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Risk factors related to self-harming behaviour in Finnish adolescent inpatients with a history of non-suicidal self-injury, suicidal behaviour or both

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Abstract

Theoretically, non-suicidal self-injury and suicide attempt are regarded as behaviours on a single continuum of self-injury. The aim of the present study was to shed more light on clinical differences between adolescent inpatients with non-suicidal self-injury (NSSI), those with suicidal behaviour (SB) and those with both SB and NSSI. We studied risk factors related to self-harming behaviour in an inpatient sample (N=205) consisting of 13- to 17-year-old adolescents referred to psychiatric hospital for the first time in their lives between 2006 and 2010. Of them, 86 (42.0%) reported no history of self-harm, 62 (30.2%) showed a history of SB but no history of NSSI, 10 (4.9 %) had a history of NSSI and 47 (22.9%) had a history of both SB and NSSI. Depressive disorders and bipolar disorders, self-reported psychiatric symptoms (measured by SCL-90) and symptoms of depression were associated with SB. Social dysfunction was related to NSSI. Sexual abuse, impulsivity and symptoms of depression were related to SB with NSSI. Self-reported psychoticism was associated with all three self-harming groups. As could be expected, more severe self-harming behaviour (SB) was closely related with psychiatric diagnosis, while the risk factors for NSSI were related to difficulties in peer relationships.

Introduction

Rates of non-suicidal self-injury (NSSI) and suicidal behaviour increase from childhood to adolescence and peak in prevalence among 15- to 19-year olds (1). Both NSSI and suicide attempt are regarded as behaviours on a single continuum of self-injury (1). The most common function of NSSI in adolescents is to escape from either adverse emotions (e.g. sadness and anxiety) or cognitive (e.g. negative memories or thoughts) states (2). NSSI has been regarded as a strategy of emotional adaptation and regulation (1), but if this strategy fails, the adolescent may undertake more severe forms of self-injury, which become progressively closer to suicidal behaviour (SB) (1).

By definition, both NSSI and SB involve intentional harm of oneself, but, unlike adolescents with SB, those with NSSI do not show an intention to die (3). The increasing rate of NSSI is of particular concern since individuals with a history of NSSI are at increased risk of suicide (4). According to the interpersonal theory of suicide, NSSI builds up suicide capability by habituating the self-injurer to the pain and fear involved in a suicide attempt (5).

Adolescents with NSSI and SB share many common risk factors including childhood trauma and abuse (6-8), negative peer interaction (9), family conflict (8), isolation, loneliness, impulsivity, history of borderline personality disorder, (4), high level of physiological reactivity in response to stress, reduced ability to tolerate stress and deficits in social problem solving ability (8,10-11). On the other hand, adolescents with NSSI and those with SB also show a clinically important difference: adolescents with NSSI show a more positive attitude toward life than those with SB (4,12).

Previous research, studying factors that differentiate between adolescents who show NSSI only, adolescents with SB only and adolescents with both SB and NSSI, has found that adolescents with both SB and NSSI show a higher prevalence of psychiatric disorders, particularly major depressive disorder and post-traumatic stress disorder (PTSD), than adolescents in other self-harming groups (2). Adolescents with both SB and NSSI exhibit greater psychiatric symptom severity (e.g. depressive symptoms) and higher traits of impulsivity than adolescents with NSSI only or adolescents with SB only (2). Further, adolescents with a history of both SB and NSSI show higher levels

of self-directed aggressiveness during inpatient treatment than the other groups. They have also experienced more frequently sexual abuse, hospitalizations and residential treatment placements than adolescents with NSSI only or adolescents with SB only. According to Boxer and colleagues (7), adolescents with NSSI only and those with both SB and NSSI spent significantly more time in psychiatric treatment compared to adolescents with SB only.

The aim of the present study was to study differences between adolescent inpatients with NSSI only, those with SB only and those with both SB and NSSI. Our special interest was on risk factors related to self-harming behaviour.

Based on extant literature, we analysed differences in psychiatric disorders, psychiatric symptoms, impulsivity, alcohol use, adverse childhood experiences, family factors and social functioning between the above mentioned patient groups.

