Psychological Problems of Adolescents in Real and Virtual Environments: Questionnaire Development

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The need to create a questionnaire to study the psychological problems of adolescents in real and virtual environments arose since previously created and available methods in this sphere did not consider the influence of the virtual environment as a factor of socialization. The article reveals the continuity in the development of methodological tools for the study of psychological problems of adolescents and shows the novelty of the new questionnaire. The questionnaire was created and standardized during five consecutive stages (collection of primary empirical material, procedures of linguistic and frequency analysis, assessment of reliability, validity, double factorization, determination of age norms). 566 teenagers aged 13—17 years took part in standardization. The result of this work is a new psychodiagnostic tool that allows to determine the degree of adolescents' concern with psychological problems, both in real life and in connection with their immersion in the Internet environment.

Keywords: psychological problems, teenagers, virtual environment, questionnaire.

Психологические проблемы подростков в реальной и виртуальной среде: методика исследования

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Необходимость в создании методики для изучения психологических проблем подростков в реальной и виртуальной среде возникла в связи с тем, что ранее созданные и имеющиеся методики аналогичной направленности не учитывали влияния виртуальной среды как фактора социализации. В статье раскрыта преемственность в разработке методических средств для изучения психологических проблем подростков и показана принципиальная новизна вновь созданной методики. Методика создавалась и была апробирована в течение пяти последовательных этапов (сбор первичного эмпирического материала; процедуры лингвистического и частотного анализа; оценка надежности, валидности; двойная факторизация; определение возрастных норм проблемной озабоченности), в которых приняли участие 566 подростков в возрасте 13—17 лет. Результатом этой работы стало получение психодиагностического инструмента, позволяющего определить степень озабоченности психологическими проблемами, как в реальной жизни, так и в связи с погруженностью подростков в интернет-среду.

Ключевые слова: психологические проблемы, подросток, виртуальная среда, методика.

Introduction

An individual's psychological problems, including those of adolescents, are conditioned not only by the individual's own development situation and environment, but also by the socio-economic conditions in which the individual lives—in other words, by the microsystem, the mesosystem and the macrosystem, as described by U.

Bronfenbrenner. That is why any study of psychological problems which does not take into account the environment and its changes will either lack objectivity or fail to be informative. This assumption is based on the results of a 20-year-long study of psychological problems in adolescents—during this entire period, the research tools have been constantly improved and adapted to keep pace with Russia's socio-economic reality. Digitalization profoundly transforms people's lives and brings not only increased comfort, but also psychological problems. That is why the available tools used to study psychological problems in adolescents needed to be adapted to take into account the new conditions of socialization.

Our questionnaire is a modification of I. Seiffge-Krenke's Adolescents' Psychological Problems Questionnaire which was developed and standardized in 1984 [34]. When both Germany and Russia entered a period of socio-economic crises, the questionnaire was adapted having regard to the new conditions—specifically, to the new stressors [3; 32]. Psychologists in Russia started to use the questionnaire in 1993 to identify both the content and degree of adolescents' concerns in the conditions of socio-economic crises followed by stabilization and economic growth (1993—2005) [10]. The years preceding 2010—12 were another period marked by major changes which increased the tension in people's lives: terrorism, drug abuse, aftermath of the economic crisis, etc. These changes necessitated an update of empirical data about adolescents' psychological problems and called for a new version of the questionnaire to be developed and standardized [14]. The new questionnaire was used in multiple studies and proven to be valid and reliable [2; 5; 6; 11].

Digitalization has made its own contribution to the process of socialization of people belonging to different age groups, but academic literature shows that it is adolescents who are most affected by it [4; 9; 17; 21; 28], and this fact needs to be factored in when studying psychological problems. Psychological studies focusing on the internet and technology—i.e., studies on computer addiction, the impact of technology on psychological boundaries, and involvement and self-representation on the internet—are paying increasing attention to the awareness of various aspects of one's self, including psychological problems, in real and virtual environments [12; 16; 30; 35].

