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Non-suicidal self-injury disorder as a stand-alone diagnosis in a consecutive help-seeking sample of adolescents

Denisa Ghinea[a,b], Alexandra Edinger[a,b], Peter Parzer[b], Julian Koenig[c,d], Franz Resch[b], Michael Kaess[a,c,*]

[a] Section for Translational Psychobiology in Child and Adolescent Psychiatry, Clinic of Child and Adolescent Psychiatry, Centre for Psychosocial Medicine, University Hospital Heidelberg, Germany
[b] Clinic of Child and Adolescent Psychiatry, Centre for Psychosocial Medicine, University Hospital Heidelberg, Germany
[c] University Hospital of Child and Adolescent Psychiatry and Psychotherapy, University of Bern, Switzerland
[d] Section for Experimental Child and Adolescent Psychiatry, Clinic of Child and Adolescent Psychiatry, Centre for Psychosocial Medicine, University Hospital Heidelberg, Germany

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ABSTRACT

Background: With inclusion of non-suicidal self-injury disorder (NSSID) in the DSM-5, empirical data are crucial to gather information regarding its clinical validity and relevance. Until now, research focused mostly on single diagnostic criteria of NSSID. The present study aimed to characterize NSSID with and without comorbid diagnoses in a large help-seeking adolescent sample, investigating the clinical validity and selectivity of NSSID within the theoretical framework of Robins and Guze.

Methods: Interview and self-report data of $n = 464$ adolescents (mean age = 14.95 years, $SD = 1.43$, 89.17% female) with NSSID according to DSM-5 from a German outpatient clinic were analysed with descriptive statistics. Group differences were calculated with χ^2 tests or t-tests respectively. Stability of NSSID without comorbidity was investigated after 12 months.

Results: Within a consecutive help-seeking sample, NSSID as a stand-alone diagnosis (without comorbidity) was rare (only 3.7%), associated with low illness severity and psychopathological distress, and prospectively rather unstable.

Limitation: Selection bias due to the help-seeking population and female preponderance.

Conclusion: Based on the theoretical framework applied, NSSI should be considered as an unspecific precursor for psychopathological development generally and suicide specifically but it may be of limited significance as a 'pure and sole' diagnostic entity. Results add to existing claims to re-propose classification criteria to better picture the clinical group of affected adolescents.

1. Introduction

Non-suicidal self-injury disorder (NSSID) was categorized as an independent disorder requiring further research within Section 3 of the DSM-5 (American Psychiatric Association, 2013). In the past years, substantial efforts have been made in collecting evidence on the *pro's* and *con's* of diagnostic classification of non-suicidal self-injury (NSSI) as presented in the DSM-5. Despite the benefits of NSSID (i.e. consistent definition, improved assessment, increased research activities, treatment development), most criticism has been expressed on the currently proposed low frequency threshold (criterion A) and minimum number of NSSI types and functions (criterion B) (Hooley et al., 2020; Selby et al., 2015). Currently, the field still warrants empirical data on the validity as well as clinical relevance and utility of NSSID.

According to Robins' and Guze's theoretical model, there are five phases to achieve diagnostic validity in psychiatric illness (Robins and Guze, 1970). First, the clinical picture of the disorder should be described. Characterizations of NSSID were described in a variety of samples, mostly in community samples (Brausch, 2019). However, to underpin the clinical relevance and utility more data from the clinical field is warranted. Second, laboratory studies are needed to enrich clinical descriptions. To date, emerging research pointed to altered neurobiological processes in NSSID; however, most findings are comparable to and may be explained by findings from associated disorders (Schreiner et al., 2015). Third, exclusion of other disorders is crucial in defining and validating psychiatric phenotypes. Past research on NSSID

* Corresponding author.
E-mail address: michael.kaess@upd.ch (M. Kaess).

