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REVISIONES

The use of video games in adolescents. A Public Health problema

El uso de videojuegos en adolescentes. Un problema de Salud Pública

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ABSTRACT:

Introduction: The excessive use of videogames has increased dramatically, especially among 10-to-19-year-old males. Many teenagers lose control over video games, which may have negative consequences such as pathological, problematic, or addictive gaming.
Objectives: Knowing the existing scientific production about the problematic use of video games and video games addiction in teenagers.
Methodology: Documents found after a bibliographic search in the databases COCHRANE, MEDLINE, LILACS, CINAHL and CUIDEN have been analyzed.
Results: It has been defined the predictive factors, the prevalence, the characteristics, the validated questionnaires, the associations with other addictions, the relations with ASD (Autism Spectrum Disorder) and ADHD (Attention-Deficit/Hyperactivity Disorder), and prevention of problematic use and addiction to video games.
Conclusions: There are inconsistencies in the results due to the transversal design of most of the studies, such as small samples, the absence of clinical or randomized samples, data extraction with self-reporting questionnaires conducted in schools, without taking into account adolescents hospitalized into mental health centers or hospitals, the gender bias in research and the lack of standardization of diagnostic criteria. The least studied subject is the treatment and prevention, the most important for nursing profession, so the future main line of research would be in this area.

Key words: video games addiction, adolescents, problematic game, pathological gaming.

RESUMEN:

Introducción: El uso excesivo de videojuegos ha aumentado de manera vertiginosa y, especialmente, entre los varones con edades comprendidas entre los 10 y los 19 años. Muchos adolescentes pierden el control sobre el videojuego, lo que puede tener consecuencias negativas como el juego patológico, problemático o la adicción al videojuego.
Objetivos: Conocer la producción científica existente sobre el uso problemático de videojuegos y la adicción al videojuego en los adolescentes.

Metodología: Se han analizado los documentos encontrados tras una búsqueda bibliográfica en las bases de datos COCHRANE, MEDLINE, LILACS, CINAHL y CUIDEN.
Resultados: Se han definido los factores predictores, la prevalencia, las características, los cuestionarios validados, la relación con otras adicciones, la relación con el TEA (Trastorno del Espectro Autista) y con el TDAH (Trastorno por Déficit de Atención e Hiperactividad) y la prevención del uso problemático y la adicción al videojuego.
Conclusiones: Hay inconsistencias en los resultados debido al diseño transversal de la mayoría de los estudios, a las muestras pequeñas, a la ausencia de muestras clínicas o aleatorizadas, a la extracción de datos con cuestionarios de autorreporte, a la realización de estos en colegios, sin tener en cuenta a los adolescentes ingresados en centros de salud mental u hospitales, a la falta de estudios en el género femenino y a la falta de estandarización de los criterios diagnósticos. El tema menos estudiado es el tratamiento y la prevención, el más importante para nuestra profesión, por lo que la principal futura línea de investigación sería en este ámbito.

Palabras clave: adicción, videojuegos, adolescentes, juego problemático, juego patológico.

INTRODUCTION

Adolescence is a time of exponential growth and exposure to considerable risks, in which social context can have a determining influence [1].

Technology such as internet, mobile phones and video games are very useful elements in everyday life, although they may have their drawbacks [2]. In the last decade, the use of video games has become an increasingly popular leisure activity, especially among adolescent males [3]. There is currently enough empirical, clinical, and scientific evidence to consider that excessive gaming can become problematic and addictive, especially in online video games [2]. The design of video games facilitates the loss of control over the game, which together with other personal and environmental factors, facilitates abusive and inappropriate use of video games, which can lead to addictive behavior in adolescents [2,4]. In this respect, technological addictions are the most recent type of behavioral addictions due to excessive and dysfunctional consumption [2].

Problematic gaming behavior refers to the condition under problematic engagement of digital games [5]. The pathological use of video games occurs when there is a dysfunctional use that harms the user on a familiar, social, work, school, behavioral and/or psychological level [6]. The growing prevalence worldwide requires improved quality of research to generate evidence on this important public health problem [3]. Knowing the indicators and predictors of video game addiction is essential for nurses and other health professionals working with adolescents to early identify pathological behavior and develop effective prevention programs [3].

OBJECTIVES

Knowing the existing scientific literature about the problematic use of video games and about the addiction to video games in teenagers.

