Video games, educational implications

Videojuegos, implicaciones educativas

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Abstract

The present article seeks to describe the educational implications of the use of digital technology in young people. To this end, a narrative review was performed through an advanced search of 140 articles with high scientific impact. The search was performed between 2000 and 2023, selecting articles that analysed eSports in young people between the ages of 6 and 21. The term eSports was conceptualised and its relationship with aggressiveness, gender and psychological outcomes was analysed. The potential of the use and application of technology in the educational setting was also considered. With regards to aggression in video games, young people with high levels of aggression were found to be attracted to violence in videogames. The correlation between videogames and aggression may be explained by underlying variables. With regards to gender, fewer females were recruited and males reported longer weekly playing times. This gender gap is present in factors such as experience, performance and gaming skills. With regards to psychological consequences, playing videogames was associated with higher levels of intrapersonal skills, greater stress control and poorer interpersonal skills. Lastly, the educational implications of playing videogames are analysed in young people. Positive aspects emerged such as greater meaningful learning or higher frustration tolerance. Next, negative aspects were examined, since a potential negative implication of exposure to violent content is alcohol consumption or aggression. In consideration of that proposed in the present study, more experimental, longitudinal and correlational studies are needed to clarify the behaviours and consequences of young players regarding the use of videogames. This would allow the educational implications of digital technology to be more precisely defined.

Keywords: videogames, e-sports, education, gamification, aggressiveness, gender, psychological characteristics,

Resumen

El presente artículo busca describir las implicaciones educativas de la tecnología digital y su consumo en los jóvenes. Para ello, se realizó una revisión narrativa a través de una búsqueda avanzada con 140 artículos de alto prestigio científico entre el periodo del 2000 - 2023, seleccionando aquellos artículos que analizaban los eSports en jóvenes con edades comprendidas entre 6 y 21 años. Se procede a conceptualizar el término eSports y analizar su relación con la agresividad, el género, las consecuencias psicológicas y las posibilidades derivadas de su uso y aplicación en el entorno de la educación. Respecto a la agresividad en los videojuegos, detectamos que los jóvenes con niveles altos de agresión pueden ser atraídos por la violencia de los videojuegos y que la correlación entre el videojuego y la agresividad puede ser causada por variables

subyacentes. En lo referido al género, la presencia femenina es baja y los hombres juegan semanalmente durante más tiempo. Esta brecha de género está presente en factores como la experiencia, el rendimiento y las habilidades de juego. En relación con las consecuencias psicológicas del uso de videojuegos destacamos que el uso de estos está asociado con mayor nivel de habilidades intrapersonales, mayor control del estrés y una baja habilidad interpersonal. En último lugar, se analizan las implicaciones educativas que el uso de videojuegos genera en los jóvenes, desatacando aspectos positivos como el aumento del aprendizaje significativo o la tolerancia a la frustración, y también analizando sus aspectos negativos, ya que a través del contenido violento se puede generar un afecto negativo propiciando la aparición del consumo de alcohol o agresividad. Considerando lo propuesto, es necesario aumentar los estudios experimentales, longitudinales y correlacionales para aclarar los comportamientos y consecuencias de los jóvenes jugadores respecto al uso de videojuegos, lo que permitirá delimitar con mayor precisión las implicaciones educativas de la tecnología digital.

Palabras clave: videojuegos, e-sports, educación, gamificación, agresividad, género y características psicológicas.

Introduction

New technology use and digital consumption has increased exponentially over the past decade. This reality has contributed new forms of leisure and alternative entertainment to society. Of these, eSports takes on particular relevance.

Esports, also referred to as eSport, e-sport and electronic sports, amongst others, is defined as "sporting activities in which individuals develop and train mental or physical capacities for the use of information and communication technologies" (Wagner 2006). Likewise, at the same time, another type of non-competitive videogames exist such as serious games (López, 2016), which are videogames or applications with a therapeutic basis or educational purpose. It is necessary to differentiate this purpose at the time of extracting educational implications from research findings pertaining to electronic sports and videogames.

In consideration of that discussed above, the present work focuses on the educational implications of new technology and digital consumption at both a curricular and extracurricular level in young people. Issues related with gender, aggression and psychological consequences are

addressed, in addition to the potential of technology use and application in the educational setting.

Methodology

A narrative review was conducted that analysed research indexed in the repositories and databases *Web of Knowledge, Scopus*, *Pubmed, Google Scholar*, *ResearchGate* and *Sportdiscus*. Criteria used to guide the document search and analysis required included articles to have been published between 2000 and 2023, on samples of participants aged between six and 21 years, and be available in English or Spanish. In addition, the search employed the descriptors "eSport", "videogame", "exergames", "gender", "aggression" "violence", "serious games" and "psychology". Overall, a total of 140 research studies were selected that met the aims of the present narrative review from the 455 articles gathered for initial analysis. A total of 315 research studies were excluded due to the fact that the methodology employed did not match the aim outlined by the narrative review, eSport use was not related to the review study design and the age of participants was not within the pre-determined range.

