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Development and validation of a psychodiagnostic technique for assessing the rehabilitation potential of an individual

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Abstract

Introduction. A psychodiagnostic technique for a comprehensive assessment of an individual's rehabilitation potential has been developed. The content of the rehabilitation potential includes components and scales for diagnostics: a psychophysiological component – a scale of the index of deep-seated aggression, a professional and pedagogical component – scales of training, learning ability, motivation for retraining and work, awareness of the possibilities of secondary professionalization; a social environment component – scales of external-environmental factors, socio-environmental factors and socio-anthropological factors.
Each scale is contains with a set of indicators that reflect levels of rehabilitation potential. The validity of this approach is confirmed by the results of the psychodiagnostic instrument formalization procedures. **Methods.** The study involved 345 respondents aged 18 to 42 years, 54% of whom were female and 46% male. Standardized methods were used for validation: the A. Buss and A. Durkee test (adapted by A.K. Osnitsky), the "Motivation for learning: levels and types" method (I.S. Dombrovskaya), the WHOQOL-26 Quality of Life Questionnaire, the Tromso Social Intelligence Scale, and the Multidimensional Scale of Perceived Social Support (N.A. Sirota, V.M. Yaltonsky). The obtained data were processed using relevant statistical methods. **Results.** The developed instrument has been tested for reliability. The optimal number of indicators is 85 items. Based on exploratory and subsequent confirmatory factor

analysis, these items were combined into factor models for the components of rehabilitation potential, which exhibit high values for the validation indicators of these models' fit to empirical data. High rates of convergent and divergent validity were obtained. **Discussion.** A two-factor model was obtained for the psychophysiological component (factors "Resentment" and "Guilt" of the index of deep-seated aggression), a four-factor model for the professional-pedagogical component (factors "Training", "Trainability", "Motivation for retraining and work" and "Awareness of secondary professionalization"), and a three-factor model for the social environment component (factors "External-environmental factors", "Socio-environmental factors" and "Socio-anthropological factors"). Levels of assessment for individual factors and complex indicators for the components of an individual's rehabilitation potential were identified.

Keywords

rehabilitation potential, components of rehabilitation potential, psychodiagnostic methodology, scales of the structure of rehabilitation potential, factor models

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Introduction

Modern society faces a complex set of challenges associated with the growing number of individuals in need of rehabilitation and reintegration. This category includes not only people with disabilities due to illness or injury, but also combat veterans with disabilities, whose lives are often complicated by a combination of combat-related psychophysical injuries and the need to adapt to civilian life after extreme experiences.

The effectiveness of rehabilitation processes largely depends on the individual psychological characteristics of the subject, his resource capabilities necessary to overcome the negative consequences of the injury, in the limit - the person’s disability (Gudilina, 2012;

Rogacheva, 2008; Porokhina, 2004; Bazanova, Auer & Sapina, 2018; Burtonetal., 2015; Goodwin & Allan, 2019; Wade, 2023) and the rehabilitation potential of the individual (Kulagina, Senkevich, 2015; Khokhlova, 2020).

In the author's interpretation, rehabilitation potential is considered by us as a dynamic combination of conscious and unconscious psychophysical, personal and environmental resources of a person, which determine his capabilities and risks in overcoming the state of disability and restoring his social and professional status in the process of rehabilitation interventions (Borozinets et al., 2025).

The assessment of rehabilitation potential will be effective if based on a comprehensive interdisciplinary approach, when in the process of professional and psychological rehabilitation it is important to provide prompt assistance not in a separate area - psychophysiological, psychological, pedagogical or social, but in their unity, comprehensively and synchronously (Bonkalo, 2023; Borozinets et al., 2023; Vodolazhskaya, Vodolazhsky, 2018; Bruner & Woll, 2011; Cogan et al., 2019; Damasio et al., 2000; Knyazev, 2012; Petrie et al., 2014). This requires an operational diagnosis of various aspects of a person's initial capabilities to perceive this type of assistance, which at a theoretical level is defined as the phenomenon of rehabilitation potential.

