

Risk factors for attempted suicide in non-psychotic patients with suicidal ideation

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Summary. Objective. In Eastern European countries, suicide rate are among the highest in the world and suicide attempts are among the most important risk factors. The aim of this study is to identify factors associated with suicide attempt (SA) in non-psychotic patients with suicidal ideation (SI). **Methods.** Among 6204 consecutive adult patients (residents of Moscow) with non-psychotic mental disorders (NPMD), 361 individuals aged 18-77 years (median 24 years) were enrolled in the study after screening for lifetime SI with the Self-Injurious Thoughts and Behaviors Interview (SITBI). All participants were assessed for sociodemographic variables, psychiatric diagnosis, family history of mental disorders, history of abuse, sexual behavior, psychiatric treatments, suicide plan, SA, and nonsuicidal self-injury (NSSI). Results of multivariable analyses (MV) are presented as odds ratios (OR) with 95% confidence intervals (CI). **Results.** 166 patients (46%) reported lifetime SA. In MV, variables associated with SA included smoking (OR 2.1; 95% CI 1.2-3.7), having made a suicide plan (OR 3.4; 95% CI 2.0-5.7), and scars covered by tattoos (OR 5.2; 95% CI 1.5-17.9). History of law violation (OR 2.0; 95% 1.0-4.2) was of borderline significance. **Conclusions.** Transition from SI to SA in patients with NPMD was associated with smoking, suicide planning, history of law violation and presence of tattoos covering scars.

Key words. Ideation-to-action framework, predictors, Russia, suicidal ideation, suicide attempt.

Introduction

In many countries, suicide remains one of the leading causes of injury-related death, particularly among young people^{1,2}. Suicide is a preventable cause of death, but its prevention is hampered by the lack of reliable predictors³. Despite a steady downward trend in suicide mortality over the past decade, suicide rates in the post-Soviet states are among the highest in the world, with an average in-

Fattori di rischio associati al tentativo di suicidio in pazienti non psicotici con ideazione suicidaria.

Riassunto. Scopo. Nei paesi dell'Europa Orientale i tassi di suicidio sono tra i più elevati nel mondo e il tentato suicidio è tra i fattori di rischio più importanti. Lo scopo di questo studio è di identificare i fattori associati a un tentativo di suicidio (SA) in pazienti non psicotici con ideazione suicidaria (SI). **Metodi.** In un campione di 6204 pazienti adulti (residenti a Mosca) con disturbi mentali non psicotici (NPMD), 361 individui di età compresa tra 18 e 77 anni (mediana 24 anni) sono stati arruolati nello studio in seguito a uno screening per ideazione suicidaria lifetime effettuato con il Self-Injurious Thoughts and Behaviors Interview (SITBI). In tutti i partecipanti sono state investigate: variabili sociodemografiche, diagnosi psichiatrica, storia familiare di disturbi mentali, storia di abusi, comportamento sessuale, trattamenti psichiatrici, pianificazione di suicidio, SA e autolesionismo non suicidario. I risultati dell'analisi multivariata (MV) sono stati presentati come odds ratio (OR) e intervalli di confidenza (CI) al 95%. **Risultati.** 166 pazienti (46,0%) hanno riportato almeno un SA lifetime. Nella MV, le variabili associate a SA erano: il fumo (OR 2,1; IC 95% 1,2-3,7), la pianificazione di suicidio (OR 3,4; IC 95% 2,0-5,7) e le cicatrici coperte da tatuaggi (OR 5,2; IC 95% 1,5-17,9). L'anamnesi positiva per violazione di legge (OR 2,0; 95% 1,0-4,2) era di significatività borderline. **Conclusioni.** La transizione da SI a SA nei pazienti con NPMD era associata a fumo, pianificazione del suicidio, anamnesi positiva per storia di violazione di legge e alla presenza di tatuaggi che coprono le cicatrici.

Parole chiave. Ideazione suicidaria, predittori, quadro ideazione-azione, Russia, tentativo di suicidio.

cidence almost double that of most other European regions⁴.

The lifetime prevalence of suicide attempt (SA) in European adults is approximately 1.3%⁵, although according to the World Health Organisation, this prevalence varies considerably (0.4%-4.2%) between countries⁶. A previous SA is one of the most reliable predictors of both non-fatal and fatal SA in the future⁷⁻⁹.

Suicidal ideation (SI) appears to be quite common in the general population, with Nock et al.¹⁰ reporting a rate of 9.2% in a representative cross-national sample.

