

Playing digital games in Czech adolescents

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ABSTRACT

As modern technologies develop, the world of digital games has changed remarkably and gained a new character. It is apparent at present that playing digital games, i.e. electronic games that can be played by means of a PC, mobile phone, tablet, game console, and other devices, is becoming one of the very favourite leisure activities for children and adolescents. This article introduces a survey of the current status of digital game playing among Czech adolescents, obtained through representative research among 3950 respondents from all over the country aged between 11 and 19. This research was performed by the Department of Psychology of Palacký University in Olomouc in 2018. The standardised scales applied in this study provide us with the prevalence of disturbances relating to playing digital games in the population of adolescents and an assessment of the size of the population at risk of addiction to game playing in the Czech Republic.

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THEORETICAL BACKGROUND

On the basis of analysis of the available information and definitions, it can be stated that digital games are electronic games that can be played by means of various displaying devices, such as, e.g., a personal computer, mobile phone, tablet, game console, and others. This is a collective term for video games, PC games, Internet games, mobile phone games, etc. Playing these digital games can be classified under the general term "gaming". Playing these games is conducted in a virtual world or in an augmented reality.

Digital games can be divided according to various criteria. There are games for a single player (single-

player) or for several players (multiplayer). Some games offer both options. Some games can be played in the offline mode and others can be played only when connected to the Internet (online). Digital games can also be classified according to the payment model into what are called premium games (paid games), freemium games (they are free to download but they offer various improvements for players and these improvements already need to be paid for), shareware games (they are free of charge only for a certain period of time or up to a certain level), and freeware games (they are free to download and without any further limitations). Games can also be differentiated

according to game genres (listed, including examples of particular games), e.g. adventure games (Machinarium, Star Trek), games with an open world (Grand Theft Auto – GTA), online card games (Solitaire, Hearthstone), role-playing games (RPG; Final Fantasy, The Witcher), including role-playing games for more players (MMORPG, massively multiplayer online role-playing games; World of Warcraft, Metin 2) or strategic games for several players in the environment of a fantasy arena (MOBA, multiplayer online battle arena; League of Legends, Dota), survival games (PlayerUnknown's Battlegrounds – PUBG, Fortnite), puzzles (Candy Crush Saga, Portal) and strategic games requiring thinking and strategy selection (Clash of Clans, Age of Empires), shooting games (Call of Duty, Counter-Strike), simulators (The Sims, Euro Truck simulator), sports games (FIFA, NHL) and racing games (Need for Speed, Gran Turismo), and sandbox games (Minecraft, Space Engineers), where the player chooses their tasks and changes a virtual world. Another example is web games (browser games; Travian, Shakes, and Fidget), which include a whole spectrum of genres but require online mode.

Playing digital games provides players with profits of varying extents and character. The primary purpose of playing digital games is entertainment, forgetting one's everyday worries, pleasure, relaxation, rest, withdrawal from one's daily routine, and experiencing something different. In digital games, a player can prove their abilities and skills, which can be further enhanced in higher levels of the game, and also improve their self-evaluation. Digital games provide space for interacting and establishing relationships (Uttal et al., 2013; Granic et al., 2014).

Digital games, however, can also pose certain risks and playing digital games can lead to a player's disturbance and other health problems. Risky playing of digital games has a strong negative impact on the health of players –frequent health problems include impaired sight, disturbance of one's sleep cycle, or sleep deprivation, and they can also cause backache, pain in the shoulders and neck, headaches, or pains in the fingers (Chou, 2001; Suhail & Barges, 2006) or even carpal tunnel syndrome (Wang et al., 2018). Playing games can also often result in disturbance of one's daily cycle, neglecting personal hygiene, and an unhealthy diet resulting in an increase in body weight (Király et al., 2014; Suchá et al., 2018). Excessive playing may be accompanied by mood swings (Blinka, 2015) and feelings of loneliness (Mehroof & Griffiths, 2010; Mérelle et al., 2017). The social sphere of a player is usually disturbed as well; they might lose their friends

and might have face interpersonal conflicts and trouble with their immediate family (Chen & Peng, 2008). Negative impacts of digital game playing include situations in which playing is conducted at the expense of other leisure and working activities and the individual devotes their free time predominantly to game playing. Their productivity at school or at work is worsened, and in extreme cases a player might lose their job or be forced to terminate their school attendance. As a result of game playing, players can run into financial problems and conflicts with various governmental institutions.

In some games, a partial element might appear which, in and of itself, might have a negative influence on a player. These include, for example, what are called "lootboxes", which are packages with a surprise in the form of various subjects or activities with a wide application in a game. In these packages, there might be important or, on the contrary, completely useless elements for the game (e.g. the acquisition of a weapon, the improvement of one's appearance, or a specific dance or gesture of a game character at the end of the game). That these in-game sales of bonuses for games with a high random factor resemble games of chance and, as a result, can lead to hazardous behaviour in players of digital games with lootboxes is a matter that is being discussed. There is a multinational debate about the justification for removing lootboxes from games for the reason that they represent hazardous playing. These restrictive measures have already been implemented in Belgium and the Netherlands (Zendle & Cairns, 2018).

Criteria of internet gaming disorder

As of the beginning of 2013, the American Psychiatric Association (APA) included Internet Gaming Disorder (IGD) in the fifth edition of the American Diagnostic and Statistical Manual of Mental Diseases (DSM-5) (in the third section, focusing on conditions to be further investigated). The APA states that although the Internet is considered an integral part of our lives, the scientific and professional public is beginning to point out that there are people who play online games compulsively at the expense of other interests and who show other symptoms reaching the level of clinical significance. This does not include games of a hazardous character (APA, 2013). Below, we use the following expressions equivalently to describe this disorder: Internet Gaming Disorder, risks of IGD, and addiction to digital gaming.

DSM-5 applies nine diagnostic criteria for Internet Gaming Disorder; in order to be diagnosed with an

addiction, a player must fulfil at least five of the symptoms within a period of the last 12 months. At the same time, these symptoms must result in worsened conditions or aggravation in the player's life (APA,

2013). In order to reach a precise diagnosis of an addiction to digital gaming, it would be necessary for each individual player to undergo a professional clinical evaluation.

Diagnostic IGD symptoms according to DSM-5 (APA, 2013):

- 1) absorption in playing Internet games (being constantly engaged in playing, thinking about the games, looking forward to playing games)
- 2) symptoms of the withdrawal effect after stopping playing games
- 3) tolerance (an increasing need to spend time on playing games)
- 4) unsuccessful attempts to control or reduce game playing
- 5) loss of interest in other hobbies and forms of entertainment as a result of playing Internet games
- 6) continuing excessive playing in spite of the fact that the player has detected the problems associated with game playing
- 7) cheating on parents, therapists, and other people in connection with the scope of game playing
- 8) playing Internet games serves as an escape from reality or relief from a bad mood
- 9) as a consequence of Internet game playing, a significant relationship, job, study, or possibility of career promotion has been threatened or lost

Criteria of gaming disorder

With the growing number of players, the World Health Organization (WHO) has proposed, in the 11th edition of the International Classification of Diseases (MKN-11), a new diagnostic unit – gaming disorder

(Aarseth et al., 2017). An official application of the 11th edition of the International Classification of Diseases in the Czech Republic is scheduled for 1st January 2022.

