Psychometric Properties and Factor Structure Analysis of the Inventory of Statements about Self-injury (ISAS) in a Russian Non-clinical Sample

Психометрические свойства и анализ факторной структуры опросника утверждений о самоповреждениях (ISAS) на российской неклинической выборке

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Original research

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ABSTRACT

BACKGROUND: The "Inventory of Statements About Self-Injury" (ISAS) is one of the most widely used and reliable psychometric tools for assessing non-suicidal self-injury (NSSI) and its motivations. The Russian adaptation of the ISAS, involving patients with nonpsychotic psychiatric disorders, demonstrated high internal consistency and a two-factor structure similar to the original. However, the reliability and suitability of ISAS in a non-clinical population remain unclear.

AIM: To adapt the ISAS in Russian, evaluate its psychometric properties, and analyze its factor structure in a sample of Russian university students.

METHODS: The psychometric properties and factor structure of the adapted ISAS version were evaluated through an anonymous online survey of Russian university students. Respondents had reported lifetime NSSI and scored above 4 on the ISAS-Functions subscale. Exploratory and confirmatory factor analysis (EFA/CFA) were performed on two randomly formed subgroups to evaluate the factor structure of ISAS. Additionally, the associations between the identified ISAS factors and the presence of suicidal thoughts and attempts over a lifetime and in the week before their participation in the study, as well as seeking psychiatric and/or psychotherapeutic care over a lifetime, were analyzed.

RESULTS: The survey included 3,919 participants, of whom 1,149 (29.3%; 88.0% female) reported NSSI, with a median age of 20 (18; 22) years. The Russian ISAS demonstrated high internal consistency (Cronbach's alpha = 0.851). EFA

results supported the original two-factor structure. CFA results suggested an alternative three-factor structure of the ISAS, including “Signal”, “Regulation”, and “Influence” factors. Suicidal attempts were associated with the factors “Regulation” and “Influence”, suicidal thoughts with “Regulation” and female gender, and the seeking of psychiatric and/or psychotherapeutic care with “Regulation” and age.

CONCLUSION: The adapted ISAS in Russian is a reliable tool with high internal consistency. The study proposed a three-factor structure, indicating a greater heterogeneity of the NSSI phenomenon compared to earlier understandings. The study demonstrated the association between two of the three identified factors with suicidal behavior and thoughts, and the seeking of psychiatric care.

АННОТАЦИЯ

ВВЕДЕНИЕ: Одним из наиболее широко используемых и надежных психометрических инструментов для оценки несуицидального самоповреждающего поведения (НССП) и его мотивов является «Опросник утверждений о самоповреждениях» (Inventory of Statements About Self-Injury, ISAS). Опросник адаптирован на русский язык с участием пациентов с непсихотическими психическими расстройствами. Он продемонстрировал высокую внутреннюю согласованность и двухфакторную структуру, аналогичную оригиналу. Однако надежность и валидность ISAS в неклинической выборке остаются неизученными.

ЦЕЛЬ: Провести независимую русскоязычную адаптацию ISAS, оценку его психометрических свойств и факторной структуры на выборке студентов российских вузов.

МЕТОДЫ: Психометрические свойства и факторную структуру адаптированного ISAS изучили с помощью анонимного онлайн-опроса студентов российских вузов, сообщивших о НССП в течение жизни и набравших более 4 баллов по подшкале ISAS-Functions. Факторную структуру ISAS исследовали с помощью эксплораторного и конфирматорного факторного анализа в двух подгруппах, сформированных случайным образом. Дополнительно проанализировали ассоциации выделенных факторов ISAS с наличием суицидальных мыслей и попыток в течение жизни и за неделю до участия в исследовании, а также с обращением за психиатрической и/или психотерапевтической помощью в течение жизни.

РЕЗУЛЬТАТЫ: В опросе приняли участие 3919 человек. Из них 1149 респондентов (29,3%; 88,0% женщины) сообщили о НССП. Медианный возраст составил 20 (18; 22) лет. Русскоязычная версия ISAS показала высокую внутреннюю согласованность (альфа Кронбаха = 0,851). Данные эксплораторного факторного анализа подтвердили соответствие двухфакторной структуры русскоязычной версии ISAS оригинальной версии. По результатам конфирматорного факторного анализа предложена альтернативная трехфакторная структура ISAS с выделением факторов «Сигнал», «Регуляция» и «Влияние». С суицидальными попытками были ассоциированы факторы «Регуляция» и «Влияние», с суицидальными мыслями — фактор «Регуляция» и женский пол, с обращением за психиатрической и/или психотерапевтической помощью — фактор «Регуляция» и возраст.

