

# Overlapping Patterns of Suicide Attempts and Non-suicidal Self-Injuries in Adults: A Prospective Clinical Cohort Study

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## ABSTRACT

**Objective:** An overlap of non-suicidal self-injuries (NSSIs) and suicide attempts (SAs) is observed in young cohorts, but there are few robust prospective studies for adults. We compared 1-year outcomes in adults with different self-harm patterns: NSSI only, NSSI + SA, and SA only.

**Methods:** 793 patients (67% women) consecutively presenting with NSSI (17%) or SA (83%) at 3 Swedish hospitals took part in face-to-face interviews. Past and current self-harm was characterized by the Columbia-Suicide Severity Rating Scale. Clinical records and national register data were employed to determine 1-year outcomes.

**Results:** At inclusion, over half of the participants had engaged in both NSSI and SA; 41% had SA only and 5%, NSSI only. During follow-up, non-fatal SAs were observed in approximately one-third of the total group (n = 269). Suicides occurred in 2% of those with NSSI + SA; the same proportion was seen in the SA only group. No suicides were observed in those with NSSI only. In a multiple logistic regression analysis, the NSSI + SA pattern was associated with a more than 3-fold risk of subsequent fatal/non-fatal suicidal behavior compared to “pure” NSSI; risk was not elevated in those with “pure” SA. Neither sex nor age group predicted subsequent suicidal behavior.

**Conclusions:** Switching between behaviors with and without suicidal intent was common in this adult clinical cohort. Risk of subsequent suicidal behavior was tripled in the combined group. Clinicians who assess adults with NSSI must evaluate not only current but also previous episodes when assessing future risk of suicidal behavior.

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Both non-suicidal self-injuries (NSSIs) and suicide attempts (SAs) are strongly associated with suicidal behavior.<sup>1,2</sup> Whether or not these two behaviors should be distinguished remains a topic of discussion.<sup>3,4</sup> Clinical studies indicate a potential overlap of behaviors with and without intent,<sup>5–7</sup> and attempts to define algorithms that delineate the two types of behavior have proven challenging.<sup>8</sup>

NSSI is particularly common in adolescents, with an estimated prevalence of 18% in non-clinical populations.<sup>9</sup> Most discontinue NSSI during late adolescence or early adulthood,<sup>10,11</sup> and its prevalence continues to decrease over the life span. Among adults with psychiatric emergency consultation due to any type of deliberate self-harm, NSSI was noted at the index episode in 22% of those aged 18–44 years, 9% of those aged 45–64, and 3% of those aged 65+.<sup>12</sup> Similarly, a pattern of decreasing occurrence with age was demonstrated by Norwegian researchers who examined the 4-week prevalence of self-harm behaviors across all of the country’s outpatient psychiatric clinics.<sup>13</sup>

While there is a rich body of research on the relationship between NSSI and suicidal behavior among adolescents,<sup>14,15</sup> the literature focusing on adults is more limited.<sup>5</sup> Studies based on non-clinical adult samples demonstrate co-occurring suicidal thoughts in one-third<sup>16</sup> and suicide attempt history in half<sup>17</sup> of those reporting NSSI. Past month NSSI was reported in 8% of all the patients in the above-cited Norwegian study,<sup>13</sup> and the prevalence of past month SA in this group was 7-fold that of patients with no NSSI. Adults with a combined pattern of NSSI and SA have been shown to have higher ratings of psychopathology (depression, hopelessness, suicidal ideation)<sup>18</sup> and more frequent and severe SAs compared to those with SA only, despite similar demographic characteristics.<sup>19,20</sup> Most previous clinical studies are cross-sectional/retrospective<sup>13,19,21–23</sup> or include relatively small samples with limited prospective data.<sup>5</sup> A recent addition to the clinical literature is a longitudinal chart review study set in adult emergency services in England that indicated a trajectory of escalation from NSSI to SA in adults who re-presented to services.<sup>24</sup>

The present prospective study follows a large clinical sample of adults attending hospital after an SA or an NSSI and aims to address both overlapping and divergent patterns of self-harm behaviors (NSSI only, NSSI + SA, and SA only) with regard to demographic and clinical characteristics and risk of subsequent fatal and non-fatal suicidal behaviors during 1-year follow-up.

