RESEARCH

Russian Version of the Inventory of Motivations for Suicide Attempts: Validation in a Clinical Sample of Adolescents

Русскоязычная адаптация «Опросника мотивов суицидальных попыток» на клинической выборке подростков

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Original research

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ABSTRACT

BACKGROUND: Understanding the motives for suicide attempts is a necessary condition of suicide risk assessment in adolescents. However, there is a lack of measures in Russian that assess these motives, particularly, in adolescent populations. The Inventory of Motivations for Suicide Attempts (IMSA) measures a variety of theoretically grounded intrapersonal and interpersonal motives and can be used in adolescent samples.

AIM: To validate the Russian version of the IMSA in a clinical sample of adolescents with suicidal behavior.

METHODS: The Russian-language adaptation of the IMSA was conducted on a clinical sample of 522 inpatient adolescents 12–17 years old (M=14.51±1.52), including 425 girls and 97 boys. All the adolescents were hospitalized in a psychiatric hospital due to a suicide attempt, suicidal intentions, or a history of suicide attempts. To test the convergent and discriminative validity of the Russian version of the IMSA, the Interpersonal Needs Questionnaire, Interpersonal Sensitivity Measure and Self-Concept Clarity Scale were used.

RESULTS: Confirmatory factor analysis showed that the original 10-factor structure did not have a good fit. After modifications and removal of 12 items an 8-factor structure emerged, which had the following scales: Hopelessness, Psychache, Escape, Burdensomeness, Low belongingness, Fearlessness, Problem-solving, Interpersonal motivations. A generalizing Intrapersonal motivations scale was also defined. The fit measures for the final model were as follows: χ^2(df)=1,757.23(808); CFI=0.911; RMSEA=0.053 (p=0.087); SRMR=0.058. All the scales in the Russian version of the IMSA displayed satisfactory internal (above 0.8 except for Problem-solving) and retest reliability (above 0.6 except for Interpersonal motivations) and statistically significant positive correlations with scales from the Interpersonal Needs Questionnaire and Interpersonal Sensitivity Measure and negative correlations with Self-Concept Clarity Scale.

CONCLUSION: The IMSA displayed satisfactory psychometric properties in a Russian adolescent inpatient sample and can be used to differentiate between the motives for suicide attempts in adolescents.

АННОТАЦИЯ

ВВЕДЕНИЕ: Понимание мотивов суицидальных попыток является необходимым условием оценки суицидального риска у подростков. Однако, русскоязычных опросников, предназначенных для изучения суицидальной мотивации, недостаточно, особенно — разработанных для подросткового возраста. Опросник мотивов суицидальных попыток (The Inventory of Motivations for Suicide Attempts, IMSA) предназначен для измерения внутриличностных и межличностных мотивов суицидальных попыток и может быть использован в исследованиях с участием подростков.

ЦЕЛЬ: Провести психометрическую проверку русскоязычной версии «Опросника мотивов суицидальных попыток» на клинической выборке подростков с суицидальным поведением.

МЕТОДЫ: Русскоязычная адаптация «Опросника мотивов суицидальных попыток» была выполнена на клинической выборке, состоящей из 522 подростков (425 девочек и 97 мальчиков) в возрасте 12–17 лет (M=14,51±1,52). Все подростки были госпитализированы в психиатрический стационар в связи с совершенной суицидальной попыткой, суицидальным намерением или имели суицидальные попытки в анамнезе. Для проверки конвергентной и дискриминантной валидности использовались русскоязычные версии «Опросника межличностных потребностей», «Опросника межличностной чувствительности» и «Шкалы ясности Я-концепции».

РЕЗУЛЬТАТЫ: Конфирматорный факторный анализ показал, что оригинальная 10-факторная модель не соответствовала эмпирическим данным. В результате модификаций и удаления 12 пунктов была выделена 8-факторная модель со шкалами «Безнадежность», «Душевная боль», «Бегство», «Восприятие себя как обузы», «Чувство брошенности», «Бесстрашие», «Решение проблем», «Межличностные мотивы». Также была выделена обобщающая шкала — «Внутриличностные мотивы». Индексы пригодности модели: χ^2(df)=1757,23(808); CFI=0,911; RMSEA=0,053 (p=0,087); SRMR=0,058. Все шкалы русскоязычной версии опросника продемонстрировали приемлемые показатели внутренней (выше 0,8, кроме шкалы «Решение проблем») и ретестовой (выше 0,6, кроме шкалы «Межличностные мотивы») надежности, а также статистически значимые положительные связи со шкалами «Опросника межличностных потребностей», «Опросника межличностной чувствительности» и отрицательные — со «Шкалой ясности Я-концепции».

ЗАКЛЮЧЕНИЕ: «Опросник мотивов суицидальных попыток» продемонстрировал приемлемые психометрические характеристики на клинической выборке российских подростков и может использоваться для дифференцированной оценки мотивов суицидальных попыток в подростковом возрасте.

Keywords: *suicidal behavior; adolescents; The Inventory of Motivations for Suicide Attempts; validity*
Ключевые слова: *суицидальное поведение; подростки; «Опросник мотивов суицидальных попыток»; адаптация опросника*

INTRODUCTION

Suicide is one of the most common causes of death in many countries, and the risk of suicidal ideation increases dramatically in adolescents and young adults [1], with a higher probability of suicide at 15–19 years than at 10–14 years [2]. In most cases, a suicide attempt is the result of a rather long suicidal process, and intervention at any stage can prevent suicide [3, 4]. Therefore, it is important to understand and be able to identify the causes of suicidal behavior, which may include the high intensity of psychological pain [5, 6] and hopelessness [7], impaired sense of belonging [8], feelings of defeat and entrapment [9].