We examined the available methods of psychological assessment and carried out a theoretical analysis of different up-to-date approaches used to operationalize the concepts "psychological problem" and "immersion in the internet environment" [13; 15]. This revealed a need for another modification of the original questionnaire in order to study psychological problems in real and virtual environments within the emotional-reflexive approach.

We define a "psychological problem" within the said approach as the "presence of—1) a contradiction which is realized by an individual in the context of his/her current life situation; 2) an emotional response to that contradiction as a factor which makes life more difficult; and 3) the willingness (or need) to resolve the contradiction in order to improve the course of one's life" [13].

Measurement methods and questionnaire development stages

We developed and standardized Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire in compliance with the applicable requirements and using standard procedures to test the validity, reliability and factorial structure of the questionnaire [36].

The following statistical methods were used to test the psychometric properties of the questionnaire: descriptive statistics, the Kolmogorov—Smirnov test to compare the forms of distributions, the reliability index (Cronbach's a, the Guttman split-half coefficient), correlation analysis (Spearman's), factor analysis (principal component analysis, Varimax rotation with Kaiser normalization) and confirmatory factor analysis.

Our questionnaire sought to have regard to the current changes in adolescents' environment and was developed in five stages from February to November 2021.

The first stage involved collection of empirical data on psychological problems faced by adolescents in the internet environment. The empirical data were collected using focus groups interviews with 132 adolescents. The work of the focus groups was based on the standardized Adolescents' Psychological Problems Questionnaire [14] which included questions corresponding to various problem areas which we identified and described earlier: school, leisure, relationships with parents and peers, self-image, health, future, and situation in society [11; 14]. However, in the present study we paid primary attention to the interrelations between the problems which the respondents encounter in various areas of life when using the internet or influenced by the internet environment. The processing and linguistic analysis of the data obtained in focus groups allowed us to make a list of such problems. The list was structured by the areas mentioned above and, after an expert examination of the problems voiced by the respondents, contained 91 items.

The second stage involved a sample of 292 adolescents aged 11—17 who were surveyed (both online and offline) in order to statistically confirm the relevance and commonality of internet-related psychological problems. The second stage also involved frequency analysis of the data. The most frequent psychological problems

(28 survey items) turned out to be mainly connected to two factors—personal safety on the internet and the lack of self-sufficiency (dependence on the internet).

The third stage aimed to ascertain whether internet-related problems constitute a separate area of concern for adolescents or supplement the problem areas described earlier. To that end, we complemented the previous version of the Adolescents' Psychological Problems Questionnaire, which consisted of 93 items, with the 28 items selected during the frequency analysis. The resulting list (121 items) corresponded to various problems experienced by adolescents both in real and in virtual environments. We surveyed 299 adolescents aged 13—17 who assessed the intensity of experiencing each problem on a scale of 1 to 5.

We carried out a factor analysis on the data obtained from the sample (299 respondents) using the principal component analysis with Varimax rotation. As a result, we identified six factors which explain 44.5% of the variance.

The factor analysis confirmed that internet-related problems constitute a separate group (factor 5) in the structure of adolescents' concerns—this group includes 17 out of 28 questions which focused on this topic in the initial list. At the same time, internet-related problems affect various areas of adolescents' life: communication, self-awareness, emotional well-being, etc. The examples are: "If I don't have the internet, I'm afraid to miss some of the events which are important for my friends and me", "I'm afraid that my life will be joyless if the internet disappears", "Without the internet, I feel as if my hands are tied". This confirms the change in adolescents' life reality [21; 24] and mutual penetration of their real and virtual environments—the facts that have been also described by other scholars [8].

The factor analysis produced one more important result. It revealed the transformation of problem areas. In addition to the internet, new areas emerged: problems related to personal safety both in real and in virtual environments and problems related to identity formation. The former correlates with the data of G.U. Soldatova and E.I. Rasskazova [19], while the latter embraces two previously separate areas of problems related to the future and to oneself.