## Clinical Points

- Non-suicidal self-injury (NSSI) and its relationship to suicidal behavior are understudied in adults.
- Switching between episodes with and without suicidal intent was common in the adult clinical cohort studied, and this pattern was associated with elevated risk of future suicidal behavior.
- Clinicians should take care to inquire about previous history in adult patients who present with NSSI.

## METHODS

### Participants

The study was conducted at 3 Swedish university hospitals in Umeå, Gothenburg, and Stockholm and included persons 18 years and older presenting at psychiatric emergency services for evaluation after deliberate self-harm, with and without suicide intent. Inclusion started in April 2012 and ended in April 2016.

Exclusion criteria included inability to participate in the interview due to language difficulties or mental states that severely compromise the ability to respond to interview questions (confusion, psychotic state, or aggressive behavior). Also, persons had to be residents of the catchment areas and have a Swedish personal identity number, allowing for follow-up. Out of 1,138 eligible patients, 804 (71%) agreed to participate. Columbia-Suicide Severity Rating Scale<sup>25</sup> data were incomplete or missing for 11 participants. These were excluded as they lacked structured data on previous history of self-harm episodes. The final sample thus included 793 persons (260 men, 533 women). Median age was 33 years (range 18–95), with a higher median age among men, 39 vs 30 years ( $U=56,087$ ,  $P<.001$ ).

### Procedure

Patients were interviewed in a standardized manner by specially trained mental health staff (physicians, psychologists, psychiatric nurses). The mean time between the self-harm event and the interview was 3.6 days ( $SD=2.7$ ). Interviews lasted about 1–2 hours and included background information and instruments shown below.

### Measurements

In order to ensure uniform assessments, type of suicidal behavior at the index event as well as lifetime history of suicidal behavior were based on participants' responses on the Columbia-Suicide Severity Rating Scale (C-SSRS).<sup>25</sup> The Mini-International Neuropsychiatric Interview version 6.0 (MINI)<sup>26</sup> was applied to systematically determine psychiatric diagnoses. As personality disorders, attention-deficit/hyperactivity disorder (ADHD), and autism were not included in this version of the MINI, these diagnoses were retrieved from charts for the index episode. Interpersonal problems were assessed with a single question: "Have you

recently experienced problems in relation to your partner, family members, or other close persons?"

Data on prescribed medication and planned care after discharge were retrieved from medical records, as were 1-, 6-, and 12-month follow-up data on subsequent self-harm behavior. These time points were chosen as they are highly clinically relevant, given the particularly elevated risk of suicidal behavior during the months that follow inpatient psychiatric care.<sup>27–29</sup> Acts with at least some intent to die as assessed in the records were categorized as SA; other deliberate self-harm acts, as NSSI. Suicides were identified by the Swedish Cause of Death Register. This register contains information on all deaths among Swedish residents; the estimated coverage rate of the register has exceeded 99% since 1961.<sup>30</sup>

### Statistics

Descriptive statistics were given as frequencies. Group comparisons for different self-harm behavior patterns regarding categorical background and clinical and prospective self-harm variables were conducted using  $\chi^2$  tests. Fisher exact tests were applied where any expected cell counts were  $<5$ . Group differences for quantitative variables were assessed using Kruskal-Wallis  $H$ -tests. Threshold for statistical significance was set to  $\alpha=.05$ .

All inferential tests for group comparisons were supplemented with effect size analysis, using Cramér  $V$  for  $\chi^2$  tests and interpreted as weak (values 0.05 to 0.09), moderate (0.10–0.14), or strong ( $\geq 0.15$ ), and for Kruskal-Wallis  $H$ -tests eta-squared ( $\eta^2$ ) was calculated using the following formula:  $\eta^2 [H] = (H - k + 1)/(n - k)$  and interpreted as small (values 0.01–0.05), medium (0.06–0.13), or large  $\geq 0.14$ .<sup>31</sup>

A multiple logistic regression model was calculated to investigate the impact of different self-harm behavior patterns (NSSI only, NSSI + SA, or SA only) on subsequent suicidal behavior during follow-up. Covariates included gender, age (3 age groups: 18–44, 45–64, and 65–98 years), and previous self-harm (index event as first-ever deliberate self-harm act). The rationale for including first-ever event was that we wanted to avoid a potential artifact of study design (ie, more than 1 episode is required for categorization in the NSSI + SA group, and a cumulative risk could be suspected if this were not controlled for).

