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ORIGINAL ARTICLE

Examining the Predictors of Video Game Addiction According to Expertise Levels of the Players: The Role of Time Spent on Video Gaming, Engagement, Positive Gaming Perception, Social Support and Relational Health Indices

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Abstract
This study aimed to examine the predictive relationship between video gaming addiction (VGA) and the level of video gaming competency among video gamers. Additionally, the role of time spent playing video games, video game engagement (VGE), video game positive perception (VGPP), social support and quality of relationships with peers were examined. We recruited 227 participants using the purposive sampling method. Of the participants, 50.20% self-identified as Novice-Amateur video gamers while 49.80% indicated being a regular-expert level players. We collected data from participants utilizing a personal and video games information form and five scales and (video game positive perception, videogame addiction scale, video engagement scale, multidimensional scale of perceived social support and relational health indices). These scales are valid and reliable instruments suitable for research purposes. The primary data analysis method was the Partial least squares- structural equation modeling (PLS-SEM). Our results demonstrated that the relationship between VGA and VGE differs based on the participants' video gaming competency level. Another important result is that VGPP has a significant positive relationship with VGA ($p<0.001$), VGE ($p<0.001$) and video game playing and watching activities ($p<0.001$). Furthermore, an increase in the time spent on watching Twitch content is associated with an increased VGA level ($p<0.05$). Finally, the time spent on playing video games has different patterns with perceptions of social support according to the level of expertise of the players. This study indicates that VGPP plays a crucial role in predicting VGA and VE and highlights the importance of considering the level of players when examining the relationship between VGA and VE. The conclusions also exhibit that the increasing popularity of esports and video game content tracking may significantly impact VGA. The role of social support in video gaming behaviors varies based on the player's level of expertise.

Keywords Video Gaming · Video Game Addiction · Video Engagement · Positive Video Gaming Perception · Social Support · Relational Health Indices

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Introduction

Playing and gaming have been a part of regular human activity since early ages (Haktanir, 2020; Saritepeci et al., 2022; Yildiz Durak, 2019a, 2020). These activities affect social skills, emotional development, intellectual abilities (Gökçearslan et al., 2023; Gökçearslan et al., 2021; Granic et al., 2014; Lobel et al., 2017). Refraining from play and games can raise developmental concerns in childhood (King & Delfabbro, 2019). With the ubiquity of technology in all aspects of human life, gaming and playing transformed from face-to-face to digital interaction in the early 1970s. Researchers have reported that action video games are associated with increased technology-related skills (Admiraal, 2015) and cognitive abilities, including task switching (Karle et al., 2010), the response time (Bialystok, 2006), and decision-making (Green et al., 2010). Despite its benefits, a growing body of literature focuses on the detrimental effects of excessive online or offline video gaming. On the other hand, various psychopathological, academic and motivational problems arise in the context of intensive and problematic use of technology (e.g. Gökalp et al., 2022; Yildiz Durak, 2018, 2019b).

However, the overuse of video games has raised concerns all around the world, as such problematic use hampers one's functioning in social (i.e., family and peers), academic, occupational, and personal areas of life (American Psychiatric Association [APA], 2022). Consequently, the International Classification of Diseases' 11th Edition (World Health Organization [WHO], 2019) cataloged gaming disorder as a diagnosable disorder. Additionally, the APA listed internet gaming disorder as a condition requiring further investigation in the Diagnostic and Statistical Manual of Mental Health Disorders 5th edition (APA, 2013) and the recently revised 5-TR edition (APA, 2022).

Current reports indicate that approximately 3 billion online gamers (%37.5) existed worldwide in 2022 (Newzoo, 2022). These rates are higher in developed countries. For example, the Entertainment Software Association's (ESA) 2021 Essential Facts report (ESA, 2022) showed that 67% of American adults and 76% of American minors are players. Additionally, the ESA report showed that 80% of all video game players were over 18, with 18–34 ages constituting the largest group with 38%. Similarly, in the Digital-2022 report, the group with the highest rate of playing video games in the 16–64 age group is the 16–24 age group. This finding supports the notion that online video gaming is not only for children.

Some studies focus on three psychological needs underlying individuals' need for playing video games (Cabeza-Ramírez et al., 2022a, b; Mills et al., 2018): (1) Competence, (2) autonomy, and (3) relatedness to others or belonging to a group. Individuals' lack of satisfaction in meeting such needs causes them to develop a broadly positive outlook that includes overconfidence in a single leisure activity (Lalande et al., 2017; Mills et al., 2018). In other words, the satisfaction that the impulses to meet these needs can be met with a single leisure activity such as video gaming is likely to trigger the development of a positive perspective towards video games. This may cause individuals to spend more time on obsessive and problematic use of video games, watching the game, and game-related content (i.e., twitch viewing, and watching) (Cabeza-Ramírez et al., 2022a, b). We think that video game positive perception (VGPP) may be one of the most important predictors of time spent playing and watching video games, video engagement (VE), and video game addiction (VGA).

According to the Digital-2022 report, the rate of those who play games on any device between the ages of 16–64 is 83.6% (We Are Social, 2022). In this report, gaming web-

sites and apps accounted for 34.8% of the most frequently visited sites and apps in January 2022. Another notable finding in the report is that 27.4% of individuals aged between 16 and 64 watch game videos weekly. Accordingly, besides playing, one of the most essential activities of video gamers is watching game videos (i.e., e-sports, gaming videos). Intensive engagement in such contents may trigger various behavioral disorders. Indeed, one study reported strong relationships between e-sports viewing habits and video gaming gambling habits (Macey & Hamari, 2018).

There are different perspectives in the literature on whether VGA can be qualified as a disease (Loton et al., 2016). There are also various difficulties in defining VGA (Moge & Romano, 2020). One of the most substantial challenges is that overuse, a manifestation of benign video game engagement (VGE), is sometimes incorrectly characterized as VGA (Brunborg et al., 2013; Moge & Romano, 2020). However, we possess strong evidence that there is no significant relationship between VGA and VE (Brunborg et al., 2013; Ferguson et al., 2011; Snodgrass et al., 2019).

