THE IMPACT OF VR COOPERATIVE GAMING ON UNIVERSITY STUDENTS' SOCIAL WELL-BEING: A CROSS-SECTIONAL STUDY OF ENTERTAINMENT, INTERACTION, AND PHYSICAL ACTIVITY

O IMPACTO DOS JOGOS COOPERATIVOS EM REALIDADE VIRTUAL NO BEM-ESTAR SOCIAL DE ESTUDANTES UNIVERSITÁRIOS: UM ESTUDO TRANSVERSAL SOBRE ENTRETENIMENTO, INTERAÇÃO E ATIVIDADE FÍSICA

EL IMPACTO DE LOS JUEGOS COOPERATIVOS EN REALIDAD VIRTUAL EN EL BIENESTAR SOCIAL DE ESTUDIANTES UNIVERSITARIOS: UN ESTUDIO TRANSVERSAL SOBRE ENTRETENIMIENTO, INTERACCIÓN Y ACTIVIDAD FÍSICA

Jing ZHANG[1]
e-mail: zhangjing@student.usm.my

Norfarizah Mohd BAKHIR[2]
e-mail: farizah@usm.my

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[1] University Sains Malaysia, 11800 Penang, Malaysia. Ph.D. Candidate, School of Arts.
[2] University Sains Malaysia, 11800 Penang, Malaysia. Doctor, School of Arts. Corresponding Author.

ABSTRACT: This study explored how social interaction features in VR movement-based games contribute to group career counseling by promoting communication, cooperation, emotional engagement, and career-related reflection. In light of increasing psychological distress among university students, the research investigated the connections between game participation and factors such as well-being, depression, self-esteem, and social connectedness within the context of social VR gaming. A stratified random sample of 658 students participated in an explanatory cross-sectional survey, utilizing a validated questionnaire to evaluate VR's effects on entertainment, social interaction, and physical activity. The data were analyzed through descriptive statistics and factor analysis. The findings shed light on the multifaceted impact of VR on student well-being while outlining theoretical and practical implications, acknowledging study limitations, and suggesting avenues for future research.

KEYWORDS: Virtual reality. Interaction components. Video games. Entertainment contexts.

***RESUMO**: Este estudo investigou como os recursos de interação social em jogos de realidade virtual baseados em movimento contribuem para a orientação profissional em grupo, ao promover comunicação, cooperação, engajamento emocional e reflexão sobre carreira. Diante do aumento do sofrimento psicológico entre estudantes universitários, a pesquisa analisou as relações entre a participação em jogos e fatores como bem-estar, depressão, autoestima e conexão social no contexto dos jogos sociais em realidade virtual. Uma amostra aleatória estratificada de 658 estudantes participou de um levantamento transversal explicativo, utilizando um questionário validado para avaliar os efeitos da realidade virtual sobre entretenimento, interação social e atividade física. Os dados foram analisados por meio de estatísticas descritivas e análise fatorial. Os resultados evidenciam o impacto multifacetado da realidade virtual no bem-estar estudantil, além de apontar implicações teóricas e práticas, reconhecer limitações e sugerir direções para pesquisas futuras.*

***PALAVRAS-CHAVE**: Realidade virtual. Componentes de interação. Jogos digitais. Contextos de entretenimento.*

***RESUMEN**: Este estudio investigó cómo las características de interacción social en juegos de realidad virtual basados en movimiento contribuyen a la orientación profesional grupal, promoviendo la comunicación, la cooperación, el compromiso emocional y la reflexión sobre la carrera. Ante el aumento del malestar psicológico entre estudiantes universitarios, la investigación analizó las relaciones entre la participación en juegos y factores como el bienestar, la depresión, la autoestima y la conexión social en el contexto de los videojuegos sociales en realidad virtual. Una muestra aleatoria estratificada de 658 estudiantes participó en un estudio transversal explicativo, utilizando un cuestionario validado para evaluar los efectos de la realidad virtual en el entretenimiento, la interacción social y la actividad física. Los datos se analizaron mediante estadísticas descriptivas y análisis factorial. Los resultados evidencian el impacto multifacético de la realidad virtual en el bienestar estudiantil, además de señalar implicaciones teóricas y prácticas, reconocer limitaciones y proponer futuras líneas de investigación.*

***PALABRAS CLAVE**: Realidad virtual. Componentes de interacción. Videojuegos. Contextos de entretenimiento.*

INTRODUCTION

Since playing games online is becoming more and more popular, a lot of study has concentrated on finding antecedent causes, while some studies have looked at the effects of playing online games. Online gaming has numerous negative effects, but it can also have some pleasant ones. the benefits of playing video games in terms of motivation, social interaction, emotions, and cognition. The user's goal, the environment (including other players), and personal traits are the main factors that determine whether playing video games online has a positive or bad effect. The relationship between online gaming behavior's motive and social consequences has been the subject of a large portion of study on the subject. There is little research on the contextual elements of online gaming, even if some studies have also looked at particular characteristics.