At the same time, reliable, valid and at the same time convenient in practical use methods for comprehensive diagnostics of rehabilitation potential, on the basis of which it is possible to build an individual rehabilitation trajectory, have not yet been developed (Solovyeva, 2023; Rogacheva, 2008; Facione, Thomas-Pohl & Borrini, 2016; Simpson & Tate, 2007; Mosqueda, 1993; Wade, 2023). Such tools could help us move closer to solving the problem of rehabilitation, for example, for combat veterans, since a comprehensive interdisciplinary approach would allow us not only to assess a person's current condition during the recovery period but also to formulate a prognosis for their future life and the realization of their abilities in the face of acquired disability. In this regard, the prognostic value of assessing rehabilitation potential is particularly valuable for individuals. It allows us to actualize the resources that underlie rehabilitation and full resocialization.

This article presents a description of the evidence supporting the suitability of a comprehensive assessment tool for an individual's rehabilitation potential in terms of its standardization for three of the four components of rehabilitation potential: psychophysiological (Vodolazhskaya, 2023), professional and pedagogical (Borozinets, 2023), and social environmental (Dargan, 2024). These components are identified at the theoretical level. The procedure and results of the corresponding analysis for the psychological component are presented in an earlier work by the authors (Solovyeva, 2024). We describe the results for the three remaining components.

Methods

For the purposes of standardizing the methodology, 345 respondents aged 18 to 42 years (M = 27.4, SD = 9.23) took part in the study, of which 54% were female and 46% were male.

Data collection was carried out using the Webanketa service.

Reflection on the experience of practical psychodiagnostics allowed us to develop a methodology that includes blocks, scales, indicators, and measures aimed at revealing the parameters related to the components of an individual's rehabilitation potential.

The methodology was developed in the form of a questionnaire, including a series of statements (indicators) relevant to the blocks, corresponding components of rehabilitation potential, and the indicators into which the blocks are divided. Each statement required a multi-level assessment by the respondent, ranging from "yes," "mostly yes," "sometimes," "mostly no," and "no" (Borozinets, 2025).

First of all, the selected indicators of the methodology were analyzed for reliability using Cronbach's α coefficient (Cronbach, 1951; Noss, 2019) to optimize the model within each of the components.

Next, the optimal models were subjected to confirmatory analysis to identify the required number of factors explaining the overall variance of the studied feature.

Following this, a test for convergent and divergent validity was conducted using diagnostic data from existing standardized methods, the scales of which may reflect similar content. The following measurement instruments served as the basis for validation:

- for the psychophysiological component – the A. Buss and A. Durkee test, adapted by A.K. Osnitsky (Buss & Durkee, 2005);
- for the professional and pedagogical component – the "Motivation for learning activity: levels and types" method (Dombrovskaya, 2007);
- or the social environment component – the WHOQOL-26 Quality of Life Questionnaire (World Health Organization, 1995), the Tromso Social Intelligence Scale (Silvera, Martinnussen & Dahl, 2001), and the Multidimensional Scale of Perceived Social Support (MSPSS) (Sirota & Yaltonsky, 2011).

At the final stage of data analysis, quartile standardization was carried out, which made it possible to designate the boundaries of the feature values, reflecting the levels of its expression.

IBM SPSS Statistics 23 software was used for data processing (Nasledov, 2011).

Results

To test the reliability of the methodology, we used a traditional analytical method—Cronbach's α coefficient—to assess the contribution of each indicator to the internal consistency of the scale. The following data were obtained for each component.

Psychophysiological component. The initial model included 20 indicators. The results of the analysis for the original set of indicators are as follows: $\alpha = 0.589$ for $N = 20$. Excluding scale items with low and underestimated correlation coefficient values resulted in an increase in Cronbach's α for the adjusted model ($\alpha = 0.911$ for $N = 17$).

Professional and pedagogical component. The initial model included 25 indicators. The obtained α = 0.489 for N = 25. Excluding scale items with low and underestimated correlation coefficient values resulted in an increase in Cronbach's α for the adjusted model (α = 0.849 for N = 22).