Education and e-sports

This section explores the potential offered by videogames in the educational setting. Different educational methodologies used in this setting are compared, including serious games, gamification and game-based learning (GBL), augmented reality, multisensory spaces and exergames, highlighting the most notable characteristics and differences. Social distancing imposed by the COVID-19 pandemic revealed the presence of academic barriers and their negative influence on mental health in students. As argued by Fontana (2020), mental health can strongly influence academic performance, with it being imperative to approach the transition to online learning in an appropriate way.

As stated by Prieto et al. (2022) *"gamification is being approached academically from two perspectives: as a methodology targeting student motivation towards their competency-based learning and as a way of strengthening academic performance in different knowledge areas".*

Videogames and digital recreational methodologies in higher education

Inclusion of videogames as an educational tool has given rise to a new field of study that connects with digital generations. Serious games, conceived by Michael and Chen (2006, cited by López, 2016), seek to create learning environments through videogames, exploring real problems. Exergames, for example, promote physical activity through engagement with the game. These games can improve motor skills and understanding of movement principles. Further, gamification, according to Kapp (2014), uses elements of gaming to train abilities and, combined with methodologies such as game-based learning (GBL) and serious games, strives to involve students in more immersive educational experiences. Nonetheless, GBL tends to be more challenging to implement, requiring additional resources such as augmented reality and collaborative working with mobile tools. The convergence of methodologies implemented in higher education strives to achieve specific educational goals more effectively. In this section, the educational implementation of videogames in higher education is examined, reflecting on educational videogame use and their relationship with academic performance, learning and psychological variables.

With regards to academic performance, a study conducted by Smith and Chan (2017) used previous, current and follow-up exam grades in order to quantify student performance through the videogame Space Race. The videogame was well-received with at least 82% of students who played it, recommending it to others. Crucially, those selected to play the game performed better than those who were not selected to play it on the course exam. Along similar lines, Pesek et al. (2020) employed

elements of gamification and the online platform Troubadour, which is an open source personalised and adaptive platform for auditory training, in order to support music theory classes with automated exercises related with the theory behind music. In this study, the experimental group showed improved learning and academic performance.

With regards to learning, a study conducted by Chang et al. (2015) examined the effect of a group videogame called "Multiple-Choice Practice Island" on frustration tolerance and learning through cognitive styles and previous abilities. Findings indicate that low ability students showed more significant improvements, leading them to demonstrate greater tolerance to frustration. Cózar and Sáez-López (2016) examined the impact of game-based learning (GBL) via "MinecraftEdu" and found a significant increase in student motivation. Romero and Kalmpourtzis (2020) investigated a game-based learning module, highlighting improvements in online learning through a games-based design. Learning platforms such as "OneUp" (Dicheva et al., 2018) are essential to gamification and game-based learning (GBL). Educational exergames (Juca, 2018a) combine videogame elements with recognisable cognitive activities, promoting enjoyable physical activity. Kazimoglu (2020) propose using innovative methods, such as serious games, in order to improve motivation and learning in computer programming. Fontana (2020) employed the serious game, "ChemDraw", in order to improve organic chemistry abilities. McEnroe-Petitte and Farris (2020) demonstrated that different types of games promoted deeper learning in nursing students. Tan (2018) and Smith and Chan (2017) employed videogames as a means to improving learning, whilst Verkuyl (2017) emphasised the value of simulations for ensuring safe practice. Chittaro and Sioni (2015) observed that serious games were capable of improving risk perceptions and emotional response. Finally, Simons et al. (2020) discovered that the game "Civilization" provoked improved problem solving and management abilities.

With regards to findings pertaining to psychological variables following the application of videogame experiences, according to Prieto (2022):

"In the topic area of educational gamification, scientific contribution is needed in relation to working with a number of lesser studied

psychological variables such as attitude, commitment, stress, anxiety and performance in gamified teaching proposals" (p.203)

In a study conducted by Tan (2018), students expressed a degree of interest, emotion and trust in their gamification experience, whilst the majority also reported greater competence and mastery after playing a game. In contrast, a study conducted by Jayalath and Esichaikul (2020) took a blended eLearning approach as a means of instilling the gaming dynamics, mechanics and components suitable for gamifying a blended electronic learning course. This study suggests that the incorporation of gaming components may provide learning opportunities to motivate and involve students. In another approach, in a study conducted by Soltani et al. (2020), participants practiced different swimming techniques (crawl, back, front and butterfly) in an exergame called "Michael Phelps: Push the Limit" using Microsoft Xbox and Kinect. The main finding of this study was that there was no plausibility to the conclusion that the novelty or competition type (competing against a computer or against peers) affected enjoyment levels. Finally, a study conducted by Roure et al. (2020) used a cycling exergame called "Greedy Rabbit" in order to identify the impact of exergaming on physical activity in 60 pre-graduate students. In this study, the experimental group scored more highly on all physical activity measures and on two situational dimensions of interest (instantaneous enjoyment and demand for attention). The study demonstrated that a cycling exergame may be a good option for improving physical activity outcomes related to players and their situational interest. In conclusion, the aforementioned studies within the higher education setting reveal the benefits of videogames regarding competence, motivation and physical health.

