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DOES VIDEO GAME PLAYING STIMULATE MINDFULNESS?

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Abstract: *The video game industry is a thriving sector where the effects derived from its consumption are studied, among other aspects. This research analyzes the possible incidence of commercial video games on the mindfulness trait of players. To this end, a survey was carried out on a sample, mostly Spanish, of 225 people aged 17 to 66 years. The measure used to assess the mindfulness trait is the Five Facets of Mindfulness Questionnaire (FFMQ). Among the main results obtained, the length of time spent playing video games is slightly and directly associated with a higher mindfulness trait among non-meditating players. On the other hand, a positive association is also detected between the greater experience with video games, except for meditating players, with the FFMQ dimensions: not-judging inner experience dimension (particularly strong correlation in ADHD players), describing and non-reactivity to inner experience dimension.*

Keywords: *video games, mindfulness, psychological effects, attention, meditation.*

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INTRODUCTION

The video game industry is a booming sector. Taking the Spanish case as a reference, nearly 40% of the population plays video games and spends more than 7 hours per week on this activity (AEVI, 2022). Although the most common users are teenagers and young adults, more and more children and older adults are playing (ISFE-EGDF, 2021). Given their prominence, it is understandable that there is considerable research on video games effects. Among other psychosocial aspects, they favor mental flexibility (Mayer, Parong and Bainbridge, 2019), attention (Dale and Green, 2016; Quwaider, Alabed and Duwairi, 2019; Villafuerte-Holguín, 2022), emotional regulation (Di Blasi et al., 2019; Kosa and Uysal, 2020), socialization (Pitic and Pitic, 2022) or well-being (Vyas, 2021).

There is currently much research on the health benefits of mindfulness. And because both in video games and in mindfulness attention is essential, specific videogames have also been developed for the study of mindfulness (Patsenko et al., 2019) or for its stimulation (Kowert, 2020). However, studies addressing the potential of commercial videogames to induce mindfulness are really scarce (Gacken-bach & Bown, 2011), despite the fact that this technique can also be conceived as a trait (Hülsheger, Alberts, Feinholdt, & Lang, 2013) to be measured (Baer, 2020).

Video game consumption in Spain

The pandemic has boosted the digitalization process, consolidating the videogame industry as a widespread consumer good and consequently placing Spain in the top 10 worldwide in the sector in terms of market size (AEVI, 2020). According to the 2022 yearbook on The Video Game Industry in Spain published by the Spanish Association of Video Games (AEVI), 2,012 million euros were invoiced by this section of audiovisual and cultural leisure, representing 12.09% more than in the previous year. With regard to the sale type, the general trend over the last decade has been positive for both physical and online channels, especially for the latter, which in 2020 managed to surpass its predecessor in sales (AEVI, 2020).

An important section within this industry is the way of consuming video games, focusing on the different devices used on the one hand and, on the other, on the time of use. Currently, the most commonly used devices in Spain are desktop consoles with 29%, followed closely by the smartphone, with 26%. This is followed by the computer with 22%, the tablet with 14% and the portable console with 9% (AEVI, 2022). The average time spent now playing games per week stands at 7.42 hours (AEVI, 2022), representing a slight decrease compared to the previous year, when the highest figure recorded to date in Spain was 8.1 hours (AEVI, 2021). In the combination between time spent per week and device used, consoles top the ranking with 4.93 hours, with men being predominantly (66%) those who use this method the most. Equal percentages of women and men use smartphones and tablets 4.37 hours. And finally, the computer gets 3.84 hours, this time with a higher percentage of women, 72% (AEVI, 2022). The frequency with which games are played is another parameter to take into account. 72% of gamers say that they play every week, representing some 13.1 million people in Spain, another 18% play at least once a month and the remaining percentage plays sporadically (AEVI, 2022).

Another relevant issue is the players' profile. According to the statistics collected, there are gamers of all ages, obtaining data between 6 and 64 years of age (ISFE-EGDF, 2021).

