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Research article

PERSONAL RISK FACTORS OF INTERNET ADDICTION IN ADOLESCENTS AGED 15–17 YEARS

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Internet addiction formation and manifestations are a relevant trend in contemporary research. It is important to identify adolescents who have risk of developing Internet addiction so that early interventions can be made and certain impacts can be exerted on personal characteristics that contribute to formation of persistent addictive behavior able to affect health.

The aim of this study was to establish personal risk factors of developing Internet addiction in adolescents aged 15–17 years.

A comprehensive study was carried out on 407 adolescents aged 15–17 years who attended comprehensive secondary schools in Ivanovo. To assess the Internet addiction in adolescents, S. Chen's method was used; personal characteristics of adolescents were determined using the Eysenck test. Mental performance was assessed based on the results of proofreading tests (M.V. Antropova); academic performance was estimated per the average score. Data were statistically analyzed using conventional methods of variation statistics.

High neuroticism, introversion in girls, and centroversion in boys are risk factors able to cause formation of Internet addiction in adolescents; an increase in the severity of neuroticism in these groups combined with a decrease in accuracy, mental performance and academic performance is also a risk factor of Internet addiction in adolescents aged 15–17 years. A direct correlation was found between the Internet addiction score and the level of neuroticism. At risk of Internet addiction, introversion was detected in girls more often than in boys, and extraversion and high neuroticism were detected in the group with Internet addiction. Boys with Internet addiction were more likely to have centroversion than girls. Adolescents with severe Internet addiction had the lowest levels of accuracy and mental performance quotient and lower academic performance.

High neuroticism, introversion in girls, centroversion in boys, an increase in the severity of neuroticism, a decrease in accuracy, mental performance and academic performance are risk factors of Internet addiction formation in adolescents. This justifies the need to carry out sanitary and hygienic measures that should involve development of standards for safe Internet use and inclusion of psycho-prophylaxis.

Keywords: *adolescents 15–17 years old, Internet addiction, risk factor, sex-dependent characteristics, neuroticism, personality type, mental performance, academic performance.*

Rapidly expanding access to the Internet has serious influence on adolescents' physical and mental health. Modern educational programs involve more active implementing computer technologies into the educational process. However, these new developments

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are not properly regulated and this can result in excessive fatigue among students, Adolescent psyche is in the making and its traits are unsteady; therefore, it is especially prone to formation of Internet addiction [1–3].

Internet addiction is an obsessive desire to use the Internet and it always means its problematic use; it typically involves spending too much time in the Internet [4]. Several diagnostic methods are employed to detect formation of Internet addiction. They all rely on specific indicators. The Chen Internet Addiction Scale (CIAS), which we used in this study, relies on five scales for addiction identification: compulsive use symptoms; withdrawal symptoms; tolerance; interpersonal and health problems; time management.

Internet addiction is a relevant trend in contemporary research. A lot of attention is being paid to Internet addiction prevalence as well as sex-specific and psychological peculiarities of Internet users [2, 4, 5].

Many studies report that prevalence of Internet addiction varies between 4.3 % and 12.0 % among adolescents in Russia and up to 48 % of them are in a risk group. This phenomenon has become the focus of attention in modern studies that investigate its prevalence as well as psychological traits and sex differences of those suffering from Internet addiction [4, 5].

Internet addiction affects mental and somatic health, personality development, and psychosocial adaptation of adolescents.

Previous researches identified personality traits able to create elevated risks of Internet addiction for adolescents, in particular, impulsiveness [4, 8–10], poor self-control [4] and impaired inhibitory control [11]. Some researchers [5, 7, 11] also found higher aggressiveness in adolescents to be associated with their pathological behavior in computer games [3, 6, 7, 10]. Other studies also identified risk factors of Internet addiction including harm avoidance [12], emotional reactivity [11], and anxiety [13, 14].