ЗАКЛЮЧЕНИЕ: Русскоязычная версия ISAS характеризуется высокой внутренней согласованностью и валидностью. Обоснована трехфакторная структура опросника, указывающая на большую гетерогенность феномена НССП, чем предполагалось ранее. Показана ассоциация двух из трех выделенных факторов с суицидальными мыслями и поведением и обращением за психиатрической помощью.

Keywords: *non-suicidal self-injury; self-harm; questionnaire; ISAS; adaptation; factor analysis*
Ключевые слова: *несуицидальное самоповреждающее поведение; селфхарм; опросник; ISAS; адаптация; факторный анализ*

INTRODUCTION

Non-suicidal self-injury (NSSI) is intentional destruction of one's own body tissue without suicidal intent and for purposes not socially sanctioned [1]. According to a meta-analysis of epidemiological studies published between 1966 and 2012, 17.2% of adolescents, 13.4% of young adults (aged 18–24), and 5.5% of individuals aged ≥25 years have self-injured at least once in their life [2]. More recent data obtained in epidemiological studies during the COVID-19 pandemic (2019–2022) showed that the prevalence of self-harm stood at 22.9% in adolescents and 11.7% in other age groups [3]. NSSI is also known to be associated with a high risk of suicidal attempts [4–6].

NSSI is a heterogeneous clinical phenomenon. It is known that NSSI can vary significantly across different patients in terms of frequency, intensity, types, age of onset, and as well as in the range of subjective psychological motivations (reasons and goals, as defined by the patient) for self-injury [7].

To date, more than two dozen psychometric tools have been proposed for the quantitative assessment of various characteristics of NSSI, including psychological motivations for self-injury [8]. One of the widely used and reliable psychometric tools for the quantitative assessment of psychological motivations for NSSI is the Inventory of Statements About Self-Injury (ISAS) [8] developed by Klonsky et al. and freely available for use and adaptation [9]. Until recently, none of the existing psychometric tools for the quantitative assessment of NSSI was validated in the Russian language. However, in 2023, the ISAS was adapted in Russian by Zinchuk et al. on a sample of 614 patients with non-psychotic mental disorders [10]. The adapted inventory demonstrated high internal consistency and a two-factor structure similar to that of the original questionnaire [10]. Yet the factor structure of the Russian-language version of the questionnaire was not validated by the results of a confirmatory factor analysis (CFA) and the psychometric properties of the tool were not evaluated on a clinical sample.

The aim of this study is to conduct an independent evaluation of the psychometric properties of the Russian-language adaptation of the ISAS and conduct a factor structure analysis on a sample of Russian university students.

METHODS

Structure of the ISAS

The ISAS is a self-reporting tool consisting of two sections (see Appendix 1 in the Supplementary) [9].

The first section of the ISAS, the ISAS-Behavior (ISAS-B), is designed to capture non-suicidal self-harm behavior. In that first part, respondents are asked to indicate whether they have ever engaged in such actions over the course of their life and, if so, how many times. Respondents who report at least one instance of self-harm are asked to indicate the types of self-harm, the age at which the first incident occurred, their attitude towards pain, the social context, the time elapsed between the urge to self-harm and acting on it, as well as their desire to stop self-injuring. Responses to the ISAS-B section are analyzed as is, without summation or scoring, which means they are not subjected to a psychometric analysis.

The second section of the ISAS questionnaire, the ISAS-Functions (ISAS-F), is designed to allow respondents to describe their perceptions of self-injury. This section contains 39 statements about the reasons behind and purposes of self-harm, each must be assessed according to three categories with corresponding scores from 0 to 2 (0 — does not apply to me; 1 — partially applies to me; 2 — fully applies to me). According to the original methodology [9], the answers to these questions were combined into 13 groups of motivations ("functions") for self-injurious actions: 1) "Affect regulation" (items 1, 14, 27); 2) "Self-punishment" (items 3, 16, 29); 3) "Anti-dissociation/feeling generation" (items 5, 18, 31); 4) "Marking distress" (items 11, 24, 37); 5) "Anti-suicide" (items 6, 19, 32); 6) "Self-care" (items 4, 17, 30); 7) "Interpersonal boundaries" (items 2, 15, 28); 8) "Sensation-seeking" (items 7, 20, 33); 9) "Peer-bonding" (items 8, 21, 34); 10) "Interpersonal influence" (items 9, 22, 35); 11) "Toughness" (items 10, 23, 36); 12) "Revenge" (items 12, 25, 38); 13) "Autonomy" (items 13, 26, 39). These groups of motivations are considered under two subscales: "intrapersonal" (groups 1–5) and "interpersonal" motivations (groups 6–13). The item scores are summed up for each of the 13 groups of motivations, as well as for the two subscales of "intrapersonal" and "interpersonal" motivations.

