109 (6.8)	44 (7.3)	15 (8.8)	28 (9.4)	3 (12.5)	21 (13.5)	

SIB self-injurious behaviors, *NSSI* non-suicidal self-injury, *SA* suicide attempt

[a] other country than Sweden

[b] one or both parents

[c] together or every other week

[d] pensioner, student, on parental leave

Table 3 Adjusted means and standard error of adverse life events and trauma symptoms among groups of self-injurers, $n = 2829$

	No SIB $n = 1585$	NSSI 1–4 times $n = 600$	NSSI 5–10 times $n = 169$	NSSI ≥ 11 times $n = 297$	SA $n = 24$	NSSI+SA $n = 154$	ANCOVA
nIPE	4.91 (.08)	6.33 (.13)	6.57 (.24)	7.46 (.18)	7.74 (.63)	7.80 (.25)	$F(5, 2829) = 60.87$, $p < .001$, partial $\eta^2 = .10$
IPE	1.10 (.04)	1.81 (.07)	2.09 (.12)	2.51 (.09)	2.82 (.32)	3.87 (.13)	$F(5, 2829) = 115.58$, $p < .001$, partial $\eta^2 = .17$
ACC	1.17 (.03)	1.61 (.05)	1.78 (.10)	2.09 (.08)	2.16 (.27)	3.08 (.11)	$F(5, 2829) = 73.65$, $p < .001$, partial $\eta^2 = .12$
Depression	3.01 (.09)	4.20 (.14)	5.13 (.26)	6.91 (.20)	6.33 (.70)	10.77 (.28)	$F(5, 2829) = 181.75$, $p < .001$, partial $\eta^2 = .24$
Anxiety	3.48 (.08)	4.37 (.13)	4.95 (.25)	6.07 (.19)	4.58 (.66)	7.49 (.27)	$F(5, 2829) = 66.01$, $p < .001$, partial $\eta^2 = .11$
Anger	2.75 (.09)	4.19 (.15)	5.42 (.29)	7.01 (.22)	4.80 (.76)	8.54 (.31)	$F(5, 2829) = 120.80$, $p < .001$, partial $\eta^2 = .18$
Posttraumatic stress	4.51 (.11)	6.19 (.18)	7.64 (.33)	9.23 (.25)	8.40 (.89)	12.82 (.36)	$F(5, 2829) = 144.44$, $p < .001$, partial $\eta^2 = .20$
Dissociation	4.09 (.11)	5.62 (.17)	6.93 (.32)	8.49 (.24)	7.20 (.85)	10.81 (.34)	$F(5, 2829) = 115.22$, $p < .001$, partial $\eta^2 = .17$

SIB self-injurious behaviors, *NSSI* non-suicidal self-injury, *SA* suicide attempt, *nIPE* non-interpersonal events, *IPE* interpersonal events, *ACC* adverse childhood circumstances

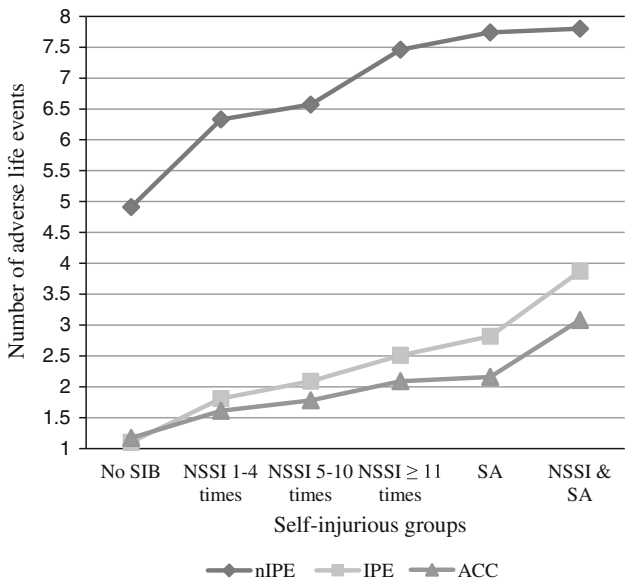

Fig. 1 Adjusted means for adverse life events among groups of self-injurers ($n = 2,829$). *nIPE* non-interpersonal events, *IPE* interpersonal events, *ACC* adverse childhood circumstances, *SIB* self-injurious behaviors, *NSSI* non-suicidal self-injury, *SA* suicide attempt

group (partial $\eta^2 = .07$ and .05 respectively). Hence, the NSSI+SA group stood out as the most burdened group regarding adversities and trauma symptoms.