Knowing the characteristics of the scientific documentation on the problematic use of video games and video game addiction in adolescents.

METHODOLOGY

A bibliographical review has been conducted on "video game addiction in adolescents". For this purpose, the Cochrane Library, CUIDEN, CINAHL, LILACS and MEDLINE databases have been consulted, applying different search strategies such as the Boolean operators "AND" and "NOT" and using 8 key words as descriptors: game (gaming), videogame (videogaming), addiction, child, adolescent, adult, problematic and online.

The research was carried out during the month of March 2019. The criteria for inclusion were defined as: the type of document, collecting only original scientific articles; full text articles about the referred subject and in the age of adolescence; and texts written in Spanish, English, French and Portuguese. Opinion articles, bibliographic reviews and experience articles were excluded, as well as those that did not meet the criteria described above.

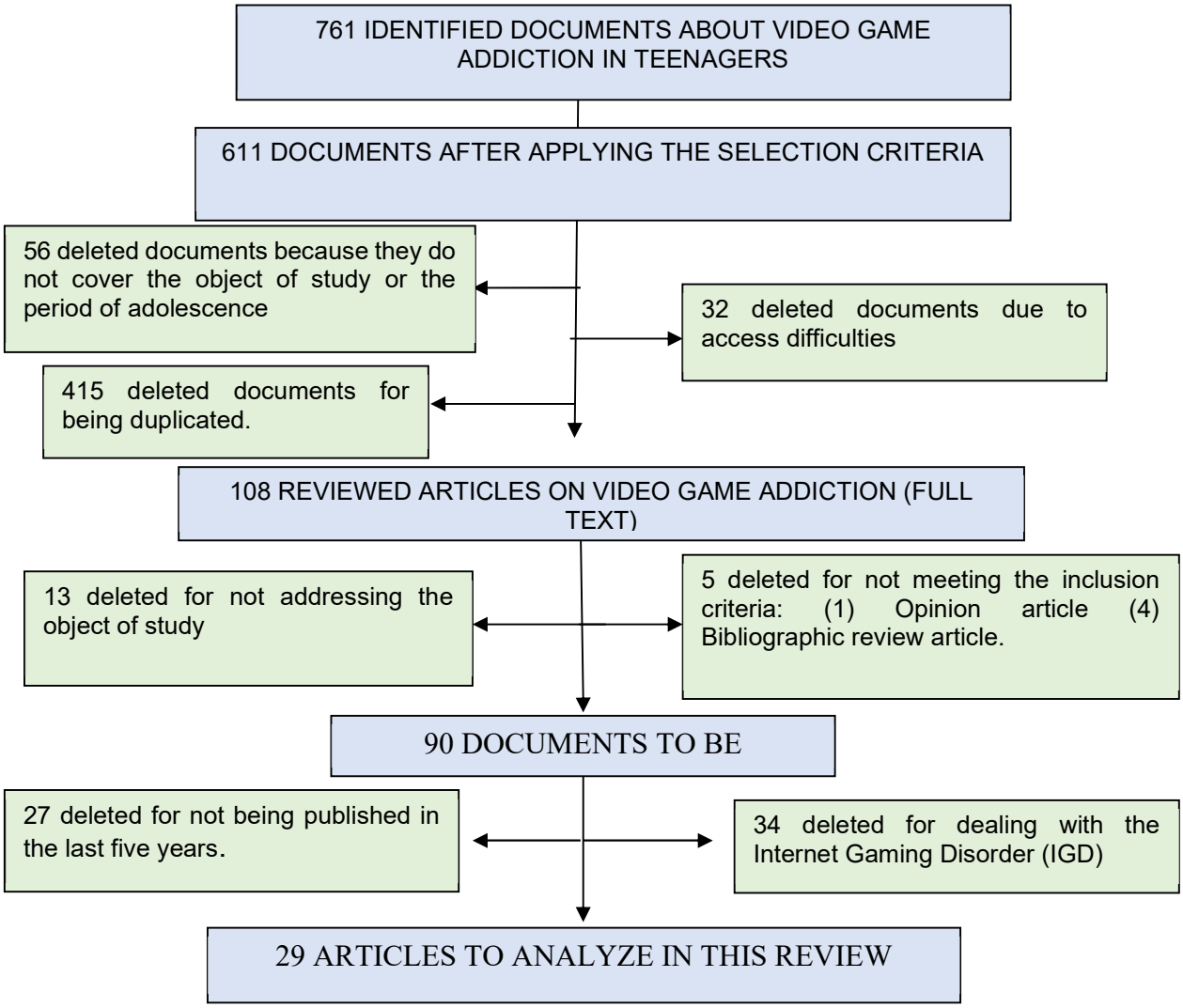
The publication year was used as a limiting factor in the research, considering only these articles published in the last 10 years and only those carried out with humans. Subsequently, articles from the last five years (from March 2015 to March 2019) and which exclusively cover video game addiction and its problematic use were selected to be analyzed in the results, in order to show the most recent scientific production and to fulfill the requirement regarding the number of bibliographic references proposed by the journal.

