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Young Adults in Virtual Reality (VR). Factors Contributing to, VR Games Addiction

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Abstract:

The article presents the results of research carried out among 1086 respondents who, according to the DSM-5 classification, qualify for the group affected by Internet gaming disorder. The aim of the survey was to collect data on the frequency and forms of VR use, as well as the factors determining the choice of virtual reality by young adults. In the course of statistical analyses, the Chi-square test, and Cramer's V interpretation were used. The collected data show that virtual reality presented with VR goggles is more attractive and absorbing than traditional computer games displayed on a monitor screen. The Chi-square test of independence and the study of the strength of the relationship showed among others that: there is a strong relationship between consciously controlling the time spent on VR games and gender ($p<0.05$; $V = 0.514$) or age ($p<0.05$; $V = 0.611$); cancelling meetings with friends to play VR games and gender ($p<0.05$; $V = 0.673$) or education ($p<0.05$; $V = 0.567$). Most respondents (50.8 per cent), classified as a group at risk of problematic use of VR games play VR games from 2 to 4 hours a day. Young adults not comply with the rules of digital hygiene, they are also characterized by low awareness of the risks arising from the use of games. Meanwhile, uncontrolled infatuation with VR can lead to addiction, which needs to be discussed and warned against. Special attention and preventive measures should be given to young men.

Introduction

VR games and simulations are increasingly used in adult education. They are used in medical, technical and natural studies. They are also present in vocational education (Galas, 2021; Czarkowski et al., 2021). In the published reports, the authors usually refer to the issues of the effectiveness of education, student activity, and their level of interest (Shamsuzzoha et al., 2020; Siemieniecka, 2021; Haowen et at., 2022; Wenyi et al., 2023; Ravichandran et al., 2023). In the case of virtual reality and VR technology, numerous threats, both physical and psychological, resulting from their presence in the life of society are also discussed (Kaimara et al., 2022). One of the more pressing issues affecting young adults and virtual reality is the problem of excessive use of VR games and their harmful potential. In the literature on the subject, it is noted that as a result of excessive use of computer games and simulations, adolescents and young adults: give up various activities, neglect home duties as well as those related to education, lose control over playing game time (they regularly extend it) focus their interests only on topics related to games, neglect social relations and isolate themselves from the environment, show aggressive behavior resulting from the inability to play games, are characterized by mood swings resulting from, for example, the possibility/ unpossibility to play or the results achieved in a computer game, may have problems with concentration and memory, which translates into the functioning and results of work. Gaming addicts are also more likely to lie and deceive others. Sometimes they show aggressive behavior or self-aggression. In many cases, the following are also observed: redness and pain in the eyes, lack of appetite, headaches and spine pain, insomnia, overweight (Furmanek, 2014; Miąso, 2019; Tanaś, 2021a; Tanaś, 2021b; Kot & Butkiewicz, 2022).

The disorder related to the problematic use of computer games is included by psychologists in the group of behavioural addictions (Sherer, 2023). According to the American classification of mental diseases and disorders DSM-5, this phenomenon qualifies as a disorder for further research (APA, 2022). Referring to the definition – problematic game use causes "'significant impairment or distress' in several aspects of a person's life" (Sherer, 2023). This applies to both playing alone as well as with other people (Ibidem). "There are also voices that addiction to computer games can be diagnosed when the time spent in front of the computer exceeds 35 hours a week" (EMC Instytut Medyczny SA). Meanwhile, the World Health Organization (WHO) emphasizes that the diagnosis of a gaming disorder requires the emergence of a pattern of behaviour that will cause significant impairment in the person's functioning in personal, family, social, educational, occupational, or other areas for at least a year (WHO, 2023). The decision to include gaming disorders in the ICD-11 of the WHO is based on numerous and in-depth analyses carried out by a wide group of experts (ibidem). However, the literature indicates that there is a further need to standardize gaming disorders (Darvesh et al., 2020). There is an ongoing debate in the research community on the classification of problematic game use and the legitimacy of including this phenomenon in the group of addictions/mental disorders in medical lists. Some researchers even wonder whether problematic gaming should not be considered a symptom of anxiety or depression, rather than an addiction/mental disorder (Sherer, 2023).