Internet addiction affects adolescents' attention and memory. D.D. Fedorova, D.T. Pirog and others established in their studies that most adolescents were prone to become addicted to the Internet and to anxiety; the authors reported weaker short-term and long-term memory, attention and mental function [15, 16].

Long-term PC use leads to the carpal tunnel syndrome, facial and hand tick, dry eye symptoms and burning in the eyes, headaches, spine aches, irregular meals, neglected hygiene, impaired sleep, and disrupted sleep-wake patterns [1, 7, 9].

Use of digital devices for more than 6 hours a day was established to create elevated risks of myopia [17]. Hypodynamia, irrational eating habits, and elevated stress levels in Internet-addicted adolescents promote cardiovascular pathology and disrupt physical development.

It is important to identify risk factors able to cause Internet addiction in order to make early intervention and diagnostics and to develop relevant strategies aimed at preventing adverse effects of Internet use.

The aim of this study was to establish personal risk factors of developing Internet addiction in adolescents aged 15–17 years.

Materials and methods. A comprehensive study was carried out on 407 adolescents aged 15–17 years (209 boys and 198 girls) who attended comprehensive secondary schools in Ivanovo. All schools included in the study provided the identical comprehensive educational programs for their students.

Therefore, the study has age-related (adolescents aged 15–17 years), regional (Ivanovo) and educational (students attending comprehensive secondary schools) limitations.

Adolescents gave their voluntary informed written consent to take part in the study; after that, they took part in a comprehensive examination. The Chen Internet Addiction Scale (CIAS, S. Cnen, 2003, adapted by V.L. Malygin and K.A. Feklisov) was applied to estimate Internet addiction in adolescents [18]. Personal characteristics of each adolescent were estimated using a score system and the results obtained by questioning and structured interviews. We estimated com-

pulsive use symptoms, withdrawal symptoms, tolerance, interpersonal and health problems, as well as time management. The result obtained for each participant was estimated using the following scale:

– from 27 to 42 scores, no Internet addiction;

– from 43 to 64 scores, a risk of developing Internet addiction / pre-addiction;

– 65 scores and higher, well-grounded presence of Internet addiction (a person's behavior includes problematic Internet use).

We identified 3 groups: Group 1 included 50 adolescents without Internet addiction, Group 2 was made of 50 adolescents who had a risk of developing Internet addiction, and Group 3 included 50 adolescents with already present Internet addiction.

Personal characteristics of adolescents were determined using the Eysenck test (adapted by A.G. Shmelev)[1]. We determined extroversion – introversion and neuroticism (emotional stability – instability).

Mental performance was assessed using the results obtained by accomplishing proofreading tests (as per the methodology suggested by M.V. Antropova)[2]. A task given to students was to be accomplished in 2-minute time and its aim was to find a specific combination of letters (for example, AIE) that stood before a certain letter. The following indicators were then estimated for each participant: a as the number of correctly found combinations; b as the number of missed combinations; c as the number of errors; d as the number of all revised letters.

Accuracy k was calculated as follows: $k = a - (b + c) / a + b$; mental performance quotient i, as follows: $i = k \cdot d$.

When adolescents with different intensity of Internet activity perform the test at the same time, it allows identifying peculiarities of their mental performance and functional peculiarities of the central nervous system.

Adolescents' academic performance was analyzed relying on their average grades in basic school subjects.

The obtained data were analyzed using variation statistic techniques in Microsoft Office 2010, Statistica for Windows 6.0, and OpenEpi 303 licensed software packages. Differences in relative indicators were estimated using Pearson's χ^2-test with Yates correction. The statistical significance was taken at $p < 0.05$. Correlation analysis involved calculating the pair correlation coefficient (r).

Results and discussion. The study identified the risk of Internet addiction for the half of the examined adolescents (51 %) aged 15–17 years; one third (33 %) did not have any signs of Internet addiction; 16 % were found to have persistent Internet addiction.