An extended involvement in viewing digital content related to video games may debilitate one's relationship with their social environment. Social relations with family, friends and special people and social support from these sources can be a protective factor against behavioral disorders, such as video game addiction (André et al., 2020; Kardefelt-Winther, 2014; Liau et al., 2015; Milani et al., 2018; Tullett-Prado et al., 2021). Social support includes elements such as attention, respect, and helps that the individual receives from family, friends, and special people (Mo et al., 2018). Social support can be provided not only in face-to-face environments but also through online environments (Tham et al., 2020). Individuals with low perceived social support in face-to-face environments could be more likely to seek social interaction and support in online environments. As a matter of fact, in a 2022 report on the gaming industry in the US, more than three-quarters of gamers state that games can mediate establishing new friendships and relationships, and 60% of them state that video games contribute to their interactions with their families (Entertainment Software Association, 2022). On the other hand, several researchers suggested that face-to-face social support was a preventive factor for behavioral addictions, such as VGA, and in-game or online social support demonstrated a positive relationship with VGA (Mazzoni et al., 2016; Tham et al., 2020). However, few studies have examined such a relationship (Uçur & Dönmez, 2021). In this context, the relationship between the perception of social support provided by friends, family, and special person(s) and video game addiction and time spent video gaming according to the player level was considered a dimension in this study.

Conceptual Framework

This section outlines the theoretical foundation of the present study by explaining several models of internet disorders. Additionally, the authors discussed the relationship among the variables and proposed 11 hypotheses based on the incorporation of multiple theoretical approaches.

Theoretical Basis

Given that video gaming disorder is still an emerging area, current theories and models of video gaming disorder are based on problematic internet use (Yildiz Durak, 2019a; Yildiz Durak et al., 2022). One of the prominent theories was the first cognitive-behavioral model (Davis, 2001), focusing on pathological internet use. Davis asserted that cognitive and behavioral factors can lead to problematic internet use and that cognitive distortions along with reinforcements for internet use, psychopathological tendencies (e.g., depression, social anxiety), and lack of social support can precipitate specific pathological internet use (e.g., video gaming, gambling) or generalized pathological internet use. More than a decade later, Dong and Potenza (2014) proposed a new model of internet gaming disorder explaining this problematic behavior from a neurocognitive perspective. This model suggested three domains that contribute to internet gaming disorder: (a) desire for reward-seeking and stress-reduction, (b) ability to control behaviors and resist gratification, and (c) decision-making regarding engaging in problematic internet use. Finally, the researchers posit that problematic internet use can alter the brain's neurological structure and diminish executive function skills, including control over behavior. Unlike Davis's model, this model does not focus on social factors as a risk or protective factor.

Though other models explaining online video gaming disorder are proposed and examined in the literature (e.g., Flow theory), a recent more comprehensive and multidimensional model of addiction has been proposed. The Interaction of Person-Affect-Cognition-Execution (I-PACE; [Brand et al., 2016]) model considers biopsychosocial factors in explaining the development and maintenance of internet addiction, including internet video gaming disorder. The I-PACE model includes four main components: (i) predisposing factors, including impulsivity, lack of social support, stress vulnerability, and psychopathology; (ii) changes in affect and thoughts after gaming (i.e., affective and cognitive responses); (iii) level of executive functioning and response control (i.e., executive and inhibitory control), and (iv) consequences of online video gaming. However, these models of addiction fail to address some personal motivators for gamers, such as competitiveness and desire for mastery. This shortcoming may stem from the fact that the aforementioned models are developed for general and specific addictions, but not particularly for video gaming addiction. Therefore, it is important to examine other various personal motivators.

Self-determination theory (SDT) highlights the contribution of internal motivation and satisfaction in developing addictive behaviors (Ryan & Deci, 2000). Przybylski and colleagues (2010) posit that video game engagement aims to satisfy three fundamental needs: (a) competence, (b) autonomy, and (c) relatedness. In the SDT-based gaming engagement model, competence refers to a sense of mastery and effectiveness and acquiring new skills in gaming (Mills et al., 2018). According to this model, individuals engage in gaming activities to increase their competence in video games, which are usually built in a way that progressively gets more challenging (Neys et al., 2014). Such a structure creates intrinsic motivation to play video games and fulfill one's competence needs (Przybylski et al., 2010). Additionally, this model defines autonomy as a sense of volition and control over options, including the freedom to play at any time, access to numerous in-game options, and customization (Przybylski et al., 2010; Neys et al., 2014). Such factors foster one's sense of autonomy and increase the chances of one's engagement in video gaming. Finally, the need

for relatedness refers to connecting with others and feeling included in social groups (Mills et al., 2018).

A comparison of these models shows that different variables are proposed to explain the manifestation of the online gaming disorder. Therefore, as suggested by APA, a further examination of factors contributing to online video gaming disorder is warranted.

The Role of Video Game Positive Perception in Video Game Engagement, Addiction and Time Spent Gaming And Watching Others Play Video Games

According to various models of online video gaming disorder, one of the reasons why people play video games is the positive perception pertaining to playing video games. Cognitive and biopsychosocial models of online gaming disorder underscore this notion. Specifically, the I-PACE model describes this process as a cognitive bias and postulates that individuals engage in activities towards which they have positive perceptions while they tend to avoid activities toward which they have negative perceptions or expectations (Brand et al., 2016). Consequently, we hypothesized that the greater one has a positive perception of video games, the greater one will engage in video games (H1), see the end of the conceptual framework section for an entire list of hypotheses. The I-PACE model list cognitive bias (i.e., positive perception in playing video games) as a risk factor for the online video gaming disorder, which can be exacerbated by other factors, such as gratification and the need for mood regulation after stressful events. Furthermore, according to the SDT-based gaming engagement model, individuals engage in gaming activities to increase their competence in video games, which are usually built in a way that progressively gets more challenging. A need for competence and mastery motivate gamers to engage in video gaming for an extended period of time (Przybylski et al., 2010), which can lead to video game addiction. Therefore, we hypothesized that having a positive perception toward video games may not only lead to video game engagement but also to overplay and gaming addiction (H2). Not only do positive video game perception and a need for competency may motivate gamers to play more, but they also watch others play (e.g., Twitch) to improve their skills. Thus, we hypothesized that video game perception is positively associated with the amount of time watching Twitch videos (H3).

The Role of Video Engagement in Video Game Addiction

Video engagement refers to the degree to which individuals watch the video in a way they view themselves as a part of the video (Lehmann et al., 2022). As indicated earlier, SDT-based game engagement model emphasizes that individuals play video games for a sense of competence. To master a video game, individuals also engage in activities to improve their knowledge and skills. One of such activities is to watch other players play on various platforms.