To characterize the scientific production found, some categories of analysis have been considered previously: type of research, thematic line, publication date, country and continent where the research was carried out, gender, age and size of the sample, and where the data has been collected.

RESULTS

A total of 761 documents were identified on the adolescents' video game addiction. After the selection of the documents, as shown in Figure 1, a total of 29 articles were included for analysis in this review.

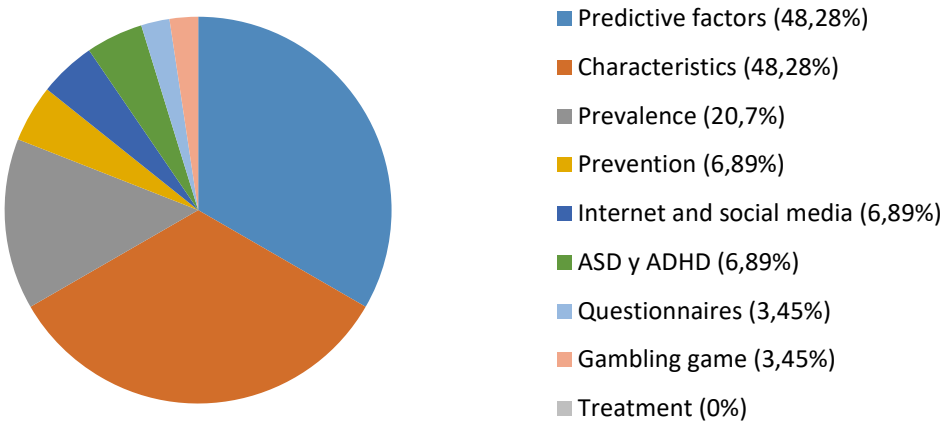
Figure 1. Selection process of published documents on video game addiction.



Only one of the 29 documents analyzed was based on a qualitative research study, the rest being descriptive research (20), analytical studies (4), experimental designs (3) and psychometric research (1).

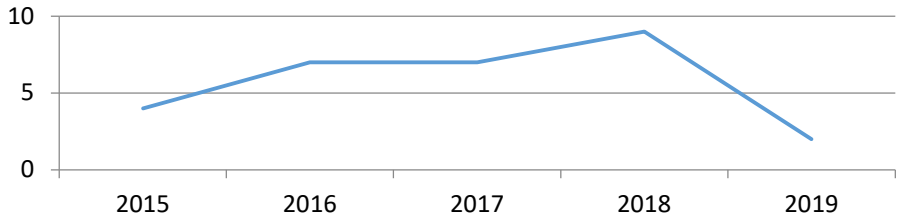
As for the thematic lines, the order of frequency of the studies has been represented in Figure 2.

Figure 2. Classification by topic. Issues addressed by the documents.



The evolution in terms of the volume of publication per year is shown in Figure 3. The selection was made from documents published between March 2015 and March 2019.