Likelihood of Internet addiction turned out to be a bit higher among girls than among boys, 56.6 against 45.9 % ($p > 0.05$). In addition, girls tended to have Internet addiction more frequently than boys, 17.2 against 12.9 % respectively ($p > 0.05$). Higher scores were also identified for girls per the scales of key Internet addiction symptoms ($p = 0.00$) and negative outcomes of problematic Internet use ($p = 0.02$).

Using the Eysenck test, we established that most adolescents with Internet addiction had high neuroticism levels (68 %). High levels of neuroticism were much frequently found in the adolescents with Internet addiction than among their peers without any addiction or only with the risk of its development ($p < 0.02$, $p < 0.005$) (Table 1).

High levels of neuroticism were much more prevalent among the adolescents with Internet addiction, 42 % against 16 % among those without it ($p < 0.02$). Low levels of

[1] Zabrodin Yu.M., Pakhal'yan V.E. Psikhodiagnostika [Psychological diagnostics]. In: Yu.M. Zabrodin ed. Moscow, Eksmo Publ., 2010, 448 p. (in Russian).

[2] Antropova M.V. Vozrastno-polovye osobennosti umstvennoi rabotosposobnosti uchashchikhsya 14–17 let [Age and sex-related peculiarities of mental performance of students aged 14–17 years]. *Novye issledovaniya v psikhologii i vozrastnoi fiziologii*, 1991, no. 1, pp. 111–115 (in Russian).

Table 1

Personal characteristics of adolescents aged 15–17 years with different levels of Internet addiction (%)

Group / conclusion		Without Internet addiction ($n = 50$)		At risk of Internet addiction ($n = 50$)		With Internet addiction ($n = 50$)		Validity of differences		
		1		2		3		4		
		n	%	*n*	%	*n*	%	*p*1-2	*p*2-3	*p*1-3
Type	extrovert	9	18.0	13	26.0	18	36.0	> 0.05	> 0.05	< 0.05
	centrovert	32	64.0	25	50.0	21	42.0	> 0.05	> 0.05	< 0.05
	introvert	9	18.0	12	24.0	11	22.0	> 0.05	> 0.05	> 0.05
Neuroticism	high	8	16.0	21	42.0	34	68.0	< 0.02	< 0.05	< 0.1
	medium	14	28.0	16	32.0	7	14.0	> 0.05	< 0.05	< 0.05
	low	28	56.0	13	26.0	9	18.0	< 0.02	< 0.001	> 0.05

neuroticism were rarer among the adolescents with the risk of addiction, 26 % against 56 % among their peers without Internet addiction. Medium levels of neuroticism were detected with comparable frequency in both groups.

Half of the adolescents with the risk of Internet addiction were centroverts whereas extraversion or introversion was not so frequent ($p < 0.05$) in one quarter of the examined adolescents. Centroversion also prevailed among the adolescents without Internet addiction (64 %), extroversion and introversion were not so frequent as they were detected in 18 % of the adolescents in this group ($p < 0.05$).

Extroversion was found more frequently among the adolescents with Internet addiction than among their peers without it (36 and 18 % respectively, $p < 0.05$); introversion was found more rarely (42 and 64 % respectively, $p < 0.05$).

Therefore, high levels of neuroticism were found more frequently in the examined adolescents with the risk of Internet addiction and already existing addiction than among their peers without any risks or addiction. This means apparent difficulty in emotional self-regulation and weaker behavior control [5, 14, 15]. Centroversion was a prevailing psych type among the adolescents with the risk of Internet addiction and without it; extraversion prevailed in the group with Internet addiction.

Analysis of personality characteristics of boys and girls in groups with different intensity of Internet addiction allows more precise identification of target groups for preventive and correction programs.