Social environment component. The initial model included 28 indicators. The obtained α = 0.526 for N = 28. Excluding scale items with low and underestimated correlation coefficient values resulted in an increase in Cronbach's α for the adjusted model (α = 0.876 for N = 24).

The results demonstrate satisfactory and good internal consistency across the methodology blocks aimed at assessing the components of rehabilitation potential. Based on the data obtained, 85 indicators remained in the final version of the methodology.

To determine the effectiveness of a comprehensive assessment of rehabilitation potential, we identified and validated factors within the components that assessed their various aspects. We used exploratory factor analysis (principal component analysis, varimax rotation with Kaiser normalization; the models converged within 3-5 iterations). The results of this analysis for the optimal factor models for each component of rehabilitation potential are presented in Table 1.

Table 1

Factor loadings of questionnaire items on an individual's rehabilitation potential (optimal models for three components, N=345)

Indicators	Factors			
	1	2	3	4
Psychophysiological component				
Touchiness				
Not receiving what was due	.651			
Underestimation of one's capabilities	.674			
Disappointment with fate	.601			
Anattractive communication	.802			
Envy	.829			
Hidden "labor asociality"	.643			
The injustice of life	.638			
Hatred of people	.614			

Indicators	Factors			
	1	2	3	4
Guilt				
Conscience from deception		.778		
Shame from thoughts		.674		
Blaming the unemployed		.712		
Depression from lack of help for parents		.783		
Desire for forgiveness of sins		.576		
Actions to regret		.564		
Disappointment from failures		.535		
Conscience from a wrong act		.611		
The wrongness of a life lived		.713		
Professional and pedagogical component				
Training				
Good study	.546			
High professionalism	.904			
High praise at work	.673			
Self-presentation skills	.661			
Learning ability				
Ease of learning new things		.689		
Willingness to learn new things		.681		
Desire to improve professional qualifications		.549		

Indicators	Factors			
	1	2	3	4
Motivation for retraining and work				
Benefit to society			.589	
Opportunity for personal growth and creativity			.673	
High social status and career			.640	
Opportunity to earn good money			.598	
Desire to retrain in the presence of a disability			.744	
Willingness to learn again			.734	
Availability of own resources for retraining and employment			.675	
Readiness to change professions			.733	
Applying effort when retraining			.743	
Desire for career guidance assistance			.562	
Interest in retraining			.654	
Awareness of secondary professionalization				
Knowledge of professions in the presence of disabilities				.576
Knowledge about retraining in the presence of a disability				.643
Preferred professional field for retraining				.578
Knowledge of the place of retraining				.672

Indicators	Factors			
	1	2	3	4
Social environment component				
External environmental factors				
Satisfaction with government support	.823			
Satisfaction with financial situation	.698			
Satisfaction with rehabilitation means	.661			
Satisfaction with medical care	.765			
Free mobility	.536			
Availability of facilities and services	.559			
Everyday adaptation	.667			
Treating others as equals	.653			
Treating others with respect	.599			
Social and environmental factors				
Work as an increase in social status		.734		
More respect for the disabled worker		.765		
The usefulness of combat experience		.730		
The value of good work in the immediate environment		.699		
A good job to support a family		.674		
Financial independence from loved ones		.670		
Family support in employment matters		.711		
Socio-anthropological factors				
Work as a way to solve personal problems			.659	
Work as an imperative			.640	
Personal employment as an example to others			.655	
Active contacts with social organizations			.589	
Reflection on the actions of other people			.576	
Reflection on one's actions			.540	
Adaptations to stressful situations			.711	
Effective communication			.659	

As shown in Table 1, the factor models for the components of an individual's rehabilitation potential are as follows:

- psychophysiological component – two-factor model (factors – "Resentment" and "Guilt" as components of the index of deep-seated aggression);
- professional and pedagogical component – four-factor model (factors – "Learning", "Learnability", "Motivation for retraining and work", "Awareness of secondary professionalization");
- social environment component – three-factor model (factors – "External-environmental factors", "Socio-environmental factors", "Socio-anthropological factors").