Statistical analyses show that the risk group for addiction to VR games (as in the case of PC games) includes males, adolescents, and young adults (Barreda-Ángeles & Hartmann, 2022). It is also emphasized that greater self-control in the context of time spent gaming is characterized by mature people (compared to children) and women (compared to men) (The Ghost Howls, 2022).

Generally, "the tendency to become addicted to VR games is 44 per cent higher than that associated with PC games" (Ibidem). According to the observations – the sensations gained through VR technology give a sense of more intense pleasure than when working with a computer. As a consequence, people are more likely to enjoy VR than the less appealing 2D environment. The sense of presence and high interest related to the attractiveness of virtual reality means that actions taken there form habits faster than activities carried out in a 2D computer environment. On the basis of his experience, Chen predicts that the addictive nature of VR will increase when the social factors of multi-user presence are introduced to the game. Therefore, this will apply to all games and activities carried out in the Metaverse space, which is still being improved at the moment.

Some studies report that users aged 16-24 perceive VR games as more attractive than those presented on a computer screen, which results from the nature of the materials displayed the help of VR games. This is because virtual games contain many more details (29.03 per cent), provide a sense of reality while playing (64.53 per cent), and give the opportunity to gain new experiences (54.84 per cent). It is worth emphasizing that these factors are taken into account as factors that increase the risk of addiction. Other reasons why users reach for virtual reality include: the possibility of spending time in an interesting way, escaping from the real world, the possibility of finding oneself in a different environment, and experiencing it (Rajan et al., 2018: 361).

According to the respondents, being in the VR environment can cause: anxiety, depression, attention disorders, vision problems, or pain (Ibidem, Majewska 2021). Young people are also aware that long-term use of VR can lead to addiction (81.82 per cent). Interestingly, users play in the VR environment despite being aware of the negative impact of VR technology on health and quality of life. In virtual reality, most users spend 2 to 4 hours a day playing VR games (42.85 per cent), a slightly smaller group (28.57 per cent) spends 1 to 2 hours a day playing games, and fifteen 15 out of 100 respondents (14.29 per cent) from 4 to 6, or from 6 to 8 hours a day (Rajan et al., 2018).

In order to reduce the risk of addiction to VR, young gamers point out that users:

— should be warned about the health risks of the excessive use of technology,
— when playing VR games, they should take a short break every hour and return to the real world (eat, rest, go outside),
— should not spend more than 4 hours a day playing VR games,
— should keep a balance between playing games and exercising (Ibidem).

Research Methodology

The main objective of the study was to collect data on the frequency and forms of using VR games, as well as the factors determining the choice of these types of games by young adults classified as at risk of problematic game use. As a consequence, the following research questions were formulated:

1. How much time do young adults qualified to be in the group at risk of problematic game use spend playing VR games per day?
2. Do young adults classified as a group at risk of problematic game use comply with the rules of digital hygiene when playing VR games[1]?
3. Is there a relationship between gender, age, and education, and compliance with the rules of digital hygiene by young adults classified as a group at risk of problematic game use?
4. Do young adults classified as at risk of problematic game use prefer playing PC or VR games and why?
5. Are young adults qualified to the group at risk of problematic game use aware of the risks arising from the use of VR games?
6. What other activities, in the opinion of young adults classified as at risk of problematic game use, could lead to a reduction in the amount of time they spend playing VR games?

Sample

The presented research was conducted from January to May 2023 in a group of 1086 people. According to the definition published by the Massachusetts Institute of Technology, the study covered young adults, i.e. people aged 18-25 (2018). The selection of people for the research was purposeful and included individuals active on portals dedicated to VR games and virtual reality[2]. Young adults who were qualified for the study, agreed to participate in the study and completed an electronic questionnaire posted on selected portals. When planning the research, it was decided to use the online data collection method, owing to the ease of access to VR players, who were expected to qualify for a heterogeneous group at risk of problematic use of VR games. In total, the questionnaire was completed by 1200 people, from whom the answers of 1086 people were taken into account in the main analyses, owing to their qualification for the group of people with disorders caused by online games, who answered all the questions asked in the survey.