According to Bandura's Social Cognitive Theory (SCT), self-efficacy, a belief that the person can successfully execute a behavior (Bandura, 1997), develops as a result of performance accomplishments, vicarious experience, imaginary experience, verbal persuasion, and physiological states (Bandura 1997). When gamers carefully watch videos of others playing, they can have vicarious experience (i.e., seeing others perform the task they intend to achieve and feeling that if others can do it, so can I) and imaginary experience (i.e.,

imagining that they can successfully execute the desired behavior), which may ultimately foster their sense of competence, self-efficacy. Additionally, as hypothesized earlier, positive video engagement can predict video gaming addiction. Therefore, we believe that the degree of video engagement can have a direct effect on whether one can develop video game addiction (H4).

The Role of Time Spent Gaming and Watching Twitch and Others Play Video Games in Video Game Addiction

As discussed earlier, individuals can stream game-related live Twitch content to foster their belief in their skills and competence related to the game. Such a belief requires testing and mastering through actual play. Consequently, it would be reasonable to assume that individuals watching such content return to playing and attempt to master their skills. Thus, we hypothesized that as the participants spend more time streaming game-related Twitch content, they would be at a greater risk of developing video game addiction (H5). Also, based on the SCT, vicarious and imaginary experiences support the development of self-efficacy, a sense of competency. The SDT-based gaming engagement model also emphasizes that one of the reasons why individuals engage in gaming is for a sense of competency (Przybylski et al., 2010). Subsequently, we hypothesized that as individuals watch others play, they would be more likely to overplay and demonstrate the symptoms of video game addiction (H6).

Another variable we tested in this study was time spent playing video games. Contrary to popular belief, the relationship between time spent gaming and video game addiction is not straightforward, and there are contradictory findings related to the correlation between the two variables. Moreover, researchers specified no specific amount of time to diagnose video gaming addiction (Griffiths, 2010). Nonetheless, various video gaming addiction instruments (e.g., Lemmens et al., 2009; Yılmaz et al., 2017) focus on how much time is allocated to gaming compared to other leisure activities, such as socializing with others. Moreover, excessive time spent playing video games has been identified as a risk factor for video gaming addiction (Baggio et al., 2015; Gentile et al., 2011). In fact, Rehm and colleagues (2013) argued that heavy use over time is the essence of addiction, and other self-assessment instruments might not accurately capture addiction. Given the controversy surrounding this phenomenon, we hypothesized that time spent video gaming would predict video game addiction (H7).

The Role Of Time Spent Video Gaming in Perceived Social Support

Though we proposed a potential direct prediction between time spent video gaming and video game addiction, such a relationship can be mediated by other factors. Social factors are emphasized in virtually all video gaming engagement and addiction models. However, limited studies investigated the mediating role of social factors, including perceived social support and the quality of relationships with others. In this study, we hypothesized that there would be a negative association between video gaming time and participants' perceived social support (H8). We also proposed that there would be a negative relationship between video gaming time and the perceived quality of relationships with peers (H9). We also hypothesized that these social factors could cushion the association between time spent

playing video games and video game addiction as serving as protective factors (H10 and H11).

The Purpose of the Study and Hypotheses

Online video gaming is not merely for children. In fact, as stated earlier, individuals between the ages of 18–34 account for the largest group playing online video games. One study conducted during the COVID-19 pandemic suggested that 16.6% of college students displayed video game addiction (Gómez-Galán et al., 2021). Given that the internet gaming disorder is listed as a condition requiring further examination by the DSM-V and DSM-V-TR, this study explored various factors potentially contributing to video gaming disorder among college students.

Acknowledging the merit in the I-PACE model of specific addiction and considering the motivational factors in the self-determination theory of video gaming, we integrated both models and proposed and tested the following hypotheses:

H1. The user's video game positive perception is positively associated with video engagement to attention (H1a); going into a narrative world (H1b); identity (H1c); empathy (H1d) and emotion (H1e).

H2. The user's video game positive perception is positively associated with video game addiction.

H3. The user's video game positive perception is positively associated with.

time spent on Twitch viewing streaming (H3a); others play game video viewing streaming (H3b); video gaming (H3c).

H4. Video engagement related to attention (4a); going into a narrative world (H4b); identity (H4c); empathy (H4d), and emotion (H4e) are positively associated with video game addiction.

H5. The user's time spent viewing Twitch streaming is positively associated with video game addiction.

H6. The user's time spent watching others play video games is positively associated with video game addiction.

H7. The user's time spent video gaming is positively associated with video game addiction.

H8. The user's time spent video gaming is negatively associated with perceived social support related to family (H8a); friend (H8b) and special person (H8c).

H9. The user's video gaming time is negatively associated with relational health indices (peer).

H10. Perceived social support related to family (H10a); friend (H10b), and special person (H10c) is negatively associated with video game addiction.

H11. Relational health indices (peer) are negatively associated with video game addiction.

Method

Methodology of the Study

This cross-sectional study examined the correlations and regressions among individuals' quality of relationships, the level of video gaming addiction, time spent playing video games, and the level of players (e.g., novice). Cross-sectional studies allow researchers to collect data from a particular group at a certain time. We followed the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines in reporting our findings.

Participants

In this study, the predictors of video game addiction were examined. Our sample was comprised of 227 students, who were 18 years or above, played video games, and voluntarily precipitated into the study, through purposive sampling. To be able to participate, individuals had to read and accept the information sheet explaining the scope of the study and voluntary nature of participation. G*Power 3.1.9.7 program was used to determine the research sample size. The sample was determined as 176 people in total, 88 + 88, with independent t-test 95% confidence interval, 5% (α err prob) margin of error, 0.5% effect size d and 95% (power(1- β err prob)) power to represent the universe, allocation ratio N2/N1 1 ratio.

Of the study group, 54.2% were female and 45.8% were male. The average age of the participants is 21.08. Participants receive undergraduate education. 50.2% of the participants defined themselves as novice-amateur videogame players and 49.8% as regular-expert. The hypotheses of the study are presented in Fig. 1.