Follow-up data regarding non-fatal behaviors were available in medical records at 1 or more time points during the observation period for all but 8 participants. Loss to follow-up was most commonly due to a move to a different county or transfer into private care. Missing data were not an issue regarding the suicide outcome as the Swedish Cause of Death Register covers the entire country. All analyses were carried out using SPSS version 26.

### Ethics

Ethical approval was obtained from the Gothenburg Regional Ethics Committee (589-10, T034-12). Participants gave written informed consent after receiving information on study procedures.

**Table 1. Background Characteristics of Adults Who Present at Psychiatric Emergency Departments With Deliberate Self-Harm, by Behavior Subtypes**

Variable	History of self-harm behavior, including index event				Subgroup comparisons		
	Non-suicidal self-injuries (NSSI) only (n=43)	Combined (NSSI + SA) (n=424)	Suicide attempts (SA) only (n=326)	Total cohort (N=793)	(df, n) Statistic <sup>a,b</sup>	P	Effect size <sup>c,d</sup>
Women, n (%)	35 (81)	333 (79)	165 (51)	533 (67)	(2, 793) 69.4 <sup>a</sup>	<.001	.30 <sup>c</sup>
Age, median (minimum–maximum)	24 (18–93)	26 (18–87)	48 (18–95)	33 (18–95)	(2, 793) 178.8 <sup>b</sup>	<.001	.22 <sup>d</sup>
Student, n (%)	9 (21)	92 (22)	24 (7)	125 (16)	(2, 793) 29.4 <sup>a</sup>	<.001	.19 <sup>c</sup>
University degree, n (%)	9 (21)	73 (17)	90 (28)	172 (22)	(2, 792) 11.9 <sup>a</sup>	.02	.12 <sup>c</sup>
Unemployed, n (%)	7 (16)	77 (18)	49 (15)	133 (17)	(2, 793) 1.30 <sup>a</sup>	.52, NS	.04 <sup>c</sup>
Living alone, n (%)	20 (47)	226 (53)	171 (53)	417 (52)	(2, 793) 0.73 <sup>a</sup>	.70, NS	.03 <sup>c</sup>

<sup>a</sup> $\chi^2$  using 2 × 3 tables.  
<sup>b</sup>Kruskal-Wallis H.  
<sup>c</sup>Effect size according to Cramer V.  
<sup>d</sup>Eta-squared ( $\eta^2$ ).  
 Abbreviation: NS = nonsignificant.

**Table 2. Clinical Characteristics of Adults Who Present at Psychiatric Emergency Departments With Suicide Attempt (SA) or Non-Suicidal Self-Injury (NSSI), by Lifetime Behavior Pattern**