The risk of SA in people with SI varies considerably between populations. For example, people with mental disorders are on average 7 times more likely to have an unfavorable SI outcome than the general population^{11,12}. Fortunately, only a minority of those who have thought about killing themselves will attempt suicide in their lifetime, so the prevalence of SI is several times higher than that of SA^{6,13}. This renders the use of SI as a sole predictor of suicide ineffective due to its low specificity¹⁴. Despite this well-established fact, it is still common practice in suicide studies around the world to lump together people with SI only and people who have already attempted suicide together. In the last decade, many suicidologists have stressed the importance of studying so-called “ideators” and “attempters” separately. A comparison between these two groups is the only way to identify the factors involved in the transition from SI to SA. This is supported by the findings of the literature review conducted by Klonsky et al.¹⁵, who reported that traditional risk factors for suicide (e.g. depression, hopelessness, impulsivity, most psychiatric disorders) robustly predict SI, but poorly predict SA among ideators.

Over the past several decades, researchers have identified numerous risk factors for suicide that can be divided into two types: distal and proximal¹⁶. Distal risk factors include family history of suicide and genetic load, early life adversities and epigenetic modifications, personality traits and cognitive styles. Proximal risk factors include conditions that act as precipitants: psychiatric and physical disorders, psychosocial crises, recent life events causing acute stress, and availability of resources. Some sociodemographic factors are considered modifiers of the relationship between distal and proximal risk factors, such as gender, age, education, religious and spiritual beliefs, family structure, employment and income, social support, and quality of the social environment. At the same time, many of these parameters were found in studies that did not separate “suicide ideators” from “suicide attempters” and should be re-evaluated from this perspective in future studies.

Integrative theories of suicide, such as the Three-Step Theory¹⁴, can be incredibly valuable in this regard, allowing us not only to separate ideators from attempters, but also to take into account factors such as lack of resilience and capacity for suicide. These parameters may be significantly influenced by the social characteristics and cultural milieu of a particular country. Research on the factors involved in the transition from SI to SA in countries with different socio-economic and cultural contexts is needed to assess the mechanisms of this influence. To the best of our knowledge, no previous study has addressed this issue in Russian patients. With this in mind, our primary aim was to identify variables associated with

SA in Russian non-psychotic inpatients with SI, following the ideation-to-action framework^{17,18}.

Materials and methods

This is a retrospective cohort study conducted at the Moscow Research and Clinical Center for Neuropsychiatry between November 2017 and May 2019. The study population consisted of all patients aged 18 and over who were admitted to the inpatient ward of the centre for any psychiatric problem requiring medical intervention. It should be noted that any person with permanent registration in Moscow who needs medical care for psychiatric problems can receive it free of charge in this type of centre. The first step in the study was to conduct a structured interview using the Self-Injurious Thoughts and Behaviour Inventory (SITBI)¹⁹ to identify those who had experienced SI in their lifetime. The tool is a valid screening instrument with strong interrater and test-retest reliability, and its short and long forms have been widely used by researchers in different countries²⁰⁻²². The SITBI-long form contains 169 questions and provides comprehensive information on SI, suicide plans, suicide gestures, SA, thoughts of nonsuicidal self-injury (NSSI). Each section is preceded by a question about the presence of the variable being studied, and if the answer is negative, the researcher moves on to the next section. Therefore, the duration of the interview did not exceed 5 minutes if the patient had no current or past history of suicidality.

We excluded patients who met criteria for disorders listed in the “Schizophrenia Spectrum and Other Psychotic Disorders” chapter of DSM-5, as well as those who met criteria for disorders coded F2x, except for F21.8 [Schizotypal personality disorder] of the Russian variant of ICD-10 Chapter V. Another exclusion criterion was inadequate knowledge of the Russian language and a manifest cognitive impairment that impeded the understanding of the interviewer’s questions.

After written informed consent was obtained, the patient underwent a structured interview to collect demographic and clinical data. A detailed ad hoc questionnaire was used for inclusion variables based on data from previous suicide research, such as: family history of self-injurious behavior²³, previous traumatic events like physical and sexual abuse, witnessing domestic violence, bullying²⁴, sexual habits²⁵, body modifications²⁶, substance abuse²⁷, self-injurious behaviors (suicide plans, suicide gestures, SA, age at first suicidal thoughts, NSSI), history of psychiatric disorders, and hospital admissions. Family history was assessed in the ancestors and siblings, but not in the offspring. A detailed psychiatric diagnosis was made using the ICD-10 codes. All interviews

were conducted by the same two clinical researchers (MZ, AA).

All variables were entered into a database and analyzed using the SAS software (version 9.4; SAS Institute, Cary, NC, USA). The significance level was set at 5%. Descriptive statistics were performed on all data. All variables were compared in subjects with and without SA. Data are presented as counts and percentages for categorical variables and as means with standard deviation (SD) or median, range and interquartile range for continuous variables. The association between each variable and SA was assessed using chi-squared or Fisher's exact test. All variables found to be statistically significant were then included in a multivariable logistic regression model. Results are presented as odds ratios (OR) with 95% confidence intervals (95% CI).

The study was approved by the Ethics Committee of the Moscow Research and Clinical Centre.