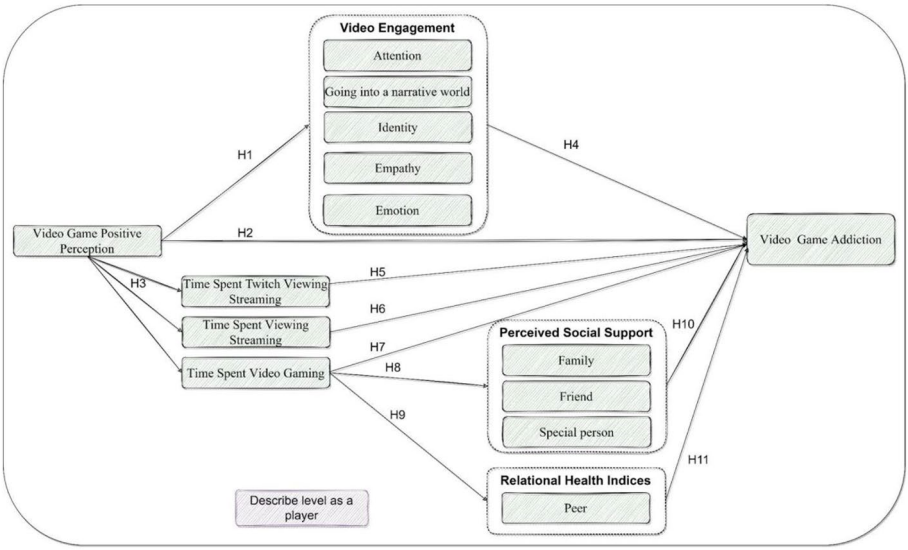

Fig. 1 The research design

Data Collection Tools

The data collection tool used for this research consisted of personal and video games information form and 5 different scales.

Personal and Video Games Information form In this form, there are questions about gender, age, grade level, academic achievement, self-defining status as a player, hours of playing games, hours of watching video game streams. Sample items are presented below.

- How many hours do you spend playing video games per week?
- How many hours do you spend watching video game streaming per week?
- How many hours do you spend on Twitch for watching video game plays per week?

Video game Positive Perception This form, which deals with positive perceptions about video games, was adapted by Cabeza-Ramírez et al. (2022a, b) from studies by Wickwire et al. (2010) and Wu et al. (2013). This form, in a Likert structure, groups three positive perceptions about video games and streaming platforms into a single structure. Sample items are presented below.

- Your video game hobby helps you make new friends .
- Your video game hobby could become your profession.

Videogame Addiction Scale This scale, which was developed by Yılmaz, Griffiths and Kan, (2017), was validated for the 18–21 age group within the scope of the current study, due to the age group difference of the target population. This scale has a 5-point Likert structure and has 21 items. The total scores obtained by summing the response scores range from 21 to 105. The factor loadings of the scale are between 0.500 and 0.832. Cronbach's Alpha value is 0.953, Composite Reliability (CR) is 0.957 and Average Variance Extracted (AVE) is 0.534. This scale include items such as.

- I cannot resist playing videogames even if it negatively affects my life.
- Even if I control the amount of time I spend playing videogames, after a while I continue to play again uncontrollably.

Video Engagement Scale This scale, developed by Visser et al. (2016), was adapted to Turkish by Deryakulu, Sancar, and Ursavaş (2019). The scale consists of 5 factors (attention, going into a narrative world, identity, empathy and emotion) and 15 items. The validity and reliability findings of the scale are presented in Sect. 4. This scale included items such as.

- During viewing I was fully concentrated on the video.
- When I had been viewing for a while, it seemed as if I had become the [the video character] in my thoughts.

Multidimensional Scale of Perceived Social Support (PSS) This scale was developed by Eker, Alkar and Yaldız (1995). This scale consists of 12 items. There are three subgroups regarding the source of support, each consisting of 4 items (family, friend, and a special

person). The structure of the scale is 7-point Likert. A high score indicates high perceived social support. The validity and reliability findings of the scale are presented in Sect. 4. Sample items are presented below.

- I get the emotional help and support I need from my family.
- I can count on my friends when things go wrong.

Relational Health Indices (RHI) (Peer) This scale was developed by Can, Haktanir, Lenz, and Watson (2021). This scale has two subscales of 12 and 11 items (the Peer and Mentor subscales). The structure of the scale is 5-point Likert. The validity and reliability findings of the scale are presented in Sect. 4. This instrument included items such as.

- After a conversation with my friend, I feel uplifted.
- My friendship causes me to grow in important ways.

Data Analysis

Data analysis was done with Partial least squares – structural equation modeling (PLS-SEM). SmartPLS 3 program was used in the analysis. The PLS-SEM is a type of non-parametric Structural Equation Modeling (SEM) that allows researchers to examine multivariate dependent and independent variables (Gefen et al., 2000). In this method, covariance and variance-based approaches are used. Additionally, variance-based Partial least squares – structural equation modeling (PLS-SEM) using Partial least square has many advantages over covariance-based structural equation models (CB-SEM) in the context of this study.

First, the PLS-SEM does not assume a normal distribution (Hair et al., 2014). Several criteria are proposed for normality testing (e.g., Shapiro Wilks Test, Skewness and Kurtosis values). We obtained skewness and kurtosis values between −2.5 and +4.5, which is much higher than the general rule of thumb suggested by researchers (e.g., Haktanir et al., 2022; Tabachnick et al., 2015). Second, the PLS-SEM is an analaysis that does not require large data sets (Hair et al., 2017). Given our moderate sample size, we deemed that the PLS-SEM was appropriate for our data set. Finally, Hair and colleuages indicated that the PLS-SEM is capable of analyzing complex SEMs. Given the complexity of our model, we decided to use the PLS-SEM using the Smart PLS 3.0. software. To validate the indicators in the proposed model, data analysis was carried out in two stages: analyzing the measurement model and testing the structural model (see Anderson & Gerbing 1988).

The measurement model was tested to examine the reliability and validity of the structural model. In addition, the structural model was tested for sub-samples of students according to their video player levels, and the statistical significance of the differences between the path coefficients was examined using the Multi-Group Analysis (MGA). For multi-group analysis, it is recommended to evaluate measurement invariance first to ensure that different group-specific model estimate differences are not due to different contexts and semantics attributed to the latent variables between groups (Henseler et al., 2016). First, we tested the predictive power of the structural model using R2, Q2 and f2. The structural model was tested for sub-groups and the statistical significance of the differences between the path coefficients was examined by Multiple Group Analysis (MGA). Based on the determined

grouping variable, the data is categorized into subgroups and bootstrapped. The observed distribution of the results obtained in this step are evaluated in the MGA (Henseler, 2012). The findings regarding the measurement and structural model are presented in Sect. 4.

Findings

Testing Measurement Model

The measurement model was examined before testing the default model. For the reflective measurement model, convergent validity, internal consistency reliability and discriminant validity findings were evaluated. Factor loadings greater than 0.50 indicate good convergent validity (Hair et al., 2017). Items with factor loadings below 0.50 were removed and factor loadings of all remaining items are presented in Table 1.