A confirmatory factor analysis was then conducted. The results are presented in Table 2.

Table 2

Parameters of the models for three components of the methodology for diagnosing the rehabilitation potential of an individual

Components	CFI	TLI	chi-sq		RMSEA	SRMR
			χ^2	p		
Psychophysiological component (two-factor model)	0.931	0.952	64.320	0.001	0.034	0.028
Professional and pedagogical component (four-factor model)	0.847	0.905	40.243	0.038	0.057	0.071
Social environment component (three-factor model)	0.910	0.879	43.287	0.019	0.045	0.056

As can be seen from Table 2, the models for the components suggest the following fitness indices:

- two-factor model of the psychophysiological component – indices CFI = 0.931, TLI = 0.952, χ2 = 64.320 (p = 0.001), RMSEA indices = 0.034 (90% CI [0.027; 0.056]), SRMR = 0.028 are at a high level of significance, which indicates the conformity of the model with the empirical data;
- four-factor model of the professional-pedagogical component – indicators CFI = 0.847, TLI = 0.905, χ2 = 40.243 (p = 0.038), RMSEA indices = 0.057 (90% CI [0.039; 0.069]),

SRMR = 0.071 are at a satisfactory and good level of significance, which indicates the conformity of the model with empirical data;

- three-factor model of the social environment component – indicators CFI = 0.910, TLI = 0.879, $\chi 2$ = 43.287 (p = 0.019), RMSEA indices = 0.045 (90% CI [0.037; 0.061]), SRMR = 0.056 are at good and satisfactory levels of significance, which indicates the conformity of the model with empirical data.

The convergent and divergent validity of the method for assessing the components of individual rehabilitation potential was assessed using previously tested standardized methods for assessing aggression, learning motivation, and social and communicative traits. Table 3 displays the factors for the three components of rehabilitation potential, represented by a set of scales for each factor, in columns. The scales of the standardized methods are given in rows.

Table 3

The relationship between the scales of the developed methodology for measuring the components of the individual's rehabilitation potential and existing standardized methods

Scales	Touchiness	Guilt	Training	Learning ability	Motivation	Awareness	External environmental factors	Social environmental factors	Socio-anthropological factors
Remorse	.611**	.758**	-.278	-.211	.103	.139	.234	.119	.167
Resentment	.689**	.512**	.089	-.101	.120	.082	.021	-.141	.019
Cognition	.177	.220	.431**	.398*	.378*	.123	.170	.029	-.103
Personal motivation	-.219	.152	.389*	.506**	.432**	.328*	-.032	.049	.122
Cognitive motive	-.121	.017	.231	.544**	0,368*	.229	-.032	.187	.287
Sociality of knowledge	-.190	-.254	.369*	.378*	.432**	.511**	.137	-.128	.206
Quality of life	.116	.128	-.182	-.221	.233	-.188	.634**	.539**	.367*
Social support	.008	.193	-.036	.002	-.061	.227	.337*	.478**	.439**
Social skills	-.132	.201	.217	.108	-.198	.231	.289	.389*	.334*

Note. ** – p <0.05, ** – p <0.01,*

As can be seen from Table 3, the scales of remorse and resentment directly correlate with the corresponding scales of our method related to the psychophysiological component: r = 0.611, r = 0.758 and r = 0.689, r = 0.512; however, for the remaining components, no connection was found between these scales. For the scales "Cognition", "Personal motivation", "Cognitive motive" and "Sociality of knowledge" from the methodology for motivation for learning, there are direct significant connections with the scales of our methodology related to the professional-pedagogical component: r = 0.431, r = 0.398, r = 0.378 and r = 0.123 (no connection) for the first scale, r = 0.389, r = 0.506, r = 0.432 and r = 0.328 for the second scale, r = 0.231 (no connection), r = 0.544, r = 0.368 and r = 0.229 (no connection) for the third scale, r = 0.369, r = 0.378, r = 0.432 and r = 0.511 for the fourth scale in relation to the factors "Learning", "Trainability", "Motivation for retraining and work" and "Awareness of secondary professionalization", respectively.