Results

Out of 6204 consecutive patients, 361 (5.8%) fulfilled the inclusion criteria and were enrolled in the study. The sample consisted of 315 (87%) participants assigned female at birth and 46 assigned male, aged 18-77 years (median 24 years), of whom 202 (56%) were younger than 25 years, 120 (33.2%) were 25-44 years, and 39 (10.8%) were 45 years or older. Alternative gender identity was reported by 36 patients (10%), all of whom were assigned female at birth.

The general characteristics of the sample are shown in table 1. Patients were mostly highly educated: 95% had secondary-level, incomplete or complete higher education. One hundred and 64 patients were unemployed (45.4%) and a significant proportion of patients (29%) were still studying at university at the time of the research. One hundred and 71 patients (47.4%) received financial support from their families. Only 174 patients (48.2%) were in a liaison at the time of the interview, while 41 (11.4%) had never been in a relationship. One hundred and 93 (53.5%) had a complete family structure during childhood.

While 205 patients (56.8%) had only heterosexual experience during their lifetime, 10 (2.8%) had only homosexual experience and 84 (23.3%) reported having partners of both sexes.

Current smoking was reported by 205 (56.8%) and alcohol consumption in the past 12 months by 296 (82%). One hundred and 69 patients (46.8%) had used illegal drugs at least once in their lives, and 49 (13.6%) had behavioural problems suggesting law-breaking. One hundred and 24 (34.3%) had at least one tattoo, 25 (6.9%) had tattoos covering scars from previous self-harm and 122 (33.8%) had body piercings. One hundred and 70 (64.6%) reported mental

disorders in at least one of their parents/siblings. SA among family members was reported by 66 patients (18.3%) and death by suicide among close relatives by 34 patients (9.4%). Two hundred and 14 (59.3%) patients had been exposed to physical abuse, 126 (34.9%) had witnessed domestic violence, and 111 (30.7%) had been sexually abused. A history of eating disorders (anorexia and/or bulimia only) was reported by 130 patients (36%). The majority of patients had a primary diagnosis of mood disorder (41.2%), followed by personality disorder (23.5%) and schizotypal disorder (19.7%). During their lifetime, a total of 217 patients reported at least one episode of NSSI, 203 (56.2%) had a suicide plan and 166 patients (46%) reported one or more SA.

UNIVARIATE ANALYSIS

Patients with a history of SA were more likely to have relatives with SA and NSSI and to have had traumatic experiences such as witnessing domestic violence, physical abuse, or sexual abuse. SA was associated with a number of behavioral characteristics (lack of romantic relationships, bi-sexual experience, tattoos covering scars, smoking, experience of illegal drug use, history of law breaking) and a number of clinical variables including eating disorders, NSSI, suicide planning (table 1). SA was more prevalent in patients with schizotypal, mood, and personality disorders (the three most common primary diagnoses).

MULTIVARIATE ANALYSIS

In the multivariable model (table 2), the only variables significantly associated with SA were smoking (OR 2.1; 95% CI 1.2-3.7), having made suicide plans (OR 3.4; 95% CI 2.0-5.7), and having scar-covering tattoos (OR 5.2; 95% CI 1.5-17.9). A history of law violation (OR 2.0; 95% CI 1.0-4.2) was of borderline significance.

Discussion

The percentage of individuals with SI in our sample (5.8%) was lower than in other studies. In line with Sørli et al.²⁸, suicide-related stigma in Russia may reduce both patient reporting and clinician recognition of suicidality, especially among men. In addition, in the Russian Federation, people with relatively mild symptoms of non-psychotic mental disorders, such as mild depression, mixed anxiety and depressive disorder, and people with organic emotional lability may also receive inpatient treatment. For these reasons, the severity of psychiatric symptoms and related distress appears to be lower than in previous studies. The patients in our sample were predominantly young and middle-aged women. SI rates are usually

Table 1. General characteristics of the sample and correlation with suicide attempts.