Research on online gaming behavior should instead examine certain processes rather than just gaming length because the total amount of time spent on gaming could lead to the false conclusion that the social effects of online games are exclusively bad. Individuals may have varied psychosocial consequences when they play online games with other players who have different types of relationships (such as family members or strangers) (Billieux et al., 2019). For instance, while research indicates that playing online games to meet new people can exacerbate loneliness and draw attention to inadequate communication between families, playing online games to interact with friends and family has been linked to a decrease in loneliness.

Although playing with friends formed through online games reduces health disruptions, playing with pre-existing friends and families increases the likelihood of experiencing regular or sporadic health disruptions for more than a week. In light of the aforementioned, in order to gain a deeper comprehension of the mechanisms associated with the social repercussions of online gaming behavior, we must analyze online gaming behavior by taking into account not only the frequency, amount of time, and money spent on gaming, but also the separation of gaming partners (Borgogna et al., 2018). Still, there aren't many studies that distinguish between different kinds of gaming partnerships.

Playing video games can be viewed as a double-edged sword, as media effects research has shown over the past few decades. Positively, a lot of people want to play video games as a hobby that enhances their life with thrilling challenges, stories, or settings, reducing risks to their basic psychological needs or depression. The Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders and the Eleventh Revision of the International Classification of

Diseases both include Internet Gaming Disorder (IGD) and Gaming Disorder (GD) as a result of research showing a strong correlation between problematic gaming and both physical and psychological health problems (Canale et al., 2019). According to both diagnostic tools, problematic video game use is characterized by a progressive lack of self-control and self-regulation mechanisms, which is likely to cause functional limitations (pertaining to an individual's social, professional, and relational life) and ultimately lead to addictions.

This diagnostic institutionalization of gaming disorder provoked a heated public discussion and harsh criticism from a number of scholars who identified serious flaws in the underlying empirical findings that could result in an over pathologization of harmless (and occasionally even helpful) activities.

Since Tennis for Two was first developed in 1958, the video game industry has experienced exponential growth (De Bérail et al., 2019). The overall amount spent by consumers has grown from 5.6 billion US dollars in 2000 to 30.4 billion US dollars in 2016, and 95% of households with children under the age of 18 own a video gaming platform. Additionally, the variety and platforms of video games have grown significantly, making them accessible to a far larger audience than one might think. Accordingly, while though teenage guys' gaming behaviors have drawn a lot of attention and it is widely believed that they are the demographic most impacted by gaming, the average age of a gamer is actually 35 years old, with women making up 41% of the gaming community.

Researchers are now very interested in the overall effects of gaming on people's behavior and sense of well-being because to the diverse population involved, the ongoing increase in gameplay amounts and rising spending by consumers (Bayram, 2022).

The majority of research has focused on detrimental factors, especially how violent video games, which depict violent behavior, affect aggression. The subject of whether excessive gaming might be considered an addiction with resultant impacts on areas of well-being including depression and anxiety has also been investigated. However, there is a lot of disagreement over whether "gaming addiction" should be classified as a problem at all because there isn't enough evidence to support it. Additionally, there are complaints that video games are being singled out as an addiction instead of falling under the category of behavioral addictions like compulsive eating, shopping, or exercise.

Despite the study on detrimental effects, such as the much-discussed existence of a gaming addiction illness, there is mounting evidence that video games can also have beneficial effects. It has been demonstrated that those who play video games moderately experience less

psychological symptoms than those who play them excessively or never at all (Beard, 2015). Furthermore, the reasons for playing are crucial in determining how gaming affects wellbeing; for example, playing for fun as opposed to achievement or obsession. In order to advance our understanding and show that video games are neither exclusively "good" nor "bad," it is crucial to highlight the positive effects they can have on wellbeing. Up until now, video games have been primarily seen as negative.

Although other evaluations have looked at various video game genres in relation to particular definitions of well-being, their scope has been more limited than the present review. For example, the beneficial impacts of video games on four specific types of well-being—cognitive, motivational, emotional, and social; social results exclusively; thriving mental health; effects of games employed as training tools; and all evaluations on particular types of video games or well-being. Therefore, the goal of this paper is to present research findings that shift away from the predominantly negative profile that video games have had in the past and instead provide evidence of the positive effects of video games, taking into account a variety of game types and different definitions of well-being (Brimelow et al., 2020). Therefore, our goal is to show the "optimal gameplay profile" in which gaming improves health.

