Residência RP Pediátrica
Publicação Oficial da Sociedade Brasileira de Pediatria

Submitted on: 08/11/2021
Approved on: 10/25/2021

ORIGINAL ARTICLE

Electronic games dependence in adolescents from the pediatrics unit of a university hospital in Distrito Federal

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Keywords:
Adolescents,
Video games,
Mental health.

Abstract

Introduction: The study aimed to identify the prevalence of addiction and the risk of addiction to electronic games in adolescents monitored at the Pediatric Service of a university hospital in Distrito Federal. **Methods:** Cross-sectional observational study carried out with adolescents aged 10 to 19 years, using a questionnaire of 10 multiple-choice questions, which aim to assess dependency in 5 dimensions in relation to "compulsive gaming". Were also evaluated: sociodemographic data (age, sex, education and grade repetition) and game usage parameters (frequency of weekly gaming, daily game time). The questionnaire was applied in 4 months and the statistical analyzes were performed by the SAS 9.4 application. p <0.05 was considered significant. **Results:** 114 adolescents were interviewed, with a median age of 15 years. The majority (71%) reported using some type of electronic game as a recreation, of which 62.1% were boys. The prevalence of dependence was 3.51% and the risk of dependency was 9.65%, with the dimension "time restriction" being the most frequent with 42.9%. Only schooling showed a significant association with the occurrence of the risk of dependency (RP = 6,16, IC 95%: 1,48; 25,65; p = 0,0125). **Discussion:** Even with some limitations, the study stands out for being able to demonstrate a prevalence of dependence on electronic games in a convenience sample similar to the one found in the literature, as well as to draw an epidemiological profile of risk factors for the dependence of the interviewed patients.

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Residência Pediátrica; 2023: Ahead of Print. DOI: 10.25060/residpediatr-2023.v13n2-708

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INTRODUCTION

Nowadays, the world is experiencing a technological transition, with the increasingly early exposure of children and adolescents to electronic media. The repercussions of this exposure are not yet fully elucidated, as there is also little knowledge about the effects on brain circuits in the medium and long term.

Despite this observation, the importance of technology and electronic games for personal development and learning is undeniable, as demonstrated in many studies, assisting, for example, in the development of cognitive and motor skills, improvement of the capacity of spatial orientation and in the facilitation of socialization[1-3].

However, while playing this type of game has some benefits in certain clinical circumstances, there is a growing body of evidence highlighting the most negative aspects of the game. These include risk of dependence and increased aggression[4,5], as well as low performance at school[6,7], anxiety disorders, depression and low self-esteem[8,9].

Adolescence represents a critical period in the development of personality, with a greater risk of developing addictive behaviors during this age[10,11]. In this regard, addictive disorder by electronic games can be defined as the excessive and compulsive use of electronic games causing emotional and / or social problems, and that despite this, the player cannot control or inhibit his/her conduct[12].

This pattern of overuse is not only favored by the characteristics present in many games, such as sense of dominance, self-determination, fantastic aesthetics and performance feedback[13]; but also by the perception, especially in children and adolescents, that games are harmless, fun, challenging, in addition to allowing them to avoid real problems when they are involved in the act of playing[14]. In addition, recent studies have suggested a possible common neurobiological basis with dependence on drugs involving the mesolimbic system and the release of dopamine[15,16].

Considering all these arguments, the World Health Organization (WHO) recognized this disorder by defining it in the 11th Review of the International Statistical Classification of Diseases and Related Health Problems (ICD-11) in 2018[17]. Thus, in addition to being current and controversial, the addictive disorder of electronic games is a theme that needs to be increasingly addressed by the scientific community. Given the importance and currentness of the theme and the scarcity of studies in Brazil on the subject, this work has as objectives evaluate the prevalence of addiction and risk for addiction to electronic games in adolescents followed up at the Outpatient Pediatric Service of a university hospital in Distrito Federal and identify factors associated with risk and dependence (gender, age, education and grade repetition), as well as the relationship between dependence and risk for dependence with the gaming time reported by the interviewed adolescents.

METHODS

This is a transversal observational study with a convenience sample in which adolescents monitored at the General Pediatrics and Adolescent Health clinics of a university hospital in the Distrito Federal were evaluated. The sample was collected for a period of 4 months (May to August 2019), through a questionnaire - attached, previously validated by Young et al. (2011)[18], based on DSM- IV and composed of 10 multiple choice questions, which aim to assess the individual in 5 dimensions related to gaming dependence (salience, mood change, tolerance, conflict and time restrictions) in relation to "compulsive gaming".