Method

Participants and procedure

The Kellokoski Hospital Adolescent Inpatient Follow-Up Study (KAIFUS) is a longitudinal naturalistic study of the clinical characteristics in a consecutive sample of adolescent psychiatric inpatients in Finland. This inpatient sample consists of 13- to 17-year-old adolescents referred to psychiatric hospital for the first time in their lives between 2006 and 2010 (N=395). Non-eligible patients were those who had a treatment period of less than two weeks, those who showed intellectual disability, those under 13 years of age and those with poor knowledge of the Finnish language (N=80, 20.2%). Of the 315 eligible patients, 62 (19.7%) declined to participate, or their parents or legal guardians did not provide their permission to participate. In 23 (7.3%) cases, patients or their parents discontinued the treatment period, and 24 (7.6%) cases had incomplete data. Thus, the sample comprised 206 inpatients. Non-participation was unrelated to age (p=0.31), living situation (p=0.58), substance use (p=0.59), mood (p=0.92), anxiety (p=0.39), eating (p=0.34) or conduct disorders (p=0.09) as principal diagnoses, but it was associated with male gender (p=0.02) and a diagnosis of psychotic disorder (p=0.02). When we analysed the variables related to self-harm, data of one girl turned out to be missing. So, the final sample of this study comprised 205 adolescents (60 boys) with a mean age of 15.1 years (SD=1.2). For more details, see Minna Rytilä-Manninen and colleagues (13).

Measurements

The Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL) (14) was performed to assess psychiatric diagnoses.

Self-harm was measured using questions included in the K-SADS-PL interview. The information on suicidal behaviour was based on the following two questions concerning the suicidal ideation and suicide method: "Have you thought about death?" and "Have you had suicide plans?" ("none"=not present; "sub-threshold"=thought about death but not specific method; and "threshold"=have often thought about death and have also thought the suicide method) and the seriousness of suicidal intent: "Have you actually tried to kill yourself?" ("none"=no attempt or gesture with any intent to die; "sub-threshold"=present, but very ambivalent; and "threshold"=definite suicidal intent). The person with SB was regarded as a person who fulfilled the threshold criteria for serious suicidal ideation (often thinks of suicide and has thought of a specific method, and/or fulfilled the sub-threshold or threshold criteria for one or more suicidal acts (with ambivalent or definite suicidal intent). The information on non-significant self-injury was based on the question about non-suicidal physical self-damaging acts without any intent to die ("none"=not present; "sub-threshold"=infrequent (one to three times a year) but has never caused serious injury; and "threshold"=frequent (four or more times a year) or has caused serious self-injury (for example burned skin or broken bones). A person was defined as having engaged in non-significant self-injury if a non-suicidal physical self-damaging act fulfilled the threshold level. A person with no history of SB or NSSI was regarded as a person with no self-harming behaviour. And finally, a person could have both types (SB and NSSI) of self-harming behaviour.

Data on adverse childhood experiences (ACE) were gathered using a structured background data collection sheet, the K-SADS-PL interview screening section for PTSD, and the Life Events Checklist (LEC) (15). Adolescents were asked if their parents had divorced (no/yes), and if their mother or father had suffered from psychiatric or substance use problems requiring professional help (no/yes). Parents' criminality was assessed using the LEC question: "Have your parents ever been arrested or suspected or judged for a criminal offence?" (no/yes). The information about witnessing intimate partner violence (no/yes) and exposure to physical (no/yes) or sexual abuse (no/yes) was based on the K-SADS-PL interview.

The accumulation of different ACE categories was described by creating an ACE total score, ranging from zero (the person had not been exposed to any studied ACE categories) to seven (the person had been exposed to all studied ACE categories). In this study, the mean ACE total score was 2.2 (SD 1.6). For details, see Rytilä-Manninen and colleagues (13).

Psychiatric symptoms were measured using the Symptom Checklist-90 (SCL-90) (16), which is a self-report measure for people aged 13 or older. It consists of 90 items, which measure subjective symptoms on nine primary symptom dimensions. Items are rated on a five-point Likert scale of distress, ranging from "not at all" (0) to "extremely" (4). Thus, the sum score can range from zero to 360. The reference period for the symptoms is the last two weeks. The psychometric properties of SCL-90 have been shown to be good for adolescents (17). In this study, Cronbach's alphas ranged from 0.800 (paranoid ideation) to 0.943 (depressive disorders). For further analyses, the SCL-90 sum score was used.