Variable	Lifetime behaviors including index episode <sup>a</sup>				Subgroup comparisons		
	NSSI only (n=43)	NSSI + SA (n=424)	SA only (n=326)	Total cohort (N=793)	(df, n) $\chi^2$ <sup>b</sup>	P value	V <sup>c</sup>
Index behavior is first-ever self-harm	7 (16)	NA	135 (41)	142 (38)	(1, 369) 10.1 <sup>b</sup>	<.001	.17 <sup>c</sup>
Suicide among significant others	2 (5)	40 (9)	46 (14)	88 (11)	(2, 787) 5.62 <sup>b</sup>	.06	.08 <sup>c</sup>
Recent relationship problems	28 (65)	294 (69)	200 (62)	522 (66)	(2, 792) 5.00 <sup>b</sup>	.08	.08 <sup>c</sup>
Depressive episode (past 2 weeks) <sup>d</sup>	29 (67)	314 (77)	204 (66)	547 (72)	(2, 758) 10.9 <sup>b</sup>	.004	.12 <sup>c</sup>
GAD and/or panic disorder, agoraphobia, social phobia <sup>d</sup>	24 (57)	264 (67)	130 (43)	418 (56)	(2, 743) 39.4	<.001	.23
PTSD (past month) <sup>d</sup>	7 (16)	108 (27)	37 (12)	152 (20)	(2, 751) 23.0 <sup>b</sup>	<.001	.18 <sup>c</sup>
Alcohol and/or substance abuse or dependence (past 12 months) <sup>d</sup>	16 (38)	171 (42)	102 (34)	289 (39)	(2, 748) 5.34 <sup>b</sup>	.07	.08 <sup>c</sup>
Psychotic disorders (past month) <sup>d</sup>	3 (7)	36 (9)	9 (3)	48 (6)	(2, 748) 10.3 <sup>b</sup>	.006	.12 <sup>c</sup>
Anorexia or bulimia nervosa (past 3 months) <sup>d</sup>	2 (5)	59 (15)	12 (4)	73 (10)	(2, 749) 23.6 <sup>b</sup>	<.001	.18 <sup>c</sup>
Autism and/or ADHD (ICD-10 codes F84.1, F84.5, F90) <sup>e</sup>	6 (14)	78 (19)	19 (6)	103 (13)	(2, 785) 26.0 <sup>b</sup>	<.001	.18 <sup>c</sup>
Disorders of personality and behavior (ICD-10 codes F60–69) <sup>e</sup>	5 (12)	143 (34)	18 (6)	166 (21)	(2, 785) 91.7 <sup>b</sup>	<.001	.34 <sup>c</sup>
Emotionally unstable personality disorder (ICD-10 code F60.3) <sup>e</sup>	4 (9)	121 (29)	9 (3)	134 (17)	(2, 785) 89.7 <sup>b</sup>	<.001	.34 <sup>c</sup>
Healthcare characteristics							
Self-initiated arrival to hospital (at inclusion)	13 (30)	87 (21)	40 (12)	140 (18)	(2, 784) 13.4 <sup>b</sup>	.001	.13 <sup>c</sup>
Inpatient psychiatric care (past 3 months)	13 (30)	152 (36)	63 (19)	228 (71)	(2, 792) 24.8 <sup>b</sup>	<.001	.18 <sup>c</sup>
Ongoing treatment (any type) for mental health problems	27 (63)	343 (81)	195 (60)	565 (72)	(2, 791) 43.7 <sup>b</sup>	<.001	.24 <sup>c</sup>

<sup>a</sup>Data shown as n (%).  
<sup>b</sup> $\chi^2$  test using 2 × 3 table (with Fisher exact test where expected cell counts were < 5).  
<sup>c</sup>Effect size according to Cramér V.  
<sup>d</sup>Psychiatric diagnoses according to MINI International Neuropsychiatric Interview. GAD (past 6 months).  
<sup>e</sup>Clinical diagnoses in accordance with the *International Statistical Classification of Diseases and Related Health Problems*, 10th revision, 2nd ed.  
 Abbreviations: ADHD = attention-deficit/hyperactivity disorder, GAD = generalized anxiety disorder, PTSD = posttraumatic stress disorder.

## RESULTS

At inclusion, 655 cases (83%) were assessed as having SAs based on the C-SSRS; the remaining 138 cases were NSSI (17%). There was a higher proportion of NSSI among women (22%) compared to men (8%) ( $\chi^2_{1, 793} = 23.4$ ,  $P < .001$ ). Among those with NSSI at index episode, 85% were women. The corresponding figure in those with SA was 64%. Persons who presented with NSSI were younger (median = 24 years) than those with SA (median = 36 years); this finding was valid for both men (23 vs 40 years,  $U = 1,336.5$ ,  $P < .001$ ) and women (25 vs 34 years,  $U = 1,6711.5$ ,  $P < .001$ ).

Half of those with an SA at index reported at least 1 previous NSSI according to C-SSRS (60% among women, 33% among men). Over two-thirds of those with NSSI at the index episode reported a previous history of SA (70% among women, 62% among men). Based on these data, the cohort was divided into 3 groups: NSSI only (5%), combined self-harm behavior NSSI + SA (53%) and SA only (41%).

Sociodemographic characteristics of those in the mixed group were very similar to those in the NSSI group in terms of gender, median age, and student status (Table 1).

Table 1 shows further that half of the participants in the “pure” SA group were men. The SA group was characterized by relatively high age; few were students. Proportions with unemployment were similar in all 3 groups. About half of the total cohort lived alone; this was valid for all 3 behavior patterns. Clinical characteristics at inclusion are shown by group status in Table 2.