Innovative extended reality technologies, like augmented reality (AR) and virtual reality (VR), have the potential to advance social interaction from face-to-face and 2D interfaces into a lively and interactive 3D virtual environment. Social interaction through new and improved technology-mediated communication has become a mainstay in a society that is constantly changing. It is anticipated that the creation of new multi-user interfaces will speed social interaction through virtual worlds, going beyond current applications. Nevertheless, despite the quickly increasing marketing of these items, the social aspects of multiuser VR games have been neglected. Social scientists agree that social ties provide psychological support that improves wellbeing. On the other hand, social isolation, sadness, and early death are risk factors associated with a lack of social connections. Social ties are not risk-free in modern media contexts. For example, research shows that antisocial behaviours like violence, loneliness, gaming addiction, cyberbullying, and more can result from improper use of technology-mediated communication.

A social VR game, in contrast to standard massive multiplayer online games for computers and consoles, enables players to engage in a virtual world by combining input devices, audio, and a head-mounted display to reach a higher level of immersion (Campo-Prieto et al., 2022). More precisely, in order to view and interact with a fully virtual environment, a

player must wear a head-mounted device and controllers that track their physical movements and allow them to control the movements of their avatar with their body. Furthermore, social virtual reality games allow users to interact and converse with other players in virtual settings. For instance, the game Rec Room enables users to get together and play different games (including disc golf and dodgeball) in reality.

However, there is still a dearth of data regarding the relationships between users' psychological characteristics and their social VR involvement. Therefore, by modelling the links between participation, well-being, depressive disorders, self-worth, and social connectedness in social VR, this study aimed to clarify the function of many situational elements in social VR games. In particular, we defined social VR as VR content with multi-user features that allows users to engage with one another in the VR environment at the same moment. Depression was found to be an affective mediator of the impact of involvement on wellbeing as we operationalized social VR use using the literature on involvement. Self-esteem and social connection in social VR were measured as modifiers to capture the conditional impacts of each person's sense of self-worth and closeness/connectedness with others (Shen & Williams, 2011).

An individual's perceived personal significance and the importance of an attitude in relation to their intrinsic needs, values, and interests are related to involvement (J Korkeila & Hamari, 2020). In the past, the idea of engagement has garnered significant attention from a variety of academic disciplines and has also been used to the explanation of user experiences in virtual environments. Participation affects consumers' perceptions of interaction and creativity in virtual environments (Marder et al., 2019). The extent to which customers' engagement with products influences their perceptions of those products and enjoyment in a virtual setting, which has yielded insightful information on virtual shopping. The current study defines engagement as the player's degree of interest in a social VR game, building on previous earlier definitions of involvement.

According to a review of earlier studies, playing social games can have a negative effect on a number of well-being dimensions (Reer & Kramer, 2019). Online social gamers, both male and female, report much greater rates of substance abuse and depression than the general American population. Additionally, some research has indicated a link between playing online games and feelings of anxiety, despair, low self-esteem, and interpersonal relationship problems. Similarly, it has been seen that online gamers have more physical issues, including

health and sleep problems, personal troubles, and issues related to their studies or employment (Brand, 2012).

According to research conducted over the past few years, playing video games excessively causes psychological and social problems that make it difficult to deal with daily life. Research supports up the idea that while playing social games might improve mental health and lower stress, playing too much of them can have detrimental psychological consequences. Previous research revealed a connection between depression and online gaming among the documented detrimental psychological impacts (Sarda et al., 2016). Addicts to video games showed worse mental and cognitive health as well as more emotional problems such elevated anxiety and depression. In a similar vein, earlier studies found, for instance, that gamers who were very active had a higher chance of developing depression.

According to earlier research, playing video games can cause both positive psychological reactions (like wellness) and negative psychological reactions (like depression), supporting conflicting findings about the impact of these kinds of activities (Uchida & Kitayama, 2009). Scholars and practitioners are confused by such contradictory results. However, this could result from the research failing to account for the unique characteristics of the players or from the game's platform not being taken into account. A person's way of life or psychological factors are generally shown to have a substantial impact on their mental health, and gaming-related mental health is no different. Depending on the person's coping level, the impact of gaming time on stress reduction varied considerably.

In today's digital environment, virtual reality (VR) has developed into a game-changing technology, especially in the entertainment sector (Uchida & Ogihara, 2012). It offers immersive experiences that alter how individuals interact with digital environments. A new paradigm in interactive media is represented by VR's capacity to replicate realistic situations.

VR is becoming increasingly commonplace, but there is still a lot of unanswered questions about how technology affects user perceptions, physical activity, and social interaction. This group is in a crucial stage of social and physical development and is proficient with technology. It's still unclear exactly how VR affects different domains and how individuals interpret these effects (Uchida et al., 2015). Understanding the implications of VR technology is essential given its growing impact on contemporary lifestyles. VR use has a particularly big effect on college students' long-term social networks and health-related behaviors (Domahidi et al., 2018).

For educators, tech developers, and legislators to responsibly integrate virtual reality in instructional and entertainment environments, this research is essential. The main goal of this study is to investigate how university students perceive virtual reality (VR) as an entertainment tool, as well as the various effects of VR on social interaction and physical activity (Quandt, 2013). The study intends to provide a thorough knowledge of VR's function in entertainment by examining both the concrete effects on social and physical behaviors as well as how students interpret and internalize their VR experiences.