	Total		No suicide attempt (n=195)		Suicide attempt (n=166)		p-value
	N	%	N	%	N	%	
Gender							0.7613
Male	46	12.7	27	13.8	19	11.5	
Female	279	77.3	148	75.9	131	78.9	
Other	36	10.0	20	10.3	16	9.6	
Age group							0.5820
<25 years	202	56.0	106	54.4	96	57.8	
25-44 years	120	33.2	65	33.3	55	33.1	
>44 years	39	10.8	24	12.3	15	9.1	
Education							0.1059
Basic	18	5.0	6	3.1	12	7.2	
High school	223	61.8	118	60.5	105	63.3	
University	120	33.2	71	36.4	49	29.5	
Occupation							0.7500
Concept workers	200	55.4	109	55.9	91	54.8	
Manual workers	35	9.7	20	10.3	15	9.1	
Student	105	29.1	57	29.2	48	28.9	
No occupation	21	5.8	9	4.6	12	7.2	
Employment							0.5531
Employed	167	46.3	85	43.6	82	49.4	
Old-age pensioneer	12	3.3	7	3.6	5	3.0	
Not working due to disability	16	4.4	8	4.1	8	4.8	
Pregnancy/childbirth leave	2	0.6	2	1.0	0	0.0	
Unemployed	164	45.4	93	47.7	71	42.8	
Source of income							0.3470
Salary	120	33.2	59	30.3	61	36.8	
Family support	171	47.4	93	47.7	78	47.0	
Pensioneer	27	7.5	15	7.7	12	7.2	
Other	43	11.9	28	14.3	15	9.0	
Marital status							0.9063
Single	172	47.6	95	48.7	77	46.4	
In a relationship	174	48.2	92	47.2	82	49.4	
Separated/divorced	15	4.2	8	4.1	7	4.2	
Parental family structure							0.3928
Full family	193	53.5	110	56.4	83	50.0	
Full family at birth with later divorce or death of a parent	125	34.6	65	33.3	60	36.1	
Other	43	11.9	20	10.3	23	13.9	
Mother's mental disorder							0.2439
No	288	79.8	160	82.1	128	77.1	
Yes	73	20.2	35	17.9	38	22.9	

(Continued)

(Continued) - Table 1.

	Total		No suicide attempt (n=195)		Suicide attempt (n=166)		p-value
	N	%	N	%	N	%	
Father's mental disorder							0.0751
No	218	60.4	126	64.6	92	55.4	
Yes	143	39.6	69	35.4	74	44.6	
Sibling's mental disorder							0.2985
No	324	89.8	178	91.3	146	87.9	
Yes	37	10.2	17	8.7	20	12.1	
Family suicide attempts history							0.0005
No	295	81.7	172	88.2	123	74.1	
Yes	66	18.3	23	11.8	43	25.9	
Family NSSI history							0.0137
No	313	86.7	177	90.8	136	81.9	
Yes	48	13.3	18	9.2	30	18.1	
Physical abuse							0.0127
No	147	40.7	91	46.7	56	33.7	
Yes	214	59.3	104	53.3	110	66.3	
Number of psychiatric diagnoses							0.0032
1	314	87.0	179	91.8	135	81.3	
2+	47	13.0	16	8.2	31	18.7	
Primary psychiatric diagnosis							
Organic Disorders	27	7.5	17	8.7	10	6.0	0.0178
Schizotypal personality	71	19.7	35	18.0	36	21.7	
Mood disorder	149	41.2	80	41.0	69	41.6	
Anxiety disorders (including OCD)	27	7.5	22	11.3	5	3.0	
Eating disorders	2	0.6	2	1.0	0	0	
Personality disorders	85	23.5	39	20.0	46	27.7	
Bullying in primary school							0.9008
No	238	65.9	128	65.6	110	66.3	
Yes	123	34.1	67	34.4	56	33.7	
Bullying in junior high school							0.6459
No	170	47.1	94	48.2	76	45.8	
Yes	191	52.9	101	51.8	90	54.2	
Bullying in high school							0.6065
No	221	61.2	117	60.0	104	62.7	
Yes	140	38.8	78	40.0	62	37.3	
Liaison experience							0.0090
Never had relationship	41	11.4	30	15.4	11	6.6	
Past or present relationship	320	88.6	165	84.6	155	93.4	
Sexual activity							0.0882
No	61	16.9	39	20.0	22	13.3	
Yes	361	83.1	156	80.0	144	86.7	

(Continued)

(Continued) - Table 1.

	Total		No suicide attempt (n=195)		Suicide attempt (n=166)		p-value
	N	%	N	%	N	%	
Sex experience							0.0066
None	62	17.2	40	20.5	22	13.3	
Heterosexual only	205	56.8	117	60.0	88	53.0	
Homosexual only	10	2.8	6	3.1	4	2.4	
Bisexual	84	23.3	32	16.4	52	31.3	
Domestic violence witnessing							0.0447
No	235	65.1	136	69.7	99	59.6	
Yes	126	34.9	59	30.3	67	40.4	
Children							0.9502
No	280	77.6	151	77.4	129	77.7	
Yes	81	22.4	44	22.6	37	22.3	
Sexual abuse							0.0001
No	250	69.3	152	77.9	98	59.0	
Yes	111	30.7	43	22.1	68	41.0	
Violation of law							0.0035
No	312	86.4	178	91.3	134	80.7	
Yes	49	13.6	17	8.7	32	19.3	
Drugs							0.0093
No	192	53.2	116	59.5	76	45.8	
Yes	169	46.8	79	40.5	90	54.2	
Piercing							0.6714
No	239	66.2	131	67.2	108	65.1	
Yes	122	33.8	64	32.8	58	34.9	
Tattoos							0.0039
No	237	65.7	141	72.3	96	57.8	
Yes	124	34.3	54	27.7	70	42.2	
Scar-covering tattoos							<0.0001
No	336	93.1	191	97.9	145	87.4	
Yes	25	6.9	4	2.1	21	12.6	
Body modifications							0.1581
No	330	91.4	182	93.3	148	89.2	
Yes	31	8.6	13	6.7	18	10.8	
Traumatic events in the previous 6 months							0.0868
No	112	31.0	68	34.9	44	26.5	
Yes	249	69.0	127	65.1	122	73.5	
NSSI							0.0044
No	144	39.9	91	46.7	53	31.9	
Yes	217	60.1	104	53.3	113	68.1	

(Continued)

(Continued) - Table 1.