The study emphasizes the importance of the sex aspect in examining Internet addiction among adolescents. Centroversion was much more frequent among the examined girls without Internet addiction than among their addicted peers (63.16 and 31.25 % respectively, $p < 0.05$). Introversion was more frequently found among the girls with the risk of Internet addiction than among those without it (36 and 10.53 % respectively, $p < 0.05$). High levels of neuroticism were more frequent among the examined girls with Internet addiction and the risk of its development (52 and 31.58 %, $p < 0.05$ and 78.13 and 31.58 % respectively, $p < 0.05$) (Table 2).

In contrast to girls, centroversion prevailed among the boys from the analyzed groups with different intensity of Internet addiction; similar to girls, high levels of neuroticism were much more frequent in the groups with the risk of Internet addiction and Internet addiction.

Our comparison of sex-specific personal characteristics established that the girls without Internet addiction had high levels of neuroticism 5.2 times as frequently (31.58 and 6.5 % respectively, $p < 0.05$) and extraversion twice as frequently (26.32 and 12.9 % respectively) than the boys without addiction.

Table 2

Personality characteristics of boys and girls with different intensity of Internet addiction (%)

Group / conclusion		Without Internet addiction (n = 50)		Risk of Internet addiction (n = 50)		Internet addiction (n = 50)		Validity of sex-specific differences		
		1		2		3		Without IA	IA risk	IA
		g	b	g	b	g	b	$P_{g\text{-}b}$	$P_{g\text{-}b}$	$P_{g\text{-}b}$
Type	extra	26.32	12.9	24.0	28.0	46.88	16.67	> 0.05	> 0.05	< 0.02
	centro	63.16	64.52	40.0	60.0	31.25	61.11	> 0.05	> 0.05	< 0.05
	intro	10.53	22.58	36.0	12.0	21.87	22.22	> 0.05	< 0.05	> 0.05
Neuroticism	high	31.58	6.5	52.0	32.0	78.13	50.0	< 0.05	> 0.05	< 0.05
	medium	26.31	29.0	28.0	36.0	9.37	22.22	> 0.05	> 0.05	> 0.05
	low	42.11	64.5	20.0	32.0	12.5	27.78	> 0.05	> 0.05	> 0.05

Note: g means girls; b means boys; IA = Internet addiction.

Table 3

Mental performance of adolescents aged 15–17 years with different intensity of Internet addiction ($M \pm m$)

Mental performance indicators	Without Internet addiction (n = 40)	Risk of Internet addiction (n = 36)	Internet addiction (n = 32)	Validity of differences p
	1	2	3	4
Accuracy k	0.78 ± 0.04	0.76 ± 0.05	0.50 ± 0.06	$p_{1\text{-}3} < 0.001$ $p_{2\text{-}3} < 0.001$
Mental performance quotient i	238.85 ± 12.39	231.48 ± 14.67	155.42 ± 20.0	$p_{1\text{-}3} < 0.001$ $p_{2\text{-}3} < 0.01$

The girls with the risk of Internet addiction were introverts more frequently than the boys with such risk (36.0 and 12.9 % respectively, $p < 0.05$). Extroversion (46.88 and 16.67 % respectively, $p < 0.02$) and high levels of neuroticism (78.13 and 50.0 % respectively, $p < 0.05$) were more frequent among the girls with Internet addiction in comparison with the addicted boys. Centroversion was more frequent among the boys with Internet addiction than among their female peers (61.1 and 31.25 % respectively, $p < 0.05$).

We established a direct correlation between the score of Internet addiction per the Chen scale and the level of neuroticism in all adolescents, boys and girls, $r = 0.4$, $p < 0.05$.

Our examination of mental performance found that accuracy and the mental performance quotient were the highest in the adolescents without Internet addiction and the lowest in those with Internet addiction (Table 3).