Impulsivity, family dysfunction and social dysfunction were measured with the Offer Self-Image Questionnaire (OSIQ-R) (18), which is a 129-item personality test for adolescents between the ages of 13 and 18. Items are rated on a six-point Likert scale, ranging from "describes me very well" (1) to "does not describe me at all" (6). OSIQ-R comprises twelve component scales, but, in this study, only those described below were used. *Impulse control* is a nine-item scale to measure whether the adolescent can handle pressure. The scale score can range from 9 to 54. Higher scores suggest that a teenager has low frustration tolerance and often acts on impulse. In this study, the Cronbach's alpha for this scale was 0.659. *Social functioning* is also a nine-item scale used to assess patterns of interpersonal relationships and friendships. The scale score can range from 9 to 54. Higher scores indicate that a teenager is unable to have and maintain close relationships with individuals of his or her own age and feels uncomfortable when socializing with peers. In this study, the Cronbach's alpha for this scale was 0.819. *Family functioning* is a 19-item scale focusing on the adolescent's feelings about, and relationships with his or her parents, as well as emotional atmosphere at home. The scale score can range from 19 to 114. Higher scores indicate that the adolescent feels that there is tension at home, that the relationships are problematic and that he/she is not getting support from his/her parents. In this study, the Cronbach's alpha for this scale was 0.842. The OSIQ has been widely used and validated for Finnish adolescents (19-22).

Alcohol use was self-assessed with the Alcohol Use Disorders Identification Test (AUDIT) (23), which includes 10 items scored from 0 to 4. Thus, the AUDIT sum score can range from zero to 40. Self-assessment has shown good psychometric properties (24). In this study, the Cronbach's alpha was 0.914.

Ethics

Participation was voluntary. All participants and their legal guardians gave their written informed consent. Permission to conduct the study was granted by the authorities of the Helsinki and Uusimaa Hospital District. The Ethics Committee of Helsinki University Hospital approved the study protocol.

Data analysis

The distributions of variables are presented as percentages for categorical variables and means (M) and standard deviations (SD) for continuous variables. The chi-square (χ^2) test, Fisher's exact test and columns proportions were compared with z-test with Bonferroni correction (post hoc analysis), analysis of variance (ANOVA) with Tukey's post hoc comparison test, and multinomial logistic regression models were used to compare the groups. P-values <0.05 were considered statistically significant. Analyses were performed using SPSS 22.0 for Windows.

Results

Bivariate analyses

Of 205 adolescent inpatients, 86 (42.0%) reported no history of self-harm, 62 (30.2%) showed a history of SB but no history of NSSI, 10 (4.9 %) had a history of NSSI and 47 (22.9%) had a history of both SB and NSSI. Gender and diagnostic distributions in these four groups are presented in Table 1. Fisher's exact test revealed significant differences between the self-harming groups on depressive disorder (p=0.025) and bipolar disorder (p=0.028), but other diagnoses showed no significant group differences. When the different forms of self-harming behaviour were tested against each other in the post hoc analyses, no significant differences were found. Female gender seemed to be over-represented in all three self-harming groups and this gender difference was significant (p<0.001).

Table 1. Distribution of gender and psychiatric diagnoses in different self-harming groups.

	Adolescents with no self-harming behaviour (n=86)	Adolescents with SB but without NSSI (n=62)	Adolescents with NSSI but without SB (n=10)	Adolescents with both SB and NSSI (n=47)	Total (N=205)	p
Gender; n (%)						
Female	45 (52.3)	50 (80.6)	9 (90.0)	41 (87.2)	145 (70.7)	<0.001
K-SADS-PL Diagnosis; n (%)						
Depressive disorder	44 (51.2)	45 (72.6)	4 (40.0)	31 (66.0)	124 (60.5)	0.025[a]
Bipolar disorder	2 (2.3)	9 (14.5)	1 (10.0)	3 (6.4)	15 (7.3)	0.028[b]
Anxiety disorder	27 (31.4)	21 (33.9)	6 (60.0)	22 (46.8)	76 (37.1)	0.131
Alcohol use disorder	10 (11.6)	5 (8.1)	1 (10.0)	3 (6.4)	19 (9.3)	0.760
Conduct disorder	25 (29.1)	15 (24.2)	0 (0.0)	11 (23.4)	51 (24.9)	0.239
Psychotic disorder	11 (12.8)	4 (6.5)	2 (20.0)	5 (10.6)	22 (10.7)	0.394
Eating disorder	14 (16.3)	10 (16.1)	2 (20.0)	6 (12.8)	32 (15.6)	0.885
PTSD or adjustment disorder	8 (9.3)	5 (8.1)	1 (10.0)	9 (19.1)	23 (11.2)	0.288
ADHD	11 (12.8)	6 (9.7)	0 (0.0)	3 (6.4)	20 (9.8)	0.613