Gaming disorder, according to MKN-11, is characterised by lasting or repeating playing (of digital games or video games) which happens online (on the Internet) or offline and manifests itself with the following symptoms (WHO, 2019):

- 1) impaired control over gaming (e.g., onset, frequency, intensity, duration, termination, context)
- 2) increasing priority given to gaming to the extent that gaming takes precedence over other life interests and daily activities
- 3) continuation or escalation of gaming despite the occurrence of negative consequences. The behaviour pattern is of sufficient severity to result in significant impairment in personal, family, social, educational, occupational or other important areas of functioning.

Behavioural patterns reach such a level of severity that they result in significant impacts on the player's personal, family, social, educational, and work-related spheres and also other areas. Gaming behaviour may be lasting, episodic, or recurrent (repetitive). In order for the disorder to be diagnosed, gaming behaviour and other related symptoms must be detectable for a period of at least 12 months. This period of time might, however, be shortened if the diagnostic criteria are fulfilled and the impacts of playing are severe (WHO, 2019).

STUDY FOCUSING ON PLAYING DIGITAL GAMES AMONG CZECH ADOLESCENTS

The present study focuses on playing digital games in the population of adolescents aged 11–19, with the objective being to evaluate the scope of digital game playing and to assess the percentage of this population at risk of IGD in the 2017/2018 academic year. This research study, covering the entire country, was conducted by a team of authors, Suchá, Dolejš, Pipová, et al., who work at the Department of Psychology of Palacký University in Olomouc. Further details are to be found in the monograph *Hraní digitálních her českými adolescenty (The playing of digital games by Czech adolescents – Suchá, Dolejš, Pipová, Maierová, & Cakirpaloglu, 2018)*.

Participants

The study sample consisted of adolescents who, in the second semester of the 2017/2018 academic year, attended the upper classes of primary schools, eight-year, six-year, and four-year grammar schools, secondary schools with a leaving examination, or secondary professional training colleges. The respondents were selected by means of a stratified random sampling of primary and secondary schools, so that the composition of students in the study sample corresponds with the composition of students in the Czech Republic with reference to regions and types of school attended. Any school on the territory of the Czech Republic might have been selected for the project and thus also any student. Altogether, 79 school institutions were contacted to participate in the project. Cooperation was, however, only established with 48 schools (61%). A total of 31 schools declined to take part in the research (39%).

The test battery was presented by experienced and well-trained administrators. Administration was conducted in school institutions during lessons in the form of a group submission. The respondents were provided with a paper test battery, so this was a pen-and-paper test.

The study sample of the research project consisted of students aged 11–19 attending the selected schools. A total of 3950 test batteries was used for the final evaluation, of which 1940 were filled in by boys and 2010 by girls. The method used for the selection, scope of the study sample, and the method used for the administration of the test battery make it possible to

state that this is a representative sample of Czech students aged 11–19, which enables the results and findings to be generalised to the entire population of Czech 11-19-year-olds. The average age of the respondents from the research sample was 15.73 years (SD \pm 1.99). In the following analyses, the number of respondents might differ because of some instances where information, such as age or gender, was missing. It also happened that not all the questionnaires were used as some of them did not fulfil the requirements for their evaluation.

The average age of the girls was 15.74 years and that of the boys 15.72 years (Table 1). The youngest participants in the research project were pupils of the sixth class of primary schools and the first class of eight-year grammar schools (11-year-old adolescents) and, on the other hand, the oldest participants were students of the last class of secondary schools (19-year-olds). The most frequent age of the male participants was 16; for female participants it was 17.

Table 1: Number of respondents and their average age according to gender

Gender	Average age (\pm SD)	Min. age	Max. age
Male (n= 1940)	15.72 (1.97)	11	19
Female (n= 2010)	15.74 (2.01)	11	19

The study sample included respondents from all 14 regions of the Czech Republic. The strongest representation was from the Pardubice region (453 respondents), South Moravia region (408 respondents), and Moravian-Silesian region (386 respondents). The smallest numbers of respondents taking part in the project were from the Karlovy Vary region (185 respondents) and Zlín region (184 respondents), but even in these regions we are talking about dozens of participants.

The adolescents from the study sample were divided according to the type of school and the level of education. In our research, the upper classes of primary school were attended by 1428 respondents, of whom 693 were boys (48.53%) and 735 girls (51.47%). These are respondents who studied at primary schools or in the corresponding classes of multiple-year grammar schools (from the first up to the fourth class, denoted further as pupils of lower grammar schools); this group

shall be further denoted as being in primary education. A total of 2522 secondary school students took part in the research, out of whom there were 1247 boys (49.44%) and 1275 girls (50.56%) (Table 2). This group includes students from the first up to the fourth classes of grammar schools with a leaving examination, students of secondary professional training colleges without a leaving examination whose studies will be terminated with a vocational certificate, and students of secondary professional schools with a leaving examination; this group shall be further denoted as being in secondary education.

Table 2 Division of respondents according to the level of education

Level of education	Gender	N	Rate (%)
Primary education	Male	693	48.53
	Female	735	51.47
Secondary education	Male	1247	49.44
	Female	1275	50.56

The upper classes of primary schools were attended by 436 of the girls and 464 of the boys; pupils of (lower) multiple-year grammar schools were represented in the research sample by approximately one half of the above figures. As expected in advance, more boys than girls were tested in specialisations without a leaving examination and the situation was reversed in specialisations with a leaving examination. The least numerous group was represented by girls who studied specialisations without a leaving examination, such as cabinet maker, cook, etc. (Table 3).

Table 3: Division of respondents according to the type of the school attended and according to gender

Type of school	Group	N	Rate (%)
Primary schools	Male	464	51.56
	Female	436	48.44
Lower grammar schools	Male	229	43.37
	Female	299	56.63
Grammar schools with leaving examination	Male	499	46.77
	Female	568	53.23
Secondary schools without leaving examination	Male	363	69.94
	Female	156	30.06
Secondary schools with leaving examination	Male	385	41.13
	Female	551	58.87

Measures

In order to map the issue of playing digital games among adolescents, two methods from abroad were applied that were translated into the Czech language and also two newly designed methods. These were, in particular, the following methods:

- Criteria of Internet Gaming Disorder (IGD);
- Scale for the Assessment of Pathological Computer-Gaming (AICA-S) - Skala zum Computerspielverhalten bei Kindern und Jugendlichen (CSV-S);
- Questionnaire of Digital Game Playing (QDGP);
- Game Type Questionnaire (GTQ).

The Internet Gaming Disorder (IGD) tool focuses on diagnostic criteria of addiction to digital game playing according to DSM-5 (Pontes & Griffiths, 2015) – see *Criteria of internet gaming disorder*.

Respondents who acquire at least five out of the nine possible points may be considered as problematic, or as users with a high probability of developing an addiction to digital games (or at risk of IGD). Respondents select their answers on a dichotomous scale (yes/no). The Cronbach's alpha reached the value of 0.67. The items in the IGD scale have, with the total scores, medium strong correlations which oscillate between 0.36 and 0.66.

Another method transferred from abroad was the Scale for the Assessment of Pathological Computer-Gaming, in the original Skala zum Computerspielverhalten bei Kindern und Jugendlichen (CSV-S) (Wölfling, Müller, & Beutel, 2011). This method is applied in diagnostics of digital game playing in children and adolescents. The scale evaluates a player's loss of control, development of tolerance, problems brought about by playing or frequency, and the amount of time spent on playing games. It contains 15 items, of which 14 items are calculated in the resulting score (the evaluation process corresponds with the recommendations of the method's authors). This method allows for various types of answers, depending on the character of the questions – dichotomous scale (yes/no); two types of Likert scales (five degrees from "not at all" up to "very strongly"; five degrees from "never" up to "very often"); two questions are open and are to be filled in with a number of hours and in two questions, the respondent has to select a value from the frequency of their occurrence of playing. Respondents who obtain 0–6.5 points fall under the category of problem-free playing, 7–13 points means problematic playing, and reaching 13.5 and more points is regarded as an addiction.