Educational implications

In the following sections, a discussion is provided on the influence of diverse variables in the context of videogames and/or e-sports.

Aggression

Three basic viewpoints exist that explain the potential relationships between exposure to violence in videogames and serious aggressive behaviour. The first is based on learning from the causal influence of subsequent serious aggression. The second suggests that individuals with high levels of aggression are, essentially, attracted to violence in videogames. Finally, the third viewpoint implies that any correlation between videogames and aggression is caused by underlying variables. Next, various studies are presented that are representative of two of these three aforementioned perspectives (Ferguson, 2011).

Causal influence of exposure to videogames on subsequent serious aggression

Variation in findings regarding aggression may be explained, in part, by differences in videogames, with aggression mainly emerging in relation to games with aggressive content, considering the small amount of variance in aggression that is explained by playing time (Colwell & Payne, 2000). Playing at imaginary aggression represents a primer exercise that increases access to aggressive thoughts, increasing the possibility of engaging in subsequent violent behaviour (Krahé & Möller, 2004). An adolescent player who identifies with a violent and stronger character during game playing may lead to them engaging in more aggressive behaviour in the real world. This study used three realistic violence games (America's Army - U.S. Army, Killzone - Sony Computer Entertainment Europe, and Max Payne - Rock Star Games), three violent fantasy games (Doom 3 - id Software, Quake - id Software and Metroid Prime - Nintendo), three realistic non-violent games (Pro Evolution Soccer - Konami, The Sims 2 - EA Games and Tony Hawk's Underground - Activision) and three non-violent fantasy games (Mario Kart - Nintendo, Mario Sunshine - Nintendo and Final Fantasy - Square Enix) (Konjin et al., 2007). Nonetheless, excitement caused by the game did not significantly differ between aggressive videogames (Violent Video Games, VVG) (Mortal Kombat: Deadly Alliance - PlayStation 2) and any other type of videogame (Hard Hitter Tennis - PlayStation 2). Excitement, thoughts and feelings after playing VVG may give rise to processes that encourage aggression lasting for longer than four to nine minutes, which is enough time to end up in a situation perceived as provocation, hostile feelings

and aggressive thoughts (Barlett et al., 2009). Length of exposure to VVG (for example, Call of Duty and Mortal Kombat) demands greater understanding of the long-term relationship of VVG with aggression, competitiveness (Chen et al., 2022a), speed of action and violent content (Chen et al., 2022b). These aspects may underly the potential association between VVG and increased aggression in the long term (Willoughby et al., 2012; Adachi & Willoughby, 2013). Average mass media consumption has risen to 7.4 hours a day in consideration of the greater and more varied offer currently available through portable devices, pointing to an association between exposure to violence and increased aggressive physical behaviour (Coker et al., 2015; Gentile et al., 2014). Controller type and screen size appear to confirm that technological characteristics of videogames affect aggression level (chosen videogame, The House of the Dead 2) (Kim & Sundar, 2013). The serious behavioural consequences of carrying arms are associated with violent games (Ybarra et al., 2014). In addition, glorification of risk through antisocial characters may bring about alterations in the self-perception of personal singularities, attitudes and values, with consequences including alcohol or tobacco consumption, aggression, delinquency and risky sexual behaviour (participants reported that 32.4% had played Spiderman II, 12.3% Manhunt and 57.9% Grand Theft Auto III) (Hull et al., 2014).

Adopting diverse mentalities through behaviour simulation can affect the behaviour of players in real life (Mass Effect 2) (Ellithorpe, 2015). Playing time had an influence on aggression in a sample after playing competitive videogames (action videogames such as Grand Theft Auto, God of War, combat games such as Mortal Kombat, and competitive games such as FIFA Soccer and Gran Turismo) (Adachi & Willoughby, 2016), whilst the empathy and morality of videogame characters (Mortal Kombat 3) can influence player aggression (Gao et al., 2017)]. All of these elements of debate must be reconsidered, demanding greater precision when using the term "VVG" (the present study found it to be used to refer to both a violent videogame, Tomb Raider 2013, and a non-violent videogame, FIFA) (Ferguson et al., 2016). Nonetheless, exposure to violent media is comparable to the risk of exposure to violence in the real world. Such exposure through the mass media occurs at a large enough scale for violence through such means to be considered a threat to public health, leading to an increase in certain behaviours such as interest in real firearms and shooting firearms (found in a study using three

versions of the videogame Minecraft – Microsoft Corporation, a violent version including guns, another violent version using swords and a non-violent version) (Chang & Bushman, 2019).