During 2022, of the 18.2 million people who confirm themselves as video gamers in Spain, it is still mainly adolescents, with 84% of the population between 11 and 14 years of age, who consume the most video games. A significant increase is seen in childhood, with 79% of children between 6 and 11 years of age playing video games. Young people between 15 and 24 years old maintain their numbers at 71%, while the older age groups are gaining more and more followers every year, accounting for 60% between 25 and 34 years old, 42% between 35 and 44 years old and 31% between 45 and 64 years old (AEVI, 2022). In reference to the device chosen by each age group, it is worth noting that 62% of gamers between 6 and 10 years of age prefer to use desktop consoles, as do 76% of gamers between 11 and 14 years of age. Gamers between 15 and 24 years of age choose indistinctly, 49%, both smartphones and desktop consoles. The same is true for the 25-34 age group, but the percentage is reduced to 34% for both devices. The smartphone prevails at 24% for those aged 35 to 44. And finally, the 45-64 age group breaks the trend, as their most used devices are the smartphone, with 15%, and the computer, with 14% (AEVI, 2022). By gender, the number of women playing video games is increasingly similar to that of men, reaching the highest percentage in Spain in 2021, with 48%. In figures, this means 8.6 million female gamers out of a total of 18.1 million (AEVI, 2021).

Finally, according to the number of sales, it should be emphasized which genres are preferred by the Spanish population today. Leading the ranking with 1,786,554 units is action, followed by role-playing games with 1,449,099 and sports games with 1,114,50. Adventure, with more than half the sales of the previous ones, followed by racing, FPS or shooter and strategy, with around half a million units each. And closing the list are family games with 280,313, 68,253 for casual games and arcade games with 1,170 that are adding new regulars every year (AEVI, 2022).

Psychosocial effects of video games

Scientific research on video games is sometimes contradictory, presenting both favorable and unfavorable results (Moncada & Chacón, 2012). This may be partly due to the high overload of cognitive abilities required by various genres of video games, as they seem to demand a paradigm shift in how cognitive neuroscience examines their impact (Dale, Joessel, Bavelier & Green, 2020). Be that as it may, the current scientific production on the psychosocial effects of video games is high.

The literature on favorable effects has been classified into four blocks: stimulation of psychological skills, emotional management, social skills and aspects associated with well-being. In relation to the first block, some studies indicate that video games can favor executive functioning in general (Dale & Green, 2016; Xu, Liang, Baghaei, Berberich & Yue, 2020), or some of the executive functions in particular, such as working memory, decision-making or self-control (De Pasquale, Chiappedi, Sciacca, Martinelli y Hichy, 2021; García-Naveira, Jiménez, Teruel & Suárez, 2018; Villafuerte-Holguín, 2022). Likewise, video games can stimulate self-confidence, motivation, inteligence and creativity (García-Naveira et al., 2018; Bowman, Kowert, & Ferguson, 2015; Xu et al., 2020). Furthermore, action games in particular seem to foster the ability to focus on visual details and make correct decisions under pressure (Bavelier & Green, 2016).

Two aspects within this first block on positive psychological skills, also linked to executive functioning, deserve special consideration: attention and cognitive flexibility. In relation to the

latter aspect, there are studies that mention this effect through commercial video games (Mayer, Parong, & Bainbridge, 2019) or in those used as training with the aim of improving some cognitive abilities (García-Naveira et al., 2018). Regarding the item of attention, there are several studies that show benefits in this ability due to video games (Dale & Green, 2016; Quwaider, Ala-bed & Duwairi, 2019; Villafuerte-Holguín, 2022). There are also papers that focus attentional gain on shooter (Bavelier and Green, 2016) or action video games (Antzaka et al., 2017), as well as studies confirming that attention improves significantly due to video games compared to other cognitive processes (Parada, Raposo-Rivas & Martínez-Figueira, 2018) or explaining the player's attentional improvement as a learning curve in new video games (Moncada & Chacón, 2012).

Two of the reasons why people play video games, escapism and stress relief (Pitic & Pitic, 2022), are associated with improvements in emotional management. The escapism (avoidance of the real) offered by video games can reduce stress levels after stressful activities (e.g., work) (Kosa & Uysal, 2020). Likewise, commercial video games are also a promising resource for coping with other negative states such as depression and anxiety (Kowal et al., 2021). And they can also, in the case of intensive players of violent video games, significantly reduce their verbal and physical aggression (Ferguson et al., 2022). In addition, video games may constitute a healthy coping strategy for some players (it is common for many to use them to avoid negative moods and induce positive ones) (Kosa & Uysal, 2020) or as a resource to improve their emotional regulation through the game experience itself (Di Blasi et al., 2019; Kosa & Uysal, 2020).