	Total		No suicide attempt (n=195)		Suicide attempt (n=166)		p-value
	N	%	N	%	N	%	
Alcohol consumption							0.5352
Never	19	5.3	12	6.1	7	4.2	
Current	296	82.0	7	80.0	140	84.3	
Former	46	12.7	156	13.9	19	11.5	
Smoking							<0.0001
Never	115	31.9	80	41.0	35	21.1	
Current/former	246	58.1	115	59.0	131	78.9	
Eating disorders							0.0072
No	231	64.0	137	70.3	94	56.6	
Yes	130	36.0	58	29.7	72	43.4	
Age at first suicidal ideation							0.3309
<15	164	45.4	82	42.1	82	49.4	
15-20	129	35.7	70	35.9	59	35.5	
21-30	29	8.0	18	9.2	11	6.6	
>30	39	10.8	25	12.8	14	8.4	
Suicide plan							<0.0001
No	158	43.8	113	57.9	45	27.1	
Yes	203	56.2	82	42.1	121	72.9	

Legend: NSSI= nonsuicidal self-injury; OCD= obsessive-compulsive disorder.

higher in women than in men^{5,29}, but the difference is generally smaller compared to our findings. Our data may be explained by the fact that women are more likely to seek psychiatric treatment than men. The high percentage of unemployed participants was associated not only with a mental disorder that impedes career advancement, but also with the fact that a significant proportion of patients (29%) were still pursuing a university education at the time of the study. Almost half of the patients received financial support from their families.

In terms of psychiatric diagnoses, the high prevalence of schizotypal disorder in our sample is consistent with other reports. A meta-analysis³⁰ found that self-harm and suicidality were highly prevalent in individuals at risk of psychosis, while Bang et al.³¹ found that these individuals had significantly greater SI and more severe depressive symptoms than healthy controls. In our study, the transition from SI to SA was reported by 46% of patients. These figures are higher than in previous reports³², which found that one-third of ideators had a plan and one-fifth had made an attempt. Our data are from an inpatient setting and represent a psychiatric sample rather than the general population. According to some studies, the

prevalence of mental disorder among those who have attempted suicide may be as high as 80%³³. However, while most patients with SA have a mental disorder, it is worth remembering that two-thirds of patients with major depressive disorder have never attempted suicide in their lifetime³⁴.

Three factors were significantly associated with SA in our study: smoking, having formulated a suicide plan, and the presence of scar-covering tattoos. Smoking has been associated with SI³⁵, suicide planning^{36,37}, and SA, including fatal SA³⁸. In a meta-analysis of 63 studies, smokers had a 2.05 risk of SI, a 2.36 risk of suicide planning, and a 2.84 risk of SA²⁷. The mechanism by which tobacco smoking affects the risk of SA may be explained by nicotine decreasing serotonergic activity in the hippocampus³⁹ and by nicotine activating the hypothalamic-adrenal-pituitary axis, which has been associated with suicidal behavior⁴⁰. Currently, there is controversy regarding the relationship between tattoos and mental illness. There is some evidence that tattooing appears to be more common in some mental disorders, such as borderline personality disorder⁴¹. The prevalence of tattooing is influenced by various cultural factors, such as social attitudes towards people with tattoos.

Table 2. Multivariable analysis of risk factors for suicide attempts.

	OR	95% CI	p-value
Family suicide attempt history			0.2715
No	1 (ref.)	-	
Yes	1.8	0.9-3.7	
Family NSSI history			0.1457
No	1 (ref.)	-	
Yes	1.0	0.4-2.2	
Physical abuse			0.7898
No	1 (ref.)	-	
Yes	0.9	0.5-1.6	
Romantic liaison experience			0.0704
Never	1 (ref.)	-	
Past or present	2.6	0.9-7.1	
Domestic violence			0.6928
No	1 (ref.)	-	
Yes	1.1	0.7-1.9	
Sexual abuse			0.2443
No	1 (ref.)	-	
Yes	1.4	0.8-2.5	
Violation of law			0.0658
No	1 (ref.)	-	
Yes	2.0	1.0-4.1	
Drugs			0.9380
No	1 (ref.)	-	
Yes	1.0	0.6-1.7	
Tattoos			0.5447
No	1 (ref.)	-	
Yes	0.8	0.5-1.5	
Scar-covering tattoos			0.0118
No	1 (ref.)	-	
Yes	5.0	1.4-17.4	
NSSI			0.6444
No	1 (ref.)	-	
Yes	0.9	0.5-1.6	
Smoking			0.0134
Never	1 (ref.)	-	
Current/former	2.1	1.2-3.7	
Eating disorders			0.9867
No	1 (ref.)	-	
Yes	1.0	0.6-1.8	
Suicide plan			<0.0001
No	1 (ref.)	-	
Yes	3.4	2.0-5.7	
Number of psychiatric diagnosis			0.1247

(Continued)

(Continued) - Table 2.