Adaptation of the ISAS

The ISAS was translated into Russian by mental health professionals who are proficient in English. The draft translation was then reviewed by four psychiatrists and unanimously submitted for further testing to a focus group. The latter consisted of 28 patients from the V.M. Bekhterev National Medical Research Center for Psychiatry and Neurology, Saint Petersburg (25 women, median age — 23 [21; 25] years). The focus group also included five

mentally healthy participants, clinical residents of the same research center, among whom four were women with a median age of 25 (24.5; 25.5) years. The draft version of the inventory was tested in person with the researcher present. After completion of the questionnaire by the focus group participants, unstructured interviews were conducted to identify difficult-to-understand questions and wording. Based on the results of the survey and interviews, the Russian-language version of the inventory was fine-tuned (see Table S1 in the Supplementary). The final version of the inventory was achieved through consensus by the above-mentioned psychiatrists and is presented in Appendix 1 in the Supplementary.

Study design

To assess the psychometric properties and factor structure of the adapted version of the ISAS questionnaire, a cross-sectional online survey was conducted among students from Russian universities across all eight federal districts of the Russian Federation.

Eligibility criteria

The inclusion criteria for the study were as follows: age ≥18 years, a report of having a history of lifetime NSSI, and a total score on the ISAS-F >4 (the value of the first quartile for the range of scores on this scale). The last criterion was used to bolster the specificity of the test (to reduce the number of participants without a history of NSSI who incorrectly reported self-injury-related behavior because of uninformed response bias [11, 12]), which refers to errors in responses that stem from a lack of understanding or information. The threshold value (>4) was chosen arbitrarily to achieve a balance between high test specificity and maintaining a large sample size. Non-inclusion or exclusion criteria were not envisaged.

Conducting the survey

In January 2023, invitations to participate in a survey, including a link to the questionnaire, were sent to 70 partner universities of the not-for-profit organization "Union for Mental Health"[1]. The invitations were sent via email to the contact persons in the administrations of the partner universities. Survey period: from January 13, 2023 (date of questionnaire completion by the first participant) to February 13, 2023, inclusive. Methods for ensuring the uniqueness of survey participants, due to the confidential nature of the survey, were not planned.

The survey was conducted online using Google Forms[2] (Google LLC, USA). In addition to the adapted ISAS version (see Appendix 1 in the Supplementary), the questionnaire included questions about each respondent's sociodemographic characteristics (gender, age, marital status, place of residence), lifetime and weekly suicidal thoughts, lifetime suicide attempts, and if they had ever sought psychiatric or psychotherapeutic care at any point in their life. All the questions were mandatory. In case one missed questions, the survey was considered incomplete and the data not saved for further analysis. The approximate time for completing the questionnaire was 10–15 min.

Statistical analysis

The required sample size was not calculated in the study.

The data analysis included Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). EFA was performed using the IBM SPSS Statistics software package, version 23.0 (IBM Corp., USA), while CFA was conducted using the IBM SPSS Amos software package, version 23.0 (IBM Corp., USA), utilizing the following plugins: Pattern Matrix Model Builder, Master Validity, and Model Fit Measures.

The analysis of the distribution of quantitative variables was performed using the Shapiro-Wilk test. In all cases, the hypothesis of a normal distribution was rejected (p <0.05). Consequently, the quantitative variables were described using the values of the median and the first and third quartiles (Q1; Q3).

To assess the internal consistency of the questionnaire, Cronbach's alpha was calculated and values ≥0.64 were considered acceptable [13]. The internal consistency was also evaluated using mean corrected item-total Spearman correlation. Corrected item-total correlation was defined as the correlation of the item score and total ISAS-F score minus the score for the item. The consistency was considered acceptable if the mean correlation coefficient was ≥0.30 [14].