These dimensions were considered by the authors and formulated in questions, as described below and in Attachment:

Salience – when the gaming activity becomes the most important thing in the person's life, which can be divided into: cognitive (when the individual often thinks about the activity) and behavioral (when he neglects basic needs such as sleep, food or hygiene to perform the activity), this dimension can be assessed through questions 5.1 and 5.2 of the questionnaire;

Mood change - refers to subjective experiences influenced by the activity performed, being evaluated in questions 5.3 and 5.4;

Tolerance - related to the process of needing increasing "dosage" of the activity to obtain the initial sensations, so the player needs to play more and more, dimension evaluated in questions 5.5 and 5.6;

Conflict - it is understood as interpersonal or intrapersonal conflict caused by the activity performed, accompanied by deterioration of academic or professional results, abandonment of old hobbies, dimension assessed in questions 5.7 and 5.8;

Time restrictions - are the time restriction attempts, which can be associated with possible relapses, dimension measured in questions 5.9 and 5.10[18].

As answers to the 10 questions, the questionnaire presents the following options: (1) never, (2) rarely, (3) frequently e (4) very frequently. The dimension is only present in individual's life if the answers are checked "frequently" or "very frequently" to at least one question of the dimension[18].

Also according to Young et al. (2011)[18], the individual is considered to have "dependent behavior" if all 5 dimensions are present in the questionnaire; and with "risks to addictive behavior" if three dimensions, in addition to the conflict, are present.

In order to assess factors related to the disorder, the following variables were analyzed:

Sociodemographic data: age, gender, repetition and schooling;

Electronic game usage parameters: weekly game frequency, daily game time during the week and / or weekend.

As inclusion criteria for the research, literate adolescents were considered, aged 10 to 19 years of age accompanied at the service. As an exclusion criterion, was considered the adolescent with cognitive, neurological or sensory deficit, which prejudiced the correct understanding of the questionnaire, and / or anyone who refused to participate in the research. It is noteworthy that the survey did not specify whether adolescents played *online* or *offline*.

The questionnaire was applied by the researcher and undergraduate students, trained by the researcher and her supervisor, during medical consultation, after approval by the Ethics Committee of the Faculty of Medicine of the Universidade de Brasília (UnB) – CAAE: 09248918.1.0000.5558. A total sample of 120 patients was estimated, based on the weekly number of adolescents seen at the service. All patients who agreed to participate in the research and their respective guardians completed a Free and Informed Assent Form (FIAF) and a Free and Informed Consent Form (FICF), respectively.

Poisson regression models with robust variance were used to assess the association of the variables gender, age, education and grade repetition with the "risk of dependence" and with the dimensions of the questionnaire (salience, mood, conflict, tolerance and time restriction). Poisson regression provides a better estimate of the prevalence ratios, representing more significantly the measures of effect for cross-sectional studies[19].

The association of dependence on games with gender, age, education and grade repetition was assessed using Fisher's exact test. The association between dependence and "risk for dependence" with the time and frequency of gaming was calculated using the Chi-square test, considering a significant $p<0.05$. The analyzes were conducted using the SAS 9.4 application.

RESULTS

143 adolescents were consulted, of which 29 (20%) were unable to participate in the research because they fit the exclusion criteria. Of the 114 interviewed adolescents, 48.2% were male and 51.75% female, as shown in Table 1.

Regarding age, adolescents under 15 years old and over 15 years old were established as variables, according to the study's median, with 63.16% of respondents aged less than or equal to 15 years. Regarding education, 50.8% of adolescents were in elementary school and 40.1% in high school. Regarding grade repetition, it was seen that about 73.6% have not had any grade repetition so far in their school life.

In assessing games usage, it was observed that 71% of the interviewed adolescents used some type of electronic game, 62.1% of whom were male. Of those who did not use games, 87% are female. It was also observed that the majority of adolescents who used the games were aged 15 years or less, differently from schooling, in which there was little difference in frequency between elementary school and high school.

The prevalence of dependence highlighted in the study was 3.51% and the "risk for dependence" was 9.65%. Evaluating each dimension of the study separately, it was observed that the dimension "time restriction" was the most present in the questionnaires answered with 42.9%, followed by the dimension "mood", with 39.4%. The other dimensions showed the following prevalence: tolerance - 29.8%, salience - 21.9% and conflict - 12.28%.