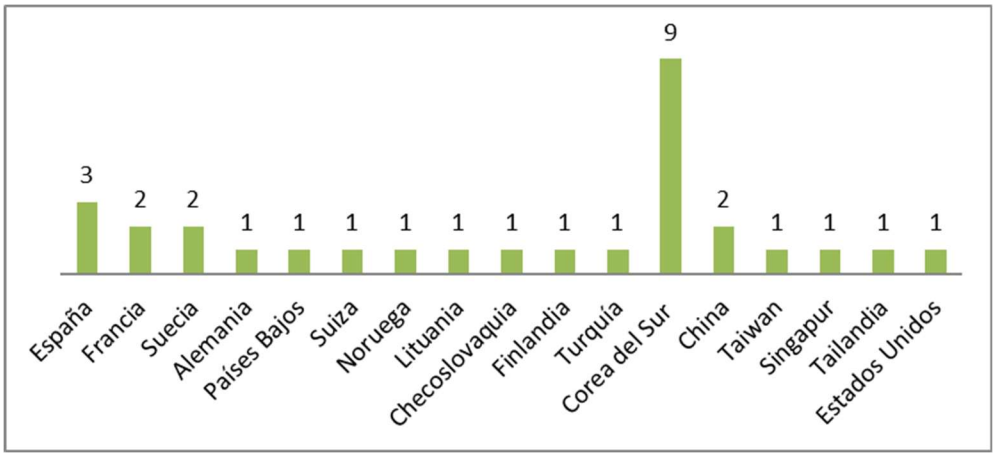
Figure 3. Chronological classification.



Regarding the countries of origin of the articles, 14 were carried out in Europe (48.28%); 13 in Asia (44.83%) and 2 in North America (6.89%). The distribution according to the different countries is shown in Figure 4.

Finally, regarding the characteristics of the sample, 22 researches included female and male adolescents (75.86%), mostly in the same proportion, although in some it could differ. The rest of the articles (7) used male specimens. In five of the six articles that studied the physical or physiological characteristics of adolescents with pathological gaming or video game addiction, exclusively male samples were selected. Another article with a male sample studied the relationship between ASD or ADHD treatment and video game addiction, being the only one found in this regard. This means that there is a lack of information regarding adolescent females in these fields.

Figure 4. Geographical classification of document origin by country



In relation to the sample size, it has generally been large. However, in the Attention Deficit Hyperactivity Disorder (ADHD) studies and most of those that analyzed physical or physiological characteristics, small samples were used. In addition, many times they were not randomized studies, or the samples were not selected in a way that could be generalized to the entire population. Most of the time, the studies were conducted at school, which means that not all the adolescents who have an addiction to online video games were really taken into account, because, in some countries, not all of them go to school, and, moreover, some of these adolescents may be hospitalized or in mental health centers.

In fact, most of the studies that needed only people who were addicted to online video games were conducted at mental health centers or hospitals. Some of the research was based on online or telephone surveys of all adolescents, but these were in the minority.

Prevalence of video game addiction

Of all the articles selected, six of them provided us with data on the prevalence of problematic or pathological video game addiction.

In Europe, in Czech Republique, 11% of the sample of 16-yearold adolescents showed excessive use of internet games [(7)]. Whereas talking about the video games issue, in France, 8.8% of the adolescents experienced pathological gaming [(8)], and in Sweden, 1.3% of the adolescents presented an online gaming addiction recognized by themselves (through the GAIT questionnaire) and 2.4% indicated by their parents (through the GAIT-P questionnaire) [(9)]. In Spain, considering adolescents between the ages of 12 and 17, 33% of online players and 6.8% of offline players presented pathological gaming [(10)].

When talking about Asia, 11.4% of adolescents in South Korea and 30.4% of adolescents in China were addicted to video games [(11)], whereas in Turkey, between 4.32% and 28.8% of adolescents were addicted to video games [(3)].

Predictors of video game addiction and problematic gaming

Predictors were the most studied subject along with characteristics. In fact, 14 out of the 29 articles analyzed dealt with this topic.

-Demographic variables: Regarding demographic variables, gender was strongly associated with video game addiction. Being a male led to a higher risk of developing this addiction and showing more symptoms, while being female was a predictor of the use of social networks, and increasingly, of the use of cell phone games [7,12].

In a Turkish sample, the predictive factors for adolescent girls were negative family environments and low school performance; while the predictive factors for boys were the level of game violence, computer self-efficacy, psychosocial problems (depression and anxiety) and decreased impulsivity control [3]. Furthermore, in a French sample, although it is difficult to generalize the results to the entire population, male adolescents attributed as possible causal factors: lack of friends, family problems, difficulty in making friends and poor school results; while females gave more importance to family problems, lack of self-confidence and poor self-image [8].

-Game characteristics: Online playing time was an important predictor of gaming addiction and those players who played late at night were more likely to develop addiction [12]. In fact, the frequency of the use of online games after midnight greatly increased the likelihood of this problem [11].