A number of measures aimed at assessing the causes of suicidal behavior have gained wide acceptance and have been adapted into Russian. These include the Psychache Scale by Holden R., which allows for the assessment of the intensity of psychological pain [10]; the Beck Hopelessness Scale by Beck A., which reveals the magnitude of a person's negative expectations in relation to his/her life and self [10]. Data obtained through these scales can be used to gauge suicidal risk: the higher the intensity of psychological pain or hopelessness, the higher the risk [10]. The Interpersonal Needs Questionnaire designed to assess the risk factors of suicide, such as thwarted belongingness and perceived burdensomeness [11], and the Reasons for Living Inventory by Linehan M., which measures the factors that prevent a suicide attempt [12], have also been adapted into Russian. However, these measures are focused on adults, in some cases including 16–17-year-old adolescents in the sample [10], which raises questions about their applicability in early and middle adolescence. It should also be taken into account that the wording of some of the items included in the suicide risk questionnaires refers to the life experience of an adult, psychologically mature person, but not a child. We could not find any Russian-language measures developed for adolescents and focused on identifying the motivational factors of suicidal behavior, with the exception of scales assessing specific emotional states (for example, a pediatric version of the Hopelessness scale [13]).

Therefore, the Inventory of Motivations for Suicide Attempts (IMSA), which was validated in both adult and adolescent samples, is of scientific and practical interest. This measure was developed in 2013 by May A.M. and Klonsky E.D. in an attempt to synthesize theoretical concepts about the causes of suicidal behavior [8, 14, 15], that were later generalized by the authors in the three-step theory of suicide [16, 17]. According to this theory: 1) suicidal thoughts arise from a combination of psychological pain and hopelessness; 2) impaired communication with other people contributes to increased suicidal thoughts; 3) the transition from suicidal ideation to suicide attempts occurs due to an acquired capacity for suicide, which is predicated on the availability of suicide means and individual features [17].

The IMSA is a self-report measure with a choice of responses on the Likert scale: from 0 ("not at all important") to 4 ("most important"). The questionnaire was initially validated on an adult sample [18]. Based on previous studies and theories of suicidal behavior, the authors proposed 10 scales of suicidal motivation: Hopelessness, Psychache, Escape, Burdensomeness, Fearlessness (lack of fear of death), Low belongingness, Help-seeking, Interpersonal influence, Problem-solving, and Impulsivity. Each of those scales combined 5 items characterizing one of the possible motivations behind suicide. In addition, the authors kept 4 items that were not included in any of the scales but were still considered clinically important. These items related to the desire to die, feeling humiliated, experiencing the severity of circumstances, and loneliness. Thus, the original version of the IMSA consists of 54 items and includes 10 substantive scales [18]. Although the authors of the original inventory did not verify this factorial structure, they performed a factor analysis on 10 first-order scales and identified two higher order factors, intrapersonal and interpersonal motivations behind suicide attempts [18, 19]. In later versions, the authors switched to the terms internal and communication motivations [19, 20].

Psychometric testing of the IMSA in a clinical sample of adolescents who attempted suicide was published in 2016 [19]. The adult and adolescent versions of the inventory were identical. A suicide attempt was defined as a "self-inflicted, potentially injurious behavior with a nonfatal outcome for which there is evidence (either explicit or implicit) of intent to die" [21]. The sample included 52 adolescents (85% female) aged between 12 and 17 years. Most of them reported only one suicide attempt (67%). In this case, the authors excluded the Problem-solving scale from the analysis due to its low internal reliability (Cronbach's alpha=0.65). Exploratory factor analysis also helped identify a two-factor structure equivalent to the structure obtained in the adult sample. The intrapersonal factor combined the scales of Hopelessness, Psychache, Escape, Burdensomeness, Low belongingness, and Fearlessness. The communication/interpersonal factor included the scales Interpersonal influence and Help-seeking. The Impulsivity scale was not included in any of the factors and was retained as an independent scale [19]. Psychological pain, hopelessness, and escape were key motivations behind suicide attempts in adolescents [19].

In both adult and adolescent samples, correlations were found between the intent to die and intrapersonal motivations for suicide attempt, whereas interpersonal motivations showed weaker correlation with the intent to die and a stronger correlation with rescue probability [18, 19].

We have found only one adaptation of this measure, the Persian version of the IMSA, which consists of 43 items and 9 scales (Hopelessness, Psychache, Escape,

Burdensomeness, Low belongingness, Fearlessness, Help-seeking, Interpersonal influence and Impulsivity) [22]. The IMSA has not been adapted into Russian.

The aim of this study was to validate the Russian version of the Inventory of Motivations for Suicide Attempts (IMSA) in a clinical sample of adolescents with suicidal behavior.

METHODS

Procedure and sample

The members of the research group who are proficient in English professional vocabulary performed a translation of the questionnaire into Russian. The reverse translation into English was performed by a clinical psychologist with an additional philological degree. The final text of the questionnaire was agreed upon during a discussion by all members of the research group, who took into account the linguistic accuracy, psychological clarity, and cultural appropriateness of the wording of the items.

Permission for Russian adaptation of the IMSA was obtained from one of its authors, Dr. Klonsky.

The study was conducted at the Crisis Department of the Scientific and Practical Center for Mental Health of Children and Adolescents named after G.E. Sukhareva (Moscow, Russia) from November 2023 to April 2024. All patients meeting the inclusion criteria were included in the sample.

Inclusion criteria: Adolescents aged 12–17 years who were hospitalized due to a suicide attempt with clinically confirmed suicidal intent or who were hospitalized for other reasons, but had a history of suicide attempt; without intellectual disability; without impairment of critical and purposeful thinking.

Non-inclusion criteria: Impairment of critical and purposeful thinking; intellectual disability; only non-suicidal self-injury without suicidal intent or suicide attempts.

Exclusion criteria: Incomplete or incorrect completion of the IMSA — the participant listed an inaccurate (only the year or month was indicated) or distant (before 2023) date of the suicide attempt when indicating the date of his/her most recent attempt, a negative answer to all items about the motivation behind this attempt.