Accuracy (k) was authentically lower in the adolescents with Internet addiction than in their peers with the risk of it (0.50 ± 0.06 and 0.76 ± 0.05, $p < 0.001$) and without Internet addiction (0.50 ± 0.06 and 0.78 ± 0.04, $p < 0.001$). The mental performance quotient (i) was also authentically lower in the addicted adolescents than in their peers with the risk of Internet addiction (155.42 ± 20.0 and 231.48 ± 14.67, $p < 0.01$) and without Internet addiction (155.42 ± 20.0 and 238.85 ± 12.39, $p < 0.001$). There were no authentic differences in accuracy and the mental performance quotient identified for the adolescents with the risk of Internet addiction and those without Internet addiction ($p > 0.05$).

We established authentic inverse correlations between intensity of Internet addiction and mental performance indicators, namely, accuracy (R = -0.315, p = 0.0009) and the mental performance quotient (R = -0.311, p = 0.001). The lowest values of accuracy and

the mental performance quotient were established for the adolescents with apparent Internet addiction (the highest scores per the Chen scale).

We examined sex-specific peculiarities of mental performance indicators in adolescents aged 15–17 years with different intensity of Internet addiction. As a result, we did not establish any authentic differences in accuracy and the mental performance indicators between boys and girls in the compared groups ($p > 0.05$).

Mental performance indicators were authentically lower both in boys and girls with Internet addiction than in their peers with the risk of it or without Internet addiction ($p < 0.05$).

Given that attention function has significant influence on academic performance, we analyzed the average grade of academic performance for the examined adolescents with different intensity of Internet addiction. We did not find any authentic differences between the adolescents without Internet addiction and the risk of it since the average grade amounted to 3.905 and 3.914 respectively.

The adolescents with already existing Internet addiction had considerably lower average grades than their peers with the risk of Internet addiction (3.736 and 3.914 respectively, $p = 0.0031$). These findings confirm that Internet addiction can affect mental performance and academic performance, which emphasizes the importance of developing effective strategies aimed at preventing and correcting Internet addiction among adolescents.

The average grade of academic performance did not have any authentic differences in the groups of girls with different intensity of Internet addiction (3.997; 4.018; 3.824 respectively); still, there was a descending trend in it identified for the examined girls with Internet addiction.

The average grade of academic performance was a bit lower among the boys with Internet addiction and with the risk of it than among their peers without Internet addiction.

The average grade was lower in all groups of boys than in all groups of girls; however, authentic differences were established only between the boys and girls with the risk of Internet addiction (3.790 and 4.018 respectively, $p = 0.002$).

Our study findings emphasize how important it is to understand personal traits and psychological factors for effective prevention of Internet addiction in adolescents. Prevention of Internet addiction and adverse outcomes of problematic Internet use is a complex interdisciplinary task that should be solved if we want to ensure adolescents' mental and physical health as well as their social adaptation. Internet-addicted behavior involves compulsive symptoms (irresistible obsession), loss of any control when using a PC, and apparent withdrawal syndrome when Internet use is limited. All these outcomes are caused by personal and inter-personal problems. Therefore, simple direct limitations imposed on PC use only lead to hypodynamia and health issues and are therefore ineffective. It is important to spot out a risk group for early and effective prevention. High levels of neuroticism in adolescents have been found to be a significant risk factor.

The established direct correlation between the score of Internet addiction per the Chen scale and the level of neuroticism in adolescents is explained by similar neurobiological pathways of these two states, namely, impaired impulse control [4, 8, 19, 20].

The established lower accuracy and mental performance quotients in the adolescents with the risk of Internet addiction and already addicted ones against their peers without Internet addiction give evidence of difficulty in attention concentration, which has negative influence on academic performance.

Our study findings indicate that there are several sex-specific personal differences in formation of Internet addiction in older adolescents. The risk of Internet addiction and persistent Internet addiction was a bit more frequently identified for girls than boys; key symptoms and negative outcomes of Internet addiction were also authentically higher in girls in comparison with boys [2, 4, 8, 20–22].

These differences are associated with sex-specific personal peculiarities.