Regarding the benefits associated with social skills, they are also linked to another of the reasons why people play video games: socialization (Pitic & Pitic, 2022). Videogames enable social skills development (García-Naveira et al., 2018), favor positive social interaction (online video games) (Arbeau, Thorpe, Stinson, Budlong & Wolff, 2020), are associated with increased peer support and prosocial behavior (case of interpersonal and prosocial video games) (Shoshani Braverman & Meirow, 2021) and, stimulate cooperation in general (Quwaider, Alabed & Duwairi, 2019).

The last block on favorable effects associated with well-being, is also linked to other motives explaining their use: entertainment, achievement and fun (Pitic & Pitic, 2022). Online video games constitute a very rewarding experience due to social interactions (Arbeau et al., 2020), an aspect that may be associated with video games being slightly, but favorably, correlated with affective well-being (Johannes, Vuorre & Przybylski, 2021). This technological amusement constitutes a useful resource for generating well-being (Vyas, 2021) or subjective well-being (Shoshani Braverman & Meirow, 2021), and may enhance psychological well-being by teaching skills associated with happiness and life satisfaction (Kowert, 2020).

From a negative perspective, the unfavorable effects detected in the literature on video games are grouped into four blocks: psychological abilities impairment, dependence, negative emotions and well-being deterioration. Regarding the first aspect, the literature indicates that they do not facilitate learning to think (Machargo, Luján, León, López & Martín, 2003). Intensive gaming is also linked to poorer memory and attention, as well as to cognitive and academic skills impairment (Farchakh et al., 2020) and this last aspect matches another study (Gómez-Gonzalvo, Devís-Devís & Molina, 2020). In relation to dependence, there is no consensus among scholars as to whether or not the possible addiction generated by video games is a mental health problem, or if it represents a gambling disorder (Ferguson & Colwell, 2020).

It is noteworthy that males appear to be more addicted than females, although dependence, in both sexes, decreases with increasing educational level (Esposito et al., 2020).

Video games provoke feelings of guilt for having invested too much time in them or implying the loss of school classes (Graner, Sánchez-Carbonell, Beranuy & Chamarro, 2008). They are also associated with higher anxiety levels (De Pasquale et al., 2021), negativity and aggressiveness (Quwaider, Alabed & Duwairi, 2019). Regarding this last mentioned aspect, some studies link aggressiveness to exposure to violent video games (Ferguson et al., 2022; Quwaider, Alabed & Duwairi, 2019). In relation to well-being deterioration, players themselves point out that the use of video games can be detrimental and affect their physical, mental and social well-being (Cisamolo, Michel, Rabouille, Dupouy & Escourrou, 2021).

Mindfulness and video games

The concept of mindfulness is strongly rooted in Buddhist psychology, although it shares conceptual parallels with ideas from various philosophical and psychological traditions (Brown, Ryan & Creswell, 2007). This word derives from the Pali word sati translated, on the one hand, as memory and, on the other, as consciousness, awareness or knowledge (the latter term also translated from sati as mindfulness) (Shulman, 2010). Consciousness, from this perspective, is the conscious registering of stimuli, including the five physical senses, the kinesthetic senses and the activities of the mind (Thera, 1973).

From the Western psychological perspective, mindfulness is usually defined as the maintenance of attention on the experiences happening in the present moment, accepting them as they occur or, in other words, without judging them. These experiences can occur both internally, whether mental or bodily, and externally. This type of disposition is often contrasted with a an autopilot state, in which behavior occurs mechanically and without attention to it (Baer, 2020). Among other aspects, mindfulness implies a renunciation of direct control, i.e., it does not aim for the person to control his or her reactions, feelings or emotions, but to experience them as they occur (Vallejo, 2006).

Definitions of mindfulness usually refer to a state of consciousness, but it can also be understood as a personality trait. In the first case, it refers to the degree to which a person pays attention and is truly aware of the stimuli occurring in the present (Brown & Ryan, 2003). Whereas the meaning of mindfulness as a trait represents the duration, frequency and intensity with which a person tends to engage in mindful states (Hülsheger, Alberts, Feinholdt & Lang, 2013). The mindfulness trait can be measured with various instruments, primarily self-report questionnaires (Baer, 2020).