The factor analysis was conducted only for the questions of the ISAS-F, the second section of the questionnaire. To assess the feasibility of conducting a factor analysis on the obtained sample, the Kaiser-Meyer-Olkin test for sampling adequacy and Bartlett's test of sphericity were

[1] Full list available from: https://mental-health-russia.ru/partnery/

[2] Available from: https://www.google.com/forms

used. The sample was considered adequate when the Kaiser-Meyer-Olkin test result was >0.6 and Bartlett's test of sphericity result was statistically significant (p <0.05) [15]. To conduct the EFA and the CFA, the sample was randomly divided into two equal parts using the "Random Sample" tool in the IBM SPSS Statistics software. The comparability of the subgroups was analyzed using the Mann-Whitney test (U-test) (for quantitative variables), Pearson's chi-squared test (for categorical variables with ≥3 categories), and Fisher's exact test (for binary categorical variables).

The EFA was conducted by the promax rotation method (k=4) with Kaiser normalization. At the first stage of the EFA, the number of factors was limited to 2 in order to test the fit to the factor structure proposed by the authors of the original questionnaire [10]. At the second stage, the number of evaluated factors was not limited. The scree plot method was used to determine the number of factors, and the model included factors having an eigenvalue >1, with at least 50% total variance explained [16]. Variables with a factor loading >0.3 on at least one factor were not excluded from the factor structure analysis [17]. Variables were distributed to factors based on the highest factor loading. The CFA was conducted to examine the one-factor and two-factor (original) structure of the questionnaire, as well as the factor structure identified by us at the second stage of the EFA. The quality of the factor model was considered acceptable if at least one of the following conditions was met: Root Mean Square Error of Approximation (RMSEA) <0.1 [18], Comparative Fit Index (CFI), or Tucker-Lewis Index (TLI) ≥0.9 [19].

To analyze the associations between the total scores on the identified factors (the sum of scores for all questions that comprise each factor) and the binary characteristics (dependent variables) of "lifetime suicidal thoughts", "lifetime suicide attempts", and "lifetime history of seeking psychiatric and/or psychotherapeutic help", binary logistic regression was employed while controlling for the variables of "sex", "age", "duration of NSSI", and "severity of NSSI". Results were considered statistically significant at p <0.05.

Ethical expert evaluation

The study was approved by the Ethics Committee of the Mental Health Research Center, Moscow (minutes No. 914 dated November 21, 2022). All potential study participants gave their informed consent to participate by clicking the "Agree" button under the following statement: "I confirm that I am 18 years old or older and give my consent to the use of my answers to these questions in an anonymous format for research purposes". The survey was anonymous. At the same time, respondents were asked to provide their email addresses to be informed about the recruitment of participants for future research. Completing this item was not mandatory.

RESULTS

Participants

A total of 3,919 individuals participated in the survey (neither the total number of students studying at the time when the invitation was sent, nor the number of students informed about the survey was known exactly). Of these, 1,673 (42.7%) reported lifetime NSSI. A total score of more than 4 points on the ISAS-F was recorded in 1,149 respondents (68.7% of those who reported NSSI).

Sample characteristics

The median age of respondents with NSSI and ISAS-F >4 points was 20 (18; 22) years. Most respondents were female, more than a quarter combined studying with work, and about half had a partner (in most cases, the relationships were not officially registered), see Table 1. Three-quarters of the respondents reported having had thoughts of not wanting to live or of committing suicide. About one-third of participants reported having had such thoughts during the week preceding their inclusion in the study. Almost a fourth of participants reported lifetime suicidal attempts. However, only about 30% of participants reported having ever sought assistance from a psychiatrist and/or psychotherapist (Table 1).

Characteristics of non-suicidal self-harm

The most common type of self-harm encountered was self-cutting (23.7%; n=272). Less common types included interfering with wound healing (14.3%; n=164), hitting one's head or other parts of the body (14.0%; n=161), biting (13.1%; n=151), severe scratching (12.3%; n=141), and even less frequent were pinching (7.0%; n=80), other ways of self-harm (7.0%; n=80), pulling hair (4.5%; n=52), burning (1.4%; n=16). Extremely rare types of self-harm were rubbing the skin against a rough surface (0.9%; n=10) and swallowing dangerous substances (0.9%; n=10), carving (0.7%; n=8), sticking needles in oneself (0.3%; n=4).

The vast majority of respondents (96.2%; n=1,105) reported several (≥2) types of self-harm methods; the median number of self-harm types was 5 (4; 7).