The obtained empirical data revealed a need for the modification of Adolescents' Psychological Problems Questionnaire that would embrace a new structure of problem areas relevant for adolescents. The modification includes six scales. Each scale contains 10 statements with the highest factor weights.

Sixty new questions were used during the fourth stage to survey additional 340 adolescents aged 13—17. Then, at stage five we confirmed the structure and standardized the new questionnaire through a confirmatory factor analysis on the total sample of 566 adolescents aged 13—17. The sample included 306 females and 260 males with a median age of 14.9 (Table 2).

Results and discussion

The scales are highly reliable. The internal consistency calculated with Cronbach's alpha coefficient varies between 0.84 and 0.90. The Guttman split-half coefficient varies between 0.80 and 0.89 suggesting a high reality of the scales. The only exception here is the scale "Problems related to internet immersion", where the coefficient value is 0.76, which is close to high (Table 3).

Table 1

Results of primary factor analysis—explained variance

Factors	Number of questions	Rotation sums of squared loadings		
		Total	**% Variance**	**% Cumulative**
1. Problems related to public and personal safety	27	12.836	10.61	10.61
2. Problems related to identity formation	25	9.621	7.95	18.56
3. Problems related to communication and peers	20	8.636	7.14	25.69
4. Problems related to the relationships with parents	18	8.176	6.76	32.45
5. Problems related to the immersion in the internet	17	7.837	6.48	38.93
6. Problems related to school	14	6.695	5.53	44.46

Table 2

Sample's age and gender distribution

Gender	Age			Total
	13—14	**15**	**16—17**	
Females	111	80	115	306
Males	114	77	69	260
Total	225	157	184	566

T a b l e 3

Reliability index: Cronbach's alpha and Guttman split-half coefficient (N=566)

Scale	Cronbach's alpha	Guttman split-half coefficient	Number of elements
1. Problems related to public and personal safety	0.90	0.89	10
2. Problems related to identity formation	0.89	0.86	10
3. Problems related to communication and peers	0.88	0.84	10
4. Problems related to the relationships with parents	0.89	0.86	10
5. Problems related to the immersion in the internet	0.89	0.76	10
6. Problems related to school	0.84	0.80	10
Integral indicator of concern about problems	0.95	0.81	60

The scales and the total score were tested for normality using the Kolmogorov–Smirnov test. It showed that scales 2, 6 and the integral indicator of concern about problems are normally distributed, while scales 1, 3, 4, 5 are asymmetrical. This might be due to different degrees of commonality or variance of problems facing adolescents.

As is seen in Table 4, all the scales of the new tool are significantly correlated (p≤0.01). The lowest correlation (r=0.18 to 0.28) is observed between the scale "public and personal safety" and the other scales. This might indicate that social processes influence problematic experiences indirectly. The scales "communication and peers" and "immersion in the internet" as well as "communication and peers" and "identity formation" have the highest correlation with r=0.58 and r=0.57, respectively. This indicates a major role of communication with peers in identity formation during adolescence and a significant contribution of the internet as a means of communication in this process. Overall, the identified scales are not independent. Each of the scales contributes to the assessment of total concern of the sample of adolescents about their problems.

The identified correlations between the scales became the basis for the development of a structural model of the new Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire. It was used to conduct a confirmatory factor analysis of the empirical data (Table 5).

Basic statistical indices obtained with the confirmatory factor analysis satisfy the requirements. This allows us to state that the obtained empirical data confirm the proposed model that includes 6 factors with 10 questions each. Specifically, CMIN/DF is higher than 5.00; TLI, CFI, IFI, NFI are higher than the critical value of 0.9; RMSEA is close to the critical value of 0.051.

