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Разработка краткой версии теста антиципационной состоятельности

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АННОТАЦИЯ

Обоснование. Тест антиципационной состоятельности разработан В.Д. Менделевичем с опорой на антиципационную концепцию неврозогенеза. Методику применяли в многочисленных исследованиях, она хорошо себя зарекомендовала как диагностический инструмент. В то же время существенный объём вопросов делает текущую версию трудоёмкой для испытуемых.

Цель настоящей работы — создание краткой версии, подходящей для скрининговых исследований антиципационной состоятельности.

Материал и методы. В исследовании приняли участие 315 студентов и 96 пациентов, проходивших лечение в отделениях Республиканской клинической психиатрической больницы им. акад. В.М. Бехтерева и Центральной клинической больницы №18 с установленными диагнозами рубрики «Невротические, связанные со стрессом и соматоформные расстройства» Международной классификации болезней 10-го пересмотра. Разработка теста включала три этапа: изучение психометрических показателей оригинального теста, разработка стимульного материала краткой версии, изучение показателей надёжности и валидности краткой версии. Для оценки конвергентной валидности применяли адаптированные русскоязычные версии опросников «Способы совладающего поведения» Р. Лазаруса и «Мельбурнский опросник принятия решений».

Результаты. Конфирматорный факторный анализ выявил достаточный уровень мер соответствия трёхфакторной структуры теста: CFI=0,909; TLI=0,894; SRMR=0,0672; RMSEA=0,05 (90% доверительный интервал 0,0338–0,0648). Краткая версия теста обладает достаточной надёжностью: Кронбах α=0,727, МакДональд ω=0,742, шкалы коррелируют между собой, отдельные утверждения коррелируют со своими шкалами. Краткая версия теста коррелировала с результатами оригинальной методики. Были подтверждены ретестовая надёжность, критериальная и конвергентная валидность.

Вывод. Краткую версию можно применять в скрининговых исследованиях антиципационной состоятельности.

Ключевые слова: *антиципационная состоятельность, валидность, прогностическая компетентность, разработка теста, ретестовая надёжность*.

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Development of a short version of the test of anticipatory solvency

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ABSTRACT

BACKGROUND. The Test of anticipatory consistency was developed by V.D. Mendelevich based on the anticipatory concept of neurosogenesis. The technique has been used in numerous studies and has proven itself as a diagnostic tool. At the same time, the substantial volume of questions makes the current version time-consuming for the subjects.

AIM. The purpose of this work was to create a short version suitable for screening studies of anticipation consistency.

MATERIAL AND METHODS. The study involved 315 students and 96 patients treated in the departments of the Republican Clinical Psychiatric Hospital of academician V.M. Bekhterev and Central Clinical Hospital No. 18 with established diagnoses of the heading "Neurotic, stress-related and somatoform disorders"of the International Classification of Diseases of the 10th revision. The development of the test included three stages: the study of the psychometric indicators of the original test, the development of the stimulus material of the short version, the study of the reliability and validity of the short version. To assess convergent validity, adapted Russian-language versions of the questionnaires "Methods of coping behavior"by R. Lazarus and "Melbourne Decision-making Questionnaire"were used.

RESULTS. Confirmatory factor analysis revealed a sufficient level of agreement of compliance with the three-factor structure of the test: CFI=0.909; TLI=0.894; SRMR=0.0672; RMSEA=0.05 (CI 90% 0.0338–0.0648). The short version of the test has sufficient reliability: Kronbach α=0.727, McDonald ω=0.742, the scales correlate with each other, individual statements correlate with their scales. The short version of the test correlates with the results of the original methodology, and retest reliability, criterion and convergent validity are confirmed.

CONCLUSION. A short version is possible for use in screening studies of anticipation viability.

Keywords: *anticipation consistency, validity, predictive competence, test development, retest reliability*.

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INTRODUCTION

The anticipatory competence test (ACT) was developed by V.D. Mendelevich, and it is based on the anticipatory concept of neurogenesis [1]. The concept of anticipation reflects a person's ability to foresee the development of various events and predict in advance one's reactions to these events [2]. Anticipatory abilities are a necessary element of self-regulation of emotional states, activity, decision making, and human behavior [3, 4].