Table 1. Characteristics of the study sample (*n*=11,149)

Parameter	Value, abs. (%)
Sex (female)	1,011 (88.0)
Employment (combining study with work)	306 (26.6)
Marital status: • Single • Have a partner • Married • Divorced	 575 (50.0) 528 (46.0) 43 (3.7) 3 (0.3)
Federal district: • Central • Volga • Northwestern • Southern • North Caucasus • Siberian • Far Eastern • Ural	 101 (8.8) 265 (23.0) 142 (12.4) 63 (5.5) 160 (13.9) 170 (14.8) 246 (21.4) 2 (0.2)
Suicidal thoughts throughout lifetime: • No, never • Previous thoughts of not wanting to live • Previous thoughts about committing suicide without any specific ideas about the ways or specific plans • Previous thoughts of a specific way to commit suicide without a specific plan • Previous thoughts about a specific plan to commit suicide	 266 (23.1) 381 (33.2) 138 (12.0) 191 (16.6) 173 (15.1)
Suicidal thoughts over the past week: • No • Current thoughts of not wanting to live • Current thoughts about committing suicide without any specific ideas about the ways or specific plans • Current thoughts of a specific way to commit suicide without a specific plan • Current thoughts about a specific plan to commit suicide	 800 (69.6) 249 (21.7) 52 (4.5) 30 (2.6) 18 (1.6)
Lifetime suicide attempts	270 (23.5)
History of seeking assistance from a psychiatrist or a psychotherapist	338 (29.4)

The majority of participants reported first engaging in self-injury during their adolescence: the median age of the first NSSI episode was 14 (12; 15) years, and the duration of NSSI (the period between the first and last episode of self-injury) was 5 (2; 8) years. Some 117 (9; 875) days separated the last case of self-harm and the inclusion in the survey. The median severity of NSSI (the number of self-injury episodes per month during the period between the first and last NSSI episode) was 2 (1; 7) episodes per month.

About half of the respondents reported having always experienced pain during attempts to self-harm (47.7%; *n*=548), 38.9% (*n*=447) of respondents reported experiencing pain sometimes, and 13.4% (*n*=154) reported not experiencing pain at all. More than two-thirds of the respondents (68.3%; *n*=785) reported being always alone when engaging in self-harm activity; 26.9% (*n*=309) reported having sometimes been alone, and 4.8% (*n*=55) reported never being alone. More than half of the respondents (57.4%; *n*=659) reported less than one hour passing between the urge to self-harm and its concretization, while this gap was larger in 7.7% (*n*=89) — 1 to 3 hours, 3.0% (*n*=35) — 3 to 6 hours, 2.1% (*n*=24) — 6 to 12 hours, 2.7% (*n*=31) — 12 to 24 hours, and was over 24 hours in 27.1% of study participants (*n*=311). Most respondents (79.7%; *n*=916) reported experiencing a desire to stop self-injuring.

The most potent motivations for self-injury according to the ISAS-F subscale were: "Affect regulation" — 4 (3; 5) points, "Self-punishment" — 3 (1; 5) points, and "Marking distress" — 2 (0; 3) points. The Cronbach's alpha value for the entire ISAS-F scale was 0.851. The mean corrected item-total Spearman correlation coefficient was 0.36.

ISAS factor structure

To perform the factor analysis, the sample was randomly divided into two groups: one for the EFA (*n*=605; 52.7%) and the other one for the CFA (*n*=544; 47.3%). No statistically significant differences were found between the groups on any of the study variables (sex, age, marital status,

Table 2. The results of the exploratory factor analysis (*n*=605), two-factor model structure

Variable	Factor loading	
	Factor 1 Interpersonal motivations	**Factor 2 Interpersonal motivations**
Autonomy	**0.757**	-0.129
Peer-bonding	**0.701**	-0.289
Revenge	**0.496**	0.029
Toughness	**0.494**	0.168
Interpersonal influence	**0.477**	0.248
Interpersonal boundaries	**0.473**	0.069
Sensation-seeking	**0.449**	0.100
Self-care	**0.347**	0.065
Marking distress	0.126	**0.704**
Self-punishment	-0.077	**0.576**
Affect regulation	-0.165	**0.541**
Anti-suicide	0.147	**0.413**
Anti-dissociation/feeling generation	0.117	**0.384**

Note: Bold font indicates the highest factor loadings for each variable.