In Finland, the most addictive games were MMORPG (Massively Multiplayer Online Video Game) and shooting games; followed by online battle, role playing, strategy and action games [5]. However, in South Korea, role-playing, simulation, and causal games increased the probability of addiction; being more associated with role-playing for boys and shooting for girls [12]. A French research identified shooting and role-playing games as the most addictive, followed by strategy games [8]. In South Korea, only MMORPG had a positive effect on the problem of psychosocial gaming, while in China, it was only the action genre that was associated with this problem [11]. The fact that they were online players, and not offline, was also considered a risk factor for addiction since online players were almost 12 times more likely to play at higher frequency than offline players[10].

-Family influence: Regarding family influence, no conclusive results were obtained. The research of Männikko, et al. [5], carried out in Finland, pointed out the importance of the family structure in the development of the problematic use of video games for both genders since those adolescents who lived in a blended family or in a sole or joint custody family were more likely to be addicted than those who lived in a nuclear family. However, the study conducted by Spilková, et al. [7] concluded that there were no significant associations between the family environment and the development of risk behavior in adolescent video game addiction.

Lee and Kim [12] provided that parental affection had no influence on the development of Internet video game addiction, but that it was the lack of interest by parents in their children's online activities that was associated with an increased risk of online gaming addiction. In fact, in Korea, dual-income families with parents who work long hours were a risk factor for the development of addiction, since it encouraged greater use of video games due to the lack of parental control [13]. Even in Korea, teenagers from multicultural families had a higher risk of developing video game addiction, due to the fact that they used them as an escape route, and also because of the few social relationships they had because of their exotic appearance [13]. In China, the lack of parental bonding was a strong predictor of gaming problems [11].

-Social influence: Adolescents who established social relationships and maintained bonds with family, friends, neighbors, and teachers were less likely to be addicted to online games [11-12]. Even those adolescents who had more online social interaction had fewer symptoms of problematic gaming than those who had less online social interaction[15].

Another predictive factor of video game addiction was the expectation of a positive outcome in the relationship between peers and parents. Frequenting the game and having peers with a positive attitude towards gaming are directly bounded to the development of video game addiction; receiving frequent invitations from peers to play internet games was a direct and indirect predictive factor of the severity of internet gaming addiction (IGA). On the contrary, the fact that parents were regular or used online games did not influence the development of addiction in adolescents, while invitations from parents did [16]. Finally, social motivations for gaming aggravated the symptoms of pathological gaming [15].

-School environment: The negative school experience produced high levels of stress in adolescents, which could lead to video game addiction [14]; in fact, the lower educational level was also an important predictive factor [15].

-Psychological and behavioral predictive factors: The fact that escapism was the game theme indicated that psychological needs existed and, therefore, the symptoms of pathological gaming were aggravated [15].

Personality characteristics such as aggression and neuroticism or sensation seeking could lead individuals to pathological gaming [10]. The highest levels of impulsivity were related to the highest levels of pathological gaming and the lowest levels of emotional regulation and self-regulation [17]. Adolescents with a weak sense of coherence tended to spend more time playing video games and to report excessive game use. They were more likely to develop problematic gaming in the long run [18].

-Physiological indicators: A longitudinal study established certain physiological indicators that could help predict the development of pathological behavior regarding video games. A decrease in the retreat of sinus respiratory arrhythmia for a cognitive task and an increase in sinus respiratory arrhythmia in family tasks were related to the appearance of more symptoms related to pathological gaming. For women, the activation of the galvanic skin response because of increased sympathetic activity during family problem solving was associated with increased pathological video game symptoms [6].

Questionnaires used to assess video game addiction

Only one article of all those analyzed dealt with the questionnaires used to assess video game addiction: The Cohort study conducted by Vadlin, et al. [9], in Sweden, concluded that the GAIT (Gaming Addiction Identification Test) and the GAIT-P (Gaming Addiction Identification Test Parents) questionnaires were suitable tools to measure teenagers gaming addiction.

Characteristics of adolescents with problematic gaming

In this group, we find a high percentage of the articles analyzed, most of them focused on physical characteristics and followed by those related to psychological, behavioral, and educational characteristics; whereas, only one article dealt with familiar, social, and school characteristics.