OBJECTIVES OF THE STUDY

- To examine the relationship between entertainment experiences in VR cooperative games and students' social well-being;
- To analyze how social interaction within VR cooperative gaming environments influences students' social connectedness and peer relationships;
- To determine the combined effect of entertainment, interaction, and physical activity on the overall social well-being of university students;
- VR use among college students is associated with a paradoxical effect on levels of physical activity, possibly increasing participation in active events while raising the possibility of reinforcing sedentary behaviors.

LITERATURE REVIEW

According to Kim et al. (2025) this study focuses on how users' participation in immersive social AR/VR athletic games affects their psychological well-being in order to investigate the social and psychological advantages of such games. In particular, we looked into (1) how the link between game participation and well-being is mediated by interpersonal interactions (i.e., social presence and communication engagement in virtual settings) and (2) how these mediation effects rely on users' social capital (i.e., loneliness). The results demonstrated how playing AR/VR sports games improves wellbeing through social presence and conversation. Additionally, the mediation impact of social presence is moderated by loneliness, but not the mediation effect of communication engagement.

For Zhang et al. (2016), there is growing pressure on universities worldwide to encourage and welcome heterogeneous student bodies and learning environments, as well as to "internationalize." However, "internationalization" is frequently linked to problems that make

it more difficult and stressful for "international students" to identify and acculturate in their new environments, both socially and academically. These problems include obstacles to cultural understanding, language barriers, and the challenges of cross-cultural cooperation. By developing unique cross-cultural cooperative games (coded in Python) and utilizing gamification based on a new custom technology system, this paper outlines a novel approach to resolving these problems for a specific group of students (the significant percentage of Chinese studying in Ireland, and particularly in Dublin). This design seeks to eliminate cultural gaps and offer an improved experience that might even surpass the levels of engagement of students working together in "live" environments.

An important area of study in the applications of emotional computing is how to improve interpersonal connections and face-to-face encounters (Bian et al., 2023). We suggest a face-to-face co-participation serious game for relationship improvement based on the co-actualization model, with an emphasis on combating COVID-19. Additionally, a low-cost brain-computer interface and an immersive virtual world are used to construct a prototype system. This method involves partners in the cooperative work by using a dynamic flow experience improvement tool. Two investigations are carried out with classmates as participants to assess the system's performance. Study 1 contrasts the cooperative and competitive approaches and shows that the former generated more affections and decision-making challenge, both of which are advantageous for developing relationships.

University students frequently have mental health issues, which got worse during the COVID-19 pandemic. Students' life underwent significant changes as a result of university closures, limitations, and a decrease in social activities, which created new emotional and mental health issues (Malighetti et al., 2023). Promoting the general well-being of university students—especially their emotional and psychological well-being—becomes crucial in this situation. Other cutting-edge technologies, including virtual reality (VR), have shown the ability to enhance people's well-being, quality of life, and positive experiences, in addition to the potential for online interventions meant to overcome distance limits and reach people at their homes. The objective of the study described in this article is to investigate the viability and initial efficacy of a three-week self-help virtual reality intervention in enhancing university students' emotional wellbeing.

Even while social interaction and play in virtual reality environments are becoming more and more popular, little is known about how social VR games affect players (Lee et al., 2021). This study sought to elucidate the role of several contingent variables in social VR games

by modelling the relationships between participation, well-being, depression, self-esteem, and social connectedness. 220 data points were used to analyze a conditional process-moderated mediation model of the variables under study. The results showed that: (1) involvement had a significant direct impact on well-being; and (2) there was a significant index of moderated mediation including depression, self-esteem, and social connectedness. We conclude that playing social VR games at high levels may have negative impacts on socially isolated individuals with low self-esteem. The study's findings have important applications and expand our understanding of the many ways in which social VR games impact participants.

The current study investigated the connection between university students' psychological health and their exposure to cyberbullying. The study's sample consisted of 262 Kuban State University students (Sergeeva & Zheltukhina et al., 2025). Data was gathered using the Cyberbullying Scale (CBS) and the Depression, Anxiety, and Stress Scale (DASS-21). When analysing data, we favored Bayesian statistical techniques. The study's findings showed that exposure to cyberbullying did not vary by age, gender, or amount of time spent online each day. Researchers discovered that, at around 9% of the variance, depression was the best predictor of being exposed to cyberbullying. Stress and anxiety factors had no discernible impact on the model's explained variance. The study's conclusions highlight the significance of creating protective measures, particularly for adolescents who exhibit depressive symptoms.

Playing video games, especially those that make use of highly immersive virtual reality technology, has become a coping strategy for generating happy emotions and escaping bad ones (Graf et al., 2025). Therefore, it's intriguing to look at the mechanisms that affect players' emotions in digital games. Using virtual characters as companions is one possible method since they can enhance the player's experience and emotional condition. Less research has been done on how the players are affected by the particular emotions of the virtual avatar, though. When someone is experiencing negative emotions, the presence of others can have a positive impact and enhance their wellbeing.