SB=suicidal behaviour, NSSI=non-suicidal self-injury

[a] column proportions do not significantly differ from each other in the post hoc analysis

[b] column proportion of no self-harming behaviour differs significantly from SB without NSSI in post hoc analysis but the self-harming behaviours do not differ from each other

The distribution of various ACE is presented in Table 2. According to Fisher's exact test, significant group differences were found on parental criminality (p=0.045) and sexual abuse (p<0.001). Again, the different forms of self-harming behaviour did not differ from each other in the post hoc analyses. Other ACE showed no significant group differences.

To determine group differences in the continuous outcome variables, including psychiatric symptoms, alcohol use, impulsivity, family dysfunction, social dysfunction and ACE total score, ANOVA was conducted. Analysis indicated an overall effect for group membership (adolescents with no self-harming behaviour, adolescents with SB only, adolescents with NSSI only, adolescents with both SB and NSSI) on psychiatric symptom scores, impulsivity scores, family dysfunction scores and social dysfunction scores (Table 3). Tukey's post hoc comparison test showed that the participants with no self-harming behaviour had significantly lower psychiatric symptom scores and social dysfunction scores than the three groups with self-harming behaviour. The group with no self-harming behaviour scored significantly lower on both impulsivity and family dysfunction scores than the SB group and the SB and NSSI group.

Next, the group differences in the SCL-90 sub-scales (Somatization, Interpersonal sensitivity, Depression, Anxiety, Phobic anxiety, Paranoid ideation, Psychoticism, Obsessive-compulsivity and Hostility) were investigated (Table 4). ANOVA indicated an overall effect for group membership (adolescents with no self-harming behaviour, adolescents with SB only, adolescents with NSSI only, adolescents with both NSSI and SB) on all sub-scale scores. Tukey's post hoc comparison test revealed that the group with no self-harming behaviour showed significantly lower scores on sub-scales Somatization, Depression, Anxiety, Phobic anxiety, Psychoticism, Obsessive compulsivity and Hostility than the three groups with self-harming behaviour. The group with no self-harming behaviour exhibited significantly lower scores on both Interpersonal sensitivity and Paranoid ideation sub-scales than the SB group and the SB and NSSI group.

Table 2. Distribution of adverse childhood experiences in different self-harming groups.

	Adolescents with no self-harming behaviour (n=86)	**Adolescents with SB but without NSSI (n=62)**	**Adolescents with NSSI but without SB (n=10)**	**Adolescents with both SB and NSSI (n=47)**	**Total (N=205)**	**p**
Parental divorce	51 (59.3)	30 (48.4)	7 (70.0)	24 (51.1)	112 (54.6)	0.513
Parental psychiatric problems	33 (38.4)	27 (43.5)	5 (50.0)	16 (34.0)	81 (39.5)	0.674
Parental alcohol problems	29 (33.7)	21 (33.9)	3 (30.0)	16 (34.0)	69 (33.7)	1.000
Parental criminality	3 (3.5)	2 (3.2)	1 (10.0)	7 (14.9)	13 (6.3)	**0.045**[a]
Witnessing intimate partner violence	28 (32.6)	18 (29.0)	3 (30.0)	15 (31.9)	64 (31.2)	0.979
Physical abuse	18 (20.9)	15 (24.2)	1 (2.1)	13 (27.7)	47 (22.9)	0.678
Sexual abuse	6 (7.0)	15 (24.2)	2 (20.0)	21 (44.7)	44 (21.5)	**< 0.001**[b]

SB=suicidal behaviour, NSSI=non-suicidal self-injury

[a] column proportions do not significantly differ from each other in the post hoc analysis

[b] column proportion of no self-harming behaviour differs significantly from SB without NSSI, and from SB with NSSI in post hoc analysis but the self-harming behaviours do not differ from each other

Table 3. Descriptive statistics for analysed continuous variables across different self-harming groups.