	OR	95% CI	p-value
1	1 (ref.)		
2+	1.8	0.8-4.0	
Primary psychiatric diagnosis			0.2776
Organic Disorders	0.7	0.2-2.1	
Schizotypal personality	1.8	0.9-3.7	
Mood disorder	1 (ref.)		
Anxiety disorders (including OCD)	0.4	0.1-1.3	
Eating disorders	Ne	ne	
Personality disorders	1.1	0.6-2.2	
Sex experience			0.9565
None	1.2	0.5-3.0	
Heterosexual only	1 (ref.)		
Homosexual only	1.0	0.2-4.6	
Bisexual	1.2	0.6-2.3	

Legend: NSSI= nonsuicidal self-injury; OR= odds ratio; CI: confidence interval; Ne= not estimable.

In recent decades, tattooing is no longer a marginal practice in the Russian Federation, but its prevalence is still lower than in other European countries⁴². The association between psychopathology and tattoos may weaken as tattoos become more prevalent in the population, although poorer outcomes may be associated with specific characteristics of tattoos, such as patient motivation⁴³. Tattooing is common among individuals with NSSI and correlates with the severity of self-harm^{44,45}, possibly indicating altered pain thresholds in individuals with a propensity to tattoo. In addition, the pain experienced during tattooing may increase suicidality by reducing the fear of pain⁴⁶. In our study, tattoos used to cover scars from previous self-harm were associated with SA. In our study, a structured interview was used to identify suicide plans and their characteristics. The results obtained confirm that in patients with non-psychotic mental disorders, the presence of a suicide plan is associated with SA. While some authors believe that most SAs are impulsive⁴⁷, others suggest that many attempts can be predicted and that the development of a suicide plan is a sign of high suicide risk⁴⁸. Suicide planning is common among patients with mental disorders^{29,36,37}. According to Dong et al.³⁴, the lifetime prevalence of suicide planning among patients with major depressive disorder is approximately 17.5%. Several studies^{29,36,37} described a continuum between SI, suicide planning, non-fatal and fatal SA. The results of our study are consistent with previous findings and underscore the importance of identifying the presence of a suicide plan when SI is reported.

Many variables found to predict SA in previous studies were significant only in univariate analysis in our research, so they could not be considered as independent predictors of SA in studied population. The first explanation could be that they are involved in the development of SI but not in the transition from SI to SA. Another reason for these results could be some peculiarities of the Russian population, and repeated cross-national research is warranted to test this hypothesis. Our findings may also be influenced by some characteristics of studied cohort, which consists mainly of young adults (almost exclusively female) with non-psychotic mental disorders. As the number of men and older patients in our study is relatively small, the study may not be sufficiently powered to reveal the importance of some factors involved in the transition from SI to SA, if these factors are specific to this subpopulation.

Our study has both strengths and limitations. The main strength is the study of a large cohort of patients with SI at high risk of suicide. Another strength is the enrolment of consecutive patients to minimise selection bias. As we used a screening tool (the SITBI) that has been validated in many countries and the full version of our questionnaire is available¹⁹, the research methodology is easily reproducible. Such studies will make it possible to compare data from different populations and provide an understanding of the specific cultural features of the transition from SI to SA.

However, there are some limitations. The first is the retrospective design. The data cannot be extrapolated to persons with mental disorders whose first SA was fatal, so they are limited to cases of first non-lethal SA. However, a prospective study in this context

has not been carried out as it would require a much larger sample size and a long follow-up period.

A second limitation is the baseline characteristics of the cohort. Our patients were admitted to the Center for Neuropsychiatry because of psychiatric symptoms, so they do not represent the entire population of people with suicidal thoughts. However, the purpose of our study was to provide data that could be used for patients with mental disorders.

A third limitation is the age and gender structure of our sample. The patients were predominantly young and middle-aged women, and this may be important for the interpretation of the results, as men and people in the older group are at higher risk of a lethal suicide attempt. With this in mind, the results of our study should not be extrapolated to the general population until additional studies are conducted in samples with higher numbers of men and older people to verify our results. The final limitation is the sample size. Although it is quite large, we cannot exclude that our study was underpowered for some variables that were found to be of borderline significance in our study (such as family history of SA and law violation).