Mendelevich's concept of anticipation postulates that prognostic incompetence is revealed in neurotic disorders. It causes the unpreparedness of such people to stressful events; however, it prevents the selection and application of adaptive ways of coping with problematic situations [5].

This concept was confirmed and developed in subsequent studies using ACT [6]. In addition, the list of applications of the technique to different samples was expanded: people with deviant and addictive behavior [7], anxiety [3], personality disorders [8], psychosomatic diseases [9], somatoform disorders [10], and other problems.

The ACT includes 81 statements that are divided into four scales of anticipatory competence: personal–situational anticipatory competence (PSAC) is the ability to predict interpersonal interactions, spatial anticipatory competence (SAC) is the ability to predict movements in space, and temporal anticipatory competence (TAC) is the ability to be oriented in time perspective. The total score of all scales forms the general anticipatory competence (GAC).

The test uses a 5-point Likert scale: 1, strongly disagree (not at all); 2, somewhat disagree (rather wrong); 3, neither (both true and false); 4, somewhat agree (rather true); and 5, strongly agree (completely true). In addition, the statements are divided into direct (44) and inverse (37) statements.

The methodology was used in many scientific studies as a tool to assess anticipatory competence. On average, the current version of the ACT is completed in 15–25 min. Combined use with other methods within a diagnostic session may be labor-intensive for the test-taker and may reduce overall diagnostic reliability. The solution to the practical problem of how to reduce the number of questions in the stimulus material while maintaining the validity and reliability of the method appears relevant.

The **aim of this study** was to develop a short version of the ACT that would be suitable for research, psychodiagnosis, and screening.

MATERIAL AND METHODS

The development of the short version of the ACT consisted of several phases. The first stage was aimed at studying the psychometric indicators of the original test. In this stage, the questions to be deleted were identified, and the text of the short version was formed from the remaining questions. For this purpose, the content of the questions was evaluated, and exploratory and confirmatory factor analyses and reliability and internal consistency checks were conducted. Finally, a list of questions for the short version was compiled.

In the second stage, the stimulus material for the short version was developed, the factor structure was examined using confirmatory factor analysis, and the reliability and internal consistency of the method were tested.

The third stage included studies that focused on examining measures of external validity: correlation between the results of the short version and the original version, retest reliability, and convergent and criterion validity.

The following model quality criteria were used for the confirmatory factor analysis: comparative fit index (CFI) = >0.9, Tucker–Lewis index (TLI) = >0.9, standardized root mean square residual (SRMR) = 0.08, and root mean square error of approximation (RMSEA) = 0.08 [12, 13]. Cronbach's alpha and MacDonald's omega coefficients were used to assess the reliability of the methodology. The cutoff value was set at 0.7. The correlation analysis (Pearson and Spearman coefficients) was used to study the relationships between the results of the short version of the methodology and the external criteria. Student's t-test with Welch's correction was used to examine differences between the sample of healthy individuals and patients with neurotic disorders. Data were processed using STATISTICA Enterprise for Windows (version 10.0, Copyright © Stat Soft Inc., 2011) and The Jamovi Project (version 2.3, 2022).

The study sample included the following categories of participants:

1. 315 students of Kazan Federal University and Kazan State Medical University (61 men and 254

Table 1. Factor loadings of the short-version statements (subgroup 1)

Statement no. from the original test	Factor loadings		
	Factor 1 (PSAC)	Factor 2 (SAC)	Factor 3 (TAC)
1	**0.5225**	0.02542	–0.13126
3	**0.5870**	0.07920	0.03855
7	**0.5299**	–0.07206	0.14617
25	**0.5996**	0.02019	–0.09386
31	**–0.0351**	0.17894	0.07348
39	**0.7625**	–0.05931	0.01914
60	**0.4384**	0.23821	0,05426
2	–0.0219	**0.54127**	–0.05060
6	–0.0940	**0.43547**	–0.11557
24	0.1708	**0.38946**	0.02792
32	0.0565	**0.63318**	0.06869
34	–0,0554	**0.62962**	0.00679
43	–0.0219	**0.48253**	0.01405
12	–0.1292	–0.02907	**0.56490**
29	0.0119	0.00627	**0.70891**
49	–0.0584	0.00597	**0.80600**
62	0.2279	0.03871	**0.62165**

Note: Factor loadings >0.35 are in bold.

women). According to self-report data, the participants did not seek psychiatric and psychotherapeutic help and denied symptoms of mental disorders at the time of the study. The age of the participants ranged from 18 to 23 (median, 20.5) years.