The data sheet at the beginning of the research tool made it possible to determine that among the people who completed the questionnaire and qualified for the study, women accounted for 21.5 per cent, and men for 78.5 per cent. Most of the respondents had secondary education (50.8 per cent), 33.4 per cent were people with higher vocational education, 14.6 per cent – people with master's degree education, and 1.1 per cent of the respondents were people with primary and lower secondary education. The largest group in the study were people aged 18-21 (41.4 per cent), the next largest – 22-23 year olds (32.1 per cent), and the smallest – 24-25 year olds (26.5 per cent).

The analysis of the first part of the questionnaire (IGDT-10 questions) showed that out of the 1200 people who answered, 1086 declared having at least five out of ten symptoms that, according to the IGDT-10 test (developed on the basis of the American Classification of Diseases and Disorders DSM-5) testified to the problematic use of computer games.

[1] The definition of digital hygiene was taken from the study prepared by the Foundation I Care about my Reach (Bigaj, 2023).

[2] Groups: VR Polska, VR Polska – Meta Quest PSVR Valve Index HTC Vive WMR | AR i VR, VRChat Polska, Oculus Quest Polska

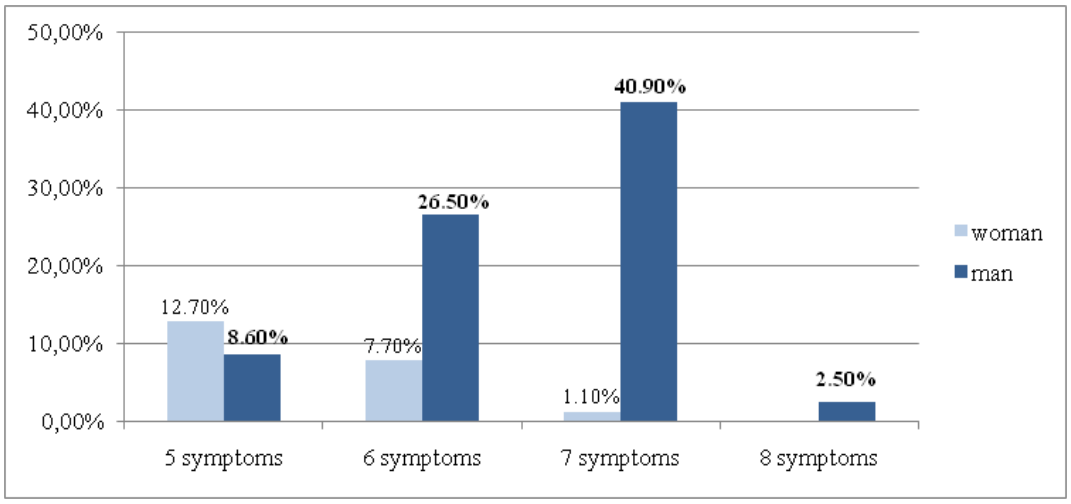

Figure 1. Number of symptoms related to VR addiction among young adults

Source: *Author's own study*

Instruments and Procedures

The study took the form of a diagnostic survey and had a two-stage character. The first stage was related to the determining of whether the surveyed person qualified for the group at risk of problematic game use. The second stage included the implementation of the research questionnaire.

The Ten-Item Internet Gaming Disorder Test, IGDT-10 (Király et al., 2019) was used to diagnose the phenomenon of problematic use of computer games. This tool was developed on the basis of the criteria contained in the DSM-5 and consisted of the following questions:

1. When you weren't playing, how often did you fantasize about gaming, think about previous gaming sessions, and/or plan your next game?
2. How often did you feel nervous, irritable, anxious, and/or sad when you couldn't play or played less than usual?
3. Have you ever felt the need to play more often or played for longer than planned to feel like you played enough time?
4. Have you ever tried and failed to cut down on the time you spend gaming?
5. Have you ever played games instead of hanging out with friends, pursuing your hobbies, and/or participating in activities you used to enjoy?
6. Have you been playing a lot despite negative consequences (e.g. lack of sleep, difficulties in school or work, arguing with family or friends, and/or neglecting important responsibilities)?
7. Have you hidden from your family, friends or other people important to you how much you play, or have you lied to them about playing games?
8. Have you played to improve a negative mood (e.g. helplessness, sense of guilt, or anxiety)?
9. Have you risked or lost an important relationship because of playing?
10. Have you ever put your studies or work at risk because of playing?