Variables underlying the correlation between videogames and aggression

Research on risk factors influencing aggressive behaviour must consider the interaction between genetic and social risk, with multivariate analysis most commonly using molecular genetics techniques (Ferguson et al., 2009). Prevention of aggressive behaviours may be observed through the lens of peers, family, society, substance abuse and depressive disorders (Ferguson & Meehan, 2010). In order for interventions to be effective, planning must consider the risk factor of sensation searching, following confirmation that VVG use has a long-term effect on aggressive behaviour in the form of physical aggression (Möller & Krahé, 2009). Strategies are needed to inform players (47% of participants report having played violent games such as Dead or Alive, Def Jam, Doom, Driver, Mortal Kombat, Grand Theft Auto, Resident Evil and Prince of Persia) and their families about the negative impact of excessive VVG use (Ybarra et al., 2022) and promote engagement with prosocial videogames, making them more attractive and accessible (Allahverdipour et al., 2010). Issues pertaining to individuals, families and aggressive behaviour must be studied, specifically, whilst, at the same time, implementing interventions targeted towards these aspects (Kim et al., 2017; Ruiz-Fernández et al., 2021). It is also important to consider the influence of social context on the effects of VVG (Verheijen et al., 2018; She et al., 2022). Interventions using electronic games to target mental health may provide effective strategies for reducing associated risk. In the case of "Adventures aboard the S.S. GRIN", knowledge increased regarding social, sentimental and behavioural skills (Sanchez et al., 2017). From the perspective of the family setting, it is important to identify habits and exposure in relation to digital media with regards to violent content, informing families and directing them towards strategies that limit and monitor use (Al-Ali et al., 2018). Despite revealing relationships between playing VVG and engagement in higher levels of aggressive behaviour, there is little evidence that this becomes externalised in the long term. Nonetheless,

existing research urges that potential outcomes pertaining to VVG use (for example, Grand Theft Auto, Assassin's Creed and Halo) (Coyne et al., 2018) are kept in mind.

Normative values for society point to a mediating effect regarding exposure to violence through VVG. The family context regulates the first stage of the mediation process. In a good family context, exposure to VVG exhibits a simple direct effect on aggression, whilst, in an unfavourable family context, alongside these direct effects, indirect effects emerge that are mediated by the effect of normative beliefs on aggression (Shao & Wang, 2019). In the same way, moral disconnect acts as a significant mediator of the positive relationship between exposure to violence in games (for example, Call of Duty: WWII) and subsequent aggression, with effects being greater in adolescents (Teng et al., 2019). It should be added that interventions target rage and hostility as relational factors of VVG and aggressive behaviours (Yao et al., 2019), negative affect (potentially to a greater extent by engaging in virtual reality games (Ferguson et al., 2022)) and shyness (using Player Unknown's Battle Grounds as a violent game and The Sims as a non-violent game) (Tian et al., 2020). When targeting mental health, research supports the potential of self-instructive games, such as RegnaTales, which was found to be effective at reducing rage issues, in both a clinical and non-clinical population (Ong et al., 2019), and, RAGE-Control, which appeared to bring about improvements in abilities learned in therapeutic settings and in behavioural and physiological changes related with rage (Ducharme et al., 2021).

At the same time, cyberaggression involves accepting and tolerating cyberaggression. Normative beliefs mediate the relationship between players' age and general cyberaggression, and between players' age and cyberaggression. Given that normative beliefs are modifiable and dynamic, cyberaggression can be reduced, with future studies elucidating the specific factors that can transform these beliefs being needed (Hilvert-Bruce & Neill, 2020). Numerous early adolescents play online videogames that target adults, whether characterised by medium risk (for example, Fortnite and Terraria) or high risk (for example, Call of Duty, Grand Theft Auto and Fallout), making these individuals the most at risk of presenting with mental wellbeing issues, due to, for example, decreased sleeping hours leading to a lack of attention, memory, decision making, reaction time and creativity. All of these factors are related to school performance (Charmaraman et al., 2020). Reduced exposure to VVG, rage, moral detachment and cognitive impulsiveness, demands

interventions with programs addressing conscience, self-control and relaxation techniques, helping to manage rage, moral connection and cognitive impulse control in order to decrease aggressive behaviour (Zhao et al., 2021). Toxicity appears to be promoted by individual singularities such as younger ages, male sex, sensation seeking and emotional reactivity, whilst empathy and motivation for socialisation emerge as protective factors (Lemercier-Dugarin et al., 2021). To this, the effect of parental authority must be added (Hou et al., 2022). This has a positive influence in the case of authoritarian parents, who stand out from the permissiveness shown by others and the negative influence this has when it comes to using communication technology (for example, videogames such as Grand Theft Auto III and Manhunt) (Cote et al., 2021). Further, biopsychosocial variables have potent interactive effects in relation to aggressive behaviour (López-Fernández et al., 2021). The impact of unfavourable settings on the effects of VVG must be considered in light of a multicultural context, opening debate around potential factors such as psychiatric background and aggression (Addo et al., 2021).