2. 96 patients treated in the departments of Akademician Bekhterev Republican Clinical Psychiatric Hospital and Central Clinical Hospital No. 18. The diagnoses were made by a psychiatrist under the heading "Neurotic, stress-related and somatoform disorders (F40-F48)" of the International Classification of Diseases, 10th revision. The age of the patients ranged from 18 to 35 (median, 24.5) years. The sample included 57 men and 39 women.

RESULTS AND DISCUSSION

In the first stage, 315 individuals were tested with the original version of the ACT. The original test has sufficient reliability: GAC (Cronbach's alpha = 0.864, McDonald's omega = 0.868), PSAC (Cronbach's alpha = 0.836, McDonald's omega = 0.837), SAC (Cronbach's alpha = 0.769, McDonald's omega = 0.775), TAC (Cronbach's alpha = 0.724, McDonald's omega = 0.743). When examining the internal consistency of the methodology, all scales were statistically significantly correlated (Pearson's coefficient) with each other ($p < 0.001$).

The exploratory factor analysis suggested a three-factor structure of the questionnaire. The confirmatory factor analysis confirmed this assumption. However, among the fit measures of the theoretical model with empirical data, only one RMSEA reached the recommended values: CFI of 0.436, TLI of 0.421, SRMR of 0.0876, and RMSEA of 0.0592 (90% confidence interval [CI] 0.0572–0.0612).

Then, we divided the sample into two subgroups by simple randomization using a random number generator computer program. Subgroup 1 included 200 participants, and subgroup 2 included 115 participants. The test results of subgroup 1 were subjected to exploratory factor analysis of the original test (maximum likelihood extraction combined with oblamin rotation). Consequently, statements with factor loadings >0.35 were selected for each of the three factors (scales) of the test. In addition, a meaningful evaluation of the questions was performed. Thus, 7 statements were selected for PSAC, 6 for SAC, and 4 for TAC (Table 1). After combining them, a short version of the ACT that contained 17 statements was obtained.

Table 2. Differences between patients with neurotic disorders and healthy participants

Scale	Patients, M ± m, n = 96	Healthy participants, M ± m, n = 75	Me, patients	Me, healthy participants	t	p	d
GAC	55.6 ± 0.957	58.8 ± 0.628	55.5	59	–3.09	0.002	–0.373
PSAC	22.2 ± 0.459	23.6 ± 0.347	23	24	–2.72	0.007	–0.328
SAC	19.1 ± 0.533	20.2 ± 0.326	19	21	–2.15	0.032	–0.259
TAC	14.3 ± 0.365	15.0 ± 0.265	15	16	–1.31	0.191	–0.158

Subsequently, a confirmatory factor analysis in subgroup 1 was conducted to examine the obtained model. The confirmatory factor analysis confirmed that the obtained version has a three-factor structure. Moreover, most questions were loaded sufficiently on a single factor, which legitimizes the formation of a common scale. The obtained fit measures of the theoretical model corresponded to the recommended values: CFI of 0.909, TLI of 0.894, SRMR of 0.0672, and RMSEA of 0.05 (90% CI 0.0338–0.0648).

The short version of the ACT had adequate reliability: GAC (Cronbach's alpha = 0.727, McDonald's omega = 0.742), PSAC (Cronbach's alpha = 0.662, McDonald's omega = 0.708), SAC (Cronbach's alpha = 0.681, McDonald's omega = 0.690), and TAC (Cronbach's alpha = 0.759, McDonald's omega = 0.774). Comparatively lower values of reliability criteria than the original test may be due to the specificity of calculation of these indicators: a lower number of questions influenced reliability indicators. Increasing the number of questions increased Cronbach's alpha but decreased the quality of the model. Thus, the given combination of questions was chosen as optimal.

A correlation analysis (Pearson's coefficient) was used to assess the internal consistency of the scales. All questions statistically significantly correlated with their scales and the total scale ($p < 0.05$). The test scales correlated with each other and the total scale ($p < 0.001$), except for SAC and TAC, whose correlations were not statistically significant.