Within the research project, the authors created a Questionnaire of Digital Game Playing (QDGP). This

tool is designed to evaluate the relationship with digital games, distinguishing between problem-free, problematic, and dependency digital game playing. The QDGP focuses on all digital games (i.e. online as well as offline games) that can be played by means of various types of displaying devices (computer, mobile phone, tablet, game console, etc.). This tool consists of 32 questions, of which 30 are answered on a dichotomous scale (yes/no). Two questions are screening questions in which the respondent replies by stating two items of time data (these items focus on the time spent on playing games on a normal day in the working week and on holiday days (during holidays, on bank holidays, at weekends, etc.), with the respondents stating the corresponding periods of time (Suchá, Dolejš, Pipová, & Charvát, in press). For further information on this method see the chapter *Questionnaire of Digital Game Playing (QDGP)*.

The last method applied was Game Type Questionnaire (GTQ). This is a screening method that records a list of game genres (e.g. sandbox games, MMORPG). Besides selecting their favourite genres, the respondents were invited to name three games in particular that they find the most enjoyable.

Participants and design - Summary

Study sample

- Representative questionnaire examination with the aim of mapping digital game playing in the entire Czech Republic
- Total of 3950 Czech adolescents (1940 boys and 2010 girls) took part in the project
- Respondents were aged 11–19 years (average age was 15.73 years, SD ± 1.99)
- Adolescents were selected from all regions of the Czech Republic

In each region, there were respondents from five types of schools

- Primary education
 - Primary schools
 - Multiple-year grammar schools (lower grammar schools)
- Secondary education
 - Grammar schools with leaving examination
 - Secondary professional schools with leaving examination
 - Secondary professional training college without leaving examination

Altogether, 48 schools took part in the research study

Methods applied

- Criteria of Internet Game Disorder (IGD) (Pontes & Griffiths, 2015)
- Scale for the Assessment of Pathological Computer-Gaming (CSV-S) (Wölfling, Müller, & Beutel, 2011)
- Questionnaire of Digital Game Playing (QDGP) (Suchá, Dolejš, Pipová, & Charvát, in press)
- Game Type Questionnaire (GTQ) (Suchá & Dolejš, 2017)

RESULTS

In the Czech Republic there exist nationwide studies that focus especially on mapping the usage of the Internet generally but that deal with digital game playing only marginally (Chomynová, Csémy, & Mravčík, 2016; Hamřík, Kalman, Sigmundová, Pavelka, & Salonna, 2014), Basler and Mrázek (2018) examined the issue of digital game playing among Czech secondary school students with the intention of focusing on selected regions of the Czech Republic.

According to the HBSC study from the Czech environment conducted in 2014, which included 4365 respondents aged 11, 13, and 15 years and focused on the differences in playing duration between girls and boys, 50.42% of 11-year-old boys, 62.41% of 13-year-

old boys, and 61.64% of 15-year-old boys and 24.57% of 11-year-old girls, 27.66% of 13-year-old girls, and 20.52% of 15-year-old girls play for two or more hours on ordinary weekdays. The biggest ratio of individuals who devote themselves to game playing on weekdays for two or more hours is found in the population of 13-year-old boys, as well as 13-year-old girls. At the weekend, the representation in the criterion being monitored is highest in 15-year-old boys (69.31%) and 13-year-old girls (35.08%). Adolescents play games on weekend days for longer than on regular weekdays in all the cases that were monitored (except for 11-year-old girls) (Hamřík et al., 2014). For the purpose of comparison, we present the acquired values in the same age cohorts and in the same criterion that was monitored (Table 4).

Table 4: Prevalence of game playing for more than two hours a day in selected age cohorts according to the HBSC 2014 study and Digital Game Playing 2018 study

Gender	Age groups	Weekday		Weekend day	
		HBSC (2014) (%)	Suchá et al. (2018) (%)	HBSC (2014) (%)	Suchá et al. (2018) (%)
Male	11 years	50.42	44.12	59.77	70.59
	13 years	62.41	62.28	67.67	74.23
	15 years	61.64	57.09	69.31	70.71
Female	11 years	24.57	26.83	24.16	35.90
	13 years	27.66	19.35	35.08	26.23
	15 years	20.52	17.09	30.29	24.44

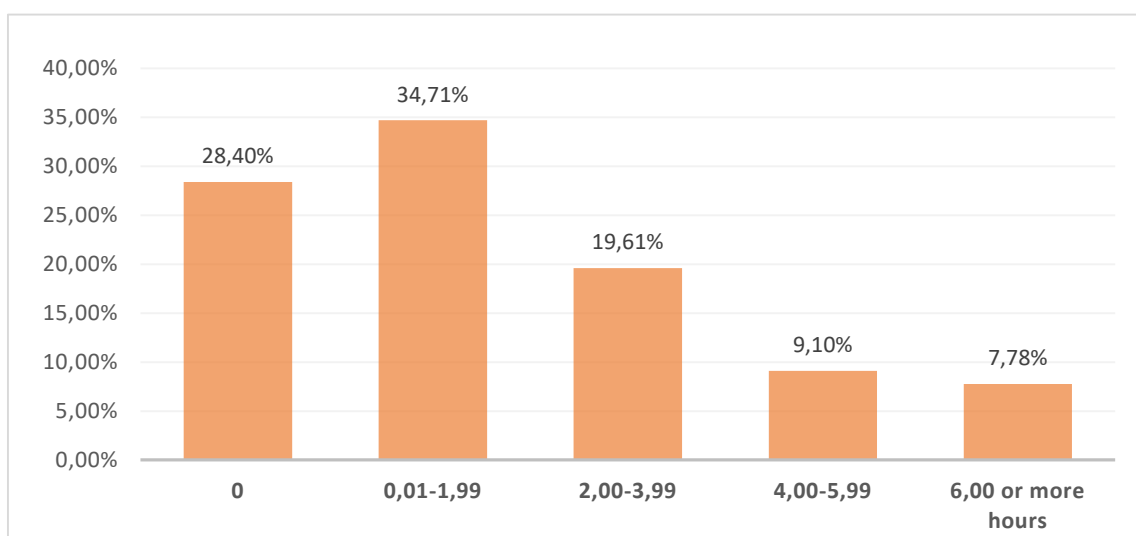
Sources: HBSC Study – Hamrik et al. (2014); Suchá, Dolejš, Pipová & Komrska, (2018).

A European school study on alcohol and other drugs (ESPAD) from 2015, conducted on a sample of 2738 students aged 15–16 years (i.e. among pupils of the ninth class of primary schools and students of the first class of secondary schools) monitored the average time spent on playing online computer games (fighting, strategic, and shooting games). It showed that among 16-year-old students, 31.5% play computer games for two or more hours a day (53.3% of the boys and 10.3% of the girls). Similar results are also presented in a validation study of an analogous scope conducted in 2016 on a sample of 2471 respondents with the aim of verifying the results of the ESPAD 2015 study – computer games were played for a period of two or more hours a day by 32.2% of the 16-year-old student respondents (Chomynová, 2017). The lower occurrence of excessive playing observed in the ESPAD study is related to a difference in the formulation of the questions – the questions were focused only on playing online computer games and did not include games

played by means of mobile phones and other electronic devices.