It was possible to answer the above questions as follows: "Never", "Sometimes", and "Often". The answers "Never" and "Sometimes" were assessed as an unfulfilled criterion (0 points), while "Often" – as a fulfilled criterion (1 point). Questions 9 and 10 belong to the same criterion, i.e. answering "Often" in item 9 or 10 (or both) resulted in only 1 point being added to the score. In the interpretation of the test, a case is considered clinically significant if the respondent scores at least 5 points.

The answers to the research questions were provided on the basis of data collected by means of a mixed questionnaire consisting of 14 questions, both closed and open. The questionnaire was standardized prior to its implementation (Konarzewski, 2000; Juszczyk, 2002; Juszczyk, 2005; Rubacha, 2008).

The screening test and the questionnaire were anonymous. During the data analysis, the averages were determined and the Chi-square statistics were used. The strength of the relationship between the variables was interpreted using the V-Cramer coefficient. The statistical significance level of $\alpha = 0.05$ was assumed in the study.

Research Results

Research shows that young adults classified as a group at risk of problematic use of VR games devote a significant part of their day to this activity. Most respondents play VR games from 2 to 4 hours a day (50.8 per cent), every fourth game user spends up to 2 hours a day on this activity (26.8 per cent), on average every seventh person (14.6 per cent) plays in virtual reality from 4 to 6 hours a day, and 7.8 per cent spend even more than 6 hours a day playing VR games.

According to the answers provided, young users of virtual reality classified as a group at risk of problematic use of games, in the context of playing with VR goggles, do not comply with the rules of digital hygiene. All the respondents (100 per cent) agreed that by putting on VR goggles they cut themselves off from the outside world. Immersing themselves in a VR game, they lose track of time and "postpone" various types of duties. In strong emotions, they usually do not feel hunger, thirst, or fatigue. Only 11.3 per cent of the respondents admit that they experience the effects of motion sickness after using VR goggles for a long time. Then they take off their goggles and rest (2.5 per cent), and some people switch to PC games (8.8 per cent). The answers provided show that most of the respondents: do not consciously control the time spent playing VR (88.1 per cent), play VR games longer than initially planned (89.2 per cent), play VR games in every free moment (89.2 per cent), follow notifications about new VR games and activities in Metaverse (99.4 per cent), postpone or interrupt an important task to play a VR game (63.8 per cent), sometimes skip social gatherings to play a VR game (82.3 per cent), play VR games at night, thus reducing the time for rest (82.6 per cent), do not pay attention to the time of day while playing games, do not follow the 1-2 hour rule before going to bed without a screen (99.4 per cent), do not plan or do not practice a conscious VR detox (100 per cent), do not look for alternative forms of entertainment outside of VR (82.3 per cent), seeing an advertisement for a new VR game, they would like to play it (79.3 per cent), take a set of VR goggles with them (33.9 per cent) when leaving for a longer period of time (e.g. on holiday).

The Chi-square test of independence and the study of the strength of the relationship showed that there is a strong relationship between gender and:

— consciously controlling the time spent on VR games ($p<0.05$; $V = 0.514$),
— postponing duties in order to play VR games ($p<0.05$; $V = 0.640$),
— cancelling meetings with friends to play VR games ($p<0.05$; $V = 0.673$),
— staying up at night to play VR games ($p<0.05$; $V = 0.663$).

Table 1. Cross Tabulation – gender variable

	Test	Value	df	Asymptotic Significance (2-sided)	Approximate Significance
Gender * controlling the time spent on VR games	Pearson's chi-square	95.515[a]	1	<.001	
	Cramer's V	0.514			<.001
Gender * postponing duties in order to play VR games	Pearson's chi-square	148.271[b]	1	<.001	
	Cramer's V	0.640			<.001
Gender * cancelling meetings with friends to play VR games	Pearson's chi-square	163.934[c]	1	<.001	
	Cramer's V	0.673			<.001
Gender*staying up at night to play VR games	Pearson's chi-square	159.233[d]	1	<.001	
	Cramer's V	0.663			<.001

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.27.
b. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 28.23.
c. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.79.
d. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.57.