The benefits associated with mindfulness are diverse. To cite some specific ones, it reduces the intensity of emotional disorders (Brown & Ryan, 2003), improves emotional regulation (Baer, Smith & Allen, 2004), stimulates creativity (Vargas, 2014) and benefits social relationships (Bihari & Mullan, 2014). In terms of well-being, its potential to promote both health and psychological well-being in the work environment (Goilean, Gracia, Tomás & Subirats, 2020), health and well-being in children and adolescents (Semple & Burke, 2019), physical well-being, especially in populations with pain (Creswell, Lindsay, Villalba & Chin, 2019), as well as psychological well-being in general (Tang et al., 2019), has been evidenced. Mindfulness has also been shown to be useful in relation to the negative effects of video games. There are studies that have found a negative association between mindfulness and an obsessive

passion for video games (Mills, 2019), specific intervention designs have been developed to treat video game addiction with mindfulness presence (Li et. al, 2018) and there are research that has detected a lower association with mindfulness, among other variables, in people with Internet gaming disorder and/or depression (Marchica, Mills, Keough & Derevensky, 2020).

Do video games have the potential to generate mindfulness? Considering non-commercial proposals, virtual relaxation spaces have been created with games to maintain sustained attention that energetically recharged participants (Asati & Miyachi, 2019); interventions with games and mindfulness have been designed to increase patients' engagement with their therapy (Birk, 2019); games have been developed to improve mindfulness with immediate results (Kowert, 2020); phone and virtual reality-based games have been created to teach mindfulness to people recovering from post-traumatic stress disorder (Birk, 2019); video games based on meditation, have been devised/implemented to study mindfulness at brain level explaining why it is associated with improvements in performance on an attentional task (Patsenko et al., 2019); and gamified applications and experimental games have been developed for participants to define their mindfulness experience in the video game (Hamilton, DiSalvo & Fullerton, 2021).

On the other hand, there are also several studies showing that virtual reality systems and their applications help induce mindfulness or increase people's mindfulness skills (Kosa and Uysal, 2018); that playing video games can enhance applied mindfulness practice (when performing a task) (Newell, 2021); and that video game players, relative to yoga practitioners, obtain more prominent mindfulness scores (Ray, 2022).

The only localized study that offers results on the relationship between co-marketing video games and mindfulness, among other variables, was developed by Gackenbach and Bown (2011) on a sample of young American adults. According to this work, the conscious experience of the present moment and the mindful awareness state, both during the game, as well as the ability to act without judgment during the day are found to be more accentuated in intensive players than in occasional ones.

The Present Study

This study evaluates the potential of commercial video games to generate mindfulness through their association with video game consumption variables. In the evaluation of each hypothesis, we consider whether players suffer from attention deficits or engage in a meditation practice as extraneous factors that may affect the results.

The hypotheses that finally articulate the study are:

Hypothesis 1 (H1): Higher consumption of video games is directly and positively associated with higher scores on all dimensions of the mindfulness trait.

More specifically:

Hypothesis 1a (H1a): greater length of time playing video games is directly and positively associated with higher scores on all dimensions of the mindfulness trait.

Hypothesis 1b (H1b): Greater frequency of playing video games is directly and positively associated with higher scores on all dimensions of the mindfulness trait.

Hypothesis 1c (H1c): Longer duration of video game playing sessions is directly and positively associated with higher scores on all dimensions of the mindfulness trait.

METHODS

Participants

The sample consisted of 225 participants, of whom 125 (55.6%) were women, 55 were men (42.2%), the rest -5, 2.2%- being of other options (prefer not to say, agender, other, etc.).

The average age of the participants was slightly over 28 years, as can be seen in Table 1.