Adolescents with SA

The adolescents with only suicide attempt differed from the NSSI+SA group with significantly less interpersonal events ($p = .04$), adverse childhood circumstances ($p = .03$) and reported symptoms of depression, anger and posttraumatic stress ($p < .001$) as well as anxiety and dissociation ($p = .001$) with medium ES for depression and anger (partial $\eta^2 = .06$). However, the SA group did not differ from the NSSI groups, with the exception of NSSI 1–4 times on interpersonal events ($p = .03$) and depression ($p = .04$). Consequently, adolescents with only suicide attempt seemed closer aligned to the NSSI groups than the NSSI+SA group with regard to reported adversities and trauma symptoms.

Adolescents with Different Frequency of NSSI

With regard to pairwise comparisons of the different frequency NSSI groups, there were no differences between adolescents with the lowest frequency (1–4 times) and those who reported 5–10 times on non-interpersonal events, interpersonal events, adverse childhood circumstances and symptoms of anxiety. The NSSI 5–10 times group reported significantly more symptoms of depression

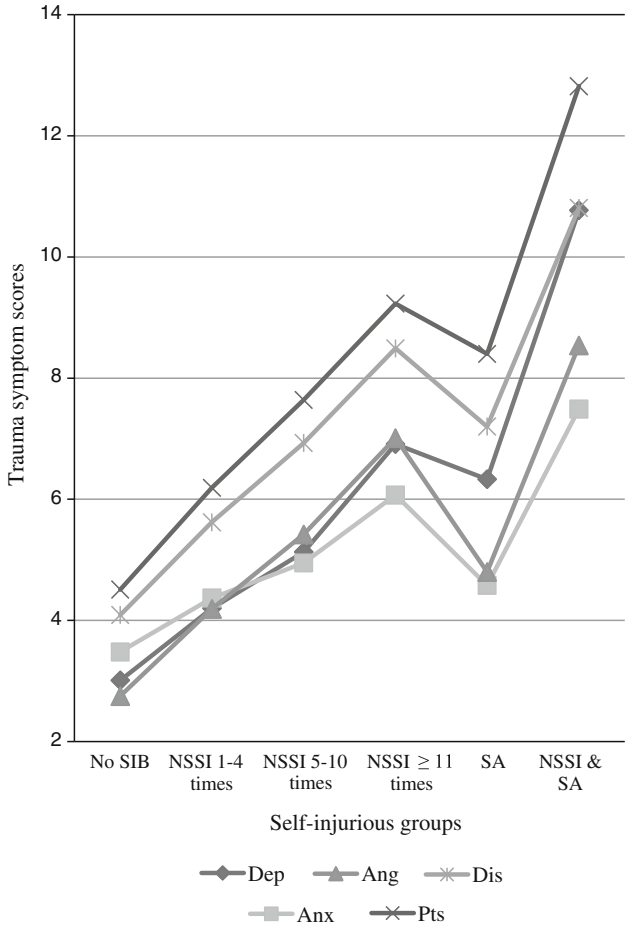

Fig. 2 Adjusted means for trauma symptoms among groups of self-injurers ($n = 2{,}829$). *Dep*. depression, *Anx* anxiety, *Ang* anger, *Pts* posttraumatic stress, *Dis* dissociation, *SIB* self-injurious behaviors, *NSSI* non-suicidal self-injury, *SA* suicide attempt

($p = .03$), anger ($p = .002$), posttraumatic stress ($p = .002$) and dissociation ($p = .005$) compared to the least frequent NSSI group (1–4 times). However, ES were small (partial $\eta^2 = .01$–$.02$). There were significant differences between the NSSI 1–4 times and the ≥11 times group ($p < .001$), with the highest frequency NSSI group reporting more non-interpersonal events, interpersonal events, adverse childhood circumstances, depression, anxiety, anger, posttraumatic stress and dissociation. Group differences were larger for trauma symptoms (partial $\eta^2 = .05$–$.09$) than adversities (partial $\eta^2 = .03$–$.04$).