For the scales "Quality of life" (WHOQOL-26 method), "Social support" (Multidimensional Scale of Perceived Social Support) and "Social skills" (Tromso social intelligence scale) significant direct relationships with the scales of our method were revealed: r = 0.634, r = 0.539 and r = 0.367 for the first scale, r = 0.337, r = 0.478 and r = 0.439 for the second scale and r = 0.289 (no relationship), r = 0.389 and r = 0.334 for the third scale in relation to the factors "External-environmental factors", "Socio-environmental factors" and "Socio-anthropological factors" from our method, respectively.

Thus, convergent and divergent validity is observed – there are connections between similar scales of the new method and existing standardized methods, and no connections with dissimilar scales.

To determine the general level of expression of the components of the individual's rehabilitation potential, we used quartile standardization for the initial data, which made it possible to identify high, medium, and low values of the indicator, represented by specific points, which is convenient for the purposes of computerization of the methodology and the corresponding accelerated processing of the results of the psychodiagnostic examination (Table 4). Overall, the methodology yielded ranges of values for low, medium, and high levels of trait expression for each individual scale, based on aggregated indicators within components and for the components as a whole. For convenience, we'll only present four sets of indicators.

Table 4

Levels of expression of four large blocks of indicators of the method for diagnosing rehabilitation potential

Levels/ Parameters	Index of psycho-physiological resourcefulness (deep aggression)	Index of psycho-logical resour-cefulness	Index of professional and pedagogical resources	Index of socio-environmental resources
Short	0 – 25.7	0 – 9.1	0 – 6.3	0 – 11.7

Levels/ Parameters	Index of psycho-physiological resourcefulness (deep aggression)	Index of psycho-logical resour-cefulness	Index of professional and pedagogical resources	Index of socio-environmental resources
Average	25.8 – 33.9	9.2 – 13.6	6.4 – 9.4	11.8 – 16.6
High	34.0 and above	13.7 and above	9.5 and above	16.7 and above

In the final version of the methodology, each level of the corresponding component is interpreted in the context of explanations and recommendations aimed at the perception of both participants in the rehabilitation process: the rehabilitator and the specialist. For rehabilitation patients, interpretation is presented in terms of speech patterns and associations accessible at a common level. For specialists, it is presented in professional terms and professionally oriented content (Borozinets et al., 2025).

Discussion

The obtained results indicate that the rehabilitation potential of an individual can be diagnosed using an original author's methodology, which includes 85 indicators relevant to four components - psychological, psychophysiological, professional-pedagogical and social environment. These findings are consistent with studies describing the specifics of assessing an individual's rehabilitation potential (Rogacheva, 2008; Khokhlova, 2020; Wade, 2023). Taking into account the previously conducted analysis concerning the psychological component of rehabilitation potential (Solovyeva, 2024), the results of which are consistent with the data of existing studies (Gudilina, 2012; Kulagina & Senkevich, 2015; Porokhina, 2004), it can be said that the holistic methodology involves consolidation into four blocks of indicators, , including:

- psychological (the indicators "Adaptability", "Quality of life", "Optimism" of the "Behavioral sphere" scale, the indicators "Intrapersonal conflict", "Neurosensory stability" of the "Affective sphere" scale, the indicators "Intelligence", "Attention", "Memory" of the "Cognitive component" scale, which meaningfully reflect the psychological resourcefulness of the subject);
- psychophysiological (indicators "Resentment" and "Guilt", scales "Index of Deep Aggressiveness", which meaningfully reflect the psychophysiological resourcefulness of the subject);
- professional and pedagogical (the indicators "Educational and professional competence", "Self-presentation" of the "Learning" scale, the indicators "Ability to learn new things", "Readiness to learn" of the "Learning ability" scale, the indicators "Motives for choosing a profession", "Self-motivation for retraining and work activity", "Readiness to change profession", "Position regarding retraining and employment" of the "motivation

for retraining and work" scale, the indicators "General awareness", "Understanding of methods" of the "Awareness of secondary professionalization" scale, which meaningfully reflect the professional and pedagogical resourcefulness of the subject);