A more detailed analysis of the present study from 2018 showed that an average Czech teenager plays digital games on a weekday for approximately 1.60 hours and at the weekend almost another hour on top, i.e. 2.37 hours. The most frequently represented group is students who play for less than two hours (on average per day, based on data stated for weekdays and weekend days); almost one fifth of the students who were addressed play for two to four hours a day, while a total of 16.88% of the respondents play for four or more hours a day (on weekdays as well as weekend days) (Figure 1). A total of 36.49% of the respondents play computer games for two hours or more every day. According to Holstein et al. (2014), spending two or more hours online a day is considered excessive and risky.

Figure 1: Representation of respondents (in %) according to the number of hours spent on playing digital games according to the Digital Game Playing study from 2018



Respondents who did not state one of the figures (either for weekdays or weekend days) are not included here.

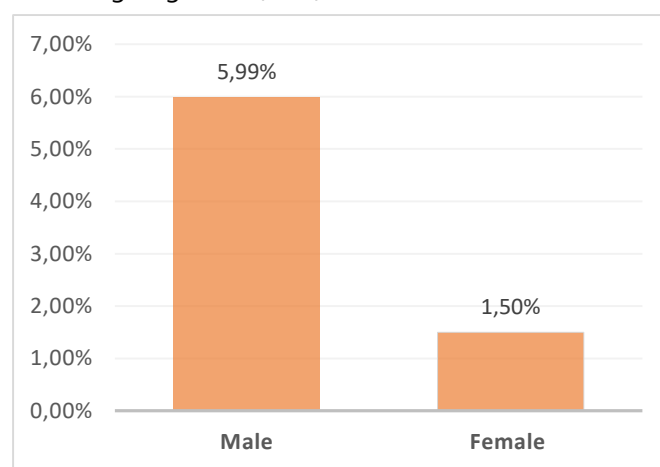
The types of games and gaming genres preferred by players differ significantly between boys and girls. The gaming genres popular among boys are first person shooters (FPS, i.e. shooting games), action games with an open world, and digital games with racing themes. Among girls, the most popular genres are life simulators, then, similarly to boys, action games with an open world. The third position for popularity among girls is shared by the genres of puzzles and web online games.

Prevalence of internet gaming disorder

In order to estimate the ratio of students at risk of addiction to gaming, we used the IGD screening scale, comprising nine items focusing on the occurrence of problems associated with digital game playing within the last 12 months (for further information, see the section titled *Criteria of internet gaming disorder*). If the respondent answered five out of the nine items that were monitored positively, they fall into the category of being at risk of developing an addiction to game playing (Pontes & Griffiths, 2015), further in the text also referred to as "at risk of IGD" or "IGD". From the research sample, 3.70% of the respondents fell into this category. It is thus indicated that approximately every 30th adolescent already has severe problems caused by computer game playing. These are individuals who often lie about the length of the time they spend playing games, are excessively absorbed by gaming, or are trying to escape their problems through playing games or relieve their bad mood or unpleasant emotions. They fail to reduce the time spent on playing and they often get into trouble (school-related or

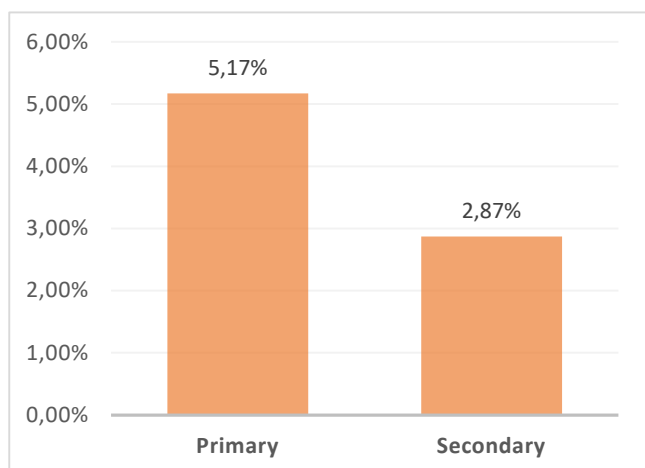
relationship-related) because of playing games. From the gender point of view, it was revealed that there is a higher prevalence in boys (5.99%) than in girls (1.50%) (Figure 2).

Figure 2: Prevalence of Internet Gaming Disorder (IGD) according to gender (in %)



When the respondents are divided into two groups according to the level of education – primary vs. secondary, we can observe a higher rate of occurrence of IGD symptoms in the pupils in the primary education group (5.17%). In the group of secondary school students, IGD symptoms are recorded by approximately half as many respondents when compared with the first group, i.e. 2.87% students of secondary schools (Figure 3). Two measurements conducted by Basler and Mrázek (2018) between 2016 and 2018 in a research sample of 1922 students of secondary schools discovered a similar prevalence of addiction (2.7% and 2.5%, respectively).

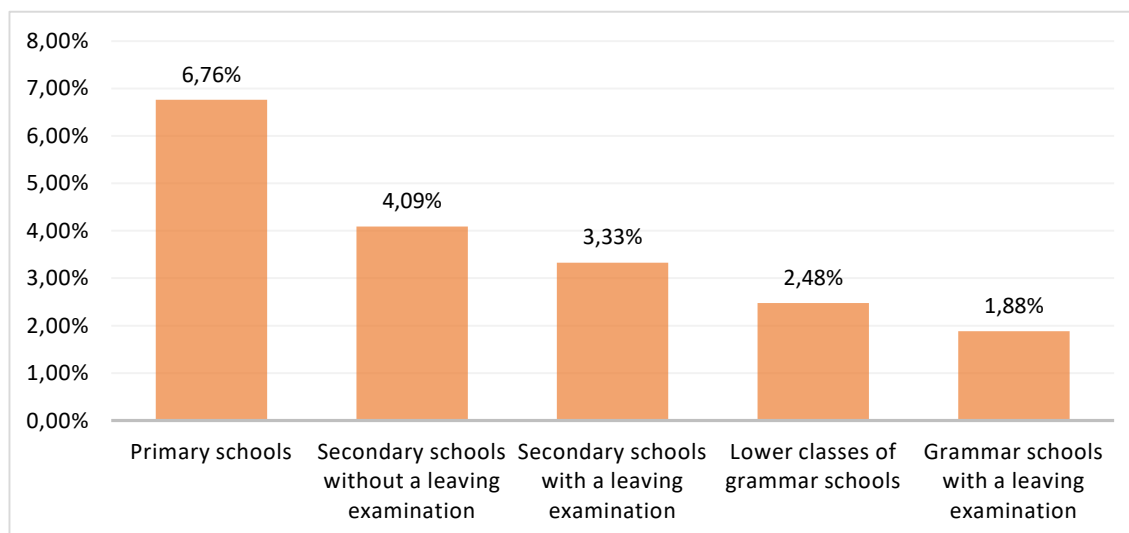
Figure 3: Prevalence of Internet Gaming Disorder (IGD) according to level of education (in %)



The largest segment of problematic players of digital games studies at primary schools, where 6.76% of the students addressed in our study fall into the category of being at risk of developing IGD. The next most risky groups are students of professional training colleges, with 4.09% of the students falling into the IGD risk category, and students of secondary schools with a leaving examination, with a 3.33% risk rate. The respondents at the lowest risk of IGD are found in students of four-year grammar schools with a leaving

examination (1.88%) and pupils from lower grammar schools (2.48%) (Figure 4). We suppose that what contributes to pupils tending to spend excessive amounts of time on game playing at primary schools is their significant amount of free time, lower demands on pupils from schools, and, at the same time, strong pressure on them, in this developmental phase of life, to integrate with a group of contemporaries, which is often made easier by sharing experience with game playing as well as the orientation of the teens in general. We assume that in individuals attending secondary schools other dominant activities associated with spending time on the Internet begin to occur, such as using social networks and applications, listening to music, etc. Another reason may be that adolescents spend more time on other than online activities – they have to devote more time to school-related duties (preparation for a leaving examination and entrance examinations, etc.), spare-time activities, and hobbies. Primary prevention should thus aim not only at the upper classes of primary schools but also the lower classes, where the same or even a higher percentage of pupils with difficulties associated with game playing can be assumed.