Gender

Differences exist within esports as a function of gender. According to Lucas & Sherry (2004), Jenson & de Castell (2011), Hayday & Collison (2020) and Kim & Lim (2021) female involvement in esports is low. Female participation ranges between 10% (Banyai et al., 2019a) and 20%, approximately (Griffiths et al. 2003; Crawford & Gosling, 2005; Király et al. 2015; Shen et al. 2016; Hayday & Collison, 2020). Gaming frequency also differs as a function of sex. Males tend to play weekly, for longer overall and accumulated time, whilst females, in exchange, play sporadically (Terlecky et al., 2011). The main motivations for gaming in males are social influence, pleasure of gaming (Jang & Byon, 2021), success and capacity for manipulation. In contrast, women play videogames due to factors related with socialisation (Eagly & Karau, 2002; Kidder, 2002; Crawford & Gosling, 2005; Yee, 2006; Williams et al., 2019; Ricoy & Ameneiros, 2016). In addition, males tend to prefer esports related with sports, whilst female preferences tend to vary to a greater extent (Terlecky et al., 2011; Crawford & Gosling, 2005).

Gender stereotypes condition the presence of sexism in esports. Gender differences emerge in factors such as experience, performance and gaming ability, in accordance with (Shen et al., 2016; Choe et al., 2019). Vermeulen et al. (2014) reported that the gaming ability of females was influenced by masculinity and gender bias. These elements act to decrease success (Parshakov et al., 2018) and gaming abilities in females (Terlecky et al., 2011), whilst also increasing the gaming ability of male opponents, leading to, at the same time, the undervaluing of females (Vermeulen et al., 2014; Ruvalcaba et al., 2018; McLean & Griffiths, 2019). Consequently, performance (Griffiths et al., 2003; Yee, 2006; Choe et al., 2019; Hayday & Collison, 2020; Shaw, 2021) and behaviour may be affected in females (Vermeulen et al., 2014; McLean & Griffiths, 2019; Yee, 2006; Kim & Lim, 2021), with this effect being more pronounced within females who value "streaming" (Ruvalcaba et al, 2018). Females do not have role models to look up to in esports (Ruvalcaba et al., 2018; McLean & Griffiths, 2019; Choe et al., 2019; Hayday & Collison, 2020). Given that female characters are often marginalised and sexualised in order to lay the way for male leads, electronic sports has turned into an environment in which male characters are more revered than females, conditioning female participation and propagating sexist attitudes towards females (Kruthika, 2020). Female avatars are often represented through a sexualised body (Kruthika, 2020). Anonymity not only allows, but, also, emboldens toxic behaviour which drives to the propagation of negative behaviours, foregrounding of dominant male cultures and gender inequality (Hayday & Collison, 2020). Further, gender stereotypes are present regardless of the platform used or the type of game played (Wasserman & Rittenour, 2019), with their being little variability in the games promoted towards females (Tang et al., 2021). Males support to combat this problem is non-existent (Choe et al., 2019; McLean & Griffiths, 2019).

Culturally, esports have been dominated by men, with this having a negative impact on the participation and visibility of females in this ambit. The existing gender gap is not due to the lack of interest or inability of women, but is, instead, the result of hegemonic masculinity in esports, defence of videogaming as a masculine space through defensive hyper-masculinised behaviour, and sexism. Nonetheless, these aforementioned aspects are decreasing with the increase in female participation, especially through esports played on mobile devices (Hayday & Collison, 2020; Peng, 2021; Rogstad, 2022).

Cognitive psychology

From a cognitive psychology standpoint, Bonny & Castaneda (2017) argued that numerical processing is directly related with the use of MOBA videogames, whilst Kokkinakis et al. (2017) demonstrated that fluid intelligence is correlated with videogame use. Along the same lines, Benoit et al., (2020) revealed that visual-spatial working memory (Spatial Span) in professional gamers was higher than in recreational gamers, with the former also exhibiting better working memory than other professional baseball players (Kang et al., 2020). Likewise, a study conducted by Pardina-Torner et al. (2019) revealed that processing speed was quicker in gamers than in individuals who did not play videogames. This was despite the fact that Matsui et al. (2020) reported that gamers who talked and did live retransmissions did not perform as well, given that they were performing two cognitive activities at the same time. Cognitive performance has also been examined by Gorrindo et al. (2022) and Tartar et al. (2019), who both found inositol containing supplements to be effective at improving accuracy, decision making and reaction time when playing. In a study published by Pishchik et al. (2019), differences were examined between students as a function of whether or not they played videogames, revealing that students who played for more than four hours a day (denominated hardcore gamers) exhibited lower levels of logical and critical thinking than the rest of the sample. This concurs with the finding that playing sedentary electronic games is related with greater interpersonal skills and better management of stress and emotions (Hinkley et al., 2017). Nonetheless, this same study also confirmed that continuous internet use was related with poorer interpersonal skills and better stress management, revealing that psychosocial wellbeing in surveyed children was largely dependent upon the type of electronic media they used.