Table 1. Descriptive statistics of the age variable

Media	Median	Minimum	Maximum	Standard Deviation
28,14	24,00	17	66	11,006

Instruments

Mindfulness trait. It was measured through the Five Facets of Mindfulness Questionnaire (FFMQ), original by Baer, Smith, Hopkins, Krietemeyer and Toney et al. (2006) and adapted to Spanish by Cebolla et al. (2012). It is an instrument of 39 items, rated on a Likert scale from 1 (*never or very rarely true*) to 5 (*very often or always true*). The tool measures five dimensions of mindfulness (Baer et al., 2008): observing (noticing or attending to inner and outer experiences, such as sensations, cognitions emotions, images, sounds, and smells), describing (labeling inner experiences with words), acting with awareness (attention to in-the-moment activities and can be contrasted with behaving mechanically with attention focused elsewhere), nonjudgment of inner experience (taking a stance toward thoughts and feelings without evaluation of them), and nonreactivity to inner experience (tendency to allow thoughts and feelings to come and go without getting caught or carried away by them). It also provides a general measure of mindfulness.

The obtained reliability of the scale determines its validity, without being outstanding (Cronbach's alpha = 0.777). Further analysis of the scale shows, according to Table 2, that all dimensions obtained normal distributions except for the fifth dimension (*non-reactivity to interior experience*).

Table 2. Kolmogorov-Smirnov test for the FFMQ scale

		Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5
N		225	225	225	225	225
Normal pameters						
	Media	27,3822	25,2444	17,0489	17,6356	22,8489
	Desv. típica	5,46300	6,98326	6,82448	7,58114	4,21459
More extreme differences						
	Absolute	,067	,063	,058	,063	,101
	Positive	,059	,062	,040	,055	,058
	Negative	-,067	-,063	-,058	-,063	-,101
Kolmogorov-Smirnov Z		1,002	,948	,876	,938	1,515
Asympt. Sig. (bilateral)		,268	,330	,427	,343	,020

Note. The contrast distribution is the Normal.

For all mean comparison tests, a Bonferroni posthoc was carried out.

Video games consumption. The sample was asked if they usually play video games, with a dichotomous response; how long they have been playing, with different alternatives for a single response (1 year or less, between 1-3, between 3-5, between 5-10, between 10-20 and more than 20); frequency, again with a single response between different options (daily, almost daily, some days of the week, weekly, monthly and occasional or very occasional); average time spent per game session, also with a single possible choice (1-30 min, 30 min.-1h, 1-2h, 2-3h, 3-4h and more than 4h); genre or genres played, with multiple choice (action, shooting, strategy, simulation, sport, racing, adventure, role-playing, musical, puzzles and others); and platforms played, also with multiple choice (computer, tablet, console connected to screen, portable console and cell phone, etc.); and platforms played, also with multiple choice (computer, tablet, console connected to screen, portable console and cell phone, etc.).

Meditation practice. The members of the sample were asked if they practiced any type of meditation, with a dichotomous response alternative, as well as their frequency of meditation practice, with different options for a single response (daily, several times a week, once a week or occasionally with no defined frequency). This is an odd variable, considered because of its possible incidence in the interpretation of the results.

Reduced attention span. The study participants were also asked whether they had been diagnosed with any type of attention deficit disorder or deficit (such as ADD or ADHD), with different alternatives for a single answer (yes, no and not sure). Again, this is an odd variable, considered because of its possible impact on the interpretation of the results.

Sociodemographic aspects. Participants were asked their age, gender (male, female or other) and country of residence (Spain, Latin America or other).

Procedure

When the research design was presented to the Research Ethics Committee (REC) of the main institution promoting the study (UEMC), the REC indicated that since clinical data were not collected, informed consent was not necessary and a favorable report from the REC would not be required. In any case, consent was required from the study participants at the beginning of the questionnaire through four items *(I understand that my participation is voluntary and I am free to participate or not in the study; I understand that the information obtained will only be used for the specific purposes of the study; I understand that I can withdraw from the study whenever I want, without having to give explanations and without any negative repercussions; I freely give my agreement to participate in the project).*

To obtain data, an initial investigation was carried out on the main associations related to the video game sector in Spain in order to find out their role and contact details (27 associations were located). Subsequently, the associations were contacted to present the study to them and to find out their willingness to participate in it.

Each of the ten entities that finally participated in the research was provided with a possible text to formalize the invitation to their members. The data were collected during the months of June to September. In addition, through Whatsapp and e-mail, the research team complemented the sample with its network of direct and indirect contacts, especially with the aim of expanding the presence of sporadic video game players and non-gamers.