Descriptive statistics in Table 6 shows that the biggest reason for concern is public and personal safety (scale 1). Here, we see certain continuity with the scale

T a b l e 4

Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire: Correlation of scales (Spearman's ρ)

	Problems related to public and personal safety	Problems related to identity formation	Problems related to communication and peers	Problems related to the relationships with parents	Problems related to the immersion in the internet	Problems related to school
Problems related to public and personal safety	1.000	0.22**	0.18**	0.15**	0.27**	0.28**
Problems related to identity formation		1.000	0.57**	0.52**	0.46**	0.42**
Problems related to communication and peers			1.000	0.50**	0.58**	0.36**
Problems related to the relationships with parents				1.000	0.53**	0.47**
Problems related to the immersion in the internet					1.000	0.43**
Problems related to school						1.000

** indicates significant correlation at 0.01 level.

T a b l e 5

Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire: Results of confirmatory factor analysis

Value	5.412	0.900	0.904	0.903	0.903	0.051

"Problems related to the development of society" from the previous version of the questionnaire. Apart from common social and environmental threats, this scale includes internet-related issues of privacy, fraud, etc. Apparently, adolescents see the internet not only as an awareness-raising tool that keeps them informed about current global issues—they also relate to these issues personally. Rooted in social processes, this problem area is difficult to control and regulate.

The second major area of problems are those related to school. Among them are reduced motivation for learning, insufficiently equal and dialogue-based relationships with teachers, rejection of school rules and school environment. The item "Other (please specify)" features statements about boring classes, packed timetables and, on the other hand, the necessity for additional training with private teachers. Other studies also provide evidence for the relevance of school-related problems for adolescents who write about school in a critical and contradictory manner [23]. Digitalization in education creates new problems for educators and, to no lesser degree, for students [7; 25]. Yet, the studies focusing on digitalization-related problematic experiences of students are almost non-existent.

Problems related to identity formation come third. Obtaining one's identity is one of the key tasks facing adolescents. The supporting evidence is E. Erikson's developmental theory and its fifth stage identity vs. role confusion as a turning point in human development. Similarly, R. Havighurst highlights the importance of self-identification as regards universal values, communication, a struggle to understand the meaning of life and one's place in the world. Identity is about where an adolescent sees him/herself in lifetime and whether he/she perceives life as a continuous journey and realizes the continuity of the past, present and future. Identity formation is associated with a range of problems related to making personal choices as regards moral values, career, responding to challenges, and self-identification across different areas of life. Today, adolescents make an extensive use of the internet with experimental purposes, including trying themselves in different roles. This is a way to solve age-related tasks that concern the development

of self-awareness and the Self-concept. Importantly, the level of Self-concept correlates with risky behavior on social networks and internet addiction [16].

Interestingly, the problems related to the immersion in the internet cause more concern than experiences related to real-life interactions with parents or peers. This leads us to suppose a transformation in socialization tools as they are shifting towards a virtual environment. According to D.P. Tkachenko, the proliferation of information technology encourages the emergence of a new social reality that transforms development and socialization patterns [22]. Mastering information technology is also part of socialization as it goes along with the acquisition of cultural rules and values and the new picture of reality. Digitalization entails a range of psychological problems in adolescents. Among them are stress induced by information, internet addiction, ineffective time management, etc. On the one hand, the internet is a source of useful supporting content that helps adolescents in problem-solving. On the other hand, it offers tools and stimuli for aggressive and self-destructing behavior [18; 26; 35]. At the same time, destructive and self-destructive outcomes of problematic experiences are often down to destructive relationships with peers, including online (cyber aggression, cyberbullying). This is aggravated by a lack of parental support and difficulties in family relationships [20; 29; 31]. A range of studies claimed the necessity of designing a valid diagnostic tool to investigate the roots of psychological problems facing adolescents in this regard, e.g., the Cyber-Aggression Typology Questionnaire (CATQ) developed by K.C. Runions and adapted by S.S. Antipina for Russian researchers focusing on adolescent cyber aggression. The questionnaire is based on the analysis of motivational goals and ability for behavioral self-control depending on the four types of aggressive online behavior [1; 33]. D. Graf et al. designed the Face-to-Face Aggression Typology Questionnaire (FATQ). The research team analyzed the driving forces behind aggressive behavior and compared how these forces manifest in samples of adolescents with problem behavior in real-life and digital settings [27].