	Adolescents with no self-harming behaviour (n=86)	Adolescents with SB but without NSSI (n=62)	Adolescents with NSSI but without SB (n=10)	Adolescents with both SB and NSSI (n=47)	F	df	p
Psychiatric symptoms; mean (SD)	79.0 (62.3)	132.9 (69.4)	162.8 (60.9)	148.9 (60.1)	16.26	3, 192	< 0.001[a]
Alcohol use	3.0 (5.8)	4.4 (6.7)	2.7 (5.8)	5.8 (7.8)	1.98	3, 187	NS
Impulsivity	27.9 (7.11)	32.5 (6.3)	34.7 (6.8)	35.3 (6.5)	12.25	3, 179	< 0.001[b]
Family dysfunction	49.4 (14.9)	59.7 (17.1)	57.2 (5.0)	61.7 (14.8)	7.24	3, 170	< 0.001[c]
Social dysfunction	23.9 (8.1)	29.8 (7.5)	34.1 (5.1)	30.6 (7.5)	7.24	3, 170	< 0.001[d]
ACE total score	2.1 (1.6)	2.2 (1.6)	2.5 (1.2)	2.6 (1.8)	1.38	3, 201	NS

Comparisons made using ANOVA with Tukey's post hoc test.
SB=suicidal behaviour, NSSI=non-suicidal self-injury, NS=not statistically significant
[a] The psychiatric symptoms sum score of adolescents with no self-harming behaviour was significantly lower than those of all three self-harming groups
[b] The impulsivity sum score of adolescents with no self-harming behaviour was significantly lower than that of adolescents with SB and that of adolescents with both SB and NSSI, but no statistically significant difference was observed between adolescents with no self-harming behaviour and those with NSSI
[c] The family dysfunction sum score of adolescents with no self-harming behaviour was significantly lower than that of adolescents with SB and that of adolescents with both SB and NSSI, but no statistically significant difference was observed between adolescents with no self-harming behaviour and those with NSSI
[d] The social dysfunction sum score of adolescents with no self-harming behaviour was significantly lower than those of all three self-harming groups

Table 4. The Symptom Checklist-90 sub-scales in different self-harming groups.

	Adolescents with no self-harming behaviour (n=86)	Adolescents with SB but without NSSI (n=62)	Adolescents with NSSI but without SB (n=10)	Adolescents with both SB and NSSI (n=47)	F	df	p
Somatization	8.6 (8.1)	12.5 (8.7)	17.4 (7.7)	14.3 (8.0)	7.34	3, 201	< 0.001[a]
Interpersonal sensitivity	9.1 (8.1)	14.7 (8.2)	15.9 (8.7)	16.0 (7.3)	10.12	3, 196	< 0.001[b]
Depression	15.2 (12.1)	27.8 (14.1)	29.1 (8.9)	30.4 (10.6)	20.39	3, 196	< 0.001[a]
Anxiety	8.3 (7.9)	14.8 (9.0)	19.9 (7.7)	16.2 (8.0)	14.27	3, 196	< 0.001[a]
Phobic anxiety	4.7 (5.4)	8.5 (7.3)	11.9 (7.4)	8.2 (6.3)	7.35	3, 196	0.001[a]
Paranoid ideation	5.3 (4.6)	8.5 (5.9)	8.2 (4.9)	8.9 (5.3)	6.76	3, 196	< 0.001[b]
Psychoticism	5.1 (5.4)	10.5 (8.6)	16.1 (8.7)	12.7 (6.7)	17.33	3, 196	< 0.001[a]
Obsessive-compulsivity	10.8 (8.7)	16.2 (9.1)	21.6 (7.4)	18.9 (8.9)	11.56	3, 196	< 0.001[a]
Hostility	5.1 (4.7)	7.3 (5.3)	9.6 (5.2)	9.3 (4.9)	8.65	3, 196	< 0.001[a]