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focused mainly on associations with borderline personality disorder (BPD). However, up to 80% of adolescents meeting criteria for NSSID do not meet criteria for BPD (In-Albon et al., 2013), and these adolescents nonetheless report greater co-occurring psychopathology and functional impairments compared to individuals with other diagnoses (Zetterqvist, 2015). Fourth, follow-up studies are required to investigate if patients present with other disorders in the course of illness, different to the 'original' disorder. In NSSI, there is a natural course with a peak in mid-adolescence and a decline in late adolescence with shifting symptoms to different problem behaviours (Brown and Plener, 2017). Further, NSSI is known to be a risk marker for the development of other disorders, e.g. BPD (Brown and Plener, 2017). Fifth, family studies are required to investigate genetic vulnerabilities. Regarding non-suicidal self-injury (NSSI), this is a rather neglected field which cannot be addressed within the following design either. Up so far, results indicate that genetic factors explain a substantial part of NSSI (Maciejewski et al., 2014). The same study suggested NSSI and suicidal ideation to share similar biological correlates.

According to this framework, our study aimed to add further information to the phases 1, 3 and 4, namely the clinical characterization and stability of NSSID as a stand-alone diagnosis and its distinction from other disorders within a large and consecutive sample of adolescent outpatients.

2. Method

2.1. Study sample and procedure

Participants were drawn from a consecutive clinical sample of adolescents presenting at the specialized German outpatient clinic for risk-taking and self-harm behaviour (AtR!Sk; *Ambulanz für Risikoverhalten und Selbstschädigung*) at the University Hospital Heidelberg, Germany. AtR!Sk offers low threshold access to risk-assessment, diagnostic assessment, and subsequent treatment (if necessary) for adolescents (aged 12 to 18 years) who are engaging in risk-taking (i.e., binge-drinking or drug abuse) and self-harm behaviour (NSSI and/ or suicide attempts; Kaess et al., 2017). The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975 and its subsequent revisions. All procedures involving human subjects/patients were approved by the Ethical Committee of the Medical Faculty Heidelberg (Study: ID S-449/2013). Written informed consent was obtained from all patients and their caregivers.

A total $n = 610$ patients participated in the scientific evaluation of AtR!Sk. Only adolescents who met full criteria for NSSID according to DSM-5 were included in the present statistical analyses ($n = 464$, mean age = 14.95 years, $SD = 1.43$, 89.87% female). The sample was split into 2 groups: NSSID-only (NSSID as a stand-alone diagnosis without any other psychiatric diagnoses) and NSSID+ (NSSID with comorbid psychiatric diagnoses). The subjects were followed up one year later. Due to shorter diagnostic assessment at follow up clinical evaluation of NSSID groups was based on criteria A and B only.

2.2. Clinical assessments

The German version of the *Self-Injurious Thoughts and Behaviour Interview* (Fischer et al., 2014) was used to assess NSSID (criteria A, B, C, D) and suicide attempts. Criteria E and F of NSSID were based on clinical evaluation using the instruments outlined below. Assessment of current psychiatric diagnoses was conducted through the German version of the *Mini-International Neuropsychiatric Interview for Children and Adolescents* (M.I.N.I-KID 6.0; Sheehan et al., 1998). To assess BPD, the German version of the *Structured Clinical Interview for DSM-IV-Axis II* (SCID-II; (First et al., 1997) was used. Adverse childhood experiences (ACE) were measured with the German version of the *Childhood Experience of Care and Abuse Questionnaire* (CECA.Q) (Kaess et al., 2011) constituting a categorical variable (yes/no), psychopathological distress with the German version of the *Symptom-Checklist-90 Revised* (SCL-90-R; Franke, 1995). Psychological, social and occupational functioning were assessed with the *Global Assessment of Functioning Scale* (GAF; American Psychiatric Association, 1994). Clinical severity was assessed via the *Clinical Global Impressions Scale* (CGI-S; Guy, 1976). The GAF score and CGI-S were rated by experienced clinicians at the end of diagnostic interview.

2.3. Statistical analyses

Descriptive statistics were used to characterize the sample at baseline and follow-up. Nominal data are presented as frequencies, while continuous data are presented as mean and standard deviation (SD). For variables with a highly askew distribution, data are presented as medians and interquartile ranges (IQR). The groups were compared with χ^2 tests or *t*-tests respectively. All analyses were performed with Stata (version 16; Stata Corp LLC, College Station, TX, USA).