The study was conducted individually or in small groups of 2–3 people. Each adolescent received a set of 4 measures, which he/she completed on his/her own in the presence of a resident physician. It took the subjects an average of 30 minutes to complete the procedure.

Statistical power analysis was performed using the semPower package [23]. A sufficient sample size was calculated to correctly determine the statistical significance of the root mean square error of approximation (RMSEA) ≤0.05 (effect size 0.80). The following models were tested: a model with 10 factors measuring motivations and 1 factor including the 4 clinically-relevant items; a model with 10 factors without the clinically-relevant items; a model with 2 higher-order factors (intra- and interpersonal motivations) [18, 19]. All factors within each model were assumed to be correlated to each other. The number of degrees of freedom was calculated using the following formula:

$$\frac{1}{2}(p\times(p+1))-k$$

where p is the number of observed variables (items in the IMSA), and k is the number of measured parameters in the model (free parameters) consisting of the number of factor loadings for the observed variables minus the number of latent variables (since the first factor loading in each factor was assumed to be equal to 1 and was not measured), residuals for the observed variables (error variances), variances for the latent variables and covariances between them [24].

The analysis showed that 42 observations were sufficient to reject the model with 11 factors (1,322 degrees of freedom); 19 observations were sufficient for the model with 10 factors (1,130 degrees of freedom); and 23 observations were sufficient for the model with 2 factors (739 degrees of freedom). However, this number is significantly smaller compared to the recommended sample size for structural modeling, especially for complex models with more than 7 constructs (the recommended size is 500) [24], and for applying estimators that account for deviations from the normal distribution (the recommended size is >250 for maximum likelihood with a robust estimates (MLM), 200–500 for diagonally weighted least squares (DWLS)) [25]. Thus, when forming a sample, we aimed to enroll more than 500 respondents.

A total of 615 adolescents (500 girls, 115 boys) aged 12–17 years, hospitalized due to a recent suicide attempt or due to an intention to commit suicide, as well as adolescents hospitalized for other reasons, but with a history of suicide attempt, participated in the study. To measure the test-retest reliability of the inventory, respondents who continued inpatient treatment completed the IMSA again 10–15 days after participating in the initial testing (n=131).

During data processing we excluded the answers of 87 respondents who had not specified the date of their suicide attempt, which had been a necessary condition for filling out the questionnaire, as well as those that gave an incomplete date (for example, only a year) or a date earlier than 2023 (this was done in order to reduce recollection errors). Six respondents who had chosen only one answer for all IMSA items ("not at all important") were also excluded. The final analysis included 522 respondents.

Measures

The Inventory of Motivations for Suicide Attempts is a self-report measure that includes 54 items and assesses intrapersonal and interpersonal motivations for suicide attempts [18, 19]. The inventory was preceded by a detailed instruction (see Appendix 1 in the Supplementary). For each item, the adolescent chose the answer that best matched the phrase "I attempted suicide because I...". The individual significance of each cause was determined according to the following scale: 0 — "not important at all"; 1 — "somewhat important"; 2 — "important"; 3 — "very important"; 4 — "most important".

Three measures were used to test the convergent and discriminant validity of the IMSA.

The Interpersonal Needs Questionnaire consists of 12 items and is grouped into two scales associated with the risk of suicide in Joiner's interpersonal theory of suicidal behavior, perceived burdensomeness (α=0.94[1]) and thwarted belongingness (α=0.85) [11].

The Interpersonal Sensitivity Measure is a Russian version of the questionnaire proposed by Boyce P. and Parker G. [26]. The questionnaire includes 22 items and consists of 3 scales: "Fear of Rejection" (α=0.83), "Interpersonal Worry" (α=0.79), and "Dependence on the Appraisal by Others" (α=0.88). The total score for interpersonal sensitivity can also be calculated by summing up the scores of the three scales (α=0.92) [27]. Interpersonal sensitivity is a predictor of depression, non-suicidal self-injury, and suicidal behavior [26, 28].

The Self-Concept Clarity Scale [29] includes 12 items and is univariate (α=0.78). Self-concept clarity reflects the integrity and clarity of a person's self-image and is associated with psychological well-being and mental health, whereas weakness in internal consistency and chronological stability of the self-concept is associated with the risks of suicide and psychopathology [29, 30].

Statistical analysis

Data analysis was conducted using the R language (4.2.3)[2], with the psych 2.4.3[3], lavaan 0.6–17 [31], and semTools 0.5–6 packages[4]. The following types of analyses were performed: distribution normality tests, confirmatory factor analysis, correlation analysis, and group comparisons using nonparametric tests.

Distribution normality tests were performed for responses to the items of the IMSA. The Kolmogorov-Smirnov test and the Jarque-Bera test were used to check the skewness and kurtosis (with a normal distribution, the skewness is considered close to 0 and the kurtosis is approximately 3) [32]. Mardia's test [32] was used to check multivariate normality, which is required for confirmatory factor analysis [33]. Statistical significance of these tests (at $\alpha<0.05$) indicates deviations of the responses to the inventory item from its normal distribution.

Confirmatory factor analysis (CFA) was performed to determine the structure of the IMSA. Maximum likelihood with robust estimates (MLM estimator) was used. The choice of this method was dictated by a non-normal distribution of responses [31, 33].

Three models that could be derived from the original key were used as a starting point for the CFA: one with 54 items and 11 factors (10 scales measuring motivations and a scale with 4 additional items), one with 50 items and 10 factors, and one with 40 items and 2 factors [18, 19]. We retained the Problem-solving factor, in contrast to the creators of the original measure, who excluded it in an attempt to assess the factor structure as was proposed by May A.M. and Klonsky E.D. based

[1] Here and below, internal consistency coefficients (Cronbach's alphas) in the current sample are shown.