The aforementioned finding regarding interpersonal skills may be explained in light of findings reported by other similar studies, given that they reveal that professional eSports gamers report engaging in eSports due to the strong sense of belonging they feel in the videogame setting (Martonkik, 2015). In accordance with this, Trepte et al. (2021) also highlight the way in which online games create social ties offline. For this reason, it can be stated that, occasionally, a subculture emerges that

is characterised by the same likes and preferences in relation to other gamers.

Nevertheless, despite belonging to a team, positive outcomes and behaviours are not always found in the community of eSports players. In this sense, aspects such as ego and self-preservation tendency have been analysed, being summarised through use of the phrase "we won" or "they lost" (Downs, & Sundar, 2011). In the same way, Alvino de Mesquita & Becker (2018) stated that specific toxic behaviours, measured as a function of conversation patterns between team members, negatively affected performance, sometimes leading to a toxic scenario overall. In contrast, teams that exhibit non-toxic behaviour tend to produce better performance output, given that they tend to be more positive, focusing on gaming and socialisation tactics. This study topic is at the heart of research into the psychology of eSports is defined as POG (problematic online gaming) and covers psychiatric symptoms (depression, anxiety) and specific gaming motives (escape, achievement). An example of such research is found in a study conducted by Kiraly et al. (2015), which revealed psychological distress to be positively related with gaming as a means of escape and negatively related with competitive gaming. This study also revealed a stronger association between gaming as a means of escape and use of problematic online games. In agreement with that discussed above, Bányai et al. (2019a) found a direct positive effect between psychological distress and gaming disorders, with this association coming through escapism (in other words, excessive gaming to avoid real world problems). For this reason, there is growing interest to know more about gamers' personalities as a function of the characteristics of the game being played (Pérez-Rubio et al., 2017) and to identify motives for gaming in order to strive for alternatives to satisfy them in gamers who are addicted to videogames (Steadman, 2019). There is also growing interest into striving to avoid the potential issues that may arise from inappropriate videogame use. With regards to personality, lower levels of extroversion and friendliness have been found in gamers belonging to higher divisions in LOL than in other gamers belonging to less prestigious divisions (Matuszewski et al., 2020).

Despite that discussed above, some reviewed studies outline that eSports players are not obsessive gamers and that videogame use is not necessarily harmful. Indeed, some studies reveal sufficient satisfaction of basic psychological needs (García Lanzo, 2018; Hulaj et al., 2020) and highlight the variety on offer thanks to the phenomenon of eSports.

Discussion

Videogames presented in the educational setting within the context of learning place students in an enjoyable context guided by various rules, mechanics and dynamics, which force them to study and learn together with their other classmates. The aim of videogame use in education consists of striving to move forwards towards learning that is not considered as linear but, instead, as contextual, given that students who move in these worlds or fun settings find themselves on a dynamic continuum, reaching agreements, sharing values and engaging in social acts.

After performing the present review, evidence suggests that popular discourse on the harmful effects of videogames should be attenuated in light of the potential positive consequences of videogames with regards to the teaching-learning process. Nonetheless, the variety of videogames available and their potential use for education are diverse and highly complex. In order to include them in the educational setting as an educational tool, it is important to consider the way in which videogames will be employed and what is hoped to be achieved with them. Rodríguez Martín et al. (2022) classified types of videogames with the aim of identifying whether certain types of games significantly differed from others with regards to their relationship with issues pertaining to the educational setting, such as academic performance. This study divided educational videogames into photorealistic immersive action videogames, competitive videogames, anime-based videogames, real-time strategy videogames and general entertainment videogames.

Whether content is presented through a physical boardgame or through a digitalised approach, the teacher's aim is to find the optimal way of improving the teaching and learning process. On the one hand, gamification is often reduced to a simple points-based system with little connection made with the activities being gamified. In this approach, a poorly designed interface makes users feel lost, confused or frustrated, impeding their effective use. On the other hand, serious games and, above all, exergames, should be played actively, which may limit the user population given that some individuals lack experience with videogames or don't have access to the hardware needed to play them. This being said, the majority of studies report benefits that are psychological and

physical in nature, as demonstrated in a review performed by Suelves et al. (2022).

Further, as future lines of research, the effect of VJV on aggressive and violent behaviour continues to be an important topic of interest (Coyne et al., 2018; Ferguson et al., 2022; Shao & Wang, 2019; Yao et al., 2019; Ybarra et al., 2022), alongside impulsivity (Ortiz & Velastegui (2023), understood as the execution of unplanned actions with negative repercussions. In this sense, two standpoints are presented in the literature. The first promotes examination of the different variables and factors that influence the emergence of aggressive behaviours, including the proposed use of videogames to prevent such behaviour. The second standpoint urges the need to reconsider the relationship between VJV and aggression, given the lack of empirical evidence to support the impact of the former on the latter.