T a b l e 6

Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire: Descriptive statistics

	Median	Average	Standard deviation
Problems related to public and personal safety	3.50	3.38	0.99
Problems related to identity formation	2.65	2.66	1.01
Problems related to communication and peers	2.00	2.18	0.91
Problems related to the relationships with parents	2.30	2.35	0.98
Problems related to the immersion in the internet	2.40	2.45	0.94
Problems related to school	3.00	2.96	0.92
Integral indicator of concern about problems	2.67	2.66	0.68

You can find the form of the Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire and the keys in the Appendix.

The Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire can be used for the following research purposes:

• to investigate psychological problems of adolescents with different socialization backgrounds, i.e., education, family, place of residence, socio-economic environment, etc.;

• to identify specific behavior of adolescents caused by their psychological problems;

• to diagnose the mental state of adolescents with pronounced individual characteristics of mental development (giftedness, developmental delay, advanced developmental milestones, etc.).

The Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire can find the following practical application:

• to assess the level of concern about problems in a specific aspect of an adolescent's life followed by targeted psychological support;

• to identify the relationship between the level of concern about problems and intensity of the internet immersion;

• to identify risk groups prone to identity loss, etc.

• to substantiate the need for the implementation of social and psychological support of adolescents in a specific educational institution, city's district, region, etc.

Further, the Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire may find an application in research focusing on psychological problems of other social groups, e.g., university or vocational school students. It may also be subjected to criterion validity tests using the A.M. Prikhozhan's Personal Anxiety Scale and test-retest reliability tools.

Another promising avenue of future research is the investigation of psychological problems facing adolescents from other parts of Russia and beyond. It is also reasonable to explore the possibilities and ways of coping with psychological problems related to the immersion in the internet.

The identified areas of high concern about problems may become the focus of an in-depth study of grounds for the concern and subsequent qualitative analysis.

Conclusions

1. The Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire was developed and tested in five consecutive stages from initial collection of empirical data from adolescents to primary and secondary factorization of its scales.

2. The application of a set of psychometric and statistical tools determined the final structure of the Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire.

The questionnaire includes six scales and an average score of overall concern about problems:

— Problems related to public and personal safety;
— Problems related to identity formation;
— Problems related to communication and peers;
— Problems related to the relationships with parents;
— Problems related to the immersion in the internet;
— Problems related to school.

Each scale contains a list of 10 real-life situations that can cause psychological problems (Appendix).

3. The questionnaire was statistically tested on a sample of adolescents aged 13, 14, 15, 16, 17. All the statistical methods were used on an age- and gender-balanced sample of 566 school students from Saint Petersburg and the Leningrad Region, Russia.

4. The questionnaire has sufficient psychometric characteristics: high reliability of individual scales and the internal consistency of all the scales throughout the questionnaire as well as convergent validity confirmed on the basis of correlations with the indicators of the scales of Adolescents' Psychological Problems Questionnaire. The Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire can find an application in scientific research and practical psychodiagnostics on Russian-speaking samples.