[2] R Core Team. R: A language and environment for statistical computing [Internet]. Vienna: R Foundation for Statistical Computing; 2023 [cited 2024 Dec 28]. Available from: https://www.R-project.org

[3] Revelle W. Procedures for Psychological, Psychometric, and Personality Research [Internet]. R package version 2.4.6. Evanston: Northwestern University; 2024 [cited 2024 Sept 1]. Available from: https://CRAN.R-project.org/package=psych

[4] Jorgensen TD, Pornprasertmanit S, Schoemann AM, et al. semTools: Useful tools for structural equation modeling [Internet]. R package version 0.5-6. 2022 [cited 2024 Sept 1]. Available from: https://CRAN.R-project.org/package=semTools

on the theoretical concepts of the motivations of suicide attempts [18].

The following indicators of satisfactory (good in parentheses) correspondence between the model and empirical data were used: $\chi^2/df<3$ (2); comparative fit index (CFI)>0.90 (0.95); RMSEA<0.08 (0.05) and *p*close>0.05; standardized root mean square residual (SRMR)<0.08. Information criteria (Akaike information criterion, AIC; Bayesian information criterion, BIC) were also calculated, as a decrease in their values indicates an improvement in the correspondence between the model and the data[5] [34].

To further improve the models, the following was done: 1) items with factor loadings of less than 0.4 were excluded [24]; 2) suggestions of the modIndices function, which calculates possible ways to improve the chi-square of structural models, were used [31]. In the latter case, the model was changed in the following ways. Items were moved to other factors they better aligned with. Covariances were also introduced between the residual terms (unexplained variance) of items with conceptually similar wording. The suggested improvements were incorporated only if they could be meaningfully analyzed in the context of the model.

Internal consistency of the IMSA scales modified as a result of the CFA was tested with the help of Cronbach's alpha and McDonald's omega and was considered satisfactory at values higher than 0.7 [24, 35]. The use of the second parameter becomes important in the context of factor structures that do not meet the condition of τ-equivalence, when the factor loadings of the items on the scale are different from each other, as well as in cases where the scale contains other scales (the factor structure is hierarchical). For first-order scales that include questionnaire items, the omega total is calculated; for hierarchical scales, or second-order scales, the omega hierarchical coefficient is obtained [35].

The Spearman correlation coefficient was used to assess the test-retest reliability (the consistency of the scales in different measurement conditions), convergent and discriminant validity (the former reflecting the presence of relationships with theoretically close constructs, and the latter showing the absence of relationships when measuring theoretically independent constructs). This coefficient was also used to establish correlations between the IMSA scales and age.

Nonparametric criteria (Mann–Whitney and Kruskal–Wallis tests) were used to determine the specific motivations behind suicide attempts based on the IMSA, depending on the gender, diagnosis, and type of suicidal behavior. The following group variables were determined: gender (2 groups: male or female), type of suicidal behavior (2 groups: attempt or intention), and type of diagnostic category (3 groups: depressive episode; mixed disorders of conduct and emotions; reaction to severe stress, and adjustment disorders), according to the International Classification of Diseases, 10th revision (ICD-10). The Mann-Whitney test for independent samples was used when comparing two groups, and the Kruskal–Wallis test was used when comparing three groups (in the case of statistical significance of the test, the Dunn test was used for pairwise comparisons of the groups).

The Wilcoxon test for paired samples was used in order to identify preferences for a particular suicide motivation. The purpose of this analysis was to determine the hierarchy of motivations in the overall sample.

Holm–Bonferroni corrections for multiple hypothesis testing were applied in the correlation analysis and all types of group comparisons (both for independent groups and paired groups). The alpha level for all types of analysis was 0.05.

Ethical approval

The study was approved at the meeting of the Local Ethics Committee of the Scientific and Practical Center for Mental Health of Children and Adolescents named after G.E. Sukhareva (Minutes No. 3/2022 dated 20 Oct. 2022). Participation in the study was contingent upon providing informed consent: written consent from legal representatives or the adolescent himself/herself if over 15 years of age and oral consent obtained from the adolescent immediately before engaging the questionnaires. All data obtained during the study were used in an anonymous form.

RESULTS

Sample characteristics

The psychometric characteristics of the IMSA were tested in 522 adolescents (425 girls and 97 boys) aged 12–17 years (M=14.51±1.52). All of them live in the Russian Federation, with 516 (98.9%) residing in Moscow. Most adolescents (511, 97.9%) identified as Russian, 11 indicated other nationalities,

[5] Kenny DA. Measuring Model Fit [Internet]. 2024 [cited 2024 Sept 1]. Available from: https://davidakenny.net/cm/fit.htm

while they cited Russian as their language of communication and instruction. The majority (476 subjects, 91.1%) were in secondary school, 29 (5.6%) of the adolescents were in college, 4 (0.8%) were homeschooled, 2 (0.4%) were university students, and 11 (2.1%) of the adolescents were not enrolled in classes at the time of hospitalization. Almost all the adolescents (507 people, 97.1%) lived with their parents, 4 (0.8%) indicated that they lived with other relatives, while 11 (2.1%) indicated that they lived apart from their family.

The clinical characteristics of the sample are presented in Table 1.

As Table 1 suggests, the majority of the adolescents were diagnosed with affective disorders, including depressive episode, mixed disorders of conduct and emotions, reaction to severe stress, and adjustment disorders. In all the cases, depression remained the leading syndrome. For the majority of the sample (n=406), the reason for hospitalization was rooted in the current suicide attempt. The most common methods used to attempt suicide were poisoning, including drug overdose; cuts (including stabbing the body with a knife) which were inflicted with suicidal intent; falling from a height and throwing oneself in front of a train or car.