3. Results

Out of $n = 610$ adolescents participating in the scientific evaluation of AtR!Sk (90% participation rate), $n = 464$ adolescents met full NSSID criteria. The NSSID-only group comprised $n = 17$ (94.12% female, mean age 14.53 years, $SD = 1.55$) versus $n = 447$ (89.71% female, mean age 14.96 years, $SD = 1.42$) in the NSSID+ group, representing a proportion of 3.66% of patients with NSSID-only. Median of NSSI frequency within the past year was 10 (IQR = 7–60) within the NSSID-only group and 50 (IQR = 20–102) within the NSSID+ group.

Groups significantly differed in the number of ACE and mean level of SCL-90-R, GAF, and GGI-S, with the NSSID-only group presenting a significantly lower burden on every dimension. Groups did not statistically differ regarding the occurrence of suicide attempts (SA) during the last year. However, the range of SA was 0–137 in the NSSID+ group vs. 1–2 in the NSSID-only group. For a comprehensive overview see Table 1.

Data of $n = 12$ adolescents were available at one year follow-up from the NSSI-only group. In total $n = 6$ (50.00%) of the 12 adolescents at follow-up did not meet the frequency criterion for NSSID anymore, and $n = 4$ (33.33%) met criteria for another psychiatric disorder ($n = 2$ substance use disorders, $n = 2$ affective disorders, $n = 1$ anxiety disorder, $n = 1$ BPD). $N = 8$ (66.67%) of the initial NSSID-only group still did not present with a psychiatric disorder at follow-up. Of those, only $n = 4$ still met criteria for NSSID one year later resulting in $n = 4$ out of 12 adolescents (33.33%) who had sole and stable NSSID over the course of one year.

For comparison, data of $n = 225$ adolescents of the initial NSSID+ group were available for follow up analysis. Due to the ongoing cohort study a substantial part of participants could not be included in the analyses since they were not in the one-year recruitment period yet. Clinical characteristics for this group at follow up 1 are presented in Table 1. $n = 45$ (20.00%) of the 225 adolescents at follow up did not meet frequency criterion for NSSID anymore; this was a significantly lower proportion compared to the NSSI-only group ($\chi^2 = 6.02$, $p = 0.014$).

4. Discussion

The aim of the present study was to set focus on the clinical description of NSSID in a large and consecutive adolescent help-seeking sample according to Robins' and Guze's theoretical framework on diagnostic validity (Robins and Guze, 1970). The present findings show that NSSID – as a stand-alone diagnosis – is rare in help-seeking adolescents (3.66%). Concurrently, the frequency as well as the diversity of comorbid disorders of NSSI is high. Our findings are consistent with

Table 1
Differences between NSSI-only and NSSI+ groups on single dimensions.