There were also differences between the NSSI 5–10 times and the ≥11 times groups on non-interpersonal events ($p = .04$), depression ($p < .001$), anxiety ($p = .004$), anger ($p < .001$), posttraumatic stress ($p = .002$) and dissociation ($p = .002$), but with small ES (partial $\eta^2 = .02$–$.04$). The groups did not differ on interpersonal events or adverse childhood circumstances. To conclude, adversities and trauma symptoms differed between the different SIB groups (see Figs. 1, 2), with support for a cumulative exposure with more adversities and trauma symptoms in the highest frequency NSSI group and the highest level found in adolescents reporting both NSSI and suicide attempt.

Discussion

Research examining differences between groups of adolescents with self-injurious behaviors, differentiated on the basis of suicide intent, is still at an early stage. This study contributes important information regarding characteristics in groups of adolescents with self-injurious behaviors, with and without suicide intent, both separately and in combination. A large sample of 2,964 adolescents was categorized into six groups and compared regarding self-injurious thoughts, demographic variables and self-reported experiences of several types of adversities and trauma symptoms. Such a large sample is unusual in this kind of study and not only elucidates differences between self-injurious behaviors but also makes it possible to analyze subgroups of NSSI on the basis of frequency. This study found support for a cumulative exposure with adolescents with no self-injurious behavior reporting the lowest level of self-injurious thoughts, socioeconomic disadvantage, adversities and trauma symptoms. Adolescents with NSSI reported more adversities and trauma symptoms, consistent with the notion that NSSI may serve as a coping behavior. Further support for cumulative exposure was found from results showing that adolescents who reported frequent NSSI reported more adversities and trauma symptoms than those with less frequent NSSI. Adolescents with both NSSI and suicide attempt reported the highest level of adversities and trauma symptoms and thus appeared to be a particular burdened and distressed group.

Groups of Suicidal and Non-Suicidal Self-Injurers

Results showed that 1,287 (43.4 %) adolescents reported at least one episode of lifetime NSSI when answers from different measures and types of questions used in this study were combined. In a recent systematic review (Muehlenkamp et al. 2012), the mean international prevalence of NSSI was found to be 18.0 % ($SD = 7.3$). The present study included lifetime prevalence, as well as checklist format, which has typically shown a higher prevalence rate in the 20–40 % range, compared to asking only one general NSSI question (Lloyd-Richardson et al. 2007; Lundh et al. 2011a; Zetterqvist et al. 2012). Rates of 5.7 % of adolescents reporting both NSSI+SA and 0.9 % reporting suicide attempts in this study were slightly lower but still fairly similar to the results found in Muehlenkamp and Gutierrez's (2007) community sample with a prevalence of 7.0 and 1.9 %, respectively. Our results were also similar, though slightly higher than previous

prevalence rates of adolescents reporting both NSSI+SA in other community samples, which ranged between 3.4 and 5.0 % (Brausch and Gutierrez 2010; Plener et al. 2009; Taliaferro et al. 2012), as well as the 4.1 % in youth presenting at emergency crises services (Cloutier et al. 2010). In conclusion, our results seem fairly similar to other studies in the Western world, using similar methods.