All data were collected online through the Google Forms tool.

RESULTS

General information

By way of introduction, it should be noted that the sample analyzed who regularly play video games (53.3% of the total, 37% of women and 63% of men) have extensive experience in their use, since according to the data shown in Table 3, slightly more than 70% of the total report experience of more than 10 years (60% of women and 81.6% of men).

Table 3. How long ago did you start playing?

	Frequency	Valid percentage
1 Year or less	4	3,2
Between 1 and 3 years	5	4,0
Between 3 and 5 years	6	4,8
Between 5 and 10 years	21	16,7
Between 10 and 20 years	45	35,7
More than 20 years	45	35,7
Total playing	126	100,0
Not playing	99	
Total	225	

On the other hand, there is also a predominance of a frequency of use that can be described as high, since the majority declare that they play weekly (33.6% -32.4% in the case of women and 34.2% in the case of men) or even daily (46.2% -36.3% of women and 50% of men) -Table 4-.

Table 4. How often do you play?

	Frequency	Valid Percentage
Very occasionally (occasionally or very occasionally)	9	7,2
Some days or a few days a month (monthly)	16	12,8
Some single day every week (weekly)	20	16,0
Two or three days a week (some days a week)	22	17,6
Almost every day of the week (almost daily)	32	25,6
Every day of the week (daily)	26	20,8
Total playing	125	100,0
Not playing	100	
Total	225	

It should also be noted that gaming sessions usually last less than two hours (67% of the total, 73% in the case of women and 61.3% in the case of men) -Table 5-.

Table 5. How much time do you spend on average on the video games you like?

	Frequency	Valid Percentage
1 to 30 minutes	12	9,6
30 minutes to 1 h	32	25,6
1 to 2 h	40	32,0
Between 2 and 3 h	21	16,8
Between 3 and 4 h	14	11,2
More than 4 h	6	4,8
Total playing	125	100,0
Not playing	100	
Total	225	

Finally, with respect to two central questions in this study, the meditation practice and ADHD presence, it should be noted that only 25.1% practice meditation (74.9% of the total sample does not -71% in the case of women and 78.7% of the total sample of men-), and that the intensity of meditation, when occurring, is less than a week (54.1% in the case of women and 60% in the case of men), as can be seen in Table 6.

Table 6. How often do you practice meditation?

	Frequency	Valid Percentage
Occasionally or at a lower frequency than the following	33	55,9
Once a week	7	11,9
Several times a week	13	22,0
Daily	6	10,2
Total meditating	59	100,0
Not meditating	166	
Total	225	

With regard to ADHD, the data obtained from the sample rule out its presence in the majority (87.9% of the total, in similar proportions according to sex).

FFMQ scale scores

The mean scores obtained from the sample with respect to the five dimensions and the total scale are shown in Table 7.

Table 7. Descriptive dimensions FFMQ scale

	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5	Total
Feminine						
Media	28,12	24,61	16,91	16,59	22,22	108,45
Median	28	24	18	17	23	22
Typ. Dev.	5,53	7,47	6,57	7,32	4,31	6,24
Masculine						
Media	26,29	26,09	17,49	18,74	23,83	112,44
Median	26	26	18	19	24	22,6
Typ. Dev.	5,29	6,34	7,02	7,74	3,9	6,058
Total						
Media	27,38	25,24	17,05	17,64	22,85	110,16
Median	27	26	18	17	23	22,2
Typ. Dev.	5,46	6,98	6,82	7,58	4,21	6,21

The comparison tests of the mean scores of the FFMQ scale dimensions obtained for players and non-players did not yield statistically significant differences (p=.292, F=24.307, T-test). That is, playing or not playing did not determine significant differences in the mean scores obtained from the FFMQ scale.

Thus, no significant differences were observed between men and women (p=.133, F=2.513, T-test) in the overall score. Considering the dimensions of the scale separately, significant differences were observed in dimensions 1, 4 and 5 (p=.014, ,037 and ,011, F=.773, ,919, T-test in dimensions 2 and 4, Mann Whitney U=4754.500 in dimension 5), and no significant differences were observed in the rest of them (p=.121 and ,528, F=5.155 and ,257 respectively, T-test).