Conclusions

Smoking, scar-covering tattoos, and suicide plan are associated with the transition from SI to SA in Russian patients with NPMD. Measures to prevent non-fatal and fatal SA should be taken in patients with SI and these behavioral characteristics.

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References

- Roth G, Abate D, Abate K, et al. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; 392: 1736-88.
- Glenn C, Kleiman E, Kellerman J, et al. Annual Research Review: a meta-analytic review of worldwide suicide rates in adolescents. *J Child Psychol Psychiatry* 2020; 61: 294-308.
- Sinyor M, Tse R, Pirkis J. Global trends in suicide epidemiology. *Curr Opin Psychiatry* 2017; 30: 1-6.
- World Health Organization. Suicide rates per (100 000 population) 2020. Available from: <https://lc.cx/FU4DFM> [last accessed 2024, February 8].
- Bernal M, Haro J, Bernert S, et al. Risk factors for suicidality in Europe: results from the ESEMED study. *J Affect Dis* 2007; 101: 27-34.
- Bertolote J, Fleischmann A, De Leo D, et al. Suicide attempts, plans, and ideation in culturally diverse sites: the WHO SUPRE-MISS community survey. *Psychol Med* 2005; 35: 1457-65.
- Beghi M, Rosenbaum J, Cerri C, Cornaggia CM. Risk factors for fatal and nonfatal repetition of suicide attempts: a literature review. *Neuropsychiatr Dis Treat* 2013; 9: 1725-36.
- Bostwick J, Pabbati C, Geske J, McKean A. Suicide attempt as a risk factor for completed suicide: even more lethal than we knew. *Am J Psychiatry* 2016; 173: 1094-100.
- Giupponi G, Innamorati M, Baldessarini RJ, et al. Factors associated with suicide: case-control study in South Tyrol. *Compr Psychiatry* 2018; 80: 150-4.
- Nock M, Borges G, Bromet E, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *Br J Psychiatry* 2008; 192: 98-105.
- Hubers A, Moaddine S, Peersmann S, et al. Suicidal ideation and subsequent completed suicide in both psychiatric and non-psychiatric populations: a meta-analysis. *Epidemiol Psychiatr Sci* 2016; 27: 186-98.
- Too L, Spittal M, Bugeja L, Reifels L, Butterworth P, Pirkis J. The association between mental disorders and suicide: a systematic review and meta-analysis of record linkage studies. *J Affect Disord* 2019; 259: 302-13.
- Cao X, Zhong B, Xiang Y, et al. Prevalence of suicidal ideation and suicide attempts in the general population of China. *Int J Psychiatry Med* 2015; 49: 296-308.
- Klonsky ED, May AM. The Three-Step Theory (3ST): a new theory of suicide rooted in the "Ideation-to-Action" framework. *Int J Cogn Ther* 2015; 8: 114-29.
- Klonsky ED, May AM, Saffer BY. Suicide, suicide attempts, and suicidal ideation. *Annu Rev Clin Psychol* 2016; 12: 307-30.
- Turecki G, Brent D, Gunnell D, et al. Suicide and suicide risk. *Nat Rev Dis Primers* 2019; 5: 74.
- Han B, Compton W, Gfroerer J, McKee R. Prevalence and correlates of past 12-month suicide attempt among adults with past-year suicidal ideation in the United States. *J Clin Psychiatry* 2015; 76: 295-302.
- Nock M, Millner A, Joiner T, et al. Risk factors for the transition from suicide ideation to suicide attempt: results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *J Abnorm Psychol* 2018; 127: 139-49.
- Nock M, Holmberg E, Photos V, Michel B. Self-injurious thoughts and behaviors interview: development, reliability, and validity in an adolescent sample. *Psychol Assessment* 2007; 19: 309-17.
- Fischer G, Ameis N, Parzer P, et al. The German version of the self-injurious thoughts and behaviors interview (SITBI-G): a tool to assess non-suicidal self-injury and suicidal behavior disorder. *BMC Psychiatry* 2014; 14: 265.
- Blasco M, Vilagut G, Almenara J, et al. Suicidal thoughts and behaviors: prevalence and association with distal and proximal factors in Spanish university students. *Suicide Life Threat Behav* 2019; 49: 881-98.
- McLafferty M, Armour C, Bunting B, et al. Coping, stress, and negative childhood experiences: The link to psychopathology, self-harm, and suicidal behavior. *Psych J* 2019; 8: 293-306.