Holtz and Appel (2011) argue for the need to conduct further experimental, longitudinal and correlational research in order to clarify relationships and define the risk and protective factors that must be considered. Such research must come from, not only, self-report data but, also, behavioural observation from other involved agents such as family, friends and teachers.

Effects of digital media reveal the power to significantly alter interpersonal behaviour in both a positive and negative way, knowledge of long-term effects may serve as an aid to politicians and the public when it comes to decision making regarding the type of society they want to see and the way in which they can help it come to fruition (Prot et al., 2014). Digital literacy is essential for reducing the types of risk behaviours that predict the propagation of cyberbullying and victimisation (Chang et al., 2015; Richard et al., 2021). In this sense, anti-intimidation programs such as KiVa emerge that are capable of reducing bullying and victimisation at early ages. Thus, schools play a leading role when it comes to making a meaningful contribution to the shared aim of teachers, specifically, to educate healthy students (Kärnä et al., 2011). The learning capacity of students is related with the type of videogame selected, with choices ideally being performed as a function of educational level. In this sense, non-violent videogames that encourage engagement in social interactions are preferred by students with a higher educational status, whilst VVG tend to be chosen more by students with a lower educational status (Bijvank et al., 2012). Alongside this perspective, evolutionary research

must also be considered. This improves outcomes by distancing itself from a simple educational approach to resolving conflict and moving towards a model in which individual differences in given scenarios and student motivational response are considered (Ingram et al., 2012).

In contrast to the perspectives discussed above, Ferguson (Ferguson, 2011; Ferguson et al., 2013), alongside other authors, urges caution and moderation in relation to the conclusions made by research conducted on VVG and current trends towards youth violence so as not to misinform the public. In accordance with this approach, speculation about the potential impact of VVG on personal wellbeing suggests that it is not as harmful as has previously been suggested and that prior warnings are exaggerated, instead, suggesting that fictitious media has a very limited impact on wellbeing (Ferguson & Wang, 2021).

In line with the gender perspective taken by Rogstad (2022), literature reviewed in the present article highlights that the environment inherent to esports is strongly male-oriented, mainly due to in-game masculinised behaviours, forms of communication and male avatars created to play, whilst, at the same time, a higher number of males than females were found to participate. Existing conditions at a sociological and structural level in relation to these factors negatively influence gaming ability and limit player progression and performance. This is due to the fact that females feel conditioned on a motivational level, in their decisions to choose certain videogames over others and with regards to gender stereotypes that represent them through a "masculinised physical appearance" or sexualised avatar. All of this conditions their own self-concept (Merino-Campos et al., 2023) and gives rise to a meritocracy that determines their reduced access and opportunities to engage in esports. The staunch preservation of male dominance in esports means that sexual harassment can be interpreted as a tool of the masculine hegemony to protect its masculine image (Rogstad, 2022), ultimately, being manifested as discrimination against women through psychological factors and social dominance orientations (García-Naveira et al., 2023).

The gender gap is grounded in the challenges faced by females that block their inroads to play, act and access, and, thus, decrease their chances of success in this setting, Education on values needs to form the backbone of the transformation process that must be undergone in esports in order to achieve parity between men and women. To this end, one of the main roads to success could be an increase in the number

of female role models, which would serve to raise the profile of female gamers and support the strive towards male gamers treating female gamers as their peers (Moldes, 2019).

Further studies must be conducted to examine related cognitive processes, given that this may provide additional evidence regarding individual differences (Bonny & Castaneda, 2016), psychosocial impact and behavioural issues (Banyai et al., 2019b). It is very important that research becomes available on changing gaming behaviours over time (Alvino de Mesquita & Becker, 2018; Banyai et al., 2019a) and cultural differences in gaming behaviour (Király et al., 2015; Alvino de Mesquita & Becker, 2018). It would also be of interest to examine the experiences of gamers when playing in collaboration, as opposed to in competition, with members of the oppositive sex (Vermeulen et al., 2014). With regards to the concept of gender, studies should be conducted in which there is equal representation of males and females, or, at least, the female perspective is analysed in relation to esports (Király et al., 2015; Shen et al., 2016; Banyai et al., 2019b; & Choe et al., 2019). A number of studies (Downs & Sundar, 2011; Tortolero et al., 2014; Kokkinakis et al., 2017; Hinkley et al., 2017; Choe et al., 2019; Pardina-Torner et al., 2019; Pishchik et al., 2019), bring attention to the need to examine competitive esports and aspects pertaining to psychological characteristics, affinity and gender (Wasserman & Rittenour, 2019; McLean & Griffiths, 2019; Király, Urbán, Griffiths et al., 2015). Personalisation and the influence of playing through an "avatar" should also be examined in greater depth (Downs & Sundar, 2011; Vermeulen et al., 2014). Finally, future studies should examine the influence of device type and amount of time spent engaged in esports as a function of gender (Hinkley et al., 2017).