High levels of neuroticism and extroversion were more rarely detected in the boys without Internet addiction than in the girls without it. Frequency of high neuroticism levels was twice as frequent in the girls with Internet addiction as opposed to boys; extroversion was also more frequent. Therefore, higher prevalence of Internet addiction among girls occurs due to more frequent high levels of neuroticism and extroversion in them. Formation of Internet addiction is usually accompanied with their growing prevalence.

Introversion was detected more frequently in the examined girls with the risk of Internet addiction than among their male peers, which means certain difficulty in real life communication. Many authors point out that underdeveloped communication skills are the reason why many adolescents are so eager to socialize in the Internet [23–25]. Internet-socializing compensates for difficulties in real life communication for people with such personality traits [6, 8, 16].

Boys with Internet addiction, similar to addicted girls, tend to have high levels of neuroticism but centroversion prevails among them in contrast to girls.

Identification of personality-related risk factors has great significance for prediction and early detection of Internet addiction. These factors include high levels of neuroticism, introversion in girls, centroversion in boys, and growing intensity of these traits together with declining accuracy, mental and academic performance. Early detection of high neuroticism, decrease in mental performance, identification of risk groups and prevention activities implemented at early stages in the development of Internet addiction can prevent its actual formation in adolescents. This creates the necessity to take relevant sanitary-hygienic measures together with developing standards of safe Internet use that include psychological prevention.

Conclusions:

1. High levels of neuroticism and extroversion were more frequently identified in adolescents with persistent Internet addiction than in their peers without it. A direct correlation was established between the score of Internet addiction and the level of neuroticism.

2. Introversion was more frequent in the girls than in boys with the risk of Internet addiction; extroversion and high levels of neuroticism were more typical for the girls with Internet addiction than for their male peers. The boys with Internet addiction tended to be centroverts more frequently than their female peers.

3. The adolescents with Internet addiction had the lowest values of accuracy and mental performance quotients as well as poorer academic performance.

4. High neuroticism, introversion in girls, centroversion in boys, an increase in the severity of neuroticism together with a decrease in accuracy, mental performance and academic performance are risk factors of Internet addiction formation in adolescents aged 15–17 years.

5. To prevent risks of Internet addiction, it is necessary to conduct sanitary-hygienic activities together with developing standards for safe Internet use that includes psychological prevention.

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References

1. Egorov A.Iu., Grechanyi S.V., Chuprova N.A., Soldatkin V.A., Yakovlev A.N., Iliuk R.D., Nikolishin A.E., Ponizovskiy P.A. [et al.]. Clinical and psychological features of people with internet dependence: experience of a pilot study. *Zhurnal nevrologii i psikhiatrii im. S.S. Korsakova*, 2020, vol. 120, no. 3, pp. 13–18. DOI: 10.17116/jnevro202012003113 (in Russian).

2. Lanovaya A.M., Fadeeva E.V. Gender differences of problematic social media use. *Psikhologiya. Psikhofiziologiya*, 2023, vol. 16, no. 1, pp. 51–62. DOI: 10.14529/jpps230105 (in Russian).

3. Trusova A.V., Grechanyi S.V., Soldatkin V.A., Yakovlev A.N., Ilyuk R.D., Chuprova N.A., Nikolishin A.E., Ponizovskiy P.A., [et al.]. Internet addiction predictors: analysis of psychological factors. *Obozrenie psikhiatrii i meditsinskoi psikhologii imeni V.M. Bekhtereva*, 2020, no. 1, pp. 72–82. DOI: 10.31363/2313-7053-2020-1-72-82 (in Russian).

4. Shakun E.U., Lanovaya A.M., Fadeeva E.V. Addiction and Problematic Internet Use among Girls and Young Women: Prevalence, Main Features and Measures (A Review of Russian Studies). *Konsul'tativnaya psikhologiya i psikhoterapiya*, 2022, vol. 30, no. 2, pp. 45–66. DOI: 10.17759/cpp.2022300204 (in Russian).