An overwhelming majority (86.7 %) of those who reported a suicide attempt also reported NSSI, indicating a considerable co-occurrence of these behaviors in adolescents who have made a suicide attempt, which is consistent with other community (Plener et al. 2009) and clinical studies (Jacobson et al. 2008). On the other hand, the majority of adolescents in this community sample who reported NSSI did not report a concurrent suicide attempt, lending support to the idea that it is meaningful to differentiate between groups with regard to suicidal intent (e.g., Nock and Kessler 2006). In a previous study of a clinical sample, a majority of those with NSSI also reported a suicide attempt (Nock et al. 2006), suggesting that there is a difference with regard to type of sample in this matter. A majority of adolescents (52.5 %) in this study reported having begun with NSSI prior to making their first suicide attempt. Far fewer (18.0 %) reported beginning with a suicide attempt and progressing to NSSI. This is in keeping with results from the few longitudinal studies of clinical (Asarnow et al. 2011; Wilkinson et al. 2011) and community samples (Guan et al. 2012) in this research field that have shown NSSI to be a risk factor for suicide attempt, and as such not to be dismissed lightly. However, Wichstrøm (2009) did not find support for NSSI predicting suicide attempts, and more longitudinal research in this area is needed, as recommended by Hamza et al. (2012). A majority (56.5 %) of those who had performed NSSI $\geq$ 11 times reported suicidal thoughts, and almost one in five adolescents in this group reported having made a suicide plan. Thus, suicidal thoughts were common in those who performed NSSI in this sample, a result confirmed in other studies (see Hamza et al. 2012 for a review). There were also distinguishable features between groups, with suicidal thoughts and plans reported most frequently in the NSSI+SA group, as shown previously with regard to suicide ideation in Brausch and Gutierrez (2010) and Plener et al. (2009).

Adverse Life Events and Trauma Symptoms

There were significant differences between groups with regard to self-reported experiences of adverse life events and trauma symptoms. The hypotheses of this study were confirmed, with adolescents with lifetime prevalence of both NSSI and suicide attempt reporting more adverse life events and trauma symptoms as well as socioeconomic disadvantages when compared to the NSSI groups. Furthermore, it was found that the NSSI groups reported more adverse life events and trauma symptoms compared to adolescents without self-injurious behavior, who reported the lowest levels. Although statistically significant, the actual differences in adjusted mean values were generally small for interpersonal events and adverse childhood circumstances (see Table 3). There was, for example, an average difference of close to three events between adolescents with no self-injurious behaviors and the NSSI+SA group for interpersonal events (partial $\eta^2 = .20$). It is, however, important to bear in mind that the subscales for interpersonal events and adverse childhood circumstances measure serious adverse life events such as sexual abuse, threats, physical abuse, emotional abuse, mental illness and alcoholism/drug abuse in family, thus representing events with probable clinical significance even in low frequencies.

Post hoc pairwise comparisons showed that adolescents without any self-injurious behavior differed from all other groups for both adverse life events and trauma symptoms (except compared to adolescents with only suicide attempts on symptoms of anxiety and anger). The adolescents with no self-injurious behavior reported significantly fewer negative experiences and symptoms compared to all other SIB groups. Interestingly, a significant difference even emerged between adolescents with no self-injurious behavior and those with NSSI 1–4 times, with the NSSI group having experienced significantly more negative life events and trauma symptoms. However, only interpersonal events reached a close to medium ES (partial $\eta^2 = .05$). It is possible that the actual transition from thoughts to actions represents a crucial step and it is therefore important to be aware of this implication in clinical work. Hence, even a low frequency of NSSI should not be dismissed as insignificant, since all the NSSI groups had experiences of more adverse life events and reported more symptoms of distress than those without any self-injurious behavior.

There were significant differences with higher adjusted mean values on all subscales for adverse life events as well as all trauma symptoms when comparing the NSSI+SA group to the NSSI groups, irrespective of frequency of NSSI. This suggests that NSSI+SA constitutes a more disadvantaged group that can be distinguished from those with NSSI by the number of adversities experienced and self-reported trauma symptoms. Previous studies also have found differences between groups (see Andover et al. 2012 for a review). However, this is to our knowledge the first study to include different frequency of NSSI in group categorization, thus not only showing differences between NSSI+SA and NSSI in general but also when compared to a high frequency NSSI group. Some studies have shown that the NSSI+SA group has more frequent NSSI (Boxer 2010; Jacobson et al. 2008) and it could therefore be

argued that differences found between groups were due to more frequent NSSI in the NSSI+SA group. Together with Jacobson et al. (2008) and Muehlenkamp et al. (2011), who controlled for frequency in their analyses of group differences, this study contributes to the clarification of this matter.