Table 3. The results of the exploratory factor analysis (*n*=605), three-factor model structure

Variable	Factor loading		
	Factor 1 "Signal"	**Factor 2 "Regulation"**	**Factor 3 "Influence"**
Autonomy	**0.747**	0.113	0.454
Peer-bonding	**0.654**	-0.035	0.377
Toughness	**0.578**	0.330	0.349
Interpersonal boundaries	**0.479**	0.215	0.365
Self-care	**0.442**	0.224	0.174
Sensation-seeking	**0.434**	0.214	0.263
Marking distress	0.340	**0.720**	0.515
Self-punishment	0.097	**0.544**	0.161
Affect regulation	0.032	**0.503**	0.118
Anti-dissociation/feeling generation	0.337	**0.491**	0.086
Anti-suicide	0.313	**0.449**	0.213
Interpersonal influence	0.481	0.360	**0.811**
Revenge	0.384	0.158	**0.667**

Note: Bold font indicates the highest factor loadings for each variable.

employment status, region of residence, history of suicidal thoughts and attempts, history of psychiatric and psychotherapeutic care, age of NSSI onset, duration and severity of NSSI, type of self-injury, and scores on the ISAS-F subscales).

Exploratory factor analysis

The value of the Kaiser–Meyer–Olkin test for sampling adequacy was >0.6 (0.837), and the significant Bartlett's test of sphericity (p <0.001) indicated that the conditions for a factor analysis of the questionnaire were met. The EFA included 13 variables — the groups of psychological motivations for NSSI from the ISAS-F. When limiting the number of factors to two (according to the original data [9]), the resulting factor structure explained 41.5% of the total variance (Table 2). During the second stage of the EFA, an alternative 3-factor structure of the questionnaire was assumed based on the eigenvalues, which explained 51.2% of the total variance of the model (Table 3). Factor 1 included motivations related to self-harm as a way of "informing" others about an altered internal state (the "Signal" factor). All variables that the authors of the questionnaire attributed to intrapersonal motives [9] had high loadings on factor 2 ("Regulation").

Factor 3 ("Influence") comprised two motivations: "Interpersonal influence" and "Revenge". The internal consistency (Cronbach's alpha) for the "Signal" factor was 0.693; for the "Regulation" factor, it was 0.665; and for the "Influence" factor, it was 0.681.

Confirmatory factor analysis

During the CFA, the one-factor, two-factor (original), and three-factor structures of the questionnaire, identified as a result of the EFA, were investigated. The three-factor structure of the ISAS-F (RMSEA <0.1) was found to be the best model. The values of the CFI and TLI did not exceed 0.9 in any case; however, they were closest to this threshold value in the three-factor model (Table 4).

Association between the perception of self-harm and suicidal thoughts and behavior

According to the binary logistic regression analysis, lifetime suicidal thoughts were associated with the female sex and a higher total score on the questions that make up

Table 4. Results of the confirmatory factor analysis (*n*=544)

Model quality parameters	Factor structure		
	One-factor	Two-factor	Three-factor
RMSEA	0.132	0.106	0.094
CFI	0.632	0.765	0.822
TLI	0.558	0.558	0.713

Note: CFI — Comparative Fit Index; RMSEA — Root Mean Square Error of Approximation; TLI — Tucker-Lewis Index.

Table 5. Predictors of suicidal thoughts, behavior, and solicitation of psychiatric and/or psychotherapeutic care: results of the binary logistic regression

Parameters	Dependent variables (Exp(B), 95% CI)		
	Lifetime suicide thoughts	Lifetime suicide attempts	Seeking medical assistance*
"Signal" factor (+1 point)	0.992 (0.931–1.058)	0.950 (0.901–1.002)	0.962 (0.915–1.012)
"Regulation" factor (+1 point)	**1.147 (1.106–1.189)**	**1.143 (1.108–1.178)**	**1.094 (1.064–1.125)**
"Influence" factor (+1 point)	1.150 (0.995–1.328)	**1.174 (1.060–1.301)**	1.074 (0.973–1.185)
Female (0/1)	**1.888 (1.193–2.990)**	1.369 (0.764–2.456)	1.297 (0.776–2.169)
Age (+1 year)	1.058 (0.979–1.144)	1.028 (0.953–1.109)	**1.206 (1.126–1.293)**
Duration of NSSI (+1 year)	0.980 (0.942–1.019)	0.998 (0.958–1.039)	0.977 (0.941–1.013)
Severity of NSSI (+1 episode/month)	1.001 (0.995–1.007)	**1.005 (1.000–1.011)**	1.000 (0.997–1.004)
R2	0.162	0.176	0.119

Note: The statistically significant associations are highlighted in bold. CI — confidence interval; NSSI — non-suicidal self-harm; R2 — Nagelkerke R squared value. *Psychiatric or psychotherapeutic care.

the "Regulation" factor. Lifetime suicidal attempts were associated with higher total scores on the questions that make up the factors of "Regulation" and "Influence", as well as a higher severity of NSSI. A history of psychiatric and psychotherapeutic care throughout lifetime was associated with older age and a higher total score on the questions that make up the "Regulation" factor.