5. Cataldo I., Lepri B., Neoh M.J.Y., Esposito G. Social Media Usage and Development of Psychiatric Disorders in Childhood and Adolescence: A Review. *Front. Psychiatry*, 2021, vol. 11, pp. 508595. DOI: 10.3389/fpsyt.2020.508595

6. Trusova A.V., Kanashov A.E., Angelovsky A.A., Varakosova E.L., Zhidkova T.S., Safonova A.V., Lukmanova Z.G., Berdetskikh E.I. [et al.]. Gender differences in individual psychological characteristics of adolescents with different levels of Internet addiction symptoms. *Voprosy narkologii*, 2020, no. 4, pp. 45–62. DOI: 10.47877/0234-0623_2020_4_45 (in Russian).

7. Huang C. A meta-analysis of the problematic social media use and mental health. *Int. J. Soc. Psychiatry*, 2022, vol. 68, no. 1, pp. 12–33. DOI: 10.1177/0020764020978434

8. Semenova N.B., Tereshchenko S.Yu., Evert L.S., Shubina M.V. Characteristics of the mental status of internet-addicted adolescents: aspects of gender and age. *Profilakticheskaya meditsina*, 2022, vol. 25, no. 8, pp. 83–89. DOI: 10.17116/profmed20222508183 (in Russian).

9. Trusova A.V., Grechany S.V., Pozdnyak V.V., Ilyichev A.B., Khutoryanskaya Yu.V., Egorov A.Yu., Kibitov A.O. Psychological risk factors for Internet addiction: findings of a pilot investigation in healthy young adults. *Sotsial'naya i klinicheskaya psikhiatriya*, 2019, vol. 29, no. 3, pp. 23–29 (in Russian).

10. Li Q., Wang Y., Yang Z., Dai W., Zheng Y., Sun Y., Liu X. Dysfunctional cognitive control and reward processing in adolescents with Internet gaming disorder. *Psychophysiology*, 2020, vol. 57, no. 2, pp. e13469. DOI: 10.1111/psyp.13469

11. Lin C.-Y., Namdar P., Griffiths M.D., Pakpour A.H. Mediated roles of generalized trust and perceived social support in the effects of problematic social media use on mental health: A cross-sectional study. *Health Expectations*, 2021, vol. 24, no. 1, pp. 165–173. DOI: 10.1111/hex.13169

12. Mak K.K., Young K.S. Development and differential item functioning of the internet addiction test-revised (IAT-R): An item response theory approach. *Cyberpsychol. Behav. Soc. Netw.*, 2020, vol. 23, no. 5, pp. 312–328. DOI: 10.1089/cyber.2019.0468

13. Strittmatter E., Parzer P., Brunner R., Fischer G., Durkee T., Carli V., Hoven C.W., Wasserman C. [et al.]. A 2-year longitudinal study of prospective predictors of pathological Internet use in adolescents. *Eur. Child Adolesc. Psychiatry*, 2016, vol. 25, no. 7, pp. 725–734. DOI: 10.1007/s00787-015-0779-0

14. Weinstein A., Lejoyeux M. Neurobiological mechanisms underlying internet gaming disorder. *Dialogues Clin. Neurosci.*, 2020, vol. 22, no. 2, pp. 113–126. DOI: 10.31887/DCNS.2020.22.2/aweinstein

15. Fedorova D.D., Pirog D.T. Vliyanie interneta na vnimanie i pamyat' u podrostkov [The influence of the Internet on attention and memory in adolescents]. *FORCIPE*, 2020, vol. 3, no. S1, pp. 726–727 (in Russian).

16. Filkina O.M., Boboshko A.V., Kocherova O.Yu., Vorobyova E.A., Dolotova N.V. Lichnostnye osobennosti i nevroticheskie rasstroistva u podrostkov s vysokoi internet-aktivnost'yu po rezul'tatam oprosa [Personality traits and neurotic disorders in adolescents with high Internet activity according to survey results]. *Aktual'nye problemy pediatrii: materialy XXV Kongressa pediatrov s mezhdunarodnym uchastiem*, Moscow, 2024, pp. 170 (in Russian).