Compared to the NSSI+SA group, those with only suicide attempts reported having experienced less interpersonal events and adverse childhood circumstances. Trauma symptoms also differed significantly between the NSSI+SA group and those with only suicide attempts, with less severe symptoms in adolescents with only suicide attempts, thereby more closely resembling the NSSI groups, compared to which there were no large differences. However, the lack of significant differences for the SA group also can be attributed to the small *N* for this group and lack of power, and should therefore be interpreted with caution.

With regard to trauma symptoms, the biggest differences between groups were found for depression and posttraumatic stress. The highest levels of depressive symptoms, posttraumatic stress and dissociation were found in the NSSI+SA group. These symptoms previously have been found to be associated with both suicidal self-injury and NSSI in adolescents (Bridge et al. 2006; Gould et al. 2003; Lundh et al. 2011b; Weierich and Nock 2008; Zoroglu et al. 2003).

There seem to be both co-occuring and distinguishing features between the different SIB groups. The NSSI and NSSI+SA groups share experiences of more adverse life events and trauma symptoms compared to the adolescents with no self-injurious behavior. At the same the number of adverse life events and symptoms is also what differentiates between groups, indicating that it is meaningful to separate self-injurers on the basis of intent to die. It appears that the different SIB groups are distinguishable and in this study the NSSI and the SA groups fall between those without any self-injurious behavior and those with both NSSI+SA, as in Asarnow et al. (2011) and Muehlenkamp and Gutierrez (2007). The results in this study lend support to the general qualitative theory (see e.g., Horesh et al. 2009) that emphasizes the nonspecific undesirability of a stressful life event in relation to psychopathology, with adolescents with NSSI and suicide attempts reporting more negative life events than adolescents without self-injurious behavior. There was also some support for the specific qualitative theory, which postulates that there may be specific events that are important for specific pathologies.

In this study the largest ES found between groups was for interpersonal events compared to non-interpersonal events, as well as for symptoms of depression and posttraumatic stress. Previous trauma research has shown that the sum of adverse events adds to the risk of a variety of mental health problems among children and adolescents (e.g., Finkelhor et al. 2007; Nilsson et al. 2012). Nock and Kessler (2006), for example, found that multiple sexual abuse and high rates of physical assault increased the risk of suicide attempts. The results in this study support the view by Muehlenkamp et al. (2011) that "…the presence of both NSSI and suicide attempt may be a general behavioral marker of increased distress…" (p. 152) in a particularly vulnerable and exposed group. The cumulative experience of multi-adversities and symptoms for this group perhaps contributes to the wish to end one's life (Brausch and Gutierrez 2010). The results can also be seen in the light of Joiner's (2005) theory of suicide, postulating that repeated painful experiences (such as sexual and physical abuse) together with past self-injury may habituate for pain and provocation, potentially leading to the ability to cause lethal self-injurious behavior.

Study Strengths

This study is an important contribution to recent years' upcoming research concerning distinguishing and overlapping features of suicidal and non-suicidal self-injury, separately and in combination, in adolescents. The large sample made it possible to categorize adolescents with NSSI into several groups based on NSSI frequency, further ameliorating analyses of group differences. The use of lifetime rather than annual prevalence of self-injurious behavior was an advantage in group categorization.

Study Limitations

The study's cross-sectional design rules out conclusions involving causality. Further studies are sorely needed with a longitudinal design. Retrospective self-report as a method also has its limitations, with a possible bias in recalling early incidents. It seems improbable, for example, that anyone who has performed NSSI would not have thought about it prior to the event, yet many adolescents reported not having done so (see Table 1). There is therefore uncertainty whether the findings reflect participants' actual experiences or are due to methodological problems. Another concern, raised by Muehlenkamp and Gutierrez (2007), is that the dependent variables (adverse life events and trauma symptoms in this study) were perhaps not close in time to the actual self-injurious behavior, since it is measured as lifetime prevalence. Their conclusion, however, is that this probably would lead to conservative estimates. With regard to drop-out, there was a larger proportion of adolescents who reported suicide attempt (SA and NSSI+SA groups) among those excluded due to incomplete questionnaires, although differences were not statistically significant. Those excluded differed from those