Dimension	Group			t / X^2	P
	NSSI+		NSSI-only		
Sex (N /% female)	401 (89.71)		16 (94.12)	0.35	*0.554*
Age (M / *SD*)	14.96 (1.42)		14.53 (1.55)	1.23	*0.218*
School type (N /%)[a]				1.24	*0.744*
Gymnasium	163 (36.47)		8 (47.06)		
Realschule	155 (34.68)		6 (35.29)		
Hauptschule	48 (10.74)		1 (5.88)		
Other	81 (18.11)		2 (11.76)		
Suicide attempts in past 12 months (N / %)	198 (44.3)		4 (23.5)	2.87	*0.133*
CECA.Q (N /%)	296 (72.55)		4 (25.00)	16.83	*<0.001*
GSI (M / *SD*)	1.75 (0.67)		0.91 (0.43)	$4.98_{(423)}$	*<0.001*
GAF (M / *SD*)	47.23 (10.30)		60.94 (12.59)	$-5.17_{(392)}$	*<0.001*
CGI-S (M / *SD*)	5.18 (0.76)		3.53 (1.23)	$8.59_{(438)}$	*<0.001*
Clinical diagnoses ICD-10 (*N* /%)	NSSI+(Baseline, $N = 447$)	NSSI+(Follow Up, $N = 225$)			
F0 (Organic, including symptomatic, mental disorders)	0 (0.00)	0 (0.00)			
F1 (Mental and behavioural disorders due to psychoactive substance use)	98 (21.12)	72 (32.00)			
F2 (Schizophrenia, schizotypal and delusional disorders)	0 (0.00)	0 (0.00)			
F3 (Mood [affective] disorders)	320 (71.95)	105 (46.67)			
F4 (Neurotic, stress-related and somatoform disorders)	185 (41.39)	110 (48.89)			
F5 (behavioural syndromes associated with physiological disturbances and physical factors)	71 (15.88)	27 (12.00)			
F6 (Disorders of personality and behaviour)	234 (52.35)	105 (46.67)			
Borderline Personality Disorder (BPD)	186 (41.61)	79 (35.43)			
F8 (Disorders of psychological development)	2 (0.45)	0 (0.00)			
F9 (behavioural and emotional disorders with onset usually occurring in childhood and adolescence)	129 (28.86)	42 (18.67)			

[a] Hauptschule: 9 years of elementary school; Realschule: 6 years of school after 4 years of elementary school, terminating with a secondary school level-I certificate; Gymnasium: 8 years of school after 4 years of elementary school, terminating with the general qualification for university entrance. Percentages refer to the respective NSSID group and take account of missing values.

studies showing that adolescents with NSSID report even greater co-occurring psychopathology and functional impairments compared to individuals with other diagnoses (Zetterqvist, 2015), questioning its diagnostic independence and selectivity according to Robins and Guze. While there was considerable psychological strain in both groups, significant differences were found, showing that the NSSI+ group demonstrated significantly higher burden of childhood adversity, more psychopathological distress, and lower psychosocial functioning. This finding suggests that mental distress and functional impairment of adolescents with NSSID seems to a large extend related to its psychiatric comorbidity.

The validity of NSSI has been studied in the past with inconsistent definitions and assessment tools in heterogeneous samples (Brausch, 2019). The clinical validity of NSSID has already been under debate in terms of increasing frequency thresholds (Muehlenkamp and Brausch, 2016) and extending types and functions (Hooley et al., 2020). Although mostly population-based research suggests the notion of NSSID as a stand-alone diagnosis (Zetterqvist, 2015), potentially with higher frequency thresholds, our data show that some requirements of an own diagnostic entity – at least in regards to the theoretical model our study is based upon – are not met. This finding is in line with a recent study investigating NSSID within a clinical sample of adolescents and adults (Washburn et al., 2015) reporting that as a dichotomous disorder, NSSID seems to have limited clinical utility. Nonetheless, it may be important to also acknowledge the benefits of a diagnostic label of NSSID. Despite the challenges of the DSM-5 criteria for NSSID in clinical settings, these criteria have enabled a consistent international definition, and have thereby already had an immense impact on research, assessment and treatment of self-injury (Hooley et al., 2020).

In our study after one year, a third of those reporting NSSID exclusively had developed a psychiatric disorder, whereas another substantial part (50%) did not meet criteria for NSSID anymore. Overall, one third ($n = 4$) of those from the NSSID-only group at baseline ($n = 12$) still presented with NSSID diagnosis as an exclusive and stable diagnostic entity after one year. In addition, stability of NSSID was significantly lower in the NSSID-only group compared to those who had NSSID in addition to other mental disorders.