Analyzing the study variables according to the prevalence ratios for the occurrence of the "risk of dependence" (Table 2), following the Poisson regression model, it was observed that only the variable education had a significant association with the occurrence of "risk of dependency" (PR = 6.16, 95% CI: 1.48; 25.65; p = 0.0125). In other words, adolescents who are in elementary school have a prevalence of "risk of dependence" 6.16 times higher than adolescents who are in high school. The variables gender, age and grade repetition were not shown to be risk factors associated with the "risk of dependence".

In the evaluation of the study variables and the occurrence of dependence, it was observed that no variable showed a significant association. For this evaluation, the association of each variable with the occurrence of dependence was analyzed - bivariate analysis, since due to the small number of adolescents with dependence, it was not possible to calculate the prevalence ratios according to the Poisson regression model.

Regarding the dimensions of the questionnaire, following the same Poisson regression model, it was observed that no variable showed a significant association with the salience dimension - Table 3. Only the gender variable showed a significant association with the mood dimensions (PR = 2.78, 95% CI: 1.64; 4.73; p = 0.0002), tolerance (PR = 3.95, 95% CI: 1.79; 8.71; p = 0.0007) and time restriction (PR = 3.04, 95% CI: 1.81; 5.10; p<0.0001). The schooling variable was the only one that showed a significant association with the occurrence of conflict alteration (PR = 3.96, 95% CI: 1.36; 11.57; p = 0.0119).

It was observed, in the analysis, that the association between dependence and "risk for dependence" with their frequency of weekly gaming, that there was a higher frequency among adolescents with dependence and risk for "playing every day" - Table 4. Regarding gaming time, there was a higher frequency of playing up to two hours a day in adolescents at risk, and there was no difference in adolescents with dependence.

The study showed no significant association between gaming frequency and number of hours played per day with the "risk of dependence" (p = 0.9333 and p = 0.5674, respectively), nor with dependence (p = 0.9288 and p = 0.8110, respectively).

Table 1. Sociodemographic variables according to the usage of electronic games.

Variables*	Uses electronic games		Total
	Yes	No	
Gender			
Male	51 (92.73)	4 (7.27)	55 (48.25)
Female	31 (52.54)	28 (47.46)	59 (51.75)
Age			
≤15	20 (27.78)	72 (63.16)	42 (36.84)
>15	30 (71.43)	12 (28.57)	
Schooling			
Elementary	42 (72.41)	16 (27.59)	58 (50.88)
High School	40 (71.43)	16 (28.57)	56 (40.12)
Grade repetition			
None	58 (69.05)	26 (30.95)	84 (73.68)
One or more	24 (80.00)	6 (20.00)	30 (26.32)

* Values expressed in frequency (%)

Table 2. Distribution of study variables according to the prevalence ratios under the multiple Poisson regression model with robust variance and their respective 95% confidence intervals for the occurrence of "risk of dependence.

Variables	Prevalence Ratio (PR)*	
	PR (CI 95%)	p-value
Gender		0.4287
Female	1	-
Male	1.73 (0.44; 6.76)	0.4287
Age		0.4946
≤ 15		
>15	0.4946	
Schooling	1	-
Elementary		0.0125
High School	6.16 (1.48; 25.65)	0.0125
Ensino médio	1	-
Grade repetition		0.7663
One or more	1.22 (0.33; 4.49)	0.7663
None	1	-

* Prevalence ratios obtained by adjusting Poisson regression models by the variables: gender, age, education, grade repetition.

DISCUSSION

In this study, the prevalence of addiction to games was 3.51%, similar to that found in the literature, which varied between 2.7% and 37.5%, with the majority of studies conducted with adolescents[20,21]. This variability in prevalence can be explained by several factors, like the fact of using appropriate instruments of the diagnostic criteria for substance use disorders or gambling games of criteria, usually by word exchange "gambling" with "play"[20]. Another factor that makes a more homogeneous analysis difficult is the fact that the evaluated items are based on self-report, which can be easily manipulated and denied by adolescents, compromising the results and diagnostic accuracy.

Also contributing to this variability is the fact that they are specific studies, carried out in different countries, with different populations and cultures, as demonstrated in a study carried out with Korean adolescents, residing in South Korea, and Korean immigrant adolescents, residing in the United States, in which different prevalences were observed between the two populations, although both came from the same country[22]. The study concludes that living in the United States is a protective factor for the Korean adolescents interviewed.

Table 3. Distribution of study variables according to prevalence ratios according to multiple Poisson regression models with robust variance and their respective 95% confidence intervals for the occurrence of dimensions for gaming dependence.