Distribution of responses to the items in the Inventory of Motivations for Suicide Attempts

The responses to the items of the IMSA showed a non-normal distribution and a multivariate non-normal distribution (Kolmogorov–Smirnov test and Jarque-Bera test for all variables: p<0.001; Mardia's test: 44,140.43,

Table 1. Clinical characteristics of the sample

Parameter	*n*	%
Hospitalization		
Primary*	430	82.4
Re-hospitalization	92	17.6
Diagnosis		
Moderate depressive episode (F32.1)	230	44.1
Mixed disorders of conduct and emotions (F92)	149	28.5
Reaction to severe stress, and adjustment disorders (F43)	115	22
Other anxiety disorders (F41)	11	2.1
Bipolar affective disorder (F31)	7	1.3
Recurrent depressive disorder (F33)	3	0.6
Obsessive-compulsive disorder (F42)	1	0.2
Other disorders** (F98)	6	1.2
Type of suicidal behavior leading to the current hospitalization		
Suicidal intent	70	13.4
Suicide attempts	406	77.8
Current suicidal ideation (a history of suicide attempts)	46	8.8
Method of suicide attempt		
Poisoning	189	46.6
Cuts and stabs	100	24.6
Falling from a height, throwing oneself under a train or a car	86	21.2
Strangulation	16	3.9
Drowning	4	1
Combination of several methods	11	2.7

Note: n — number of patients. *Adolescents hospitalized for the first time. **Other behavioral and emotional disorders with onset usually occurring in childhood and adolescence.

p<0.001; kurtosis: 68.89, p<0.001). For most of the items, the skewness was positive (the distribution was left-skewed); a negative skewness was observed for items "2", "6", "7", "9", "12", "13", "16", "21", "35", "37", "40", "45–47".

An analysis of the frequency of the different responses made by respondents showed that negative responses ("not at all important") prevailed for several items. More than 50% of respondents answered negatively to the following items: "3" — from the Fearlessness scale in the original version of the questionnaire; "10", "19" — Burdensomeness; "11", "15", "36", "39", "53" — all items on the Interpersonal influence scale; "43" — Help-seeking, "42", "33" — Impulsivity; "20" — Problem-solving; "23" and "25" — additional items.

Factor structure of the Inventory of Motivations for Suicide Attempts

Model fit indices are presented in Table 2. Models 1–3, which corresponded to the authors' key, were found to be unsatisfactory.

The interpersonal factors from the original version of the IMSA (Help-seeking and Interpersonal influence) were found to have a very high correlation (r=0.92), which led to the decision to combine these scales into one (Model No. 4). In the resulting model, several items turned out to have low factor loadings ("19", "20", and "43"); therefore, they were removed. Further modifications to the model included moving item "8" ("...wanted to know if someone really cared about me") from the Interpersonal motivations scale (this item was initially included in the Help-seeking scale) to the Low belongingness scale, and item "40" ("...my thoughts were too much to bear") from the Escape scale to the Psychache scale. Covariates were introduced between the residuals of items "8" ("...wanted to know if someone really cared about me") and "31" ("...thought nobody loved me"), "4" ("...wanted to make my family better off") and "41" ("...thought it could fix some important practical problems for my family/friends"), which may be explained by the similar wording of these items. The resulting model (Model No. 5) had a satisfactory fit. However, after the introduction of the hierarchical latent variable Intrapersonal motivations, which combined the Hopelessness, Psychache, Escape, Burdensomeness, Low belongingness, Fearlessness, and Problem-solving scales (Model No. 6), the CFI dropped below the cut-off value for satisfactory model fit.

Further, it was decided to exclude the Impulsivity scale from the model, since it demonstrated the lowest internal consistency (Cronbach's alpha=0.71) and the correlations with all IMSA scales, except for the Interpersonal motivations scale, scored lower than 0.2. In addition, the items included in this scale showed low factor loadings (the average factor loading for all five items was 0.58, and one item had a loading <0.5). The 8-factor model before the modifications is presented as Model No. 7. To improve it, the same modifications were made as in Model No. 5, and a covariance was added between the residuals of items "17" ("...had thought about it for a while and finally acted on my plan") and "32" ("...had been working myself

Table 2. Model fit indices (confirmatory factor analysis)

No.	Model description	χ^2(df)	CFI	RMSEA (*p*close)	SRMR	AIC	BIC
1	Original factor structure — 2 higher-order factors	3,094.39 (739)	0.762	0.087 (p<0.001)	0.086	66,917	67,262
2	Original factor structure — 10 factors and 4 additional items	3,254.33 (1,322)	0.850	0.058 (p<0.001)	0.072	89,446	90,140
3	Original factor structure — 10 factors without the additional items	2,731 (1,130)	0.866	0.057 (p<0.001)	0.071	82,526	83,144
4	9-factor structure	2,816.51 (1,139)	0.860	0.058 (p<0.001)	0.077	82,600	83,179
5	9-factor structure with modifications	2,136.57 (996)	0.902	0.051 (p=0.207)	0.063	77,020	77,582
6	9-factor structure with the hierarchical factor Intrapersonal motivations	2,257.01 (1,022)	0.894	0.053 (p=0.054)	0.068	77,113	77,564
7	8-factor structure (without the Impulsivity scale)	2,328.87 (917)	0.873	0.060 (p<0.001)	0.073	73,866	74,368
8	8-factor structure with modifications	1,656 (788)	0.919	0.051 (p=0.295)	0.051	68,253	68,743
9	8-factor structure with the hierarchical factor Intrapersonal motivations	1,757.23 (808)	0.911	0.053 (p=0.087)	0.058	68,338	68,742

Note: AIC — Akaike information criterion; BIC — Bayesian information criterion; CFI — comparative fit index; RMSEA — root mean square error of approximation; SRMR — standardized root mean square residual.