Spain is one of the top gaming-consuming nations in Europe, demonstrating how popular video games have become both culturally and economically (García-Cabrera et al., 2025). This study looks at the gaming behaviors and preferences of 440 University of Seville students, categorizing player profiles according to academic background and gaming choices. An anonymous online survey was used for a cross-sectional study, and principal component analysis revealed three different player profiles: Explorer, Socialized, and Competitive. Students in technical areas play more frequently and prefer PC gaming, while those in social

and health sciences choose mobile gaming, according to findings that show a considerable variation in gaming frequency by academic subject. Additionally, the Socializer profile is linked to reduced involvement, whereas the Explorer profile is linked to more frequent play. Despite popular belief, gaming time does affect academic achievement, especially when it exceeds five hours per day.

Despite the fact that gaming has historically been more popular among men, research on female gamers has started to appear (Lopez-Fernandez et al., 2019). The role of women in culture, society, and technology has been highlighted by studies in the twenty-first century, and female gaming is one of the expanding phenomena that has not received much attention. Reviewing female gaming (i.e., the place of women in video game culture) and identifying any related psychopathological symptomatology was the goal of this article. In order to perform a narrative literature review, the review modified the Sample, Phenomenon of Interest, Design, Evaluation, Research (SPIDER) model. 49 papers were found through a search of three scientific electronic databases for a further examination.

Class craft is becoming a popular gamification option that transforms lessons into enjoyable and inspiring role-playing games. This study intends to examine the effectiveness of Class Craft in terms of ideal gamification learning experiences linked to learning achievement and motivation, based on content analysis and meta-analysis. Following the steps of identification, screening, eligibility, and inclusion, we have discovered that learning achievement and motivation are important elements that support the best possible gamification learning. Class craft with gamified incentive mechanics, interactive environments, and group projects can meet the requirements of the best gamification learning experiences, according to another content study. The primary finding is that class craft may effectively produce the best gamification learning procedures, which can have a beneficial impact on motivation and learning achievement. We have also spoken about the possible causes of gamification's beneficial effects on motivation and learning achievement (Zhang et al., 2021).

HYPOTHESIS

H1: *According to the study's hypothesis, people's attitudes and perceptions of virtual reality in entertainment activities are largely positive.*

H2: *Frequent use of Virtual Reality (VR) by college students is linked to notable alterations in their social interaction styles, which may improve virtual connectedness while affecting social interactions in real life.*

H3: *VR use among college students has been associated with two effects on levels of physical activity: it may increase participation in active experiences while also increasing the danger of reinforcing sedentary behaviors.*

METHOD AND MATERIALS

Research design

In order to methodically clarify the relationships between the use of VR in entertainment scenarios and the ensuing effects on social interaction and physical activity dynamics, this study employs an explanatory cross-sectional survey approach. A mainstay of quantitative research approaches, this design was chosen for its strong ability to test experimental hypotheses. As a result, this study deliberately concentrates on identifying the current patterns and connections that are present in VR interaction in entertainment situations (Hartmann et al., 2012).

PARTICIPATES

In order to obtain a representative cross-section of young adults involved in VR activities within entertainment contexts, the study uses a stratified random selection technique to recruit a diverse sample of 657 participants. The majority of the participants are young adults between the ages of 18 and 27. This age group was specifically chosen since they are the ones that use virtual reality for entertainment the most and are most likely to be significantly impacted by the technology in terms of social contact and physical activity. With 348 females and 309 males, the sample is carefully balanced in terms of gender. The study's gender variation is essential since it makes it possible to examine possible gender-based variations in VR use and its consequences (Griffiths et al., 2017). Additionally, participants come from a range of academic fields and university levels, including undergraduates and postgraduates. The features of the sample are shown in Table 1 below.

Table 1.
Properties of the Sample

Variables		Frequency	Percentage
Gender	Male	308	48%
	Female	349	52%
	Total	656	100%
Frequency of VR Use	Always	146	21%
	Often	221	34%
	Rarely	181	29%
	Sometimes	84	13%
	Never	26	4%
Total		657	100%

Note. Researcher's findings.

INSTRUMENT

The primary instrument used for gathering data in this study is a highly developed structured questionnaire that is carefully crafted to collect a wide range of information essential for clarifying the complex effects of virtual reality on social interaction, physical activity, and user perceptions. This tool's two sections guarantee a thorough compilation of demographic data coupled with particular behavioral and attitudinal insights relevant to VR communication.

The initial section of the survey is used to gather basic demographic information from the respondents, such as age, gender, and how often they use virtual reality. This section is essential to developing a precise demographic profile of the participants, which makes it easier to conduct a critical analysis that takes demographic differences into consideration and could greatly influence the findings of the research (Kardefelt-Winther, 2015).