SB=suicidal behaviour, NSSI=non-suicidal self-injury
[a] The sub-scale score of adolescents with no self-harming behaviour was significantly lower than those of all three self-harming groups
[b] The sub-scale score of adolescents with no self-harming behaviour was significantly lower than that of adolescents with SB and that of adolescents with both SB and NSSI, but it did not significantly differ from that of adolescents with NSSI

Multinomial analyses

In order to assess potential mutual risk factors for self-harming behaviour, multinomial regression analysis was performed. The group with no self-harm served as a reference group for all three self-harming groups. Age and gender were used as covariates in the analyses. First, all psychiatric diagnoses (see Table 1) were entered into the model. Depressive (OR 4.05, CI 1.65-9.94, p=0.002) and bipolar disorders (OR 15.22, CI 2.72-83.89, p=0.002) were significantly related to SB. Anxiety disorder was linked to SB with NSSI, but the finding did not quite reach statistical significance (OR 2.17, CI .995-4.71, p=0.051). None of the studied diagnoses were significantly related to NSSI only.

In the second phase, all adversities (parents' divorce, parental mental health problems, parental alcohol use problems, parental criminality, witnessing intimate partner violence, physical abuse and sexual abuse) were entered into the model. Only one statistically significant result was found: sexual abuse was significantly related to SB with NSSI (OR 7.48, CI 2.53-22.09, p<0.001). Multinomial regression analysis revealed that the ACE total score was related to SB with NSSI, but the finding did not reach statistical significance (OR 1.25, CI 1.00-1.56, p=0.050).

In the third phase, impulsivity, social dysfunction, family dysfunction, alcohol use and psychiatric symptoms were entered into the model (Table 5). Impulsivity was significantly related to SB with NSSI (OR 1.08, CI 1.00-1.16, p=0.044), and psychiatric symptoms were significantly related to SB (OR 1.01, CI 1.00-1.02, p=0.023) and to SB with NSSI (OR 1.01, CI 1.00-1.02, p=0.035). Entering the ACE total score to the model revealed some substantial changes: psychiatric symptoms no longer associated significantly with SB, but social dysfunction was significantly related to NSSI (OR 1.19, CI 1.00-1.41, p=0.048).

In the fourth phase, in order to assess psychiatric symptomatology more closely, we entered all SCL-90 sub-scales into the multinomial regression model (Table 6). The sub-scale Psychoticism was significantly associated with all three self-harming groups, with the strongest association with NSSI (OR 1.45, CI 1.17-1.81, p=0.001), followed by SB with NSSI (OR 1.19, CI 1.05-1.35, p=0.006). The sub-scale Depression was significantly related to SB (OR 1.10, CI 1.03-1.18, p=0.006) and to SB with NSSI (OR 1.10, CI 1.02-1.19, p=0.011). When the ACE total score was entered to the model, the significances did not change.

Table 5. Multinomial regression analyses of associations between different groups of self-harming behaviour and impulsivity, social dysfunction, family dysfunction, alcohol use and psychiatric symptoms.

Group	Variable	OR	CI 95%	p
Step 1				
SB	Impulsivity	1.02	0.950-1.092	0.610
	Social dysfunction	1.04	0.977-1.110	0.215
	Family dysfunction	1.02	0.989-1-048	0.230
	Alcohol use	1.02	0.955-1.099	0.504
	Psychiatric symptoms	1.01	1.001-1.017	**0.023**
NSSI	Impulsivity	1.06	0.908-1.240	0.453
	Social dysfunction	1.17	0.997-1.373	0.054
	Family dysfunction	0.99	0.919-1.056	0.678
	Alcohol use	1.02	0.875-1.188	0.807
	Psychiatric symptoms	1.01	0.991-1.022	0.435
SB+NSSI	Impulsivity	1.08	1.002-1.164	**0.044**
	Social dysfunction	1.04	0.966-1.114	0.314
	Family dysfunction	1.02	0.985-1.051	0.291
	Alcohol use	1.04	0.965-1.117	0.320
	Psychiatric symptoms	1.01	1.001-1.018	**0.035**
Step 2				
SB	Impulsivity	1.01	0.942-1.087	0.745
	Social dysfunction	1.04	0.975-1.111	0.231
	Family dysfunction	1.01	0.982-1.044	0.430
	Alcohol use	1.01	0.936-1.085	0.837
	Psychiatric symptoms	1.01	1.001-1.016	**0.035**
	ACE total score	1.04	0.817-1.412	0.767
NSSI	Impulsivity	1.05	0.895-1.229	0.557
	Social dysfunction	1.19	1.001-1.406	**0.048**
	Family dysfunction	0.97	0.904-1.041	0.403
	Alcohol use	1.00	0.856-1.172	0.986
	Psychiatric symptoms	1.00	0.988-1.020	0.627
	ACE total score	1.35	0.686-2.661	0.385
SB+NSSI	Impulsivity	1.10	1.000-1.168	**0.049**
	Social dysfunction	1.06	0.980-1.141	0.151
	Family dysfunction	1.01	0.972-1.042	0.712
	Alcohol use	1.03	0.995-1.110	0.443
	Psychiatric symptoms	1.01	0.999-1.017	0.071
	ACE total score	1.29	0.958-1.748	0.093