Then, a confirmatory factor analysis was performed on subgroup 2 data to test the reproducibility of the model. The validation showed better-fit measures: CFI = 0.936, TLI = 0.925, SRMR = 0.0675, and RMSEA = 0.0374 (90% CI 0.0012–0.0572).

Moreover, 75 participants were tested with the short version of the ACT 3 months after testing with the original version. The correlations (Spearman's coefficient) between the original and short versions were studied. All relevant scales statistically significantly correlated with each other ($p < 0.001$): GAC rho = 0.643, PSAC rho = 0.548, SAC rho = 0.528, and TAC rho = 0.692.

After 2 months, the short version of the ACT was retested to check for the retest reliability (n = 74). The scales were statistically significantly correlated (Spearman's coefficient): GAC rho = 0.733, PSAC rho = 0.751, SAC rho = 0.722, and TAC rho = 0.57 ($p < 0.001$). This indicates sufficient retest reliability of the short version of the ACT.

Moreover, 96 patients with neurotic disorders were examined for criterion validity. According to the anticipatory concept of neurosogenesis, prognostic incompetence is an important factor in the development and maintenance of neurotic disorders. Patients with neurotic disorders showed statistically significant differences from healthy individuals and had lower ACT scores [3, 5, 10, 11]. Thus, the ability of the short version of the ACT to discriminate between the expression of anticipatory competence in healthy participants and patients with neurotic disorders was chosen as an indicator of criterion validity.

Table 2 shows the results of the study of the differences between patients and healthy participants. Student's t-test with Welch's correction was used. Statistically significant differences were found in all scales, except for the TAC anticipation scale. Patients were found to have comparatively lower scores in each scale.

Influence of sex and age. When comparing men and women in both the healthy group and the group with neurotic disorders, no statistically significant differences were found ($p \geq 0.05$). Similarly, no statistically significant correlation with age was found.

Convergent validity study. Mendelevich's anticipatory concept of neurogenesis considers anticipatory processes as part of the "system of personality stabilization," along with coping strategies

Table 3. Correlation matrix of the scales of the short version of the ACT and the ways of coping behavior questionnaire by R. Lazarus

Coping strategies	GAC	TAC	SAC	PSAC
Confrontational coping	r = –0.1504	r = 0.0431	r = –0.0895	r = –0.2588
	p = 0.354	p = 0.792	p = 0.583	p = 0.107
Distancing	r = **–0.4575**	r = **–0.3139**	r = **–0.3538**	r = –0.2910
	p = 0.003	**p = 0.049**	**p = 0.025**	p = 0.069
Self-control	r = –0.2512	r = –0.2014	r = –0.1707	r = –0.1536
	p = 0.118	p = 0.213	p = 0.292	p = 0.344
Seeking social support	r = –0.0805	r = –0.0526	r = –0.1272	r = 0.0053
	p = 0.622	p = 0.747	p = 0.434	p = 0.974
Taking responsibility	r = **–0.3556**	r = **–0.3124**	r = **–0.3286**	r = –0.1125
	p = 0.024	**p = 0.050**	**p = 0.038**	p = 0.489
Escape-avoidance	r = **–0.6369**	r = **–0.3830**	r = **–0.4932**	r = **–0.4557**
	p = 0.0001	**p = 0.015**	**p = 0.001**	**p = 0.003**
Planning a solution to the problem	r = **0.4315**	r = 0.1791	r = **0.3792**	r = **0.3442**
	p = 0.005	p = 0.269	**p = 0.016**	**p = 0.030**
Positive revaluation	r = 0.1454	r = 0.1676	r = 0.1563	r = –0.0119
	p = 0.371	p = 0.301	p = 0.335	p = 0.942

Note: Statistically significant correlations are in bold.

[2, 5, 10]. Mendelevich presented the following model of coping with stress: "signals – anticipation of the situation" – "anticipation" – "anticipatory activity" – "stimulus" – "indicative actions instead of "stress reaction" – "adaptive behavior" [5]. In other words, anticipatory processes are involved both before the event, allowing to avoid the stressfulness of the situation, and at the moment of choosing subsequent actions aimed at coping with stress.

Thus, a correlation between the scales of coping behavior, coping strategies, and decision-making strategies should be determined. Accordingly, the ways of coping behavior by R. Lazarus (adapted by T.L. Kryukova, E.V. Kuftyak, and M.S. Zamyshlyaeva, 2004) [13] and Melbourne decision-making questionnaire (adapted by T.V. Kornilova, S.A. Kornilova, and M.A. Chumakova, 2013) [14] were chosen.