With regards to cognitive psychology, a number of studies were identified that reported findings associating a professional playing status and high engagement with videogames with greater working memory, processing speed and visual-spatial working memory (Kang et al., 2020). Amongst the potential explanations behind this finding, the most plausible is that such individuals tend to play and retransmit at the same time. In other words, they engage in two cognitive activities simultaneously, carrying greater concomitant demands (Matsui et al., 2020). Videogame playing was found to be associated with better intrapersonal skills, greater stress control and poorer interpersonal skills. Nonetheless, gamers report a strong sense of belonging to their gaming environment (Martín

& Pedrero, 2019). Negative behaviours have also been detected, including ego and trends towards self-preservation, in addition to toxic behaviours. In the case of the latter, outcomes in team games were poorer than when toxic behaviours were not detected. Further, gamers whose reason for playing was escapism exhibited higher levels of psychological distress and depression (Mentzoni et al., 2011).

With regards to positive practical implications, findings from a number of studies (Smith & Chan, 2017; Troussas et al., 2020) provide strong evidence of the effectiveness of videogames for teaching computing in higher education. In this sense, various studies report better learning (Pesek et al., 2020; Cózar & Sáez-López, 2016; Romero & Kalmpourtzis, 2020; Troussas et al., 2020), academic performance and frustration tolerance (Chang et al., 2015), alongside increased meaningful learning (McEnroe-Petitte & Farris, 2020; Tan, 2018; Jayalath & Esichaikul, 2020), including better emotional response (Chittaro & Sioni , 2015) and physical activity enjoyment(Kim et al., 2020; Mora-González et al., 2020; Soltani et al., 2020; Roure et al., 2020).

Risk prevention targeting improved mental health could be approached through prosocial videogames (Allahverdipour et al., 2010) such as "Adventures aboard the S.S. GRIN" (Sanchez et al., 2017), "RegnaTales" (Ong et al., 2019) and "RAGE-Control" (Ducharme et al., 2021), which have produced improvements in anger management. Intervention programs are needed that target relaxation, self-control, awareness and moral connection in order to reduce aggression (Zhao et al., 2021), in addition to considering the positive influence of parental authority (Hou et al., 2022).

Greater self-efficacy in females was found to be significantly associated with intentions for prolonged engagement in eSports (Hao et al., 2020). Engagement with electronic sports using mobile phones is starting to redress some of the negative aspects related with the gender gap and is helping to increase female participation (Peng, 2021; Rogstad, 2022).

With regards to cognitive aspects, a number of studies revealed improvements in processing speed (Pardina-Torner et al., 2019; Matsui et al., 2020), spatial awareness (Benoit et al., 2020), working memory (Kang et al., 2020) in gamers when compared with non-gamers. Further, cultural diversity within teams has also been shown to be beneficial to the performance of individual members (Parshakov et al., 2018)

Finally, negative practical implications indicate that various elements of VVG, such as their violent content, pace of action (Chen et al., 2022b), identification with antisocial characters (Krahé & Möller, 2004; Barlett et al., 2009), length of exposure (Chen et al., 2022a; Adachi & Willoughby, 2016), screen size, controller type (Kim & Sundar, 2013; Ybarra et al., 2014), moral disconnect (Teng et al., 2019) and negative affect (Ferguson et al., 2022; Tian et al., 2020) can all lead to consequences such as alcohol consumption, smoking, aggression, delinquency and risk-taking during sex (Hull et al., 2014), and obsession with real firearms and shooting (Chang & Bushman, 2019). Playing VVG intended for a mature adult audience during adolescence may lead to issues with mental wellbeing and poorer academic performance (Charmaraman et al., 2020).

Factors pertaining to the violence with some esports (Hartman & Klimmt, 2006) condition behavioural problems in males (Király et al., 2014, 2015) and contribute to reduced participation in females. Masculine behaviours, sexist language and the female body are associated with sexual components (Fox & Tang, 2016; Choe et al., 2019; McLean & Griffiths, 2019). As a result, harassment and verbal aggression are inherent to esports. Sexism is grounded in issues related with non-inclusivity due to gender (Xue et al., 2019). This typically causes females to "hide themselves" behind pseudonyms and "avatars" with male characteristics (Pinto et al., 2017; McLean & Griffiths, 2019). Female engagement in esports is influenced by the prevailing male hegemony (Hayday & Collison 2020).

Players denominated as hardcore gamers exhibit higher levels of critical and logical thinking (Pishchik et al., 2019) and poorer interpersonal skills (Hinkley et al., 2017). It is important to highlight that games who play violent videogames on a daily basis exhibit higher levels of depression (Bányai et al., 2020). The diversity of findings reported leads us to conclude that more studies are needed to continue to shed light on the psychological characteristics of videogames and esports and their implications.

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