Table 3. Factor loadings of the items in the Inventory of Motivations for Suicide Attempts (8-factor model with the hierarchical factor "Intrapersonal motivations" — Model No. 9)

Factors with included items	Factor loading
Hopelessness	
"2" …was feeling hopeless	0.712
"6" …lost all hope that things could get better in the future	0.814
"37" …my future seemed dark	0.833
"44" …didn't think things would get better, no matter what I did	0.765
"45" …was the most hopeless I'd ever been	0.778
Psychache	
"7" …couldn't stand all the emotions in my head anymore	0.736
"9" …my state of mind was too unbearable	0.759
"21" …my emotions were too overwhelming to handle	0.757
"35" …needed to stop my mental pain	0.782
"40" …my thoughts were too much to bear	0.813
"46" …could no longer tolerate my emotional pain	0.882
Escape	
"1" …was so flawed I had to escape from myself	0.639
"16" …couldn't stand being aware of my failings anymore	0.749
"18" …hated myself so much	0.815
"47" …thought so poorly of myself, dying seemed like a relief	0.853
Burdensomeness	
"4" …wanted to make my family better off	0.657
"14" …was only dragging down those around me by staying alive	0.826
"30" …was causing too much trouble for those around me	0.846
"34" …needed to stop being a burden to others	0.775
"50" ….was a drain on my loved ones	0.700
Low belongingness	
"8" …wanted to know if someone really cared about me	0.597
"10" …didn't belong to any community	0.556
"31" …thought nobody loved me	0.603
"38" …didn't fit in anywhere	0.813
"51" …felt disconnected from everyone in my life	0.820
Fearlessness	
"3" …had almost attempted in the days or weeks beforehand, but this time it didn't seem as scary	0.622
"17" …had thought about it for a while and finally acted on my plan	0.704
"29" …was no longer afraid to try attempting suicide	0.714
"32" …had been working myself up and this time I followed through	0.719
"52" …was less afraid of the physical pain than I used to be	0.653

Problem-solving	
"13" …needed to get out of an impossible situation	0.569
"22" …seemed like the best way to deal with my problems (e.g., personal, financial)	0.776
"41" …thought it could fix some important practical problems for my family/friends	0.644
"48" …felt it would help solve some specific problems	0.738
Interpersonal motivations	
"5" …wanted to get help from someone	0.490
"11" …wanted to make people sorry for the way they treated me	0.683
"15" …needed to persuade someone to change his or her mind	0.531
"28" …needed to make other people understand how distressed I was	0.725
"36" …wanted to make others afraid	0.629
"39" …wanted to make other people feel guilty for not helping me	0.784
"53" …hoped to influence the actions of people around me	0.752
"54" …wanted others to recognize how much I was hurting	0.817
Intrapersonal motivations (general scale)	
Hopelessness	0.889
Psychache	0.823
Escape	0.936
Burdensomeness	0.833
Low belongingness	0.848
Fearlessness	0.776
Problem-solving	0.887
Correlations	
Intrapersonal motivations and Interpersonal motivations	0.433
Covariances between residuals	
Item "4" and item "41"	0.356
Item "8" and item "31"	0.407
Item "17" and item "32"	0.357

Note: For all factor loadings and covariances, $p<0.001$.

Table 4. Internal consistency and test-retest reliability of the Inventory of Motivations for Suicide Attempts

IMSA scales	Internal consistency		Test-retest reliability
	Cronbach's α	McDonald's ω	Spearman's r_s
Hopelessness	0.89	0.89	0.63
Psychache	0.91	0.91	0.69
Escape	0.85	0.85	0.64
Burdensomeness	0.88	0.86	0.72
Low belongingness	0.82	0.82	0.64
Fearlessness	0.82	0.83	0.65
Interpersonal motivations	0.87	0.88	0.58
Problem-solving	0.78	0.78	0.62
Intrapersonal motivations (general scale)	0.91	0.91	0.66

Note: All Spearman correlation coefficients are significant with $p<0.001$. IMSA — Inventory of Motivations for Suicide Attempts.

up and this time I followed through"), which had similar wordings. Model No. 8 had a satisfactory correspondence to the data, which was maintained when the hierarchical factor of intrapersonal motivations was introduced (Model No. 9). For further analysis, Model No. 9 served as the final model (Table 3).

Reliability of the scales of the Inventory of Motivations for Suicide Attempts

The IMSA scales showed satisfactory indicators of internal consistency and test-retest reliability (Table 4).

Convergent and discriminant validity of the Inventory of Motivations for Suicide Attempts

The Intrapersonal motivations scale from IMSA (and its sub-scales) demonstrated the strongest correlations with the scales of the Interpersonal Sensitivity Measure and the Interpersonal Needs Questionnaire, whereas the correlations with the Self-Concept Clarity Scale were weak. The Interpersonal motivations scale had either weak correlations (with the Burdensomeness scale from the Interpersonal Needs Questionnaire and all scales of the Interpersonal Sensitivity Measure) or no statistically significant correlation (with the Low belongingness scale from the Interpersonal Needs Questionnaire and the Self-Concept Clarity Scale) (Table 5).

Hierarchy of motivations for suicide attempts

Following in the path of the authors of the original version of the IMSA [18], we performed an analysis of the raw responses of the participants to determine the percentages of "very important" and "most important" responses on each scale. Such responses made up 48% of all responses to items in the Hopelessness scale, 49% in the Psychache scale, 40% in the Escape scale, 32% in the Burdensomeness scale, 30% in the Low belongingness scale, 27% in the Fearlessness scale, 38% in the Problem-solving scale, and 20% in the Interpersonal motivations scale.

Afterwards, these scales were ranked using the Wilcoxon test with the Holm–Bonferroni correction for multiple comparisons: significant differences indicate a difference in the magnitude of the motivations for suicide attempts in the sample, whereas the absence of significant differences indicates that the compared scales are at the same level (Table 6).