Appendix

Adolescents' Psychological Problems in Real and Virtual Environments Questionnaire

Guidelines. *The questionnaire offers some situations that your peers or you personally may experience as problems. Use the scale below to say how much you agree or disagree with each of the statements.*

1—strongly disagree
2—somewhat disagree
3—neither agree nor disagree
4—somewhat agree
5—strongly agree

		1	2	3	4	5
1	I'm worried about drug and alcohol abuse in modern society.					
2	I'm worried that in modern society people are often indifferent to each other.					
3	I'm worried about terrorism and violence in the modern world.					
4	I'm worried that a war may break out.					
5	I'm worried about the decline of moral standards in society, permissiveness and rudeness.					
6	I'm worried about the proliferation of diseases many of which are incurable.					
7	I'm worried about the environment. People do not seem to care about nature anymore.					
8	I'm worried that laws and human rights are violated.					
9	I get upset because of bad news (pandemics, disasters, etc.)					
10	I'm worried that many things from real life will disappear because of the virtual environment.					
11	My future seems too uncertain.					
12	I'm afraid to fail to live up to my parents' expectations.					
13	I still don't know what to do after I leave school.					
14	I'm afraid that I won't be able to fully use my potential in the future.					
15	I'm not sure I'll earn enough to be independent from my family.					
16	I have difficulties in understanding myself.					
17	I don't know what I want to achieve in my life.					
18	I can't figure out where my potential lies.					
19	I often feel lonely and left out.					
20	I feel guilty about some of the things I've done.					
21	I often feel insecure when talking to friends.					
22	I feel constrained to speak to people of the opposite sex.					
23	I find it difficult to find a common ground with peers.					
24	I'm worried that I'm not popular with the opposite sex.					
25	I'm shy to initiate a relationship or to make an acquaintance.					
26	It's difficult to communicate with my peers because of their rudeness.					
27	I don't often voice out my opinion as I fear being laughed at by my peers.					
28	I'd love to be the leader of a team of peers but I keep failing.					
29	At times it's hard for me to support my point of view.					
30	I find it difficult to share my feelings with others.					
31	I fear that when I become an adult my parents will keep interfering in my life.					
32	I often fall out with my parents.					
33	My parents often fail to understand me.					
34	I get angry when my parents interfere in my life.					
35	I often fail to understand my parents.					
36	I don't like it that my parents still treat me as a child.					
37	My parents still control me.					
38	It often happens that my parents and I have absolutely nothing to talk about except for my studies and meals.					
39	My parent put too much pressure on me because of my school grades.					
40	My parents try to regulate my leisure time.					
41	Without the internet, I feel as if my hands are tied.					
42	If I don't have the internet, I'm afraid to miss some of the events taking place in my country or beyond.					
43	A power cut or an internet connection problem means you can't solve many of the everyday issues.					
44	I'm afraid that my life will be joyless if the internet disappears.					
45	If I don't have the internet, I'm afraid to miss some of the events which are important for my friends and me.					
46	I find it hard to effectively manage my time between the internet and household chores.					
47	I can't manage time I spent online.					
48	I'm angry that because of my addiction to the internet, I put off important things for later time and then never do them in time.					
49	I can't keep pace with all the new possibilities offered by the internet.					
50	The internet takes up all of my free time.					
51	I'd like my teachers to treat me with more understanding and respect.					

		1	2	3	4	5
52	I can't manage that much homework.					
53	Sometimes teachers treat me unfairly.					
54	Many school subjects are boring.					
55	I don't like the school dress code.					
56	I don't like the school timetable.					
57	I'd feel much better if school started one or two hours later.					
58	Classrooms and school corridors look uncomfortable.					
59	If I could opt out of school, I'd do it.					
60	School and household chores take too much time.					
61	_Other (please specify):_					

Keys:

Scale 1. Problems related to public and personal safety: items 1—10

Scale 2. Problems related to identity formation: items 11—20

Scale 3. Problems related to communication and peers: items 21—30

Scale 4. Problems related to the relationships with parents: items 31—40

Scale 5. Problems related to the immersion in the internet: items 41—50

Scale 6. Problems related to school: items 51—60

The calculation includes an average score for every scale and an average score of overall concern about problems.

A 1 to 5 rating scale is used to measure the magnitude of concern about problems.

Quantitative methods are used to determine the average concern about problems for each scale and for the psychodiagnostic tool as a whole.

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