As the questionnaire continues on to the second section, it becomes more focused and divides into three well-constructed variables, each with ten items. These elements are deliberately created to align with the main ideas and theories of the research. The first component focuses on consumers' attitudes and views of virtual reality in entertainment, providing a thorough examination of their opinions on the benefits, limitations, and general worth of VR in entertainment situations. The second factor investigates how VR affects social interaction by looking at how much VR use alters social experiences and behaviors.

DATA COLLECTION

In order to fully ascertain how VR affects university students' enjoyment, Northern University in the Inner Mongolia Chinese autonomous region organized the data collection portion of this study over a three-month period, from February to May 2023. Using an academic network was a key strategy in reaching this group, and university instructors were essential in this process, enabling a targeted and effective reach to the intended participants by sending the survey link straight to their students.

They generated a more receptive and involved participant base by giving the study increased legitimacy and trust. Maintaining participant involvement and obtaining a sufficient response rate were crucial throughout the data collecting time.

DATA ANALYSIS

The Statistical Package for the Social Sciences (SPSS) was used in this investigation. Using descriptive statistical methods, such as computing percentages and frequencies, was part of the first analytical phase. To further understand the nature of the correlations between the different study variables, the Pearson correlation coefficient was utilized. Cronbach's Alpha was computed in order to assess the questionnaire's internal consistency, which was a crucial component of the study (King et al., 2020). In parallel, exploratory factor analysis (EFA), a method essential to locating and deciphering hidden variables and underlying structures in the dataset, was carried performed. Confirmatory Factor study (CFA) was specifically carried out using the LISREL statistical program to supplement the study done with SPSS.

RESULTS AND DISCUSSION

Pilot study

Preliminary pilot research was carried out with a sample size of 50 people in order to verify the accuracy and suitability of the questionnaire items for the target sample. Prior to the study's ultimate implementation, this important step was completed to verify the instrument's overall validity and reliability. Demonstrating the instrument's face validity and making sure the questionnaire was understandable and pertinent to the participants were the main goals of the pilot study. A thorough application of both confirmatory and exploratory factor analysis methods was then used. A panel of seasoned specialists conducted a thorough evaluation

procedure for the research, beginning with face validity, also known as the validity of judgment. This section carefully examined the questionnaire, highlighting how well it captured and measured the target constructs. These experts' insights were crucial in improving the instrument's usefulness and effectiveness. Their comments included a number of suggestions, such as changing certain phrasing to improve clarity, removing unnecessary or duplicate items, and adding new things to address previously ignored dimensions.

A thorough examination of the coherence between individual items and their corresponding dimensions, as well as the general alignment of these dimensions with the scale's aggregate score, was carried out to evaluate the internal consistency validity of the study's instrument. Correlation coefficients for each item in respect to the total score of its relevant dimension and, similarly, for each item in relation to the overall scale score were carefully calculated for this assessment. All of the items showed a strong positive connection, each surpassing the 0.50 criterion, according to the investigation, supporting their inclusion in the scale (Kneer et al., 2012). Table 2 presents a thorough overview of the inter-item and item-to-scale correlations and details these results, which show strong internal consistency within the instrument.

Table 2.
Correlation Coefficients Between the Questionnaire's Overall Corresponding Dimensions and Statement Ratings

General Opinions and Attitudes Regarding Virtual Reality in Entertainment			**Social Interaction**			**Physical Activity**		
No	***Dimensions***	***Scale***	***No***	***Dimensions***	***Scale***	***No***	***Dimensions***	***Scale***
1	.849**	.710**	1	.821**	.189**	1	.489**	.859**
2	.954**	.495**	2	.635**	.415**	2	.654**	.648**
3	.478**	.489**	3	.218**	.415**	3	.652**	.548**
4	.524**	.621**	4	.659**	.654**	4	.635**	.965**
5	.526**	.614**	5	.489**	.632**	5	.774**	.964**
6	.415**	.659**	6	.962**	.148**	6	.632**	.964**
7	.597**	.258**	7	.621**	.654**	7	.188**	.974**
8	.321**	.489**	8	.635**	.339**	8	.965**	.984**
9	.987**	.419**	9	.965**	.648**	9	.978**	.968**
10	.659**	.625**	10	.648**	.687**	10	.632**	.548**

Note. Researcher's findings.

The correlation coefficients between the total score of the questionnaire and the aggregated scores of each dimension were calculated in order to assess the construct validity of the scale. In order to provide a meaningful measure of construct validity, this methodological step was essential for figuring out how closely different dimensions aligned with the overall instrument score. Table 3 carefully summarizes the evaluation's specific results, which are

essential for confirming the scale's efficacy in precisely measuring its targeted characteristics (Kökönyei et al., 2019).