The Hopelessness and Psychache scales scored significantly higher than the other scales, indicating that the adolescents were more likely to confirm the suicidal motivations included in these scales. Escape, Problem-solving, and Intrapersonal motivations ranked second (there were no significant differences between these scales). The Burdensomeness, Low belongingness, and Fearlessness scales were in third place. The reasons

Table 5. Correlations of the scales of the Inventory of Motivations for Suicide Attempts with the scales of the Interpersonal Needs Questionnaire, Interpersonal Sensitivity Measure, Self-Concept Clarity Scale and age

Scales	Inventory of Motivations for Suicide Attempts								
	1	2	3	4	5	6	7	8	9
Interpersonal Needs Questionnaire									
Perceived burdensomeness	0.50***	0.40***	0.56***	0.67***	0.60***	0.52***	0.25***	0.49***	0.65***
Thwarted belongingness	0.24***	0.20***	0.30***	0.21***	0.41***	0.27***	0.07	0.17**	0.30***
Interpersonal Sensitivity Measure									
Dependence on the appraisal by others	0.53***	0.46***	0.57***	0.47***	0.51***	0.45***	0.32***	0.48***	0.59***
Fear of rejection	0.53***	0.52***	0.61***	0.56***	0.61***	0.55***	0.25***	0.48***	0.66***
Interpersonal worry	0.43***	0.40***	0.45***	0.42***	0.41***	0.36***	0.27***	0.41***	0.50***
Interpersonal sensitivity	0.58***	0.53***	0.63***	0.55***	0.58***	0.52***	0.32***	0.53***	0.67***
Self-Concept Clarity Scale									
Self-concept clarity	−0.45***	−0.41***	−0.41***	−0.32**	−0.34**	−0.27*	−0.10	−0.24	−0.41***
Age									
Age	0.15*	0.14*	0.11	0.05	0.02	0.04	−0.05	0.06	−0.02

Note: The Inventory of Motivations for Suicide Attempts scales: 1 — Hopelessness; 2 — Psychache; 3 — Escape; 4 — Burdensomeness; 5 — Low belongingness; 6 — Fearlessness; 7 — Interpersonal motivations; 8 — Problem-solving; 9 — Intrapersonal motivations. *p<0.05; **p<0.01; ***p<0.001.

Table 6. Descriptive statistics for the scales of the Inventory of Motivations for Suicide Attempts and their comparison in the overall sample (Wilcoxon test for paired samples)

Scale	Min	Q1	Med	Q3	Max	Significant differences
Hopelessness (A)	0	1.25	2.4	3.2	4	AC**, AD***, AE***, AF***, AG***, AH***, AI***
Psychache (B)	0	1.17	2.42	3.33	4	BD***, BE***, BF***, BG***, BH***, BI***
Escape (C)	0	0.75	2	3	4	CD**, CE***, CF***, CG***
Burdensomeness (D)	0	0.4	1.6	2.6	4	DF*, DG***, DI*
Low belongingness (E)	0	0.4	1.4	2.4	4	EG***, EH***, EI***
Fearlessness (F)	0	0.2	1.2	2.2	4	FH***, FI***
Interpersonal motivations (G)	0	0.25	0.75	1.88	4	GH***, GI***
Problem-solving (H)	0	0.75	1.75	2.75	4	—
Intrapersonal motivations (I)	0	1.06	1.89	2.57	3.89	—

Note: Max — maximum; Med — median; Min — minimum; Q1 — first quartile (25th percentile); Q3 — third quartile (75th percentile). *p<0.05; **p<0.01; ***p<0.001 (p-values after the Holm-Bonferroni correction are given).

included in the Interpersonal motivations scale were the least frequently cited.

The relationships between motivations for suicide attempts with the demographic and clinical characteristics of respondents

The correlations of the IMSA scales with age were insignificant, except for weak correlations with the Hopelessness (r_s=0.15, p<0.05) and Psychache (r_s=0.14, p<0.05) scales (see Table 5).

When comparing IMSA scores across genders, significant differences were encountered for the Burdensomeness (p=0.013) and Intrapersonal motivations (p=0.036) scales, with higher values observed in girls (see Table S1 in the Supplementary).

No significant differences in IMSA scores between groups with specific types of suicidal behavior were detected, when adolescents with suicide attempt and adolescents with suicidal intent were compared (see Table S2 in the Supplementary).

We also compared the 3 largest groups of ICD-10 diagnostic categories: 1) depressive episode; 2) mixed disorders of conduct and emotions; and 3) reaction to severe stress, and adjustment disorders. Significant differences were found on the Hopelessness and Fearlessness scales (see Table S3 in the Supplementary). According to the Dunn test, the scores on both scales in the group diagnosed with a depressive episode were significantly higher than in the other two groups. The mean values of the Hopelessness and Fearlessness scales were, respectively, 2.41±1.14 and 1.50±1.11 for depressive episode; 1.99±1.33 and 1.20±1.22 for mixed disorders of conduct and emotions; and 1.96±1.40 and 1.18±1.12 for reaction to severe stress, and adjustment disorders.

DISCUSSION

The Russian version of the Inventory of Motivations for Suicide Attempts, tested in a clinical sample of adolescents with suicidal behavior, showed satisfactory psychometric characteristics. The Russian version differs from the original version of the IMSA in the number of items (42 questions in the Russian version instead of 54 in the original one) and the questionnaire structure. The Russian version of the IMSA includes 8 scales that characterize suicidal motivations: Hopelessness, Psychache, Escape, Burdensomeness, Low belongingness, Fearlessness, Problem-solving and Interpersonal motivations. A generalizing scale (Intrapersonal motivations) may also be used. At the same time, the Impulsivity scale present in the original version was excluded from the factor structure because of relatively low indicators of internal reliability and the absence of significant correlations with other motivations [18, 19], and the scales of Help-seeking and Interpersonal influence were combined into the Interpersonal motivations scale.

The identified factor structure corresponds to the theoretically justified components of suicide, such as unbearable psychological pain and hopelessness, the idea of death as the only way to solve one's problems [5, 14], the perception of self as a burden, thwarted belongingness [8], and fearlessness (lack of fear of death) [8, 16].