In Table 2, composite reliability (CR), and Cronbach's Alpha coefficients were examined. Values examined for internal consistency reliability indicate that this validity has been met. As a matter of fact, the recommended cutoff value for Cronbach's Alpha, and CR are 0.70, and 0.50 for AVE values (Hair et al., 2014). As a result, it was concluded that the structures discussed in the study were reliable and had sufficient internal consistency.

Fornell and Larcker's (1981) criteria were examined to assess discriminant validity. According to Table 3, the correlations between the variables considered are lower than the diagonal values of the AVE. This indicates that discriminant validity is provided.

Structural Model

The statistical significance of the path coefficients was tested with 1000 sub-samples. Table 4; Fig. 2 presents the results of the structural model.

*The dashed line indicates non-significant relationships.The significance of the path coefficient was examined in Tables 4 and 5. H1 assumes that video game positive perception is associated with video engagement. The results showed that video game positive perception had a significant effect on video engagement (H1-Accept). H2 assumes that video game positive perception significantly predicts videogame addiction. The results showed that video game positive perception significantly predicted videogame addiction; therefore H2 is accepted. In H3, video game positive perception is predicted to be associated with time spent. The results showed that video game positive perception had a significant relationship with time spent. Therefore, H3 is accepted. In H4, the relationship between video engagement and videogame addiction was tested. The results showed that video engagement was not significantly associated with videogame addiction; therefore H4 is rejected. H5 assumes that time spent twitch viewing streaming significantly predicts videogame addiction. The results showed that time spent twitch viewing streaming significantly predicted videogame addiction; therefore H5 was accepted. In H6 and H7, time spent viewing streaming and time spent video gaming is predicted to be significantly associated with videogame addiction. The results showed that this relationship did not have a significant effect and therefore H6 and H7 were rejected. In H8, time spent video gaming is estimated to be associated with perceived social support. The results showed that there was no significant relationship other than the friends (H8b) dimension. Therefore, H8a and H8c were rejected, while H8b was

Table 1 Factor Loadings

Factor	Sub factor	Items	Factor loading
Video Game Positive Perception	Positive Perception	PP1	0.915
		PP2	0.867
		PP3	0.931
Time Spent	Time Spent Twitch viewing Streaming	TS1	1.000
	Time Spent Video Gaming	TS2	1.000
	Time Spent Viewing Streaming	TS3	1.000
Video Engagement	Attention	VE1	0.902
		VE2	0.874
		VE3	0.902
	Emotion	VE4	0.955
		VE5	0.947
		VE6	0.949
	Empathy	VE7	0.960
		VE8	0.934
		VE9	0.936
	Identity	VE10	0.968
		VE11	0.960
		VE12	0.902
	Going into a narrative world	VE13	0.872
		VE14	0.805
		VE15	0.916
Relational Health Indices	Peer	RHI1	0.852
		RHI2	0.770
		RHI3	0.922
		RHI4	0.921
		RHI5	0.920
		RHI6	0.912
		RHI7	0.886
		RHI8	0.689
		RHI9	0.889
		RHI10	0.900
Perceived social support	Family	PSS1	0.910
		PSS2	0.968
		PSS3	0.902
		PSS4	0.886
	Friends	PSS5	0.949
		PSS6	0.933
		PSS7	0.967
		PSS8	0.937
	Special person	PSS9	0.941
		PSS10	0.956
		PSS11	0.958
		PSS12	0.967

Table 1 (continued)

Factor	Sub factor	Items	Factor loading
Videogame Addiction		VGA1	0.813
		VGA2	0.822
		VGA3	0.780
		VGA4	0.811
		VGA5	0.50
		VGA6	0.50
		VGA7	0.596
		VGA8	0.673
		VGA9	0.832
		VGA10	0.792
		VGA11	0.792
		VGA12	0.608
		VGA13	0.633
		VGA14	0.609
		VGA15	0.815
		VGA16	0.813
		VGA17	0.655
		VGA18	0.817
		VGA19	0.807
		VGA20	0.795

Table 2 Construct Reliability and Validity

	Cron-bach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Attention	0.873	0.922	0.798
Emotion	0.947	0.966	0.903
Empathy	0.938	0.960	0.890
Going into a narrative world	0.833	0.899	0.749
Identity	0.939	0.961	0.891
Family	0.945	0.955	0.841
Friends	0.962	0.972	0.896
Special person	0.969	0.977	0.913
Relational Health Indices (Peer)	0.964	0.968	0.756
Time Spent Twitch viewing Streaming	1.000	1.000	1.000
Time Spent Video Gaming	1.000	1.000	1.000
Time Spent Viewing Streaming	1.000	1.000	1.000
Video Game Positive Perception	0.889	0.931	0.818
Video Game Addiction	0.953	0.957	0.534

accepted. Time spent video gaming on H9 is predicted to be associated with relational health indices. The results showed that no significant relationship was found. Therefore, H9 is rejected. In H10, it is estimated that perceived social support is related to videogame addiction. The results showed no significant relationship and H10 was rejected. Relational health

Table 3 Discriminant validity -Fornell and Larcker's (1981) criteria

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Attention	0.893													
2. Emotion	0.880	0.950												
3. Empathy	0.837	0.938	0.943											
4. Family	0.176	0.160	0.167	0.917										
5. Friends	0.159	0.144	0.133	0.776	0.947									
6. Going into a narrative world	0.886	0.921	0.911	0.180	0.135	0.865								
7. Identity	0.852	0.884	0.882	0.130	0.085	0.889	0.944							
8. Relational Health Indices (Peer)	0.077	0.090	0.098	0.583	0.725	0.075	0.040	0.869						
9. Special person	0.115	0.048	0.045	0.469	0.470	0.059	0.056	0.359	0.955					
10. Time Spent Twitch viewing Streaming	0.240	0.187	0.153	0.091	0.130	0.209	0.200	0.096	0.095	1.000				
11. Time Spent Video Gaming	0.336	0.265	0.265	0.021	0.143	0.309	0.269	0.084	0.078	0.506	1.000			
12. Time Spent Viewing Streaming	0.259	0.208	0.189	0.037	0.081	0.258	0.240	0.040	0.081	0.751	0.581	1.000		
13. Video Game Positive Perception	0.483	0.461	0.440	0.069	0.097	0.470	0.417	0.082	-0.019	0.321	0.504	0.292	0.905	
14. Videogame Addiction	0.564	0.546	0.495	0.058	0.076	0.555	0.481	0.060	0.052	0.380	0.442	0.328	0.644	0.731

indices in H11 are predicted to be associated with videogame addiction. The results showed that no significant relationship was found. Therefore, H11 is rejected.