First-ever deliberate self-harm episodes were more prevalent in the SA group compared to the NSSI group. For each of the psychiatric diagnoses examined, the largest proportions were found in the NSSI + SA group. Taking into consideration the effect size measures this was especially evident, with a high frequency of anxiety and personality disorders in the combined group. Emotionally unstable personality disorder was diagnosed in over one-fourth of those with NSSI + SA. A low proportion in the SA group

**Table 3. Planned Follow-up and Treatments at Discharge and Care Setting During Follow-up of Adults Who Present at Psychiatric Emergency Services With Suicide Attempt (SA) or Non-Suicidal Self-Injury (NSSI), by Lifetime Behavior Subtypes**

	Lifetime behaviors including index episode <sup>a</sup>				Subgroup comparisons		
	NSSI only (n=43)	NSSI + SA (n=424)	SA only (n=326)	Total cohort (N=793)	(df, n) $\chi^2$ <sup>b</sup>	P value	V <sup>c</sup>
Planned treatment at discharge <sup>d</sup>							
Psychiatric outpatient care	36 (84)	376 (89)	247 (76)	659 (83)	(2, 790) 22.8	<.001	.17
Substance abuse care	5 (12)	75 (18)	63 (19)	143 (18)	(2, 789) 1.63	.44	.05
Primary care	6 (14)	61 (15)	85 (26)	152 (19)	(2, 789) 16.9	<.001	.15
Psychologist or talk therapy	27 (63)	202 (48)	117 (36)	346 (44)	(2, 790) 17.2	<.001	.15
Prescriptions at discharge <sup>d</sup>							
Antidepressants	26 (61)	314 (75)	234 (73)	547 (73)	(2, 782) 4.36	.11	.08
Mood stabilizers	6 (14)	93 (23)	37 (12)	136 (18)	(2, 774) 15.7	<.001	.14
Antipsychotics	15 (35)	180 (44)	102 (32)	297 (38)	(2, 776) 11.1	.004	.12
Anxiolytics or hypnotics	33 (77)	359 (87)	264 (82)	656 (84)	(2, 777) 5.06	.08	.08
ADHD medication	3 (7)	50 (12)	13 (4)	66 (9)	(2, 776) 15.3	<.001	.14

<sup>a</sup>Data shown as n (%).

<sup>b</sup> $\chi^2$  test using 2x3 table (with Fisher exact tests where expected cell counts were < 5).

<sup>c</sup>Effect size according to Cramér V.

<sup>d</sup>According to discharge notes.

Abbreviation: ADHD=attention-deficit/hyperactivity disorder.