Finally, no significant differences were detected between meditators and non-meditators (p=.168, F=5.070, T-test, X non-meditators=109.17, X meditators=113.34,) or between ADHD and non-ADHD (p=.371 ANOVA 1 factor, posthoc Bonferroni, X ADHD=102.72, X non-ADHD=111.97). That is, both meditating and noting having ADHD do not imply significantly higher scores on the FFMQ scale.

Contrast of hypotheses

The hypotheses proposed and their contrast with the data obtained for this study are as follows:

Hypothesis 1 (H1): Higher video game consumption is directly and positively associated with higher scores on all dimensions of the mindfulness trait.

The contrast of this hypothesis is reached by adding the subsequent hypotheses. Thus, and considering the evidence obtained for the working hypotheses H1a, H1b and H1c, it can be generally affirmed that greater consumption of video games is not directly and positively associated with higher scores in the dimensions of the mindfulness trait.

This situation holds in different subgroups of the sample: meditators and non-meditators, and sample with ADHD and without ADHD.

More specifically:

Hypothesis 1a (H1a): greater length of time playing video games is directly and positively associated with higher scores on all dimensions of trait mindfulness.

The correlation coefficients in Spearman's Rho test show a direct and significant relationship between the length of time playing video games for dimensions 2, 4 and 5, an inverse and significant relationship for dimension 1, and no significant relationship for dimension 3 (Table 8). Consequently, it cannot be affirmed that more time playing video games is associated with higher scores on the FFMQ mindfulness scale.

Table 8. Rho Spearman test between seniority playing video games and PPMQ scale dimensions

	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5
Coef. Corr.	-0,26	0,30	0,16	0,32	0,20
Sig.	0,00	0,00	0,08	0,00	0,03
N	126,00	126,00	126,00	126,00	126,00

However, considering this question in relation to the part of the sample that meditates and the part that does not meditate, significant correlations should be highlighted in general in the group of non-meditators -inverse in dimension 1 (p=.001, Coef. Corr=-.326) and direct in the rest except dimension 3 (p=.001 , ,000 and ,041, Coef. Corr=.332, ,367 and ,206 respectively), where there is no statistical significance (p=.248 and Coef. Corr=.117) - with respect to the group of meditators - where no significant relationships are observed in any dimension. In other words, in the group of non-meditators there is a certain relationship between length of time playing video games and higher scores on the FFMQ scale. This cannot be affirmed in the group of meditators.

Regarding the sample with presence and absence of ADHD, it should be noted that in the case of non-ADHD direct and significant relationships are observed in dimensions 2, 4 and 5 (p=.007, .001, and .037, Coef. Corr=.273, .328 and .312). In the case of the sample with ADHD, a direct and significant relationship was observed only in dimension 4 (p=.007 and Coef. Corr=.780).

Hypothesis 1b (H1b): Higher frequency of playing video games is directly and positively associated with higher scores in all dimensions of the mindfulness trait.

In this case, the correlation coefficients in Spearman's Rho test highlight the absence in all the dimensions of the FFMQ scale of a significant relationship with the frequency of playing, thus affirming that the greater frequency of playing video games is not associated in any case with higher scores in all the dimensions of the mindfulness trait. The specific data can be seen in Table 9.

Table 9. Rho Spearman test between frequency of playing video games and PPMQ scale dimensions

	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5
Corr. Coeff.	0,10	0,10	-0,21	-0,09	0,01
Sig.	0,26	0,25	0,02	0,32	0,90
N	126,00	126,00	126,00	126,00	126,00

Unlike the previous case, a certain homogeneity should be noted in the data between non-meditators (where only an inverse and significant relationship was observed between frequency

of gambling and dimension 3 of the FFMQ scale -p=.002 and Coef. Corr=-.312-) and mediators (where no significant relationship was observed).

On the other hand, and in homogeneity with the data presented above, the presence or absence of ADHD does not make any difference to the general findings, since, in the same way as mentioned above, no significant relationships of any kind could be established between the frequency of gambling and the scores of the FFMQ scale dimensions.

Hypothesis 1c (H1c): Longer duration of video game playing sessions is directly and positively associated with higher scores on all mindfulness trait dimensions.