In addition, the percentages of variance explained in the structural model are 23.3% for attention, 21.2% for emotion, 19.4% for empathy, 22.1% for going into a narrative world, 17.4% for identity, 2.0% for friends, 0.0% for family, 0.6% for special person. 0.7% for relational health indices (Peer), 10.3% for time spent twitch viewing streaming, 25.4% for time spent video gaming, 8.5% for Time Spent Viewing Streaming and 54.7% for videogame addiction.

Multi Group Analysis

Multi Group Analysis (MGA) was conducted to test the statistical significance of the differences between the levels of the players as a sub-sample in the findings related to the structural models. When Table 5 was examined, it was found that the relationship between H1, H2 and H3 was significant for the novice-aAmateur and regular-expert sub-samples. The relationship between going into a narrative world and videogame addiction is regular-expert, and the relationship between empathy and emotion and videogame addiction is significant in novice-amateur. The relationship between time spent twitch viewing streaming and videogame addiction is significant in regular-expert. The relationship between time spent video gaming and friends is significant in Regular-Expert, and the relationship with special person is significant in Novice-Amateur.

Discussion

In this study, multiple relationships between VGA, VGPP, VE, perceived social support, and relational health indices according to a player level were examined within the framework of variables such as game playing and watching time. The focus of this study is whether the predictors of VGA vary according to the level of the player.

The relationship between VGPP and all sub-dimensions of VE is significant. This is a result that comes within expectations. Because engagement is directly related to motivation (Wiebe et al., 2014), and positive perception of any situation or behavior is directly affected by motivation. In addition, engagement measures the individual's behavioral, cognitive, and affective patterns for any action (Fredricks et al., 2011). Therefore, it can be said that there is a high probability of a mutually positive relationship between the individual's optimistic view of the behavior and the level of engagement towards this behavior. In addition, according to the results of multi-group analysis, this relationship does not differ according to the player level. Accordingly, VE is not related to the level of expertise in the game. According to the Digital 2022 report, 83.6% of the population aged 16–64 play video games (We Are Social, 2022), and it is possible to say that a significant part of them are novice-amateur players. This situation shows that most people engage in videos related to video games regardless of their level of expertise.

The study results show a significant relationship between VGPP and VGA, time spent watching activities (Twitch, streaming), and time spent video gaming. Besides, these relationships do not differ according to the players' levels (novice-amateur and regular-expert). These results can be explained by meeting three basic psychological needs used in self-

Table 4 SEM

	Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
H1a	Video Game Positive Perception -> Attention	0.483	0.486	0.063	7.684	p<0.001
H1b	Video Game Positive Perception -> Going into a narrative world	0.470	0.474	0.060	7.882	p<0.001
H1c	Video Game Positive Perception -> Identity	0.417	0.420	0.063	6.590	p<0.001
H1d	Video Game Positive Perception -> Empathy	0.440	0.442	0.061	7.183	p<0.001
H1e	Video Game Positive Perception -> Emotion	0.461	0.464	0.062	7.421	p<0.001
H2	Video Game Positive Perception -> Videogame Addiction	0.402	0.399	0.072	5.612	p<0.001
H3a	Video Game Positive Perception -> Time Spent Twitch viewing Streaming	0.321	0.330	0.057	5.586	p<0.001
H3b	Video Game Positive Perception -> Time Spent Viewing Streaming	0.292	0.303	0.065	4.470	p<0.001
H3c	Video Game Positive Perception -> Time Spent Video Gaming	0.504	0.509	0.044	11.454	p<0.001
H4a	Attention -> Videogame Addiction	0.129	0.126	0.120	1.079	p>0.001
H4b	Going into a narrative world -> Videogame Addiction	0.243	0.231	0.146	1.663	p>0.001
H4c	Identity -> Videogame Addiction	-0.143	-0.137	0.138	1.036	p>0.001
H4d	Empathy -> Videogame Addiction	-0.194	-0.223	0.158	1.229	p>0.001
H4e	Emotion -> Videogame Addiction	0.299	0.337	0.202	1.482	p>0.001
H5	Time Spent Twitch viewing Streaming -> Videogame Addiction	0.178	0.165	0.089	1.993	p<0.05
H6	Time Spent Viewing Streaming -> Videogame Addiction	-0.054	-0.046	0.087	0.626	p>0.001
H7	Time Spent Video Gaming -> Videogame Addiction	0.076	0.085	0.091	0.835	p>0.001
H8a	Time Spent Video Gaming -> Family	0.021	0.022	0.080	0.264	p>0.001
H8b	Time Spent Video Gaming -> Friends	0.143	0.145	0.058	2.445	p<0.05
H8c	Time Spent Video Gaming -> Special person	0.078	0.080	0.074	1.065	p>0.001
H9	Time Spent Video Gaming -> Relational Health Indices (Peer)	0.084	0.086	0.083	1.021	p>0.001
H10a	Family -> Videogame Addiction	-0.038	-0.039	0.081	0.468	p>0.001
H10b	Friends -> Videogame Addiction	-0.066	-0.067	0.083	0.800	p>0.001
H10c	Special person -> Videogame Addiction	0.054	0.054	0.055	0.978	p>0.001
H11	Relational Health Indices (Peer) -> Videogame Addiction	0.026	0.023	0.068	0.374	p>0.001