- social environment (indicators "Satisfaction with social policy and social protection of the state", "Satisfaction with the accessibility of the environment", "Inclusive and social culture" of the scale "External environmental factors", indicators "Influence of the formal social environment", "Influence of the informal social environment" of the scale "Socio-environmental factors", indicators "Social motivation and activity", "Social communication and social interaction" of the scale "Socio-anthropological factors", substantively reflecting the socio-environmental resourcefulness of the subject).

Thus, the developed psychodiagnostic method can be used to assess an individual's rehabilitation potential within the context of a four-component, integrated, interdisciplinary framework, with the ability to distinguish assessment levels for each component separately or as a whole. Based on the obtained results, it is possible to develop individualized trajectories for professional and psychological rehabilitation, both as interpreted by the respondent and as part of a rehabilitation strategy for the specialist.

Conclusions

We define rehabilitation potential as a dynamic combination of conscious and unconscious psychophysical, personal and environmental resources of a person, consisting of a psychophysiological component associated with deep diencephalically generated autoaggression, a psychological component encompassing behavioral, affective and cognitive characteristics, a professional and pedagogical component implying preserved professional competencies, the ability to learn and retrain, and a social environment component taking into account the support of the state, the social environment, the availability of rehabilitation infrastructure and the socio-cultural conditions of adaptation.

The developed diagnostic method demonstrated strong psychometric properties, confirmed by a comprehensive statistical analysis. The study results demonstrate the instrument's significant reliability, as evidenced by high Cronbach's alpha values for the optimized models.

The construct validity of the method was consistently substantiated in the course of a multi-stage analysis: the initial exploratory factor analysis using the principal components method and varimax rotation revealed stable factor structures, which were subsequently verified by confirmatory factor analysis, which showed a good fit of the models to the empirical data.

Evidence of convergent validity was obtained through significant correlations ($r = 0.334$-0.758 at $p < 0.05$) with similar scales of standardized methods, while divergent validity was confirmed by the absence of significant relationships ($r < 0.278$ at $p > 0.05$) with methods measuring fundamentally different constructs.

A standardization procedure based on quartile analysis allowed for the establishment of clear normative boundaries—high, medium, and low levels. Normative indicators were

developed for both individual factors within the components (taking into account their specific characteristics) and for the integrated indicator of rehabilitation potential, enabling differentiated interpretation of diagnostic results.

Based on the results of the pilot study, this psychodiagnostic tool is suitable for use in research and practice and can be recommended for use by professionals working with individuals with disabilities to assess their rehabilitation potential.

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Appendix

Full version of the questionnaire: Access mode: https://ncfu-test-rehab.ru/

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Author Contributions

Natalya M. Borozinets — conceptual idea and design of a study on the rehabilitation potential of individuals with disabilities acquired during military actions and special operations.

Olga V. Solovyova — justification of the relevance and theoretical and methodological foundations of the comprehensive study.

Margarita G. Vodolazskaya — justification of the relevance and theoretical and methodological foundations of the study concerning the psychophysiological component.

Alexey S. Lukyanov — Conducting secondary mathematical processing of the data obtained during the diagnostic process. Testing the diagnostic instrument for validity and reliability. Editing the final version of the article.

Tatyana S. Shekhovtsova — justification of the relevance and theoretical and methodological foundations of the study concerning the professional and pedagogical component.

Olesya D. Salnikova — justification of the relevance and theoretical and methodological foundations of the study concerning the social environment component.

Anna A. Dargan — collection, processing, primary analysis and interpretation of diagnostic data necessary for validation of diagnostic methods.

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Conflict of Interest Information

The authors have no conflicts of interest to declare.