The questionnaire "ways of coping behavior" contains eight scales, namely, confrontational coping, distancing, self-control, seeking social support, taking responsibility, escape-avoidance, planning a solution to the problem, and positive revaluation. Table 3 presents the results of the correlation analysis of the scales of the short version of the ACT and the ways of coping behavior questionnaire by R. Lazarus (n = 40).

Table 3 shows that the anticipation ability scales are inversely correlated with some coping strategies (distancing, taking responsibility, and escape-avoidance) and directly correlate with problem-solving planning. The higher the anticipatory ability, the more pronounced the productive coping strategy, and the less pronounced the anticipatory ability, the more avoidance strategies are present [5, 14].

The Melbourne decision-making questionnaire includes four scales of coping in a decision situation: productive (vigilance) and unproductive coping (avoidance, procrastination, and hypervigilance) [14]. Fig. 1 shows the results of the correlation analysis between the scales of the short version of the ACT and the scales of the Melbourne decision-making questionnaire (n = 46). Statistically significant inverse correlations were found with unproductive coping.

Prognostic ability refers to the ability to effectively predict future events: without exaggerating or minimizing negative consequences and relying on more likely scenarios of events. According to the Melbourne decision-making questionnaire, unproductive coping is positively related to intolerance

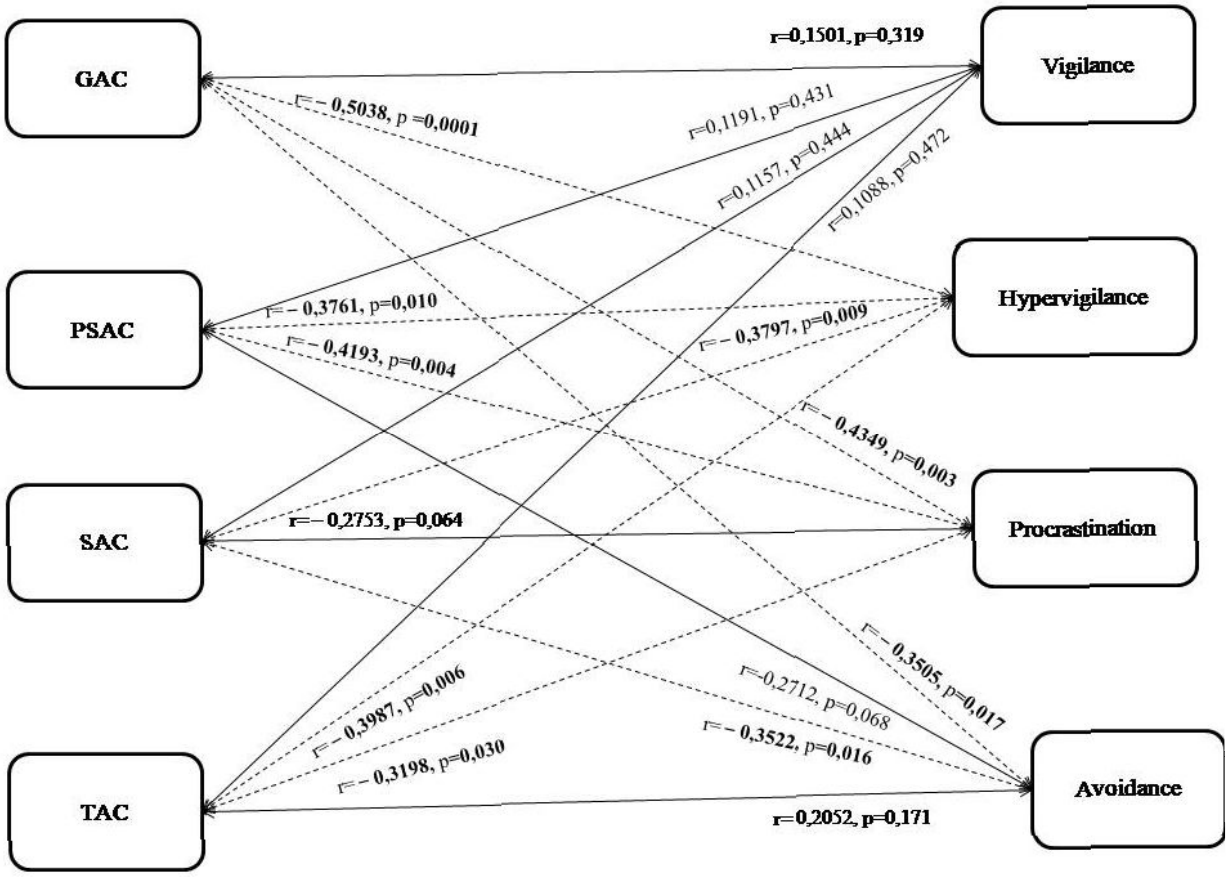

Fig. 1. Correlations between the scales of the short version of the anticipation competence test and the Melbourne decision-making questionnaire. The dotted line shows statistically significant inverse correlations. GAC, general anticipatory competence; PSAC, personality–situational anticipatory competence; SAC, spatial anticipatory competence; TAC, temporal anticipatory competence.

of uncertainty [14]. With lower predictive ability, situations are subjectively perceived as uncertain and threatening, leading to the use of maladaptive coping strategies, i.e., attempts to overcontrol, postpone, or avoid coping.

Thus, the presence of correlations between the scales of the short version of the ACT and coping strategies is consistent with the theoretical considerations regarding the measured construct. This indicates sufficient convergent validity of the developed version of the test.

CONCLUSIONS

Based on the results of this study, a short version of the ACT containing 17 statements was created. During the study, the obtained version of the ACT demonstrated a suitable three-factor model with an identified common scale, characterized by sufficient internal consistency, reliability, criterion and convergent validity, and retained retest reliability. The short version of the ACT can be used to screen studies of anticipatory competence. The standardization and normalizing of the short version of the ACT and the study of the applicability of the methodology in other age and nosological groups are directions for further research.