Adolescent video game players could have short-term benefits, but in the long term, they could present anxiety and depression symptoms, which led to an increase in the usage of video games as they use them as an escape route, leading, on numerous occasions, to pathological, problematic or addictive gaming [10]. The adolescents were aware of the addictive danger that video games have and the impact that video game addiction has on themselves and on their health, while they did not recognize the existing impact on their relationships with the environment [8]. In addition, the level of adolescent addiction was more associated with greater comorbidity factors and health problems than with excessive use over time [19].

The article conducted by Joung Seok, et al. [14], at the family level through a focus group, confirmed that pathological gamers had worse relationships with their parents and family. While, at a social level, he defended that, despite having a negative perception about the consequences of video game addiction, adolescents stated that gaming made them closer to their online friends. At the school level, they presented high levels of disaffection.

At the psychological and behavioral level in the focus group, it was shown how adolescents who were shy and quiet from being addicted to video games, experienced extreme mood swings and anger, resulting in more aggressive and compulsive behavior [14]. Video game addiction was associated with the presence of type D or distressed personality and also associated with negativism; in fact, almost twice of adolescents in the group with Internet gaming addiction, in relation to the normal group, had this type of personality [20]. They also presented higher levels of anxiety [21]. However, computer game addiction in psychiatric patients was more related to behavioral and emotional problems [22].

At the physical or physiological level, pathological gamers were more likely to have health problems and worse self-care, such as poor sleep, irregular sleep patterns and irregular eating patterns [14]. These adolescents were also more likely to be obese because of the indirect effect of poor sleep quality and irregular habits on them. This was fundamental because of the relationship between abdominal obesity and low levels of HDL, high levels of triglycerides and blood pressure, and insulin resistance [23]. Teenagers with internet gaming addiction had significantly lower plasma epinephrine and norepinephrine levels and slightly higher dopamine levels than the non-addicted group, demonstrating that internet gaming addiction can cause physiological stress. Although there was no correlation between catecholamine levels and anxiety levels, there was a correlation between daily time spent playing video games and plasma norepinephrine [21]. The length of the leukocyte telomeres and the T/S ratio in patients with gaming addiction was significantly lower than in patients without this problem, which could be a consequence of the changes in anatomical function, while the T/S ratio was also related to age [24]. Online video game addiction was associated with reduced levels of HRV at rest, that is, with an increase in the sympathetic nervous system and a

decrease in the parasympathetic system [20]. At the brain level, the increase in the global efficiency of the white matter network was correlated with online gaming addiction [25].

The relation between problematic gaming and gaming addiction with other problems and addictions

Very few articles were found on this subject, only three, out of which, two were related to the Internet, cell phones and social networks and only one was related to gaming and gambling.

Regarding the Internet, cell phones and social networks, Wang, et al. [26] associated males with Internet addiction, while Muñoz, et al. [27] associated problematic use of the Internet and cell phones with females. Teenagers with problematic internet use (PIU) had the highest levels of addiction in a Spanish sample [27].

The consumption of alcohol, tobacco and cannabis, the low school performance and poor family relationships were associated with problematic use of the Internet, cell phones and video games, being therefore risk factors for these problems. However, engaging in extracurricular activities and having parental control were protective factors for these problems. Spending more than three hours a day was considered a problematic Internet use, but it required more than five hours a day of online video games to be considered problematic use [27]. Unscrupulousness and poor socialization were related to online gaming addiction, neurosis and extraversion were associated with social network addiction [26].

However, when we talk about gambling or gaming addiction, the significant variables to predict it among teenagers addicted to video games were: being male, being young and playing poker or casino offline, although the latter was the least significant. In addition, adolescents with problematic gaming were twice as likely to develop pathological gaming as adolescents who did not have this problem [28].

The relationship of ASD (Autism Spectrum Disorder) and ADHD (Attention Deficit Hyperactivity Disorder) with the development of problematic video game use and addiction

Only two articles exposed the relationship between ASD (Autism Spectrum Disorder) and ADHD (Attention Deficit Hyperactivity Disorder) in video game addiction. Of these, only one spoke of the effect that medication has.

Symptoms of lack of attention were strongly associated with the problematic use of video games, so children with ASD and ADHD were more at risk of developing this problem than typically developed children [29]. In fact, children with ADHD appeared to have higher scores on the GAST (Game Addiction Scale Test) than those without ADHD.