Table 3

Coefficients of correlation between each factor scale score

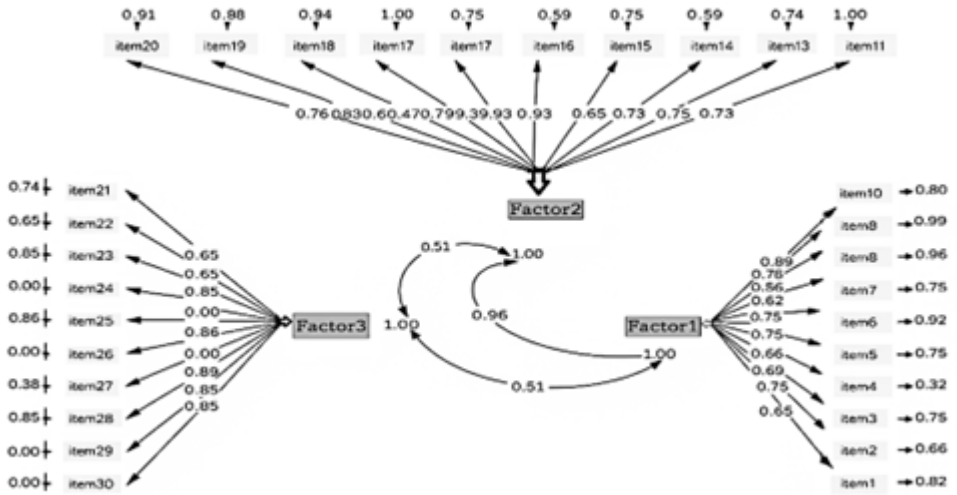
Factors	*Attitudes Towards VR in Entertainment*	*Social Intention*	*Physical Activity*	*Scale*
Attitudes Towards VR in Entertainment	1	.985	.986	.968
Social Intention		1	.597	.867
Physical Activity			1	.936

Note. Researcher's findings.

The study shows that the correlation coefficients between the different dimensions are significantly high, ranging from 0.632 to 0.802, as shown in Table 3. Each dimension and the scale's overall score show a similar pattern of significant correlations, with coefficients ranging from 0.861 to 0.918. At the 0.01 significance level, these correlations are statistically significant, highlighting the strong interconnection of the scale's dimensions and their general alignment with the scale measurement. A two-step analytical procedure was used to fully assess the scale's factor validity. To identify the underlying factor structure, Exploratory Factor Analysis (EFA) first employed the Principal Components approach.

Figure 1

Visual Display of the Confirmatory Factor Analysis of the Scale



Note. Researcher's findings.

As part of the CFA, a thorough study was carried out to evaluate the Convergent Validity and Composite Reliability of the scale (Lemmens et al., 2015). In order to determine the scale's

Composite Reliability (CR) and Average Variance Extracted (AVE), certain formulae have to be applied. These metrics are essential for assessing the validity and dependability of the scale's constructs. Table 4 summarizes the results of this thorough statistical analysis, which offer a numerical assessment of the scale's dependability and the suitability of the variation covered by the model.

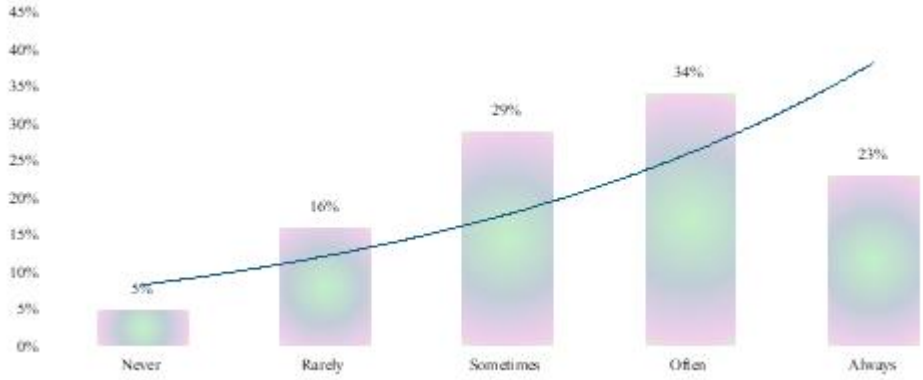
Table 4.
Convergent validity of values and mixed reliability for scale

Factors	No. of Items	Cronbach's Alpha (α)	Composite Reliability (CR)	AVE
Attitudes Towards VR in Entertainment	10	0.91	0.92	0.63
Social Intention	10	0.86	0.88	0.56
Physical Activity	10	0.89	0.91	0.61
Total	30	0.90	0.93	0.58

Note. Researcher's findings.

The data displayed in Figure 2 shows a significant tendency among research participants to use VR often. VR is used "Often" by 33% of respondents and "Sometimes" by 28% of respondents. Additionally, 22% of participants fell into the "Always" group, highlighting regular and constant VR contact. Conversely, just 13% of respondents said they "rarely" use VR, and only 4% said they "never" use it. The findings demonstrate a widespread trend of VR engagement, with the majority of the respondents showing at least sporadic usage, indicating VR's important position in their spectrum of digital interaction.