**Table 4. Self-Harm Behaviors During 12-Month Follow-up, by Self-Harm History Including Index Episode<sup>a</sup>**

Self-harm behavior during follow-up	Lifetime behaviors including index episode <sup>b</sup>				Subgroup comparisons		
	Non-suicidal self-injuries (NSSI) only (n=43)	Combined (NSSI + SA) self-harm behavior (n=424)	Suicide attempts (SA) only (n=326)	Total cohort (N=793)	(df, n) Statistic <sup>c,d</sup>	P value	Effect size <sup>e,f</sup>
NSSI only, n (%)							
0–1 month	5 (12)	35 (8)	4 (1)	44 (6)	(2, 785) 20.6 <sup>c</sup>	<.001	.16 <sup>e</sup>
0–6 months	13 (30)	67 (16)	8 (3)	88 (11)	(2, 778) 49.8 <sup>c</sup>	<.001	.25 <sup>e</sup>
0–12 months	15 (35)	60 (14)	11 (3)	86 (11)	(2, 765) 48.9 <sup>c</sup>	<.001	.25 <sup>e</sup>
SA only, n (%)							
0–1 month	5 (12)	37 (9)	12 (4)	54 (7)	(2, 785) 9.05 <sup>c</sup>	.006	.11 <sup>e</sup>
0–6 months	6 (14)	62 (15)	39 (12)	107 (14)	(2, 778) 1.15 <sup>c</sup>	.56	.04 <sup>e</sup>
0–12 months	6 (14)	71 (17)	53 (16)	130 (16)	(2, 765) 0.26 <sup>c</sup>	.88	.02 <sup>e</sup>
NSSI + SA, n (%)							
0–1 month	0 (0)	26 (6)	0 (0)	26 (3)	(2, 785) 23.5 <sup>c</sup>	<.001	.17 <sup>e</sup>
0–6 months	1 (2)	77 (18)	5 (2)	83 (11)	(2, 778) 58.1 <sup>c</sup>	<.001	.27 <sup>e</sup>
0–12 months	2 (5)	111 (26)	6 (2)	119 (15)	(2, 765) 90.0 <sup>c</sup>	<.001	.34 <sup>e</sup>
Suicide, n (%)							
0–1 month	0 (0)	0 (0)	0 (0)	0 (0)	...	...	...
0–6 months	0 (0)	7 (2)	3 (1)	10 (1)	(2, 778) 1.37 <sup>c</sup>	.73	.04 <sup>e</sup>
0–12 months	0 (0)	10 (2)	6 (2)	16 (2)	(2, 765) 1.20 <sup>c</sup>	.55	.04 <sup>e</sup>
Any self-harm, n (%) <sup>g</sup>							
0–1 month	10 (23)	98 (23)	16 (5)	124 (16)	(2, 785) 48.5 <sup>c</sup>	<.001	.25 <sup>e</sup>
0–6 months	20 (47)	213 (50)	55 (17)	288 (36)	(2, 778) 92.1 <sup>c</sup>	<.001	.34 <sup>e</sup>
0–12 months	24 (57)	252 (59)	79 (24)	355 (45)	(2, 769) 98.5 <sup>c</sup>	<.001	.36 <sup>e</sup>
Number of NSSIs, median (minimum–maximum) <sup>h</sup>	3 (1–7)	3 (1–39)	1 (1–11)	2 (1–39)	(2, 206) 11.1 <sup>d</sup>	.004	.04 <sup>f</sup>
Number of SAs, median (minimum–maximum) <sup>i</sup>	2 (1–5)	2 (1–21)	1 (1–5)	2 (1–21)	(2, 216) 42.5 <sup>d</sup>	<.001	.19 <sup>f</sup>

<sup>a</sup>N = 793; n = 8 patients were lost to follow-up during the first month, at 6 months n = 15, and at 12 months n = 28.

<sup>b</sup>Patients may transfer to a different subgroup over time due to change in self-harm behavior pattern.

<sup>c</sup> $\chi^2$  test using 2x3 table (with Fisher exact tests where expected cell counts were < 5).

<sup>d</sup>Kruskal-Wallis H test.

<sup>e</sup>Effect size according to Cramér V.

<sup>f</sup>Eta-squared ( $\eta^2$ ).

<sup>g</sup>Any self-harm behavior (NSSI, SA, suicide, or any combination, including 4 cases with self-harm during follow-up but with partially missing data for the full 12-month period).

<sup>h</sup>Patients with at least 1 episode of NSSI during the 12-month follow-up period.

<sup>i</sup>Patients with at least 1 episode of SA during the 12-month follow-up period.

Abbreviations: NSSI = non-suicidal self-injury, SA = suicide attempt.

initiated arrival to hospital after the deliberate self-harm event, while the highest proportion of self-initiated arrival to hospital was in the NSSI group. Over a third of those in the NSSI + SA group were inpatients at a psychiatric clinic at some point during the 3 months that preceded the index episode. The NSSI + SA group had to a high extent (81%) ongoing treatment for mental health problems at the time of the index event.

Rates of planned care contact for substance use issues did not differ among the 3 behavior groups. Slightly over a quarter of those in the “pure” SA group were referred to primary health care after the index event, a proportion higher than the 14%–15% observed for the others (Table 3).

Table 3 shows further that psychological treatment (psychologist or talk therapy) was planned for almost two-thirds of those with “pure” NSSI, with lower proportions in the other 2 groups. Almost three-fourths of the total cohort were prescribed antidepressants at discharge; proportions were quite similar in each of the 3 groups. The highest proportions with psychoactive drug prescriptions (mood stabilizers, antipsychotics, anxiolytics/hypnotics, and ADHD drugs) were observed in the mixed group. Record review showed that a relatively low proportion in the “pure” SA group (30%) visited the psychiatric emergency unit within 6 months of the index episode (NSSI only, 45%; NSSI + SA, 48%;  $\chi^2 = 22.83$ ,  $df = 3$ ,  $P < .001$ ,  $V = 0.17$ ).