23. Rodante D, Rojas S, Feldner M, et al. Differences between female suicidal patients with family history of suicide attempt and family history of completed suicide. *Compr Psychiatry* 2016; 70: 25-31.
24. Zatti C, Rosa V, Barros A, et al. Childhood trauma and suicide attempt: a meta-analysis of longitudinal studies from the last decade. *Psychiatry Res* 2017; 256: 353-8.
25. Sicard S, Mayet A, Duron S, et al. Factor associated with risky sexual behaviors among the French general population. *J Public Health* 2016; 39: 523-9.
26. Hicinbothem J, Gonsalves S, Lester D. Body modification and suicidal behavior. *Death Studies* 2006; 30: 351-63.
27. Poorolajal J, Haghtalab T, Farhadi M, Darvishi N. Substance use disorder and risk of suicidal ideation, suicide attempt and suicide death: a meta-analysis. *J Public Health* 2015; 38: 282-91.
28. Sørli T, Sørgaard K, Bogdanov A, Bratlid T, Rezvy G. Prevalence and characteristics of suicide attempters and ideators among acutely admitted psychiatric hospital patients in northwest Russia and northern Norway. *BMC Psychiatry* 2015; 15: 187.
29. Scocco P, de Girolamo G, Vilagut G, Alonso J. Prevalence of suicide ideation, plans, and attempts and related risk factors in Italy. *Compr Psychiatry* 2008; 49: 13-21.
30. Taylor P, Hutton P, Wood L. Are people at risk of psychosis also at risk of suicide and self-harm? A systematic review and meta-analysis. *Psychol Med* 2014; 45: 911-26.
31. Bang M, Park JY, Kim KR, et al. Suicidal ideation in individuals at ultra-high risk for psychosis and its association with suspiciousness independent of depression. *Early Interv Psychiatry* 2019; 13: 539-45.
32. Bromet E, Havenaar J, Tintle N, Kostyuchenko S, Kotov R, Gluzman S. Suicide ideation, plans and attempts in Ukraine: findings from the Ukraine World Mental Health Survey. *Psychol Med* 2007; 37: 807-19.
33. Cho S, Na K, Cho S, Im J, Kang S. Geographical and temporal variations in the prevalence of mental disorders in suicide: systematic review and meta-analysis. *J Affect Disord* 2016; 190: 704-13.
34. Dong M, Zeng L, Lu L, et al. Prevalence of suicide attempt in individuals with major depressive disorder: a meta-analysis of observational surveys. *Psychol Med* 2019; 9: 1691-704.
35. Boden J, Fergusson D, Horwood L. Cigarette smoking and suicidal behaviour: results from a 25-year longitudinal study. *Psychol Med* 2007; 38: 433-9.
36. Kessler R, Berglund P, Borges G, et al. Smoking and Suicidal Behaviors in the National Comorbidity Survey: replication. *J Nerv Mental Disease* 2007; 195: 369-77.
37. Miller M, Borges G, Orozco R, et al. Exposure to alcohol, drugs and tobacco and the risk of subsequent suicidality: findings from the Mexican Adolescent Mental Health Survey. *Drug Alcohol Depend* 2011; 113: 110-7.
38. Hemmingsson T, Kriebel D. Smoking at age 18-20 and suicide during 26 years of follow-up – how can the association be explained? *Int J Epidemiol* 2003; 32: 1000-4.
39. Malone K, Waternaux C, Haas G, Cooper T, Li S, Mann J. Cigarette smoking, suicidal behavior, and serotonin function in Major Psychiatric Disorders. *Am J Psychiatry* 2003; 160: 773-9.
40. Jokinen J, Carlborg A, Mårtensson B, Forslund K, Nordström A, Nordström P. DST non-suppression predicts suicide after attempted suicide. *Psychiatry Research* 2007; 150: 297-303.
41. Dhossche D, Snell K, Larder S. A case-control study of tattoos in young suicide victims as a possible marker of risk. *J Affect Disord* 2000; 59: 165-8.
42. Sagoe D, Pallesen S, Andreassen C. Prevalence and correlates of tattooing in Norway: a large-scale cross-sectional study. *Scand J Psychol* 2017; 58: 562-70.
43. Byard R, Charlwood C. Commemorative tattoos as markers for anniversary reactions and suicide. *J Forensic Leg Med* 2014; 24: 15-7.
44. Solís-Bravo M, Flores-Rodríguez Y, Tapia-Guillen L, et al. Are tattoos an indicator of severity of non-suicidal self-injury behavior in adolescents? *Psychiatry Investig* 2019; 16: 504-12.
45. Zinchuk M, Beghi M, Beghi E, et al. Non-suicidal self-injury in Russian patients with suicidal ideation. *Arch Suicide Res* 2020; 27: 1-25.
46. Klonsky E, Qiu T, Saffer B. Recent advances in differentiating suicide attempters from suicide ideators. *Curr Opin Psychiatry* 2017; 30: 15-20.
47. Gore-Jones V, O'Callaghan J. Suicide attempts by jumping from a height: a consultation liaison experience. *Australas Psychiatry* 2012; 20: 309-12.
48. Thompson A, Dewa C, Phare S. The suicidal process: age of onset and severity of suicidal behaviour. *Soc Psychiatry Psychiatr Epidemiol* 2011; 47: 1263-9.