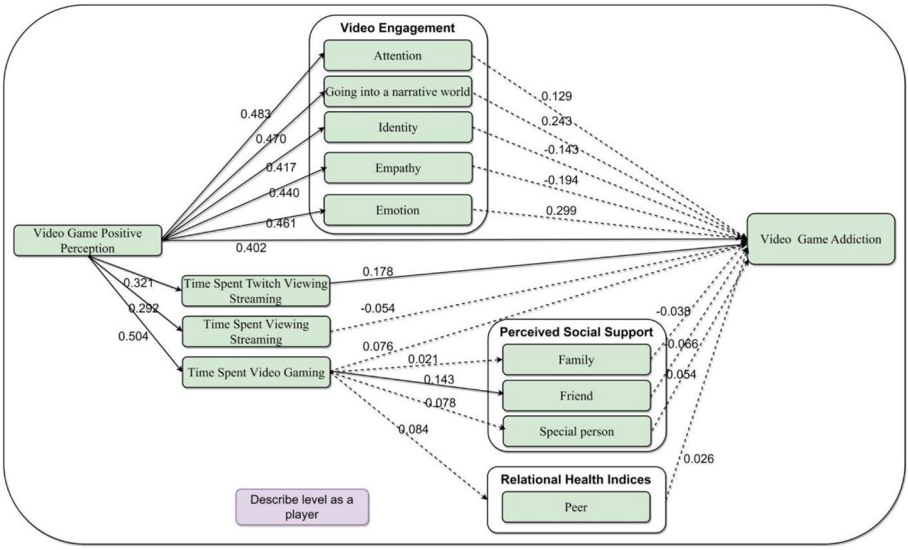

Fig. 2 SEM Model

determination theory to explain involvement in any activity; competence, autonomy, and relatedness (Mills et al., 2018). The perception of meeting these three needs while playing games may lead to an increase in behaviors such as playing more games and following game-related content, as well as the development of positive attitudes towards these behaviors and an increasingly problematic behavior pattern (Cabeza-Ramírez et al., 2022a, b).

There is no significant relationship between VE and VGA. On the other hand, according to the results of multi-group analysis, the relationship between empathy and emotion dimensions and VGA is significant in the VE sub-dimensions of the participants in the novice-amateur group. There is an inverse relationship between empathy and VGA. If the level of empathy with the characters in the video game is high, it can be said that the probability of problematic situations such as VGA is lower. Another remarkable result is that the relationship between going into a narrative world -a sub-dimension of VE- and VGA is significant in the regular-expert group. This result shows that regular-expert players' immersion in the reality of the game in the videos increases the risk of VGA. The increase in preoccupation with the content related to video games and the affective and cognitive meaning attributed to them affect the problematic game-playing behavior differently according to the level of the player. Significant relationships emerging between some VE dimensions and VGA in both groups are noteworthy for understanding the connection between VGA and VE.

There is no relationship between time spent viewing streaming and VGA. In contrast, time spent on Twitch viewing streaming is a significant predictor of VGA. Continuous monitoring of Twitch broadcasts can be a factor that encourages individuals' preoccupation with video games and their obsessive video game-playing habits. The increasing time spent on Twitch can be a factor that increases the tendency of individuals to display deviant behaviors within the framework of the content they watch. Indeed, Macey and Hamari (2018) reported that e-sports viewing habits significantly impact online gambling habits and video game gambling habits. This situation shows that gambling behavior increases as the habit of

Table 5 Multi Group Analysis- Bootstrapping Results

		Novice-Amateur			Regular-Expert		
	Path	Path Coefficients	t-Value	p-Value	Path Coefficients	t-Value	p-Value
H1a	Video Game Positive Perception -> Attention	0.367	3.590	p<0.001	0.485	6.345	p<0.001
H1b	Video Game Positive Perception -> Going into a narrative world	0.377	3.949	p<0.001	0.484	6.415	p<0.001
H1c	Video Game Positive Perception -> Identity	0.330	3.377	p<0.001	0.431	5.116	p<0.001
H1d	Video Game Positive Perception -> Empathy	0.354	3.708	p<0.001	0.460	5.489	p<0.001
H1e	Video Game Positive Perception -> Emotion	0.411	4.173	p<0.001	0.437	4.724	p<0.001
H2	Video Game Positive Perception -> Videogame Addiction	0.396	4.480	p<0.001	0.343	2.602	p<0.001
H3a	Video Game Positive Perception -> Time Spent Twitch viewing Streaming	0.283	3.233	p<0.001	0.309	4.274	p<0.001
H3b	Video Game Positive Perception -> Time Spent Viewing Streaming	0.309	3.291	p<0.001	0.250	2.878	p<0.05
H3c	Video Game Positive Perception -> Time Spent Video Gaming	0.296	4.574	p<0.001	0.519	8.862	p<0.001
H4a	Attention -> Videogame Addiction	0.100	0.385	p>0.001	0.151	0.999	p>0.001
H4b	Going into a narrative world -> Videogame Addiction	0.038	0.186	p>0.001	0.486	2.263	p>0.001
H4c	Identity -> Videogame Addiction	-0.023	0.091	p>0.001	-0.270	1.525	p>0.001
H4d	Empathy -> Videogame Addiction	-0.640	2.368	0.018	0.213	0.926	p>0.001
H4e	Emotion -> Videogame Addiction	0.848	2.752	0.006	-0.207	0.895	p>0.001

Table 5 (continued)

		Novice-Amateur			Regular-Expert		
	Path	Path Coefficients	t-Value	p-Value	Path Coefficients	t-Value	p-Value
H5	Time Spent Twitch viewing Streaming -> Videogame Addiction	0.069	0.197	p>0.001	0.262	2.043	p<0.05
H6	Time Spent Viewing Streaming -> Videogame Addiction	0.018	0.050	p>0.001	-0.125	1.005	p>0.001
H7	Time Spent Video Gaming -> Videogame Addiction	0.039	0.161	p>0.001	0.058	0.398	p>0.001
H8a	Time Spent Video Gaming -> Family	-0.122	1.175	p>0.001	0.107	0.979	p>0.001
H8b	Time Spent Video Gaming -> Friends	-0.091	0.952	p>0.001	0.237	3.010	p<0.05
H8c	Time Spent Video Gaming -> Special person	-0.189	2.878	p<0.05	0.142	1.306	p>0.001
H9	Time Spent Video Gaming -> Relational Health Indices (Peer)	-0.143	1.401	p>0.001	0.178	1.843	p>0.001
H10a	Family -> Videogame Addiction	-0.127	1.048	p>0.001	0.070	0.525	p>0.001
H10b	Friends -> Videogame Addiction	-0.005	0.041	p>0.001	-0.126	0.883	p>0.001
H10c	Special person -> Videogame Addiction	0.075	1.113	p>0.001	0.053	0.559	p>0.001
H11	Relational Health Indices (Peer) -> Videogame Addiction	0.107	1.210	p>0.001	-0.061	0.499	p>0.001

watching e-sports increases. Similarly, in the Twitch environment, the dominant situation is e-sports consumption related to the digital gaming experiences of others.