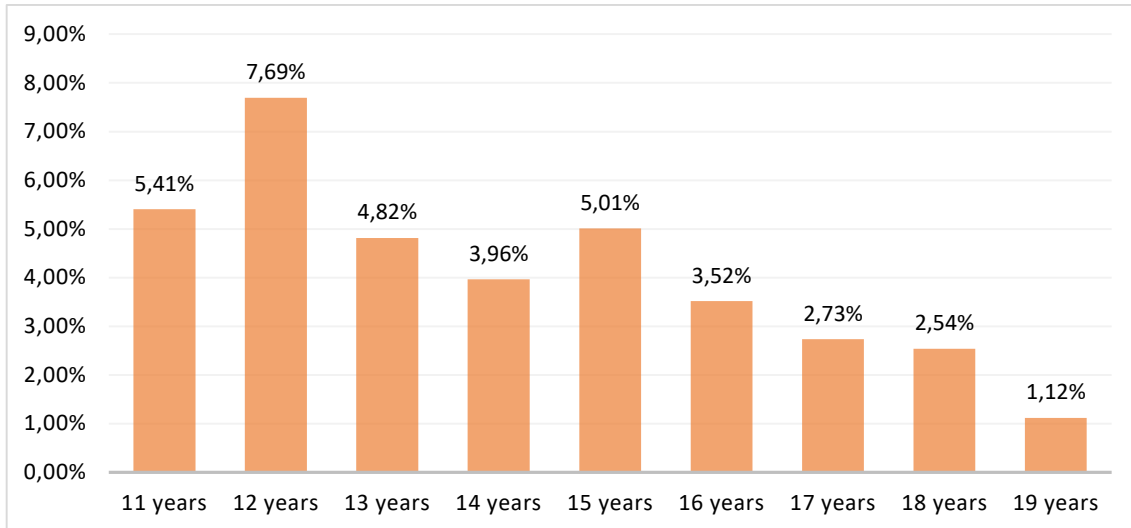
Figure 4: Prevalence of Internet Gaming Disorder (IGD) according to types of schools attended (in %)



Evaluating the occurrence of a disorder associated with digital game playing (IGD) according to the player's age showed that the highest occurrence was monitored at the age of between 11 and 15 years. The highest prevalence of all is in 12-year-olds and reaches a value of 7.69%. The second highest occurrence was in

11-year-olds (5.41%) and 15-year-olds (5.01%), followed by 13-year-old ones (with a prevalence of 4.82%) and 14-year-old ones (with a prevalence of 3.96%). In the 16-19 age group, the occurrence of IGD shows a decreasing tendency (from 3.52% down to 1.12%) (Figure 5).

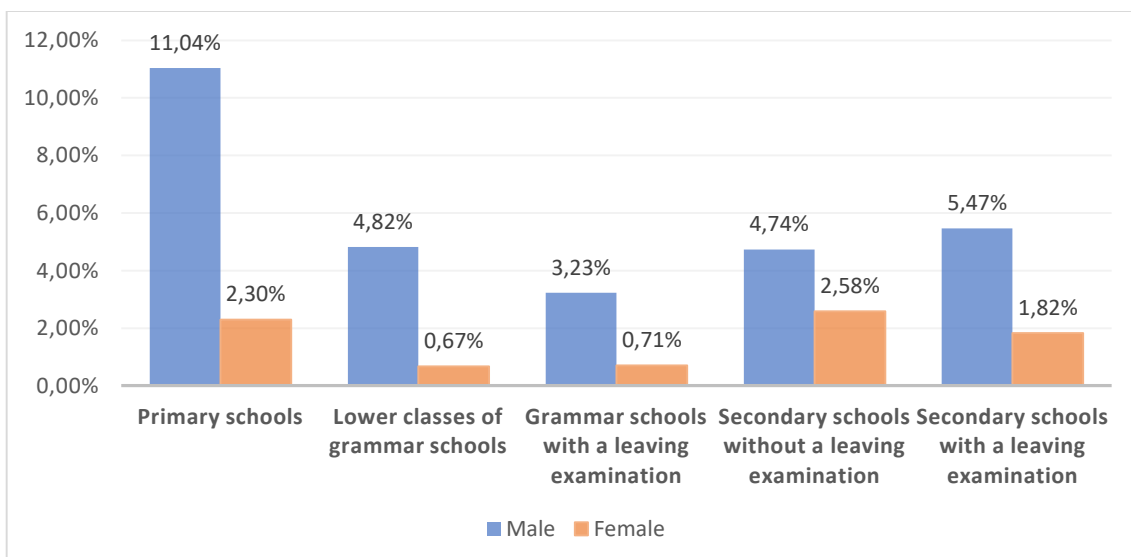
Figure 5: Prevalence of Internet Gaming Disorder (IGD) according to age cohorts (in %)



The highest prevalence of IGD was obviously in boys at primary schools (11.04%), which is a value twice as high as that of the group which is second in terms of being at risk, which is made up of boys from secondary schools with a leaving examination (the prevalence was 5.47%). The lowest number of boys at risk of IGD was found in the group of students of grammar schools with a leaving examination (secondary school level), which proves to be, from the point of view of the

symptoms of IGD being discovered in boys, the least risky environment. In comparison with the most risky one, i.e. with primary schools, there are roughly four times fewer students (boys) with IGD at four-year grammar schools than at primary schools. In girls, the highest prevalence of IGD was at secondary professional training colleges without a leaving examination (2.58%) and at primary schools (2.30%) (Figure 6).

Figure 6: Prevalence of Internet Gaming Disorder (IGD) according to the type of school attended and gender (in %)



Occurrence of Internet Gaming Disorder according to the IGD scale – Summary

Internet Gaming Disorder (IGD) according to DSM-5 (contains nine criteria, five of which must be fulfilled)

- five criteria are fulfilled by 3.70% of the respondents (aged 11-19 years)

Prevalence of IGD according to gender (age 11–19 years)

- boys 5.99%
- girls 1.50%

According to the type of education (for age 11–19 years)

- in pupils of primary schools, 5.17 % are at risk of IGD
- in pupils of secondary schools, 2.87 % are at risk of IGD

According to the type of school attended, the prevalence of IGD in pupils /students was as follows:

- 6.67% in primary schools
- 4.09% in secondary schools without a leaving examination
- 3.33% in secondary schools with a leaving examination
- 2.48% in lower grammar schools (age 11–15 years)
- 1.88% in upper grammar schools (age 15–19 years)

According to gender and type of school attended, the highest prevalence of IGD was as follows:

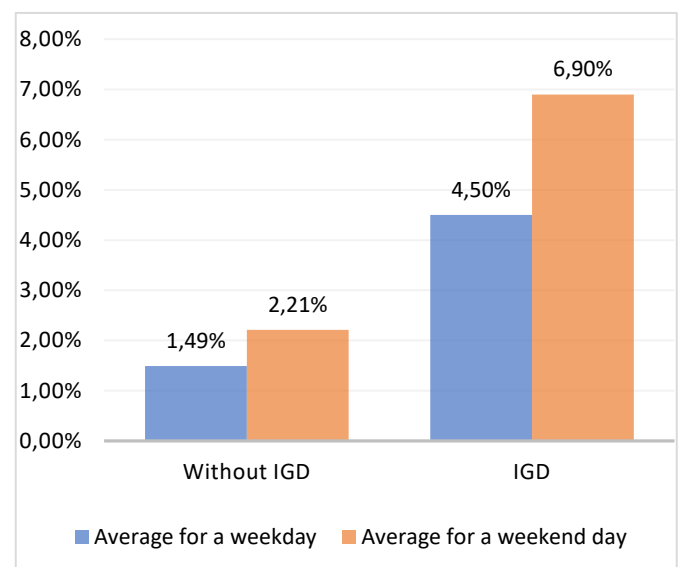
- in the group of boys at primary schools (11.04%)
- in the group of girls at secondary schools without a leaving examination (2.58%)

Time spent on digital game playing in individuals at risk of IGD

On average for the entire week (weekdays and weekend days altogether), players from the category at risk of IGD spend 5.60 hours a day on playing games, whereas players in whom evidence of problematic or dependency playing was not identified play on average for 1.83 hours a day, with a somewhat higher intensity of playing at the weekend.

The group in the category without a risk of IGD stated, on average, that they played for 1.49 hours on weekdays and 2.21 hours at the weekend. In the group of individuals at risk of IGD, the duration of playing was significantly higher ($p < 0,001$). Players spent, on average, 4.50 hours on playing games on weekdays and up to 6.90 hours at the weekend (Figure 7). Although it is obvious that the time spent on playing games correlates significantly with the occurrence of IGD, the time aspect itself is not considered a diagnostic criterion of an addiction to digital game playing.

Figure 7: Average number of hours spent on gaming in adolescents at risk of IGD and without IGD



Increasingly more time spent in a sedentary way in front of a screen (watching TV, playing games, using a PC, etc.) correlates significantly with obesity (Andersen & Sabiston, 2010; Proctor, Moore, Gao, Cupples,

Bradlee, Hood, & Ellison, 2003). Similarly, our findings confirm that increasing the time spent on playing digital games also increases the body weight. Table 5 shows the values detected in our study for the population aged 11-19 years in the Czech Republic.

Table 5: BMI and average time spent on gaming in adolescents aged 11-19 years

Body mass index (BMI)	Average time spent gaming a day	N
Standard (healthy) weight	1 hour 52 minutes	2475
Overweight	2 hours 26 minutes	354
First-degree obesity	3 hours 23 minutes	75
Second-degree obesity	4 hours 27 minutes	10

Note: Third-degree obesity was not represented by a sufficient number of respondents in our research study, and that is why this group is not listed here.

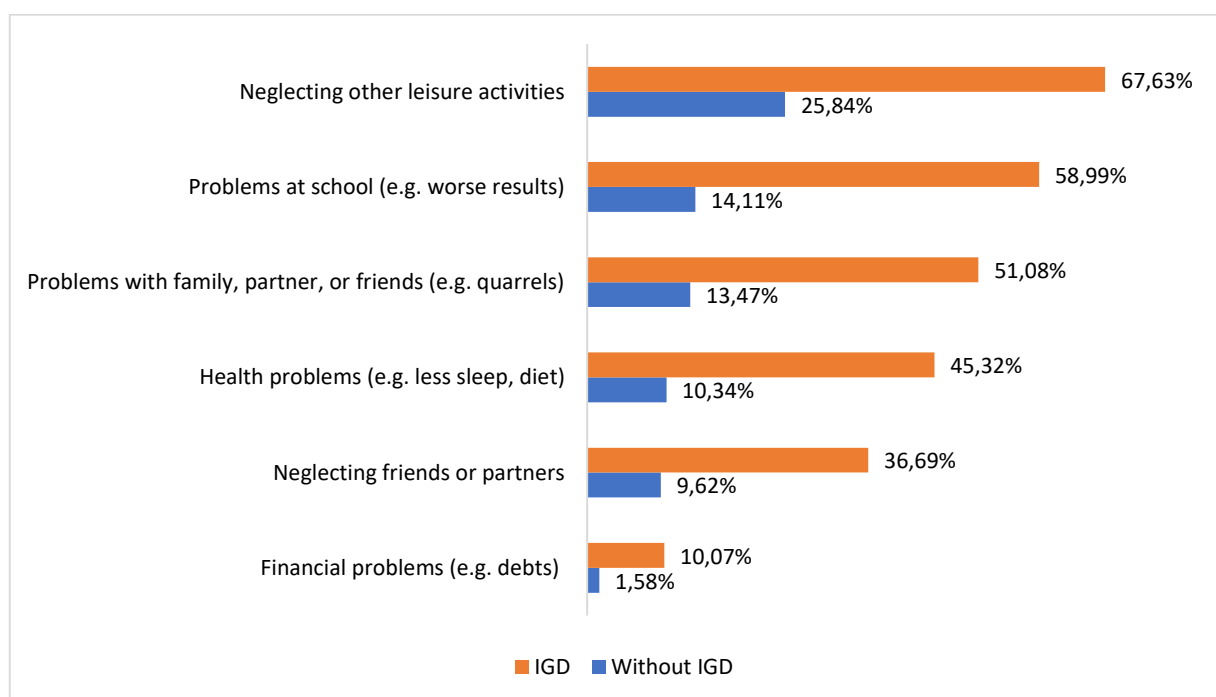
ADDITIONAL ANALYSES USING IGD DIAGNOSTIC CRITERIA

Within the questionnaires that were administered, selected impacts associated with game playing were monitored in more detail – the adolescents themselves subjectively evaluated the occurrence of individual

problems. In the group without the risk of IGD, the largest single group of individuals (25.84%) stated that they neglected other leisure activities because of playing games. Respondents also often confirmed that game playing caused problems in their relationships with their family or partner (13.47%) and at school (14.11%). Approximately 10% of the individuals not at risk of IGD admitted that games have a negative impact on their health and a similar number of adolescents stated that they neglect their friends or their partner because of game playing. The lowest occurrence in this group was in the case of problems with money (less than 2%).

In the group of respondents who fulfil the criteria of addiction to digital game playing (at risk of IGD), up to two thirds of them stated that they neglect other leisure activities (67.63%). Problems in relationships with parents or partners and problems at school were confirmed by more than a half of the respondents who were addressed (51.08% and 58.99%, respectively). Less than a half of the respondents (45.32%) admitted to problems associated with health (e.g. less sleep). A total of 36.69% of the respondents stated that they neglect their friends or partners because of game playing. 10% of the adolescents at risk of IGD who were addressed faced financial problems (Figure 8).