In this case, it cannot be affirmed that there is no association between the duration of video game sessions, since the statistical test only highlights a significant relationship between dimension 3, which is also inverse in nature (Table 10).

Table 10. Rho Spearman test between duration of gaming sessions and dimensions of the PPMQ scale

	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5
Corr. Coeff.	0,05	-0,02	-0,21	-0,16	0,07
Sig.	0,56	0,86	0,02	0,08	0,44
N	126,00	126,00	126,00	126,00	126,00

Considering again the difference between meditators and non-meditators, we highlight a similar situation to that described above. Here we only observe an inverse and significant relationship between meditators and duration of game sessions in dimensions 3 and 4 (p=.008 and .041 and Coef. Corr=-.265 and -.207 respectively). As in the previous case, no relationship was observed between meditators and duration of game sessions.

Finally, the samples without ADHD and with ADHD also showed homogeneity in this regard, since in both cases only significant differences were observed between the duration of the sessions and the scores obtained in dimension 3, although both were inverse (p=.027 and .048 and Coef. Corr=-.228 and .-610).

DISCUSSION

According to the results, no differences were observed in the mindfulness trait for playing or not playing video games, although the length of time spent playing video games was directly associated with a higher mindfulness trait among non-meditators. In this sense, if one does not meditate, continuing to play video games seems to stimulate the mindfulness trait to some extent.

Particularly, on the dimensions of mindfulness, the ability of players to attend to internal and external experiences (*observing*) seems to be slightly reduced, to a greater degree among non-meditators, as the length of time spent playing video games increases. Similarly, the ability to *act with awareness* with respect to the duration of games in meditators and in ADHD and non-ADHD players, as well as with the playing frequency in non-meditating players. Both dimensions, closely related to attention in our opinion, are in line with the studies indicating that intensive gaming reduces this capacity (Farchakh et al., 2020). The negative association with game duration is particularly strong among players with ADHD, which seems to indicate

that the regular playing of video games in this group favors mechanical behavior with their attention focused elsewhere (Farchakh et al., 2020). The negative association with game duration is particularly strong among players with ADHD, which seems to indicate that the habitual playing of video games in this group favors mechanical behavior with their attention focused elsewhere.

The ability to label internal experiences with words (*describing*) is, on the contrary, positively associated with greater seniority in video games (except in the ADHD group where this relationship is not detected). This link could perhaps be explained through a possible identification that players establish between the content of the screens and the internal vision of their consciousness, so that the greater experience with these devices could lead to a greater ability to name what is happening in the mind. This direct relationship with seniority in video games also occurs with the ability *to be non-judgmental* about the inner experience, especially intense in the case of ADHD players. Stance towards inner thoughts and feelings that presents syntony with the development of the capacity to act without judging in intensive players detected in another study (Ga-ckenbach & Bown, 2011). However, this link with seniority is inverse in the case of meditating gamers, something that could perhaps be explained by the greater development of the capacity for *non-judgment of inner experience* through meditative practice than through video games, with the result that this second activity reduces this capacity in meditating gamers.

Finally, *non-reactivity to inner experience* is positively related to seniority in video games. A result that, in our opinion, presents correspondence with studies pointing out that video games stimulate cognitive flexibility (Mayer, Parong, & Bainbridge, 2019), considering that this is applied to some degree in the non-evaluative stance towards inner thoughts and feelings.

CONCLUSIONS

This study represents a contribution to the study of commercial video games with the aim of generating mindfulness, a practice with many associated benefits. Although more studies are needed in this line of research to provide robust results, it is considered that the results achieved in this work could be useful for the industry. In the sense, that they could favour their ability to design commercial video games with the capacity to stimulate mindfulness. In addition, the results could also be interesting for those gamers interested in stimulating certain skills associated with this meditative practice: the ability to label internal experiences with words (except in players with ADHD), the ability to not judge the internal experience (in players who do not meditate) and non-reactivity to the internal experience.

LIMITATIONS AND FURTHER STUDIES

The study shows some limitations, such as not being carried out with a larger sample and not contrasting the findings with a longitudinal study. In future research on the topic addressed, it could be interesting to study whether the different platforms from which games are played or the different video game genres have a particular impact on the mindfulness trait or some of its dimensions.

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