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APPENDIX

ACT short version
Instructions. Using this scale, indicate the extent to which you agree or disagree with each of the following statements by placing an X in the appropriate place. Give only one answer for each statement:
1 — Strongly disagree (not at all)
2 — Somewhat disagree (rather wrong)
3 — Neither (both true and false)
4 — Somewhat agree (rather true)
5 — Strongly agree (completely true).

Statement	1	2	3	4	5
1. What sets me apart from others is my punctuality.					
2. People around me are often unfair to me.					
3. I can always tell for sure if I will jump over a puddle (stream or hole) or not.					
4. I take my over-the-counter medications with me on my trip in case any of my traveling companions need them.					
5. I have no trouble planning my route and getting to my destination on time.					
6. I can easily “swat” a fly with a fly swatter or newspaper.					
7. Often, I take offense at people close to me and people I know.					
8. I tend to set my alarm so that not only do I have time to get everything done before I leave, but I also have a few minutes to myself.					
9. If someone throws me keys (or any other small objects), I catch them with ease.					
10. I am often deceived.					
11 I can easily juggle (juggled before) different objects by throwing and catching them.					
12. I often thought I still had plenty of time to get to work (school and meeting) on time, but I was late despite my predictions.					
13. I tend to be disappointed in people.					
14. I enjoy (or used to enjoy) playing games that require manual dexterity.					
15. I have a hard time distributing my food evenly throughout the day and often end up with the bare minimum of leftovers at the end of the week (or month).					
16. In my life, I often encounter (have encountered) an unimaginable confluence of unfavorable circumstances.					
17. I can skillfully and accurately throw a ball into a basket or papers into a trashcan from a distance.					

Processing of results
Direct questions (points are calculated directly): 1, 3, 4, 5, 6, 8, 9, 11, 14, and 17.
Direct statements: 10.
Reverse questions (points are counted in reverse: 5 – 1, 4 – 2, 3 – 3, 2 – 4, 1 – 5): 2, 7, 10, 12, 13, 15, and 16.
Reverse statements: 7.
Anticipatory competence scales:
Personal–situational (questions 2, 4, 7, 10, 13, 15, and 16), 7 statements; max: 35 points.
Spatial (questions 3, 6, 9, 11, 14, and 17), 6 statements; max: 30 points.
Temporal (questions 1, 5, 8, and 12), 4 statements; max: 20 points.
The total anticipation ability is calculated by adding the scores on all three scales. The maximum score is 85 points.

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