DISCUSSION

Interpretation of the study results

Two-factor structure of the ISAS-F

We conducted the first study on the reliability of the Russian-language version of the ISAS on a large non-clinical sample, as well as the first CFA of the Russian-language version of the questionnaire. The psychometric analysis demonstrated good internal consistency of the Russian-language version of the ISAS-F. Moreover, the EFA showed that when the number of factors is limited to two, the factor structure (the distribution of observed variables across factors) of the adapted ISAS-F version is fully identical to that of the original version of the inventory [10].

It is noteworthy that the obtained values of factor loading for the "self-care" motivation (by the "interpersonal motivations") and "anti-dissociation/feeling generation" motivation (by the "interpersonal motivations") were relatively low, at 0.347 and 0.384, respectively (0.41 and 0.50 in the original inventory [9]). The authors of the original version of the ISAS do not offer hypotheses regarding the high factor loading of the motivation "self-care" on the "interpersonal motivations".

The same factor structure was obtained in studies on the adaptation and validation of ISAS conducted in South Korea [20], Turkey [21], and Pakistan [22]. It is safe to assume that switching to caring for the wound resulting from self-harm can also be considered a kind of "signaling" behavior. However, in a number of other validation studies conducted, in particular, in Australia [23], Norway [24], and Russia [10], this motivation had a higher factor loading on the "intrapersonal motivations".

It is noteworthy that in a study conducted by Zinchuk et al., the EFA of certain questions revealed that two questions (No. 4 and 30) describing the motivation of

"self-care" had higher factor loadings on the interpersonal motivations (0.4 and 0.35, respectively), while the third question (No. 17) from this group had a higher factor loading on the "interpersonal motivations" (0.44) [10]. This apparent "divergence" in the questions grouped under "self-care" likely explains the differences in validation study results for this variable [20–24]. Furthermore, "marking distress" motivation in our study had a higher loading on the "intrapersonal motivations", similar to the findings of the studies of original [9] and adapted versions [23, 24]; however, in the study by Zinchuk et al. [10], this motivation had a higher loading on the "interpersonal motivations".

Three-factor structure of the ISAS-F

The EFA without limitations on the number of evaluated factors revealed the three-factor structure of the questionnaire. The CFA demonstrated the greater quality of this model compared to the one-factor and original two-factor structures. The groups of motives (factors) were identified as "Signals" (NSSI as a way to "inform" others about one's own state), "Regulation" (NSSI as a way to regulate and correct one's own mental state), and "Influence" (NSSI as a way to influence the behavior of others). The factors we identified logically align with the authors' original division of self-harm motives into "intrapersonal" and "interpersonal" as proposed in the original inventory [9]. The former ones determine the type of self-regulation, without any involvement of others in the formation of NSSI. The latter ones are related to interpersonal relationships and the social environment. This division also correlates with the earlier concept of "social" and "automatic" motivations for self-harm [25]. At the same time, the three-factor structure of NSSI that we identified suggests the need for further differentiation of "interpersonal" factors into "signal" and "influence" factors. The main difference between these groups of motivations, as we assume, is the expectation of change in the behavior of the surrounding people in response to one's self-harming actions. We have not been able to find any studies that evaluate the differences between the "signal and "influence" types of NSSI. However, in some studies of the psychological motives behind suicide attempts, the factors of "appealing to others" and "revenge" were separated, where the latter implies a direct influence on the behavior of others as a result of the suicide attempt [26–28]. In some publications, "demonstrative suicide attempts" or "suicidal gestures" have been described; however, these concepts and their use remain controversial due to the lack of a clear, universally accepted definition. This ambiguity can potentially lead to a downplaying of the seriousness and danger of the situation, which may lead to a worsening of the quality of care provided [29].

The three-factor structure of the ISAS-F was also confirmed during the validation of the Japanese version of the questionnaire [30]. The authors of that study identified three groups of motives: "Coping with stress" ("Marking distress", "Anti-suicide", "Self-punishment", "Affect regulation"), "Interpersonal influence" ("Interpersonal influence", "Revenge", "Self-care"), and "Maintaining identity" ("Anti-dissociation/feeling generation", "Toughness", "Autonomy", "Peer-bonding", "Interpersonal boundaries", "Sensation-seeking"). It can be noted that this factor structure is similar to the one we obtained: the factor "Coping with stress" corresponds to the factor "Regulation" (with the exception of the motivation "Anti-dissociation/feeling generation"), the factor "Interpersonal influence" corresponds to the factor "Influence" (in our study, it also includes the motivation "Self-care"), and the factor "Maintaining identity" corresponds to the factor "Signal" (with the addition of the motivation "Anti-dissociation/feeling generation" and the exclusion of the motive "Self-care"). Nevertheless, further research on the three-factor structure of the questionnaire is needed on other samples.