### Subsequent Self-Harm Events

Non-fatal self-harm events, as well as suicides, are presented in Table 4 for 1, 6, and 12 months after the index episode.

Within a year after the index episode, 8 persons in the initial NSSI only group (19%) made a suicide attempt and thus shifted to the mixed group. During this period, 17 persons in the SA only group (5%) had their first-ever episode of NSSI and shifted to the combined group. There were no suicides within a month of the index event. Ten persons died by suicide within 6 months, 7 of whom were in the NSSI + SA group; the remaining 3 were in the SA group. Numbers in both of these groups continued to grow during the next 6 months, to 10 in the combined group and 6 in the SA group. An equal gender proportion was found among those who died by suicide. No suicides were observed among persons with “pure” NSSI.

During 1-year follow-up, 269 persons had at least 1 episode of suicidal behavior (fatal or non-fatal SA), corresponding to 34% of those with full follow-up data ( $n = 769$ ). In a multiple logistic regression model ( $\chi^2 = 61.46$ ,  $df = 769$ ,  $P < .001$ , Nagelkerke  $R^2 = 0.11$ ), the combined pattern (NSSI + SA) was associated with a more than 3-fold risk for fatal or non-fatal suicidal behavior during the follow-up period (OR = 3.37,  $P = .002$ ) compared to NSSI only, while controlling for sex, age group (18–44, 45–64, and 65–98 years), and whether the index episode was the patient’s first ever self-harm event (SA or NSSI). Risk was not elevated in those with SA only (OR = 1.09,  $P = .83$ , NS). Neither sex nor age group nor first-ever status predicted subsequent suicidal

behavior in the multiple model (OR<sub>min-max</sub> = 0.77–1.66,  $P_{min-max} = 0.13$ –0.83) (Supplementary Table 1).

## DISCUSSION

Over half of the adults in our clinical cohort had lifetime histories of both SA and NSSI. Switching between episodes with and without suicidal intent was common, and this pattern was associated with elevated risk of future suicidal behavior.

The study confirms the overlap between non-fatal self-harm behaviors with and without suicidal intent in adults who present at emergency services in connection with deliberate self-harm. Only one-fourth of those who presented with NSSI remained in the “pure” NSSI group when both retrospective and prospective data were taken into consideration. Less than half of those with SA at the index episode had “SA only” at the end of the study. Since the categorization of SA and NSSI is based on the presence or absence of suicide intent,<sup>25</sup> the prominent overlap highlights the fluctuating nature of intention from event to event. A person may have had multiple motivations (relief from unbearable emotions, wishing death, or punishing oneself), and these may differ over time.<sup>32,33</sup>

The relatively low proportion (5%) that transitioned from SA only to the SA + NSSI group during follow-up lends some support to the Gateway theory,<sup>5,34</sup> which describes a trajectory from NSSI to more severe forms of suicidal behavior, and not the other way around. This is also supported by our finding that every fifth person in the NSSI group re-presented with an SA during the follow-up year. However, our data do not fully support a trajectory of escalation<sup>24</sup> as many persons in the mixed group continued the fluctuating pattern during follow-up. Also, one-tenth of those with an SA at some point up to and including the index event made an NSSI but no new SA during the following year. There is merging evidence that NSSI and SA may share some biological etiology,<sup>35,36</sup> which might help to explain the substantial overlap of behavior patterns with and without suicide intent. Non-psychiatric risk factors that correlate genetically to SA, such as risk-taking behavior, smoking, and lower socioeconomic status,<sup>37</sup> may also share genetic correlation with NSSI.

There was no gender difference in the “pure” SA group. This was somewhat unexpected considering the consistent reports of higher attempt rates in women.<sup>38,39</sup> The discrepancy probably relates to our use of a structured instrument to capture NSSI, which was more prevalent in women. Higher age in the SA only group was anticipated<sup>20</sup> and probably explains the higher education level in that group. Other baseline demographic characteristics did not reveal any group differences, paralleling reports involving younger ages.<sup>40</sup>