Time spent video gaming is not a significant predictor of VGA. Although it is wrong to describe video games playing longer hours as VGA, it is widely accepted as one of the indicators of VGA. However, VGA is a phenomenon beyond video gaming (Macey & Hamari, 2018; Spekman et al., 2013; Von der Heiden et al., 2019). The meaning attributed to the time and frequency of playing video games is a situation that increases the risk of erroneous addiction diagnosis (Macey & Hamari, 2018). For some individuals, excessive video game playing may be related to a healthy passion such as fishing, not missing the matches of the team they support, or a high level of engagement related to excessive enthusiasm (Charlton & Danforth, 2007; Griffiths & Meredith, 2009; Spekman et al., 2013). However, for

some individuals, the increased time spent on the game may be related to time management problems and a way of coping with the problems that individuals avoid or procrastinate on (Wood, 2008). In addition, excessive gaming is likely to have various adverse outcomes, but using the attribute of addiction based on this situation is an overgeneralization (Blaszczynski, 2008).

Time spent on video gaming has a significant relationship with social support from friends, one of the sub-dimensions of social support perception. Similarly, according to the results of multi-group analysis, there is a positive relationship between the time spent on video games for regular-expert players and their friends' perceptions of social support. On the other hand, this relationship is not significant for novice-amateur players. The basis of this relationship may be online friend support, especially in the game. For most children and young people, video games are not only a game tool but also a platform to interact with their friends socially (Kovess-Masfety et al., 2016; Kuss, 2013; Cole & Griffiths, 2007) emphasize that online multiplayer role-playing games can be considered social platforms that enable the establishment of new and permanent friendships. The difference for novice-amateur players may be that they are unfamiliar with the game and its components, being more distant from social interactions in such environments, or it may take time to discover these structures. However, for novice-amateur players, there is a negative correlation between the time allocated to video games and the perception of the social support of the person special to them (i.e., dating, fiancée, spouse). An individual's excessive preoccupation with playing video games can be an obstacle to maintaining or developing relationships with a special person(s) to her/his (Stavropoulos et al., 2018). Two possibilities can explain why this situation is not similar for regular-expert players. First, it may be that these individuals have developed the ability to distinguish between the time they devote to games and the time they devote to people they are in close contact. Second, the special person(s) for them may have an integrated interaction in virtual and real life, as they have similar player habits.

No significant relationship is between the sub-dimensions of perception of social support and VGA. This result is similar for novice-amateur and regular-expert players. On the other hand, various studies in the literature show that a low perception of social support increases the risk of VGA (Tham et al., 2020; Trumello et al., 2018; Uçur & Dönmez, 2021). One of the reasons for this differentiation may be the structure of perceived social support. While various studies in the literature report a positive relationship between perceived social support in the game and VGA, they reveal a negative relationship between real-world social support and VGA (Lemmens et al., 2011; Moge & Romeno, 2020; Tham et al., 2020). In-game or online social support has a weaker structure regarding affective and emotional support and therefore does not have a protective role in displaying problematic behaviors (Tham et al., 2020).

Relational health indices (peer) are not a significant predictor of VGA. Similar results emerged for novice-amateur and regular-expert players. We thought that there was an essential possibility that this could trigger the emergence or deepening of problematic behaviors such as video game addiction. When the perception of social support and peer relational health indices are considered together, we think that online or offline multiplayer gaming and interactions in these environments begin to exhibit similar characteristics with real-world interactions related to these results. Indeed, in the Entertainment Software Association (2022) report on the digital gaming industry in the United States, 83% of gamers consider

video games as a means of forming new friendships. In this report, 46% of the participants said they met a close friend, spouse, or someone special to them through video games.

Implications and Suggestions

One of the most important contributions of this study to the literature is that it presents a model within the framework of the relationship between VGA and affective and behavioral variables related to video game playing according to the player level.

One of the most noteworthy results of this model is that the relation between VGA and VE differs according to the player level. In this context, this study has an essential contribution to the nomological network that deals with the relationship between VGA and VE. Player level or experience has an unidentified role in this relationship. To better understand the framework of this relationship, longitudinal and experimental studies are needed to explore the contexts in which this relationship differs. For example, longitudinal studies could explore how developing gaming skills and expertise influences an individual's VGA risk. Qualitative studies could also investigate how social and emotional factors influence the development of VGA.

The time Twitch viewing streaming is an essential predictor of VGA, suggesting that interventions that reduce problematic video game behavior must focus on monitoring and regulating video game content consumption.

Another significant result of the study is that the perception of the social support received from friends and special person(s) differs according to the level of the player. Social support from a special person is negatively associated with time spent playing video games among novice-amateur instrumentalists. In contrast, social support from friends is positively related to time spent playing video games among regular and expert players. Future interventions to reduce VGA or problematic video gaming behavior should consider the player level and promote healthy relationships with individuals who discourage excessive gaming among novice-amateur players. Also, these interventions should focus on developing supportive settings that promote positive social interactions among regular and expert players. For example, gaming communities and online platforms can promote positive social interactions and social support among players.

The relationship between VGPP and VE does not differ according to player level. However, this relationship is significant within both player-level groups. This suggests that interventions promoting healthy video gaming habits must focus on developing positive attitudes and perceptions toward video game-playing behavior. For example, interventions can be designed to encourage a balanced approach emphasizing the importance of maintaining social connections, engaging in physical activity, and pursuing other hobbies and interests along with video game playing.

Limitations

This study has several limitations. One of the most significant limitations is that the measurements are entirely based on self-report. The measurements were collected based on participants' perceptions and judgments, which may lead to misleading information and

affect the accuracy of the results. Another limitation of the study is that it is based on cross-sectional data, which makes it difficult to establish causal relationships between VGA and its predictors. Lastly, the participants were selected only from a specific region, which is a limitation in terms of the generalizability of the results.

Conclusion

According to the study's results, VGPP is associated with all the variables discussed regarding video game-playing habits and behaviors. However, one of the essential findings of this study is that the relationship between VGA and VE differs according to the level or experience of the players.

The role of e-Sports activities and video game viewing and tracking behaviors on VGA should be considered. For more experienced gamers, esports and video game content tracking in Twitch-like environments is associated with an increased potential for pathological video game play. Finally, the time spent on video games and the individual's perception of social support varies according to the level of the player.

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Data Availability The data that support the findings of this study are available from the corresponding author upon request.
Our data are not yet available online in any institutional database. However, we will send the whole data package by request. The request should be sent to Assoc. Professor hatyil05@gmail.com

Declarations

Conflict of interest We have not received any funding or other support to present the views expressed in this paper. The authorsdeclare no conflicts of interest with respect to the authorship or the publication of this paper.

Ethics approval and consent to participate All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent In addition, informed consent was obtained from all individual participants included in this study.

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