included on demographics such as type of education, parental occupation status, living conditions and perception of family's financial situation. It is therefore likely that the excluded adolescents represented a risk group, with perhaps greater issues in trauma and adverse experience. This also may be one reason why they did not respond sufficiently on LYLES and TSCC. Regarding ethnicity, significantly more among those excluded were born in countries other than Sweden as were their parents, probably reflecting language barriers that hindered them from filling out an extensive questionnaire. Exclusion probably led to conservative estimates of group differences. The TSCC measures self-reported trauma symptoms and validated diagnoses are lacking, which would have been optimal. An important limitation concerns the categorization of individuals into SIB groups. Since categorization was based solely on self-report, the distinction between NSSI and suicide attempts was not always clear. Participants were not interviewed in order to clarify their understanding of the questions pertaining to self-injurious behaviors and the meaning of their answers, which would have been optimal. Such an approach would have probably led to lower prevalence of NSSI. Seventeen adolescents gave ambiguous answers to the suicide intent questions. In accordance with Jacobson et al. (2008), the non-zero rule (O'Carroll et al. 1996) was applied in these cases. The implication of this is that they were categorized as belonging to either the SA or the NSSI+SA group, when a more strict definition of suicide attempt would perhaps have placed them in the no SIB group or the NSSI group instead. When sufficient information about NSSI frequency was not available, adolescents were placed in the lowest category (1–4 times) for conservative reasons, and thus this group might include adolescents with more frequent NSSI. Finally, although the sample was large and representative for Swedish adolescents it cannot be generalized to other countries and cultures.

Conclusions and Clinical Implications

This study showed that groups of adolescents with self-injurious behaviors, with and without suicide intent, separately and in combination, do in fact differ. This implies that it is meaningful to separate self-injurious behavior on the basis of suicide intent. The behaviors also co-occur and it is thus important to inquire into the possible presence of NSSI when assessing and treating adolescents with suicidal behavior, as well as assessing suicide ideation and plans in adolescents with NSSI. This study showed an almost linear relationship between the number of adversities and trauma symptoms and frequency of self-injurious behavior. Adolescents with no self-injurious behavior reported the lowest level of self-injurious thoughts, socioeconomic disadvantage, adversities and trauma symptoms. Adolescents with NSSI reported more adversities and trauma symptoms, which is consistent with the notion that NSSI may serve to regulate affective and social experiences in adolescents who are burdened by adversities and distress. Adolescents reporting frequent NSSI reported more adversities and trauma symptoms than those with less frequent NSSI. Hence, frequent NSSI can indicate a need to inquire about the adolescent's trauma history. Adolescents with both NSSI and suicide attempts reported the highest levels of adversities and trauma symptoms and appeared to be a particularly burdened and distressed group, who also reported more self-injurious thoughts and socioeconomic disadvantages compared to NSSI alone. Including several different types of childhood adversities and examining both the quantitative and qualitative importance of such experiences in different kinds of self-injurious behavior is an important addition to existing research. Considering cumulative experiences of adversities and trauma symptoms may be an important step towards understanding why some adolescents with NSSI also try to commit suicide, although the relationship is complex and caution must be taken regarding causality. Longitudinal studies are needed. Regarding adversities, the largest difference between groups was found for adversities of an interpersonal nature. A clinical implication of this result is that it is important to pay attention to experiences of adverse life events, especially of an interpersonal nature, as well as symptoms of depression and posttraumatic stress when working with adolescents with self-injurious behavior.

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MZ conceived the study, participated in the design of the study, performed the data collection and the statistical analysis, helped to draft the manuscript; L-GL helped to draft the manuscript and revised it critically; CGS participated in the design of the study, helped to draft the manuscript and revised it critically. All authors read and approved the final manuscript.

Conflict of interest The authors declare that they have no conflict of interest.

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