Variables	PR* - Salience		PR* - Mood		PR* - Tolerance		PR* - Conflict		PR* – Time restriction	
	PR*	p- value	PR*	p- value	PR	p- value	PR	p- value	PR	p- value
Gender		0.2996		0.0007		0.0002		0.3893		<0.0001
Female	1	-	1	-	1	-	1	-	1	-
Male	1,56 (0.67;3.65)	0.2996	3.95 (1.79;8.71)	0.0007	2.78 (1.64;4.73)	0,0002	1,68 (0.51;5.50)	0.3893	3,04 (1.81;5.10)	< 0.0001
Age		0.4577		0.9654		0.6702		0.6145		0.7045
≤ 15	1.48 (0.53;4.15)	0.4577	1.02 (0.49;2.10)	0.9654	1,14 (0.63;2.05)	0.6702	0.74 (0.23;2.39)	0.6145	1.11 (0.64;1.96)	0.7045
> 15	1	-	1	-	1	-	1	-	1	-
Schooling		0.7306		0.9368		0.7330		0.0119		0.2875
Elementary	0.84 (0.33;2.19)	0.7306	1,03 (0.52;2.03)	0.9368	1,11 (0.62;1.99)	0.7330	3.96 (1.36;11.57)	0.0119	1.33 (0.78;2.26)	0.2875
High School	1	-	1	-	1	-	1	-	1	-
Grade repetition		0.0564		0.7870		0.6745		0.2758		0.5173
One or More	2.27 (0.98;5.25)	0.0564	1.09 (0.59;1.99)	0.7870	0.89 (0.53;1.51)	0.6745	1,90 (0.60;6.02)	0.2758	0.85 (0.53;1.38)	0.5173
None	1	-	1	-	1	-	1	-	1	-

* Prevalence ratios obtained by adjusting Poisson regression models by the variables: gender, age, education, grade repetition.

Table 4. Association between "risk of dependence" and dependency with frequency and hours of play.

Variables*	Risk of dependence			Dependence		
	No	Yes	p-value#	No	Yes	p-value#
Gaming frequency			0.9344			0.9288
Weekend	12 (85.71)	2 (14.29)		13 (92.86)	1 (7.14)	
Every day	31 (86.11)	5 (13.89)		34 (94.44)	2 (5.56)	
Once a week	12 (92.31)	1 (7.69)			13 (100.00)	0 (0.00)
Twice or more a week	16 (84.21)	3 (15.79)		18 (94,74)	1 (5.26)	
Hours of gaming			0,5674			0.8110
Up to 2 hours a day	37 (88.10)	5 (11.90)		41 (97.62)	1 (2.38)	
2 to 4 hours a day	14 (87.50)	2 (12.50)		15 (93.75)	1 (6.25)	
4 to 6 hours a day	8 (72.73)	3 (27.27)		10 (90.91)	1 (9.09)	
Mais de 6 horas por dia	12 (92.31)	1 (7.69)		12 (92.31)	1 (7.69)	

* Values expressed in frequency (%). # p-value calculated by the Chi-square exact test.

It is worth noting that studies in Brazil on the disorder are scarce, most of which are literature reviews or studies that assess game time, without assessing the existence of addiction, which makes it difficult to compare results nationwide[14,20,23]. It is noteworthy, however, a study carried out in the South region, in which the same questionnaire used in this analysis was used, with 47 adolescents from a private school being interviewed, with an average age of 12.98 years and prevalence of dependence of 13%, with a higher frequency in boys[24]. Similarities were found in this analysis and in the study of the southern region, with a greater frequency in the dimensions "time restriction" and "mood", as well as their relationship with gender, as it was observed that the majority of patients who presented these positive dimensions were male, in both studies.

Regarding the association between dependence and gender, studies show that boys are more vulnerable to developing addiction to games, as they invest much more time in electronic games than girls[14,24-26]. A plausible explanation for this preference would be girls' lack of interest in games,

since they value cooperation more than competition, being more interested in simulation games and interactions with male characters, characteristics that are rarely present in most games produced worldwide[14].

Despite these findings, the issue of gender is still controversial, some studies show a significant association with males, but others have not shown differences between genders.[27,28] In a majority, there is a higher frequency of boys who play and who are dependent, but with no statistically significant difference.

Following the same worldwide pattern, this study found a higher frequency of male adolescents who use electronic games as leisure activities (62.1%), but no significant association was found with gender, neither for dependence nor for the risk, although males are more frequent in these two conditions.