Table 6. Multinomial regression analyses of associations between different groups of self-harming behaviour and the Symptom Checklist-90 sub-scales.

Category	Variable	OR	CI 95%	p
SB	Somatization	0.95	0.879-1.026	0.191
	Interpersonal sensitivity	0.92	0.827-1.017	0.102
	Depression	1.10	1.028-1.182	**0.006**
	Anxiety	1.04	0.926-1.174	0.490
	Phobic anxiety	0.99	0.897-1.100	0.900
	Paranoid ideation	0.99	0.872-1.132	0.922
	Psychoticism	1.15	1.023-1.292	**0.019**
	Obsessive-Compulsivity	0.94	0.882-1.054	0.425
	Hostility	0.93	0.828-1.049	0.244
NSSI	Somatization	0.94	0.813-1.082	0.381
	Interpersonal sensitivity	0.88	0.706-1.092	0.243
	Depression	0.94	0.801-1.099	0.428
	Anxiety	1.16	0.931-1.452	0.184
	Phobic anxiety	1.07	0.868-1.320	0.526
	Paranoid ideation	0.72	0.543-0.957	0.023
	Psychoticism	1.45	1.173-1.812	**0.001**
	Obsessive-Compulsivity	1.12	0.935-1.344	0.219
	Hostility	0.87	0.694-1.086	0.216
SB+NSSI	Somatization	0.95	0.871-1.033	0.228
	Interpersonal sensitivity	0.93	0.828-1.038	0.187
	Depression	1.10	1.022-1.188	**0.011**
	Anxiety	1.02	0.893-1.154	0.818
	Phobic anxiety	0.95	0.844-1.058	0.323
	Paranoid ideation	0.93	0.807-1.072	0.320
	Psychoticism	1.19	1.051-1.345	**0.006**
	Obsessive-Compulsivity	1.02	0.926-1.118	0.723
	Hostility	1.01	0.892-1.133	0.931

SB=adolescents with suicidal behaviour, but without non-suicidal selfinjury;
NSSI=adolescents with non-suicidal self-injury, but without suicidal behaviour;
SB + NSSI=adolescents with both suicidal behaviour and nonsuicidal self-injury

Discussion

The aim of the present study was to study differences between adolescent inpatients with different kinds of self-harming behaviour. As compared to previous inpatient studies with approximately 30% of adolescents being engaged in NSSI (7,25), the prevalence of our adolescents with NSSI only, turned out to be remarkably low (4.9%). This is most probably explained by the Finnish treatment culture, where patients with NSSI are mainly treated in outpatient clinics. In accordance with previous studies (7,25) approximately 30% of our inpatients showed a history of SB but no NSSI. The prevalence of adolescents with a history of both SB and NSSI was approximately 23%. In earlier studies, the prevalence of these inpatients has ranged from 18.9% (26) to 30.9% (7), and even up to over 70% (25,27). Despite these somewhat inconsistent findings, it looks clear that NSSI and SB often co-occur. Indeed, studies have demonstrated that NSSI is a strong risk factor for later suicidality (26,28-29) even after adjusted for other risk factors (1,30) and thus, NSSI could be regarded as a gateway toward more severe forms of self-harming behaviour. These findings indicate that NSSI should always be taken seriously in clinical settings in order to prevent later suicidality.