Source: *Autor's own study with IBM SPSS Statistics*

The Chi-square test of independence and the study of the strength of the relationship showed that there is a strong relationship between age and:
— consciously controlling the time spent on VR games ($p<0.05$; $V = 0.611$),
— extending the planned time of playing VR games ($p<0.05$; $V = 0.578$),
— using every free moment to play VR games ($p<0.05$; $V = 0.578$),
— postponing duties in order to play VR games ($p<0.05$; $V = 0.705$),
— staying up at night to play VR games ($p<0.05$; $V = 0.511$),
— the ability to spend free time alternatively ($p<0.05$; $V = 0.660$).

Table 2. Cross Tabulation – age variable

	Test	Value	df	Asymptotic Significance (2-sided)	Approximate Significance
Age* consciously controlling the time spent on VR games	Pearson's chi-square	135.206[a]	2	<.001	
	Cramer's V	0.611			<.001
Age *extending the planned time of playing VR games	Pearson's chi-square	121.110[b]	2	<.001	
	Cramer's V	0.578			<.001
Age *using every free moment to play VR games	Pearson's chi-square	121.110[c]	2	<.001	
	Cramer's V	0.578			<.001
Age* postponing duties in order to play VR games	Pearson's chi-square	179.797[d]	2	<.001	
	Cramer's V	0.705			<.001
Age*staying up at night to play VR games	Pearson's chi-square	94.396[e]	2	<.001	
	Cramer's V	0.511			<.001
Age*the ability to spend free time alternatively	Pearson's chi-square	157.698[f]	2	<.001	
	Cramer's V	0.660			<.001

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.40.
b. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.34.
c. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.34.
d. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 34.74.
e. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.71.
f. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.93.

Source: *Autor's own study with IBM SPSS Statistics*

The Chi-square test of independence and the study of the strength of the relationship showed that there is a strong relationship between education and:
— consciously controlling the time spent on VR games ($p<0.05$; $V = 0.676$),
— extending the planned time of playing VR games ($p<0.05$; $V = 0.789$),
— using every free moment to play VR games ($p<0.05$; $V = 0.789$),
— cancelling meetings with friends to play VR games ($p<0.05$; $V = 0.567$),
— staying up at night to play VR games ($p<0.05$; $V = 0.553$).

Table 3. Cross Tabulation – education variable

	Test	Value	df	Asymptotic Significance (2-sided)	Approximate Significance
Education* consciously controlling the time spent on VR games	Pearson's chi-square	165.483[a]	3	<.001	
	Cramer's V	0.676			<.001
Education* extending the planned time of playing VR games	Pearson's chi-square	225.315[b]	3	<.001	
	Cramer's V	0.789			<.001
Education* using every free moment to play VR games	Pearson's chi-square	225.315[c]	3	<.001	
	Cramer's V	0.789			<.001
Education* cancelling meetings with friends to play VR games	Pearson's chi-square	116.392[d]	3	<.001	
	Cramer's V	0.567			<.001
Education* staying up at night to play VR games	Pearson's chi-square	110.703[e]	3	<.001	
	Cramer's V	0.553			<.001

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 0.48.
b. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 0.43.
c. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 0.43.
d. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 0.71.
e. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 0.70.

Source: *Autor's own study with IBM SPSS Statistics*

Regarding the preferences for playing PC and VR games, it should be emphasized that 88.7 per cent of the respondents declared that for some time they had been playing mainly VR games. 21.3 per cent play both VR and PC games. The respondents indicated that they switched to PC games when they felt physical fatigue resulting from being in virtual reality. Given the choice between PC and VR games, young people (100 per cent) choose VR games. They justify their decision with the following: VR environment is more captivating (100 per cent), VR games are more interesting and provide a sense of being in the centre of the action (100 per cent), thanks to VR games they move where they want and do what they want (99.4 per cent), and playing in VR is fashionable (63.8 per cent). The respondents reach for VR games because this form provides them with emotions, adrenaline, is very convincing, and gives the opportunity to forget about everyday problems. Young adults enjoy competition and feel satisfaction from their successes in the game. In addition, as they emphasize, the plot of VR games is always so captivating that it is difficult for them to stop the virtual adventure.