Although the level of dependence was similar in both groups, the ADHD group spent more time playing and had a higher utilization rate and a higher problematic rate than the controls, an association that was even more significant in women [29].
Regarding treatment, both MPH (methylphenidate) and ATM (atomoxetine) reduced the severity of the symptoms of internet gaming addiction by reducing the impulsivity present in adolescents with ADHD [30].

Prevention

When we talk about prevention of video game addiction, we find two articles that argued that there is no evidence of the effectiveness of a guide to the prevention of problematic gaming for parents [4], but that the effectiveness of impulsivity control techniques to decrease pre-video game addiction was demonstrated [2].

A Norwegian study found no significant difference between the group of parents who read and applied the guide and those who did not, and also found a deterioration of the results in terms of control of the video game problem in the first group. This could be due to the short time between the application of the guide and the completion of the questionnaire to evaluate it, in addition to the lack of specificity between the advice given and the results [4].

However, we did find evidence of the effectiveness of traditional prevention activities and impulsivity control activities, resulting in decreased video game use and dependency level compared to the control group. Moreover, innovative prevention techniques not only maintained results over time (2-5 months after program completion) but continued to decline.

The traditional activities consisted of making a weekly schedule of video game use (without playing every day and without doing so beyond the scheduled time), playing after obligations, using other alternatives in free time, showing favorite video games to parents and not using the online multiplayer game. The prevention program with impulsivity control techniques, apart from the mentioned activities, added: waiting between 5-10 minutes before starting to play, reflecting at this moment if it is the programmed time for it or if there are other things to do, and putting an alarm before playing so that it sounds a little before in order to leave the game and help them to do it[2].

DISCUSSION

This review has tried to communicate what the scientific production describes about the addiction and problematic use of video games, highlighting the existence of a growing public health problem.

Firstly, in relation to prevalence, we have significant observations: teenage boys are very likely to be addicted to video games, being the main group at risk. Coinciding with other studies [31], very wide ranges of prevalence have been found, probably due to the different sample sizes, sample selection and questionnaires used. There is very little scientific production on instruments for assessing video game addiction, and only one document has been found, probably because of the controversy surrounding them.

In literature, emphasis is placed on the importance of the diagnosis of video game addiction being based on an exhaustive and complete initial evaluation. This evaluation consists in examining not only the problems with the game, but also the rest of the areas of the adolescent's life, such as the social, familiar, school or psychosocial situation, being also important which games are used and the reason for that choice [31].

Although there is not much research related to the prevention of this problem, the literature review by Saunders, et al. [32] adds the Public Health response to excessive gaming. In Hong Kong (China), the Department of Health in collaboration with other associations is developing a multidisciplinary approach to the vigilance, prevention, and treatment of Internet addiction. The South Korean Ministry of Public Health is launching a program that, starting at midnight, asks for credentials for online video games, limiting access to those who are on legal age. In Iran, a school-based prevention program and treatment based on a motivational and cognitive-behavioral interviewing approach is launched. In some western countries, there is also awareness of the seriousness of this public health problem and certain programs are beginning to be implemented, for example, in Switzerland. However, in other countries, the responses so far have been gradual, since it is necessary that governments and professionals give it the relevance it deserves and work to improve the situation [32].

One of the strengths of this study is the broad description of the predictors and the different characteristics of adolescents with video game addiction. In this description, great importance is given to the negative effect existing in the family and in the school environment, to anxiety, to extreme mood swings and anger and to the most aggressive and impulsive behaviors.

On the one hand, the bibliographical review by Thumé Breda, et al. [31], apart from agreeing on this point with ours, clearly establishes that violent video games are triggers of violent behavior in adolescents. As we have already commented in the results, the physiological consequences are very important, which can cause problems such as those included by the bibliographic review of Saunders, et al. [32] (dehydration, malnutrition, convulsions and even pressure ulcers).

On the other hand, the association between ADHD and the problem of video games is also important; in fact, the bibliographic review carried out on how the screen culture influences children with ADHD regarding video games, reaches the same conclusions as our study. It is important to highlight the positive effect that methylphenidate treatment has on reducing symptoms of video game addiction in adolescents with ADHD and that the association between video game addiction and ADHD is a two-way relationship, i.e. ADHD symptoms make games look more attractive, while gaming can exacerbate ADHD symptoms [33].