Association of NSSI motives with suicidal thoughts and behavior

Our study showed that the suicidal thoughts and behaviors of the survey participants were associated with the factors "Regulation" and "Influence", but not the factor "Signal". The aforementioned study of the Japanese-language version of the questionnaire [30] showed that suicidal thoughts or attempts were associated with all three identified "Interpersonal influence" factors. We have not found any other studies that evaluates the association between "signal" and "influence" motivations for NSSI and suicidal thoughts and behavior. However, it can be noted that similar directions of association between internal factors of "Regulation" and external "influence" motivations are partially consistent with a concept proposed by Orri et al., according to which "the desire for revenge" as one of the "influence" motivations for engaging in a suicide attempt is an externalization and a direct expression of internal emotional distress, thus demonstrating the connection between the motivations of "Regulation" and "Influence" [27].

Given the phenomenological similarity between NSSI and suicidal behavior, this concept may also be applied to non-suicidal self-harm.

Limitations

This study has a number of limitations.

First, the study sample was limited to a specific social and age group (students). Therefore, the extrapolation of its results to the general population or to other social and age groups can be done only with reservations [31]. However, the percentages of gender- and age-based subgroups in the sample are consistent with the results of epidemiological studies which show that the prevalence of NSSI is higher among female and young people [2; 3]. Thus, the sample on which we conducted the adaptation, validation, and factor structure analysis of the ISAS questionnaire is close to the target audience of this questionnaire (individuals with NSSI) in the general population. Nevertheless, the gender-age characteristics of the sample do not allow for a broad attribution and identification of the associations between the factors "Regulation" and "Influence" to/with suicidal thoughts and attempts. It is known, e.g., that gender and age affect both the risk of suicidal thoughts and attempts, as well as the motivations for NSSI [28, 32]. However, the results we obtained were derived from regression models that took into account the factors of gender and age, thus demonstrating associations that are independent of these factors. Nevertheless, further research is needed to confirm these findings on samples with a different gender and age composition.

Secondly, during the development of the Russian version of the questionnaire, we did not follow all the recommendations for adapting psychometric tools [33]. In particular, we did not conduct a back-translation process, which could have negatively affected the semantic equivalence of the Russian-language and original versions (more details about the specifics of the translation can be found in Table S1 in the Supplementary).

Thirdly, the test-retest reliability of the questionnaire was not assessed owing to the cross-sectional study design. Nevertheless, the authors of the original inventory demonstrated sufficient test-retest reliability of the questionnaire when assessed after one year [34].

Fourthly, since the survey was distributed not only among individuals with NSSI, but also in an online format that did not allow for control over the completion of the questionnaire, some participants may have completed the ISAS-F questionnaire without having had any history of NSSI. To neuter such data, we did not include in the study individuals with a score of 4 points or less on the ISAS-F scale, which, as we expected, increased the specificity of the questionnaire (it minimized the proportion of individuals without a history of NSSI).

The strengths of this study include its wide geographical scope: participants from all federal districts of the Russian Federation; the large sample size, which allowed for conducting both EFA and CFA on different subsamples without a loss of statistical power; and the anonymous online format and the absence of a need to provide potentially identifying information, which potentially allowed for avoiding data distortion associated with the stigmatization that comes with mental disorders and the tendency to dissimulate suicidal experiences in the absence of anonymity and confidentiality [35].

CONCLUSION

We conducted an independent adaptation and validation of the Russian-language version of the ISAS in a large non-clinical sample, and also conducted the first confirmatory factor analysis of the Russian-language version of the questionnaire. The psychometric analysis demonstrated good internal consistency and reliability of the ISAS-F. During the factor analysis, an alternative three-factor structure of the questionnaire was proposed, which reflects the greater heterogeneity of the NSSI phenomenon and the mechanisms involved in its development. The proposed Russian-language version of the ISAS questionnaire is a reliable tool for describing NSSI and its psychological motivations.

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Supplementary data

Supplementary material to this article can be found in the online version:
Appendix 1: https://doi.org/10.17816/CP15537-145484
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