Young adults qualified for the group at risk of problematic game use are characterized by low awareness of the risks arising from the use of games. Among the risks associated with VR games, the respondents mentioned:

— cuts and bruises,
— nausea and dizziness,
— eye pain,
— the possibility of addiction in case of excessive amount of time spent on gaming.

It is worth emphasizing that other risks resulting from the use of VR games are not known to young people or are assessed by them as insignificant – as a consequence of which the respondents did not mention them in the survey.

The respondents who were asked about the possibility of limiting the time spent on VR games indicated that it was possible. Among the activities alternative to VR games, young people mentioned: travelling to previously unknown places, a photography course, sports activities, i.e. climbing, diving, go-carting, paint ball, motor hang

gliding, and parachute jumping. These were the activities related to passion or those that provide great emotions. None of the respondents indicated passive activities as an alternative form of spending time, such as reading a book, solving puzzles, watching TV, playing a board game, playing a card game, painting, assembling models, etc.

Discussion and Conclusions

The collected data are in global line with the trend indicating that the majority of users at risk of problematic use of VR games are men, who are more prone to addiction than women (Barreda-Ángeles & Hartmann, 2022). Women, according to the answers provided, control the time devoted to VR games in a more conscious way. They rarely permit themselves to postpone specific duties or meetings with friends in order to play VR games. It has also been noted that men are more likely than women to stay up at night in order to move into a virtual environment.

Issues connected with the behaviour of young people at risk of problematic use of VR games are largely related to their age. People aged 24-25 were the only ones who indicated in the survey that they controlled the time spent playing VR games. Similarly, only in this age group were there users who did not increase the time planned for playing VR games, and additionally were able to break away from VR in their free time. On the basis of the collected data, it can also be concluded that 24-25 year olds are more responsible than younger users of VR games and to a lesser extent put off their duties to play a VR game. On the other hand, 18-19 year olds are more likely to stay up at night to play VR games (The Ghost Howls, 2022). This group is also characterized by the lowest creativity in the context of alternative forms of spending free time, apart from virtual reality.

Based on the collected data, it was also found that the ability to control the time spent on VR games is also related to the education of users. People who declared that they had some control over the time spent playing VR games belonged to the group of people with a master's degree or higher vocational education. Perhaps this arises from a greater mental and emotional maturity of these users. People with primary and secondary education, as well as most people with higher vocational education, indicated in the survey that they spent every free moment playing VR games, and the time spent playing VR games was usually longer than originally planned. Analyzing the percentages – the fewest people who stay up at night or cancel meetings with friends in order to play VR games belong to the group of people with a master's degree.

The answers of the respondents show that the key to success, which means a reduction in the number of hours spent in virtual reality and a more conscious use of VR games, may be controllers that show the amount of time devoted to virtual entertainment. It is also advisable to shape pro-health attitudes based on physical activity, which has been indicated in the research as an alternative to VR games (Rajan et al., 2018).

The threat of excessive use of VR games is a big problem that has a real impact on the behaviour and functioning of many young people. Thus, this phenomenon requires a broad discussion and further research in the field of pedagogy, psychology, neurology, or even cognitive science. Especially, as the problem presented in the article will be getting greater every year. VR games and simulations are increasingly used in the process of specialized adult education (Mellet-d'Huart, 2009). It is worth remembering that interest in virtual reality from the educational area can easily transfer to the home ground. Meanwhile, uncontrolled infatuation with VR can lead to addiction, which needs to be discussed and warned against. Unfortunately, at the moment there is a lack of reliable data, analyses, and recommendations regarding the safe use of virtual reality. Another problem is access to diagnostic tests enabling the screening of addiction to VR games. At the moment, specialists reach for tools developed for traditional computer games and 2D technology.

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