Regarding the playing time, some authors suggest that the dependence occurs due to the time spent in the activities of electronic games, based on the theory of substitution of social activities, according to which the individual who engages many hours a day in a certain activity, ends up neglecting other more important ones, such as studying and sleeping.[20] However, research carried out in an attempt to prove this hypothesis usually presents confusion bias, often revealing controversial results[20]. Despite this, the vast majority of studies demonstrate a relationship between gaming time and addiction[27,28].

In the current study, a higher frequency of adolescents with the disorder to "play every day" and "play for up to 2 hours a day" was evidenced, although there was no statistical association, most likely influenced by the small sample. This result evidences the previous theory that the time dedicated per day to gaming does not necessarily influence the diagnosis of addiction.

It is known that the problems related to the individual with the disorder extend to all aspects of his life - health, family, school and social relationships, which can reduce interpersonal relationships, change sleep patterns, as well as reduce academic performance and labor[6,7]. Thus, in the study, the variable "grade repetition" was used as a parameter for low school performance. However, there was no significant association between this variable and dependency or "risk for dependence".

The results found in relation to the "risk for dependence" are also worth mentioning. In the analysis carried out in the study, a significant association was found with the variable "schooling" and "risk for dependence", however, no studies were found that evaluated the "risk for dependence". Another important point is that the majority of studies carried out evaluating the dependence on games among adolescents, did not evaluate "schooling" as a risk factor, the majority of which was based on the "gender" variable. Only one Korean study carried out an assessment related to "study time in years" and which did not demonstrate significant relevance[22]. Therefore, more comprehensive studies with more robust samples will be needed to better evaluate this variable.

Regarding the limitations found in the study, they are mainly concentrated in the sample space. In addition to the interviewee's bias, which may underestimate or overestimate the diagnosis, it is important to note that the sample number may have influenced the research results because it is relatively small, even making multivariate analysis of patients with dependence impossible.

It is also worth mentioning that the research was carried out with a convenience sample, in a tertiary care hospital, with the vast majority of the adolescents being monitored presenting comorbidities, whether organic or psychiatric. In this sense, the sample was reduced, even though the collection was carried out over a period of four months, since most patients show frequent returns to the institution, as well as the fact that the large portion of patients who were unable to participate in the research presented important cognitive deficits that made it impossible to understand and properly complete the questionnaire.

Despite the limitations, the study stands out for being able to demonstrate a prevalence of dependence on electronic games in a convenience sample similar to that found in the literature, as well as to outline an epidemiological profile of the interviewed patients. However, the importance of further research on the subject is carried out in Brazil in order to better understand the clinical characteristics, risk factors and relationships with other disorders; to propose measures and strategies for treatments and prevention, within the scope of Public Health Policies for Adolescents

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ATTACHMENT

RESEARCH: ELECTRONIC GAMES DEPENDENCE IN ADOLESCENTS FROM THE PEDIATRICS UNIT OF A UNIVERSITY HOSPITAL IN DISTRITO FEDERAL

1. **Sociodemographic data:**

Name:_____ **Medical record:** _____

Age:____ DN: _____**Gender:** _____

Living area: _____**Schooling:** _____

Grade repetition:_____

2. Do you use electronic games?

1. Yes
2. No

3. If so, how often?

1. Only in the weekends
2. Every day
3. Once a week
4. Twice or more a week

4. How many hours a day do you play?

5. Up to 2 hours a day
6. 2 to 4 hours a day
7. 4 to 6 hours a day
8. 6 to 8 hours a day
4. More than 8 hours a day

ELECTRONIC GAMES DEPENDENCE QUESTIONNAIRE (YOUNG, KS et al, 2011):[18]

5.1. Have you ever stopped performing activities like eating or sleeping or going to the bathroom to stay connected to the internet while playing?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.2. Do you sometimes imagine yourself in the game when you're not?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.3. Have you ever felt angry or uncomfortable when you can't be in the game?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.4. You feel happier and more pleased when you get to play?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.5. Do you feel like you're spending more and more time in the online game?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.6. Do you start playing without being truly interested?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.7. Do you fight with your family members because of your gaming time?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.8. Do your family, friends, school suffer because of the time you're spending playing on the internet?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.9. Have you ever tried limiting your gaming time and failed?

1. Never
2. Rarely
3. Frequently
4. Very frequently

5.10. You happen to stay in the game longer than you planned?

1. Never
2. Rarely
3. Frequently
4. Very frequently