17. Filkina O.M., Kocherova O.Yu., Boboshko A.V., Vorobiova E.A., Dolotova N.V. Gender peculiarities of internet-activity in adolescents: interrelation with health status and academic progress. *Vestnik Ivanovskoi meditsinskoi akademii*, 2023, vol. 28, no. 4, pp. 16–22. DOI: 10.52246/1606-8157_2023_28_4_16 (in Russian).

18. Malygin V.L., Feklisov K.A., Iskandirova A.B., Antonenko A.A. Metodologicheskie podkhody k rannemu vyyavleniyu internet-zavisimogo povedeniya [Methodological approaches to early detection of

Internet-addicted behavior]. *Meditsinskaya psikhologiya v Rossii: electronic scientific journal*, 2011, no. 6 (11). Available at: http://www.medpsy.ru/mprj/archiv_global/2011_6_11/nomer/nomer03.php (June 05, 2024) (in Russian).

19. Wartberg L., Thomasius R., Paschke K. The relevance of emotion regulation, procrastination, and perceived stress for problematic social media use in a representative sample of children and adolescents. *Computers in Human Behavior*, 2021, vol. 121, pp. 106788. DOI: 10.1016/j.chb.2021.106788

20. Gorelova G.G., Inozemtsev D.V. Analysis of psychological well-being based on the parameters of behavioral activity of users of social networks. *Uchenye zapiski universiteta im. P.F. Lesgafta*, 2020, no. 2 (180), pp. 489–494. DOI: 10.34835/issn.2308-1961.2020.2.p489-494 (in Russian).

21. Meshi D., Ellithorpe M.E. Problematic social media use and social support received in real-life versus on social media: Associations with depression, anxiety and social isolation. *Addict. Behav.*, 2021, vol. 119, pp. 106949. DOI: 10.1016/j.addbeh.2021.106949

22. Marino C., Vieno A., Altoè G., Spada M.M. Factorial validity of the Problematic Facebook Use Scale for adolescents and young adults. *Journal of Behavioral Addictions*, 2016, vol. 6, no. 1, pp. 5–10. DOI: 10.1556/2006.6.2017.004

23. Rumpf H., Achab S., Billieux J., Bowden-Jones H., Carragher N., Demetrovics Z., Higuchi S., King D.L. [et al.]. Including gaming disorder in the ICD-11: The need to do so from a clinical and public health perspective. *J. Behav. Addict.*, 2018, vol. 7, no. 3, pp. 556–561. DOI: 10.1556/2006.7.2018.59

24. Vochenko D.A., Tkach E.N. Internet-dependence of modern teenagers as a psychological and pedagogical problem: contents, causes, risks. *Bezopasnost' zhiznedeyatel'nosti, fizicheskaya kul'tura i sport: sovremennoe sostoyanie i perspektivy: sbornik nauchnykh trudov*, Khabarovsk, 2019, pp. 273–277 (in Russian).

25. Kunitsyna I.A., Barilyak I.A., Kunitsyn N.V. Vzaimosvyaz' kommunikativnykh kharakteristik i simptomov internet-zavisimosti u devochek i mal'chikov podrostkovogo vozrasta [The relationship between communication characteristics and symptoms of Internet addiction in teenage girls and boys]. *Aktual'nye voprosy psikhologii razvitiya i obrazovaniya: sbornik materialov IV Vserossiiskoi nauchno-prakticheskoi konferentsii*, Saint Petersburg, 2022, pp. 13–19 (in Russian).

Kocherova O.Yu., Filkina O.M., Boboshko A.V., Vorobyova E.A., Dolotova N.V., Malyshkina A.I. Personal risk factors of Internet addiction in adolescents aged 15–17 years. Health Risk Analysis, 2024, no. 3, pp. 21–29. DOI: 10.21668/health.risk/2024.3.03.eng

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