All the scales of the IMSA demonstrated acceptable internal consistency (Cronbach's alpha 0.78–0.91) and

test-retest (r_s=0.58–0.72) reliability, which confirms the interrelations between the items in the scales and their relative ability to withstand changes in test conditions.

Intrapersonal motivations for suicide attempts showed significant (r_s>0.5) correlations with different features of psychological vulnerability to suicide (interpersonal sensitivity, suicidal motivations identified in Joiner's theory), whereas the correlations of the interpersonal motivations for suicide attempts with these same parameters were either weaker (r_s=0.25–0.32) or absent. As for the self-concept clarity, which characterizes a psychologically integral, healthy person, its correlations with the intrapersonal motivations were mostly negative and weak, while its correlations with the interpersonal motivations were non-significant. The obtained data confirm the convergent and discriminant validity of the Russian version of the IMSA.

The discrepancy between the Russian version and the factor structure of the original inventory is due to the following factors: the original measure was not tested using confirmatory factor analysis, and its factor structure was based on the synthesis of theoretical concepts of the nature of suicide. The exploratory factor analysis, which was used to identify intra- and interpersonal motivations in different samples, was conducted on scale scores [18, 19] rather than on raw data (responses to the items of the inventory). Thus, the factor structure of the Russian version of the IMSA may have changed due to the use of a different analytical method. This change could also be due to the cultural differences between Russian and American adolescents.

The most powerful motivations for suicide attempts/intentions in Russian adolescents were hopelessness and psychache, followed by the motivations of escape and problem-solving. These results are close, although not identical, to the results obtained by the authors of the original version of the inventory [18, 19]. Interestingly, the authors of the original version excluded the Problem-solving scale from the inventory as unreliable after testing it in a sample of adolescents [19], whereas in the Russian version, this scale showed satisfactory reliability and, moreover, was the second most frequent choice of the adolescents. Like the authors of the original inventory [18, 19], we discovered that the items relating to interpersonal motivations for suicide attempts were rarely endorsed.

Although intrapersonal suicidal motivations dominate interpersonal ones, we believe that the Interpersonal motivations scale contained in the inventory requires a separate interpretation, as it affects the social aspects of suicidal behavior, when a suicide attempt is both a cry for help and a way to influence the behavior of other people. Interpersonal suicidal motivations come into play when other ways to communicate life's difficulties and painful experiences are unavailable or ineffective. The IMSA provides an opportunity for future studies to focus on assessing both individual suicidal motivations and their correlations over time in the follow-up of adolescents with suicidal behavior.

We found that hopelessness and psychache scores tend to increase with age, which improves our understanding of the causes of the increase in suicides among older adolescents compared with younger ones [4]. Burdensomeness scores were significantly higher in girls (this is of interest in the sociocultural perspective of parenting practices for girls and boys).

No differences on IMSA scales were detected depending on the type of suicidal behavior (attempt or intention). This confirms that factors other than motivation can also increase the risk of a suicide attempt when combined. In addition, this may be due to the combination of individual features with the availability of means of suicide, which is defined as the third step to a suicide attempt in Klonsky's three-step theory. Thus, the decision to commit suicide is determined not only by the motivation, but also by the availability of the means to carry it out [17].

Adolescents with a depressive episode scored the highest on the scales of Hopelessness and Fearlessness, which is consistent with the clinical presentation of depression and studies performed in clinical samples of adolescents. Thus, hopelessness is associated with worsening symptoms of depression [36] and fearlessness is viewed as a predictor of future suicide attempts [37].

Limitations

The Inventory of Motivations for Suicide Attempts uses recollections of a suicide attempt, which does not completely rule out errors in recollection, deliberately incorrect answers to painful questions, or avoiding answers to suicidal topics. Another limitation is that the sample was not gender-matched, but the predominance of girls in this sample corresponds to the gender pattern observed by researchers among adolescents with suicidal behavior [4].

Generalization of the study results is limited to the clinical population of adolescents with a history of suicide attempts. The inventory allows one to garner a rather

wide profile of the motivations behind suicidal behavior. However, an additional test of its applicability for diagnostic purposes in comparison with other measures (for example, the assessment of the intention to die during a clinical interview) is necessary. To extrapolate the results to the entire population of adolescents with suicidal behavior, the sample should be expanded in subsequent studies to include adolescents with suicide attempts who are not in hospital (for example, adolescents undergoing outpatient treatment). The study of motivations in the context of the development of suicidal behavior will help assess the diagnostic validity of this measure.

CONCLUSION

The Russian version of the Inventory of Motivations for Suicide Attempts (IMSA) adapted in a clinical sample of adolescents allows for a differentiated assessment of the motivations for suicidal behavior in adolescents. The inventory consists of 9 scales characterizing intrapersonal and interpersonal motivations for suicide attempts. The Intrapersonal motivations scale combines Hopelessness, Psychache, Escape, Burdensomeness, Low belongingness, Fearlessness, and Problem-solving. Interpersonal motivations for suicide attempts are measured by one scale.

The inventory demonstrated satisfactory reliability and validity. The intrapersonal suicidal motivations (hopelessness, psychache, escape, and problem-solving) were the most endorsed ones in the clinical sample of Russian adolescents. The highest hopelessness and fearlessness scores were found in adolescents diagnosed with a depressive episode. The motivations of hopelessness and psychological pain seemingly increase with age, but the causes of this increase require a separate study. Girls had higher scores on the Burdensomeness scale and the general scale of intrapersonal suicidal motivations.

The structure of the inventory is consistent with the theoretical concepts of suicidal behavior, and it also improves our understanding of the reasons behind suicide, which in the future may provide an opportunity for a more accurate assessment of the sources of suicidal motivations and how they develop.

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Supplementary data

Supplementary material to this article can be found in the online version:
Appendix 1: 10.17816/CP15597-145614
Table S1: 10.17816/CP15597-145615
Table S2: 10.17816/CP15597-145616
Table S3: 10.17816/CP15597-145617

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