This study has certain limitations that should be recognized. The bibliographical search was conducted in COCHRANE, MEDLINE, CINAHL, CUIDEN, and LILACS, so if it had been conducted in more databases, we might have obtained more results. As we did not know about the existence of the Internet Gaming Disorder (IGD) before the study, this concept was not included in the search strategies or in the analyzed articles, so we could have lost relevant documentation about the addiction to online video games.

CONCLUSIONS

The bibliographic review carried out allows us to affirm that video games have a significant influence on today's adolescents. In fact, as time goes by, we find more and more studies related to the problematic use of video games, since it is a problem that grows in an exponential way in nowadays teenagers. In addition, where the pathological,

problematic, and addictive gaming are being largely researched in the last five years is in South Korea and Spain, followed by China, France, and Sweden.

Even so, the existing production of video game addiction has a low quality. In the first place, we find the lack of a concept and standardized criteria, so when analyzing the documentation, the same problem is named in various ways and, especially, studied with different criteria. This is the main problem presented by the study of prevalence, because, although there is data regarding it, not all of it is collected with the same parameters, which means that there is great variability between these. The continent where there is more prevalence is Asia (in China and Korea) followed by Europe, where the prevalence is very diverse due to the existing methodological deficiencies.

In second place, it can be stated that there are numerous studies on the predictive factors and characteristics of adolescents with pathological gaming or video game addiction. We know that the main predictor for video game addiction is being a male, overusing games and playing at night, especially after midnight. Adolescents with this problem usually present family conflicts or belong to mono-parental or blended families, with both working parents or multicultural families. In addition, they tend to be disaffected at school, to have lower sociability levels, and to receive invitations from parents or classmates to play. These adolescents generally have aggressive and impulsive behaviors.

Finally, it is necessary to emphasize the deterioration of these adolescents' health and self-care, having irregular sleeping and eating patterns, more risk of obesity, alterations in the catecholamines and leukocyte telomeres and variability of the heart frequency.

The significant variables to predict gambling games addiction among video game addicts are being a male, being young and playing poker or casino offline. In addition, the fact of presenting a problematic or pathological gaming is already a risk factor for gaming addiction. Regarding the influence of ASD and ADHD in this addiction, they are a risk factor for video game addiction, but they also make the disease worse. Treatment with methylphenidate and atomoxetine decreases the symptoms of addiction.

The similarity between predictive factors and adolescent characteristics is due to the transversal nature of studies on video game addiction, which cannot establish causal relationships. There are very few longitudinal studies, only two, which do establish those relationships, and, in many cases, they are bidirectional relationships.

On the other hand, we can see how the sample size varies in the investigations. There is a lack of randomized studies and the data are mostly obtained from questionnaires filled out by students, which limits the information and causes variability among the results. Regarding the studies conducted on physiological and physical characteristics and on the influence of ADHD treatment on problematic gaming, they are generally conducted with small samples and with male adolescents, since they are the ones who usually suffer from this disorder, which means that there are no data in these fields for women and that it is difficult to generalize the results to the general population. Moreover, many researches have been made with data obtained in schools, so they do not take into account those children who do not attend to classes, and they discard a great proportion of teenagers with addiction to video games who may be in mental health centers or in hospitals.

Although most of the articles mentioned in their conclusions the need to prevent the problematic use of video games or video game addiction, there is hardly any publication about this, in fact, no documentation has been found that explicitly points out interventions carried out by health professionals. In the same way, there is little information regarding the questionnaires to be carried out or possible treatments for video game addiction.

This public health problem presents a great challenge for nurses. In the first place, it is a great challenge regarding investigation, since in only 4 of the 29 articles analyzed, the research team belonged to the Nursing area, being mostly researchers from other areas, such as medicine, psychology, sociology or communication, among others. Secondly, because one of the least studied areas is that of prevention, a fundamental field for our career.

In view of further research in order to improve the knowledge about predictors and consequences of video game addiction, it would be convenient to carry out longitudinal studies, and not only to use self-report questionnaires that limit the gathering of information. When studying the prevalence, it would be interesting to focus on national samples and to use unified diagnostic criteria in order to compare the prevalence in different countries. Finally, with regard to the interesting areas for future research, they could be the consequences of video game addiction in the long term, video game addiction in girls and, specially, the prevention of video game addiction, being able to use all the existing information about the predisposing factors to develop and evaluate early detection and prevention programs

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