Figure 8: Occurrence of selected problems in individuals in categories at risk of IGD and without risk of IGD (in %)

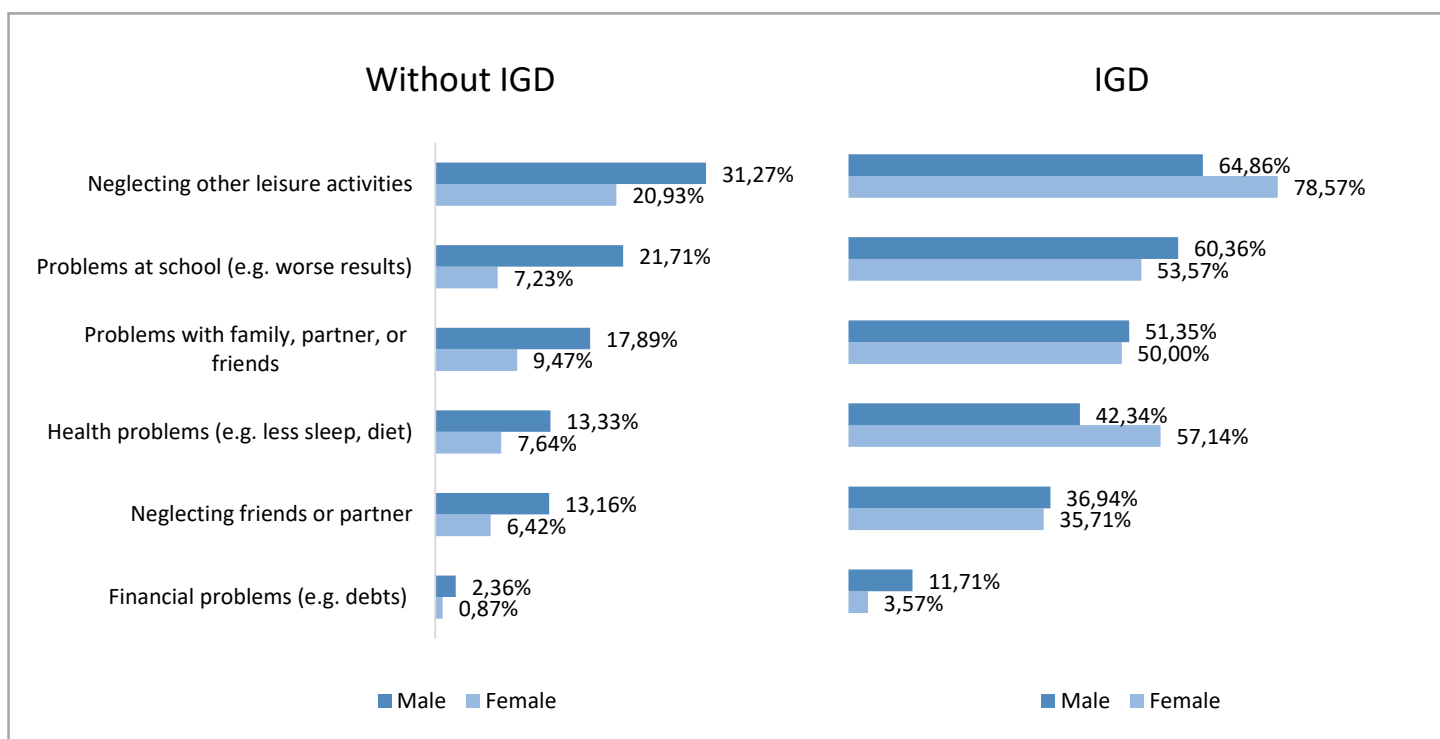


It is necessary to highlight that in both groups – those without symptoms of IGD as well as those at risk of IGD – it is essential to focus on categories from the point of view of gender, and thus to follow the trend of what is more typical for boys or girls and what negative consequences occur more frequently in the respective groups of respondents (or which spheres of life are more often affected by digital games). In the group of adolescents who, according to the DSM-5 criteria, did not show Internet Gaming Disorder (IGD), the boys in all the categories that were monitored showed problems more profoundly than the girls. The most common problem among boys (almost one third) was that the consequences of playing resulted in their neglecting leisure activities; the least serious impact was recorded in the area of financial problems (2.36%).

Percentage expressions of the consequences for girls as well as for boys and average percentage values for both groups together are further presented in Figure 10.

Unlike the group of adolescents who did not show criteria of Internet Gaming Disorder (without IGD), in the group at risk of IGD, problems with health and more frequent neglect of leisure activities were monitored in the girls in comparison with the boys. Boys stated more often that they had problems at school and financial difficulties. Similarly, boys and girls at risk of IGD declared unpleasant consequences in connection with relationships, either within the family or with their friends or partners (Figure 9).

Figure 9: Occurrence of selected problems in relation to playing digital games in respondents in the category at risk of IGD and without IGD according to gender (in %)



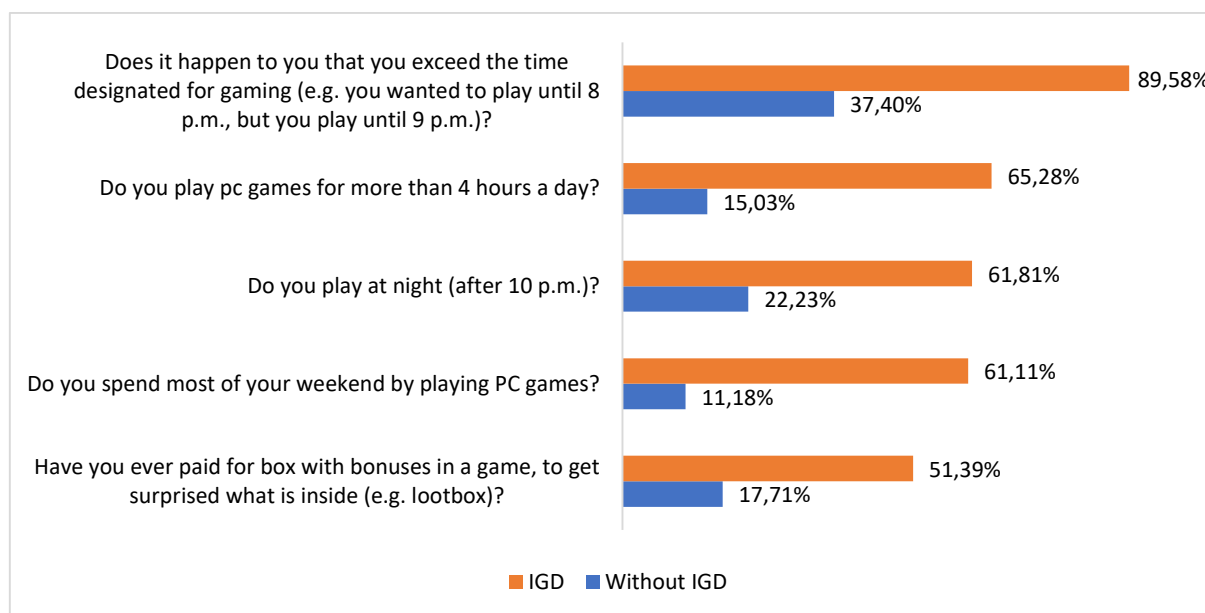
Six items of the digital gaming questionnaire (Suchá, Dolejš, Pipová, & Charvát, in press) were analysed in more detail from the point of view of the IGD risk category. These items map other aspects of playing digital games. In all the activities that were monitored, respondents showing problems with digital gaming and falling into the IGD risk category score higher. A total of 61.81% of the respondents falling into the IGD risk category play after 10 p.m., a level of frequency

which is three times higher than in adolescents who were not marked as being at risk of IGD. A total of 65.28% of the adolescents falling into the IGD risk category play digital games for more than four hours a day (compared with 15.03% of the respondents without IGD). Individuals at risk of IGD also invest financial means into gaming more often, especially into gaming bonuses, such as lootboxes (51.39%). In nine out of ten individuals at risk of IGD, we may monitor exceeding of

the gaming time which they themselves decided to spend playing. This behaviour, however, is not exceptional even for adolescents not at risk of IGD, who confirmed that they had exceeded the set time in

37.40% of cases. For a total of 61.11% individuals at risk of IGD, gaming is the main weekend activity; the others stated values which were six times lower (Figure 10).