While 2% of the patients with SA (with or without NSSI) died by suicide within 1 year, no suicides were observed in the NSSI only group. The proportion of suicides in the total group (2%) is in accordance with findings from

a meta-analysis that estimated fatal repetition in 1.6% of individuals within 1 year after hospital presentation with deliberate self-harm.<sup>41</sup> Considering the relatively short follow-up period and thus the low number of suicides, it was not possible to draw conclusions regarding potential differences in suicide risk among groups. While our finding that no suicides occurred in the “NSSI only” group might lend some support to the argument of Coppersmith and colleagues<sup>21</sup> for a dichotomy between “pure” NSSI and combined behaviors, our study was underpowered to test this. Applying the composite variable (any subsequent fatal/non-fatal suicidal behavior), our multiple regression model showed a more than 3-fold risk in patients in the NSSI + SA group compared to those with NSSI only, and this elevated risk could be explained by neither sex nor age group. “Pure” SA was not associated with increased risk. We could identify no studies for direct comparison, and larger studies are required to determine separate risk estimates for fatal and non-fatal suicidal behaviors.

**Methodological Considerations**

The prospective longitudinal study design based on a rather large and well-characterized clinical sample of adults with SA and NSSI who took part in a face-to-face interview with a mental health professional is quite unique in its kind. Also, the participation rate of eligible patients was sufficient to meet quality criteria for representativeness for this type of study.<sup>42</sup> We have quite a low rate of internal missing data and low mobility rate among persons included in the study allowing for reliable follow-up data.<sup>43</sup> Further

strengths include the use of standardized instruments for the evaluation of deliberate self-harm and diagnostics, as well as reliable register data for the suicide outcome.

Only persons with hospital presentations of SA or NSSI are included in the study, which introduces bias toward more severe cases; this is especially relevant for the NSSI group. A recent survey-based study set in England showed that over half of those with NSSI had no contact with psychiatric services.<sup>17</sup> It must be emphasized that our results apply to the clinical setting and may not be extrapolated to the background population. Also, there might be a situation of recall bias regarding earlier self-harm events, ie, that some events were not reported by the participants.<sup>44</sup> Another methodological consideration is that the time between the self-harm act and the research interview was not standardized, and it is possible that participants’ responses to the C-SSRS items varied between those interviewed shortly after the self-harm episode compared to those who took part in the research interview several days later.

**Clinical Implications**

Our results regarding both previous and subsequent self-harm behaviors underline the fluctuating nature of suicidal intent in adult self-harm. The NSSI + SA pattern seems to constitute a potent signal of increased risk for subsequent suicidal behavior. Clinicians should inquire about previous SAs among adults presenting with NSSI. Otherwise, these patients’ suicidality, may not, at times, be fully understood and taken into sufficient consideration in treatment and safety planning.

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*Editor’s Note:* We encourage authors to submit papers for consideration as a part of our Focus on Suicide section. Please contact Philippe Courtet, MD, PhD, at [pcourtet@psychiatrist.com](mailto:pcourtet@psychiatrist.com).

See supplementary material for this article at [PSYCHIATRIST.COM](https://www.psychiatrist.com).



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## **Supplementary Material**

**Article Title:** Overlapping Patterns of Suicide Attempts and Non-suicidal Self-Injuries in Adults: A Prospective Clinical Cohort Study

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### **List of Supplementary Material for the article**

1. [Table 1](#) Multiple Logistic Regression Predicting Suicidal Behavior (Fatal or Non-fatal) During One-Year Follow-up After Psychiatric Emergency Consultation in Connection with Deliberate Self-harm

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Supplementary Table 1. Multiple Logistic Regression Predicting Suicidal Behavior (Fatal or Non-fatal) During One-year Follow-up After Psychiatric Emergency Consultation in Connection with Deliberate Self-harm

<i>Predictor variables</i>	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>df</i>	<i>P Value</i>	<i>OR</i>
Index is first-ever event (NSSI or SA)	0.00	.002	0.28	1	.60	1.00
Sex	-0.26	.179	2.05	1	.15	0.77
<b>Self-harm patterns</b>						
NSSI only	-	-	40.0	2	<.001	-
Combined (NSSI+SA)	1.22	.391	9.66	1	.002	3.37
SA only	0.09	.413	0.05	1	.83	1.09
<b>Age groups</b>						
Age 65+	-	-	2.58	2	.28	-
Age 45 - 64	0.51	.331	2.36	1	.13	1.66
Age 18 - 44	0.35	.348	.99	1	.32	1.41

*Note.* N = 769