One the one hand, our follow-up data indicate that NSSI may serve as an important early warning sign for emerging mental illness, which has previously been postulated elsewhere (Wilkinson et al., 2018). NSSI constitutes one of the most robust predictors of subsequent suicidality (Brown and Plener, 2017) and should still be regarded as clinically highly relevant as a potential marker of risk. As genetic studies suggest the correlation between NSSI and suicidality is largely driven by overlapping genetic factors and shared aetiology (Maciejewski et al., 2014). In addition, NSSID might also precede other psychiatric diagnoses like depression or anxiety (similarly to other disorder associations e.g. obsessive compulsive disorder and schizophrenia; Meier et al., 2014). This would not necessarily question its validity as initial diagnosis. Labelling NSSI as a disorder could thus be beneficial in terms of providing early detection and subsequent intervention for the latter developing disorder (analogous to the new DSM-5 diagnoses of the attenuated psychotic syndrome that was originally derived from research on precursor states of psychosis). At the same time, the role of diagnoses in this context should be critically reviewed since they depend on symptom manifestation and symptoms can fluctuate on a continuum. One the other hand, our follow-up data also show that NSSID without comorbidity is in many cases limited to brief episodes with remission within one year. This is in line with previous population-based research that revealed high remission rates in adolescent self-harm behaviour (Moran et al., 2012). Indeed, our data even postulate that likelihood of remission seems significantly higher in those with sole and pure NSSID.

A particular strength of this study is the large clinical sample that was drawn from a widely used service within a defined catchment area, and recruited consecutively with a high participation rate. Thus, the sample can be regarded as rather representative of the help-seeking self-injuring adolescent population. Additional strengths are the use of

standardized methods and the collection of longitudinal data.

However, there are also several limitations to address: First, there is a clear selection bias due to the help-seeking population, e.g. co-morbidity may drive help-seeking behaviour rather than NSSID itself; however, we would like to point out that it is the help-seeking NSSID patient group that psychiatric classifications are commonly applied to. In addition, inclusion criteria for presenting in AtR!Sk are explicit risk-taking and self-harming behaviour and not other symptoms of mental burden, at least minimizing the likelihood of help-seeking for problems other than NSSID. Another point to consider is that individuals who engage in NSSI may present different severity and those with less severe type of NSSID may not seek help. This idea is supported by findings showing that adolescents presenting in AtR!Sk with NSSID reported a mean NSSI frequency of 77.18 (SD = 79.02) compared to a much lower reported mean frequency of 11 in a community sample of adolescents with NSSID (Zetterqvist et al., 2013). Related to the help-seeking bias, there is an over-representation of females in our study which limits generalizability to NSSID in males. However, the female preponderance in prevalence of NSSI with stronger effect sizes in clinical samples is known from other studies (Bresin and Schoenleber, 2015). Beyond that, according to DSM-5 the utility of the GAF is limited due to "conceptual lack of clarity" and "questionable psychometrics" (American Psychiatric Association, 2013, p. 16). Conclusions on psychosocial functioning in our study should therefore be drawn with caution. Another important point to consider as limitation is that the clinical evaluation of NSSID at follow-up was based on criteria A and B only. Therefore, some stability rates have to be interpreted with caution. Last, phase 2 and 5 according to Robins and Guze could not be addressed within the present study.

Based on the theoretical framework of Robins and Guze our results suggest that 1) NSSID is unselective regarding its overlap with other mental disorders and 2) rather unstable as a sole and pure disorder without comorbidities. Our results are in line with critical views on the current DSM-5 classification, and may argue in favour of NSSI as an 'unspecific' risk-marker, symptom or precursor for psychopathological development in general and suicide specifically. According to Brausch (2019), future classifications could include NSSI as a "specifier" that can be added onto already existing disorders instead of establishing an own diagnostic entity for NSSI. The specifier "with NSSI" would be pursuant to existing specifiers like "with psychotic features" or "with catatonia" (Brausch, 2019). Due to the high beneficial impact of a NSSID as outlined above, our results could also add to the increasing body of research pointing out the need to re-propose classification criteria to better picture the clinical group of affected adolescents.

Author contribution

MK is the principle investigator and responsible for the study design. DG is the coordinator of the study. DG and AE participated in recruitment and assessment and wrote the first draft. PP provided statistical support. JK provided support in analysis and interpretation of the data. All authors revised the article critically, approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Declaration of Competing Interest

The authors were independent of the funders in all aspects of study design, data analysis, and writing of this manuscript and have no conflict of interest to declare.

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