Both depressive and bipolar disorders were significantly associated with SB, but we were unable to find any other substantial relations between different diagnoses and self-harming groups. Our finding related to depressive disorders is in accordance with some earlier studies, which have reported that suicidal adolescents are more likely to have a diagnosis of depression compared to their counterparts with NSSI (31-32). Different from our finding, Hamza and colleagues (30) have reported that adolescents with both SB and NSSI are more likely have a diagnosis of major depressive disorder and post-traumatic stress disorder (PTSD) than adolescents with NSSI only (32). Further, NSSI, SB, as well as SB together with NSSI have all been associated with borderline personality disorder in adolescence (32). Unfortunately, we were unable to study this kind of relation, since, during the study period, personality disorder diagnoses were not made in the index study wards. Nowadays, borderline personality disorder diagnosis is made according to national Treatment Guideline.

Focusing on ACE, adolescents with self-harming behaviour did not significantly differ from those with no self-harming behaviour with regard to parents' divorce, parental mental health or alcohol problems, witnessing intimate partner violence or physical abuse. In univariate analyses both sexual abuse and parents' criminality showed significant group differences. In multivariate analyses, however, only sexual abuse was significantly associated with SB with comorbid NSSI. This finding has been verified in numerous previous studies which all have reported that adolescents with both suicidality and NSSI commonly have experienced sexual and other abuse as well as childhood maltreatment (2,7,33-35). The relationship between abuse and maltreatment and later suicidality with NSSI appears to be explained by two factors (7). First, childhood abuse is a significant risk factor for future psychopathology, especially for internalizing problems (13,36-37). Secondly, being a victim of abuse and/or maltreatment habituates a person to pain, as well as to the anticipatory anxiety associated with pain.

In our sample, impulsivity was associated with SB with comorbid NSSI, but not with NSSI only. The finding is in accordance with a previous study by Dougherty and colleagues (38), which showed that adolescents with both SB and NSSI exhibit higher levels of impulsivity than their counterparts with NSSI only. It is known that adolescents with self-harming behaviour are more likely to report being bullied by their peers than their counterparts with no self-harming behaviour (39). It has also been reported that, among suicidal adolescents, loneliness increased the risk of self-mutilation to almost 6-fold (40). In the present study, subjective social dysfunction was associated with NSSI only. The finding is interesting, since it has previously been reported that adolescents with NSSI only tend to show less psychosocial dysfunction compared to SB and NSSI and those with SB only (1).

Self-reported depressive symptoms were associated with both SB and SB with comorbid NSSI, and the finding is in line with several previous studies (1,41). Our finding that self-reported psychoticism was associated with all self-harming groups is less often discussed in earlier studies. Stewart and colleagues (2) reported higher rates of psychotic symptoms among adolescents with no current suicide ideation and no lifetime suicide attempts, and among those with current ideation and at least one lifetime attempt, compared to adolescents with current ideation and no lifetime attempts. On the other hand, in a community sample by Honings and colleagues (42), psychotic symptoms were regarded as a risk factor of both suicide ideation and suicide attempt. The explanation for our finding might be that all self-harming groups associate with depressive symptoms (43) and dissociative experiences (44), usually due to ACE and/or a borderline personality disorder (43). These depressive and dissociative symptoms, in turn, link to symptoms of psychoticism (45-46).

Strengths and limitations

One of the strengths of this study was its relatively high number of consecutive inpatients. However, of the eligible inpatients, as many as 109 (34.6%) dropped out from the study. Dropping out was related to male gender and psychotic disorder. Boys are known to suffer from externalizing disorders more often than girls, which may have somewhat skewed our results. We used the highly reliable and valid semi-structured K-SADS-PL interviews to set the DSM-IV-based psychiatric diagnoses. Unfortunately, the inter-rater reliabilities of the diagnoses derived from the K-SADS-PL was not measured. A structured background data collection sheet enabled us to consistently collect background information on all inpatients. However, data was partly collected retrospectively, which may have introduced a recall bias. The study method did not allow us to separate intra- and extrafamilial sexual abuse. In the hospital area, where the study took place, adolescent patients with neuropsychiatric, substance use and serious eating disorders are referred to special tertiary units rather than to local adolescent psychiatric wards. Further, in Finland, most adolescents with severe conduct disorders receive treatment under child welfare services, not under the specialty of adolescent psychiatry.

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