Figure 10: Prevalence of selected aspects of digital game playing from the QDGP questionnaire in respondents in the category at risk of IGD and those not at risk of IGD (in %)



In the questionnaire dealing with digital game playing the expression "computer games" was used as an equivalent of the expression "digital games"

QUESTIONNAIRE OF DIGITAL GAME PLAYING (QDGP)

The Questionnaire of Digital Game Playing (QDGP) (Suchá, Dolejš, Pipová, & Charvát, in press) was compiled in 2017 with the aim of more detailed mapping of various aspects of digital game playing and evaluating the relationship of teenagers towards digital games within the Czech environment. This tool contains a total of 32 items, for which, in 30 questions, the respondent selects their answers on a dichotomous scale (yes/no), e.g. "Do you play to make your mood better?", "During classes at school, do you look forward when you will play PC game?", while the other two questions are in the form of screening questions and are focused on the time spent on playing games on weekdays and on school holidays, bank holidays, at the weekend, etc.. The maximum number of points is 30 (only positive answers from the dichotomous scale are calculated). The method states recommended point limits on the basis of which it is possible to categorise respondents into problem-free playing, problematic playing, and dependency playing of digital games. The resulting scores are evaluated separately for girls and

boys; the data are, at the same time, assessed from the point of view of the level of education (i.e. primary vs. secondary education). The QDGP focuses on all digital games (online as well as offline) that can be played by means of various types of displaying devices (personal computer, mobile phone, tablet, game console, etc.).

This method is not time-consuming either in terms of its administration or the evaluation of the answers (five minutes). Its application takes approximately 15 minutes. The method can be applied both in individual psycho-diagnostics and within a group submission, e.g. in conducting preventive programmes or searching for teenagers who are addicted and those at risk of becoming addicted. The method will be officially published at the beginning of 2020 and will include a testing guideline with a comprehensive theoretical grounding, statistical-mathematical analyses and population standards, stimulus-providing materials, and an evaluation template.

Within the method, there are four separate scores (termed cut-off points) for four sub-groups, i.e. for girls from primary schools, boys from primary schools, girls

from secondary schools, and boys from secondary schools. Within the framework of this part of the analysis, we at first assessed whether there exists a difference in terms of the total QDGP scores between individual sub-groups according to the respondents' age or gender. When using factorial ANOVA where the dependent variable was the gross QDGP score and the factors were the respondents' sex and age groups, we reached the following results. The main effect of gender reached significant values of the difference $F(1.3886) = 999.2$; $p < 0.001$; $\eta^2_p = 0.20$ among girls and boys, with a high clinical significance. The main effect of age groups also reached significant values $F(8.3886) = 14.1$; $p < 0.001$; $\eta^2_p = 0.03$, but only with a minor clinical significance, as well as the interaction between both factors $F(8.3886) = 5.6$; $p < 0.001$; $\eta^2_p = 0.01$.

In order to simplify the creation of standards and practical evaluation of the questionnaire and in relation to the situation about age groups, two categories based on the level of education were created. The group marked as primary schools, where the age ranges between 11 and 15 (or exceptionally 16) years, is composed of pupils attending, at the beginning of the data gathering, the upper classes of primary schools, including the first up to the fourth classes of eight-year grammar schools and the first and second classes of six-year grammar schools (i.e. within the time frame of the basic compulsory nine-year school attendance obligation, or the lower sub-type of secondary education within ISCED 2). The other group, marked as secondary schools, represented the age group from 15 up to 19 years, i.e. students attending, at the beginning of the data gathering, grammar schools, secondary professional schools, and secondary professional training colleges (higher secondary education within ISCED 3).

The method presented here shows high-quality psychometric features and high inner consistency (the standardised Cronbach's alpha corresponds to a value of 0.97 and the McDonald's omega is 0.97). Individual questions correlate with the total QDGP score within the range between 0.59 and 0.85. The QDGP has a high correlation with criteria applied within the international scales for Internet Gaming Disorder (IGD) ($r=0.71$) and Scale for the Assessment of Pathological Computer-Gaming (AICA-S) ($r=0.76$). The average number of

hours spent on playing on weekdays and at the weekends has a close relation to the total QDGP score ($r=0.69$, $r=0.66$ respectively).

Evaluation of the method in boys

In the population of boys attending the upper classes of primary schools and the first up to the fourth classes of eight-year grammar schools, according to the QDGP method, 69.3% of the pupils are problem-free users of digital games. These pupils achieve scores from 0 to 17 points in the QDGP. A total of from 18 up to 20 points is achieved by 14.9% of the boys and they can be considered as problematic players. Pupils who scored more than 21 points in the QDGP fall into the category of being at risk of becoming addicted to the activity being monitored (playing digital games) – a total of 15.8% of the boys. A total of 12.0% of the boys at risk of gaming addiction were identified in the group of secondary school boys; the lower limit of the result score in the QDGP questionnaire was 21 points. Problematic players of digital games from secondary schools who scored between 17 and 20 points in the QDGP questionnaire amounted to 15.9%. Less than three quarters (72.1%) of the boys from secondary schools have no problems with playing computer games (more details of the individual categories are to be found in Table 6).

Evaluation of the method in girls

Girl pupils of primary schools and eight-year and six-year grammar schools who scored a maximum of eight points within the QDGP questionnaire (81.8%) were classified as problem-free users. A total of 15.7% of the girls from this group scored from nine up to 18 points and fell into the category of problematic users. Reaching 19 and more points is, in this group, already considered as risky for developing an addiction and 2.5% of the girls fell into this category. The least risky category is girl students of secondary schools, among whom only 2.2% are at risk of becoming addicted (i.e. they scored 20 or more points). The category of problematic digital game playing involved 6.5% (13 up to 19 points), whereas 91.3% of the girls from secondary schools and grammar schools can be considered as problem-free users of digital games (Table. 6).

Table 6: Ratio of respondents at risk of problems associated with playing digital games according to gender and level of education

Gender	Education	Index	Problem-free playing	Problematic playing	At risk of addiction
Male	Primary	Prevalence (%)	69.3	14.9	15.8
		No. of points in QDGP	0 up to 17	18 up to 20	21 up to 30
	Secondary	Prevalence (%)	72.1	15.9	12.0
		No. of points in QDGP	0 up to 16	17 up to 20	21 up to 30
Female	Primary	Prevalence (%)	81.8	15.7	2.5
		No. of points in QDGP	0 up to 8	9 up to 18	19 up to 30
	Secondary	Prevalence (%)	91.3	6.5	2.2
		No. of points in QDGP	0 up to 12	13 up to 19	20 up to 30

The psycho-diagnostic tool QDGP presented here serves as one of the sources providing information on the level of severity of playing digital games. The questionnaire may be applied by addictologists, clinical, consultant, and school psychologists, psychiatrists, and other professionals from various spheres in their professional practice (psychological and addictological outpatient clinics, consultancy and

psychiatric facilities). The relevant professionals not only have a chance to work with the results acquired at the level of population standards but can also use the individual questions and answers as a basis for their further professional work with a client, e.g. within therapeutic treatment or in psychodiagnostics.

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