Figure 2.
The Participants' Frequency of VR Use



Note. Researcher's findings.

H1**:** *It is hypothesized that those who regularly use virtual reality (VR) for entertainment have generally favourable opinions and attitudes toward VR's function in entertainment.*

This hypothesis was tested empirically using a One-Sample T-test. According to the study, the sample's average answer score on the questionnaire's first dimension—General Perceptions and Attitudes Towards VR in Entertainment—was 35.72, with a standard deviation of 7.50. This was evaluated using the scale's fictitious mean value of 30. The comparison showed that the sample mean score exceeded the hypothesis of the scale (Omair, 2015). Furthermore, a t-value of 19.538, which significantly above the crucial t-value at 656 degrees of freedom, demonstrated the statistical importance of this variation. Table 5 demonstrates this remarkable outcome, supporting the hypothesis and emphasizing the favourable attitudes and views of frequent VR users in entertainment situations.

Table 5.
Results of the T-Test for Hypothesis

H1: VR Positive Perceptions of Users.							
Sample Size	***Mean***	***Std***	***Assumed mean***	***df***	***t***	***sig***	***Results***
657	35.96	7.89	30	656	19.856	0.000	Statistically significant
H2: Patterns of Social Interaction in VR							
Sample Size	***Mean***	***Std***	***Assumed mean***	***df***	***t***	***sig***	***Results***
657	96.8	8.58	30	656	18.98	0.000	Statistically significant
H3: VR's Effect on Physical Activity							
Sample size	***Mean***	***Std***	***Assumed***	***df***	***t***	***sig***	***Result***
657	34.9	8.96	30	656	18.965	0.000	Statistically significant

Note. Researcher's findings.

H2: *Frequent use of virtual reality (VR) by college students is linked to notable alterations in their social interaction styles, which may improve virtual interaction while affecting social interactions in daily life.*

Hypothesis H2, which holds that frequent VR use among college students is correlated with significant changes in their social interaction patterns, was assessed using a One-Sample T-test. The average answer score on the social contact dimension of the questionnaire was 34.77, with a standard deviation of 7.98, compared to a theoretical mean of 30, according to the research. This comparison showed that the sample's real mean on the Social Interaction facet was far higher than the supposed mean of the scale (Riner et al., 2022). A computed t-value of 15.315, which above the threshold value at 656 degrees of freedom, shows that the statistical assessment of these differences validated their significance at the 0.01 level, as shown in Table 5. This result confirms the hypothesis by showing a strong correlation between regular VR use and changes in university students' social interaction behaviours.

H3: *VR use among college students has been associated with two different effects on levels of physical activity: it may increase participation in active experiences while also increasing the danger of reinforcing sedentary behaviours.*

A One-Sample T-test was used to validate Hypothesis H3, which suggests that VR use has two effects on college students' levels of physical activity. In contrast to a predefined theoretical mean of 30, the examination of responses in the questionnaire's "Physical Activities" category produced a mean score of 36.05 with a standard deviation of 8.18. This comparison showed that there was a considerable discrepancy since the real mean of replies was higher than the theoretical benchmark. These differences were verified to be statistically significant at a significance level of 0.01. A significant deviation from the estimated mean was indicated by the calculated t-value of 18.951, which significantly above the threshold t-value for 656 degrees of freedom of speech. These results, which are presented in Table 5, offer empirical evidence in Favour of Hypothesis H3 and demonstrate the intricate relationship between VR use and physical activity among college students.

There are several underlying reasons behind these favourable impressions. One noteworthy feature that distinguishes VR technology from traditional leisure activities is its participatory and immersive nature. With virtual reality (VR), users may interact with and view digital worlds in ways that are not possible with traditional media, offering them an unmatched kind of entertainment. This might lead to higher levels of enjoyment and involvement. Furthermore, these positive viewpoints have unquestionably been shaped by the ongoing development of VR, which is marked by greater accessibility and a wider range of possible applications. As virtual reality (VR) technology becomes more widely available and integrated into a variety of entertainment activities (such as virtual tourism and gaming), they are becoming more widely acknowledged and accepted as an engaging and popular aspect of leisure time. The novelty of VR, which tends to attract people looking for new and creative leisure activities, is the source of its growing awareness and enjoyment.

Researchers have paid comparatively less attention to finding the intervening factors that regulate the association between excessive computer-mediated gaming and depression, despite the fact that previous research clearly shows this link. According to our findings, self-esteem shows promise as a mediator between well-being, depression, and participation. Previous research indicates that those who are deeply involved in a certain activity (such as entertainment) are more likely to have higher levels of self-worth and self-esteem because creating and accomplishing objectives has a beneficial effect on their ego.

Low self-esteem is also a major risk factor for depressive illnesses, according to several research. In light of this, our findings might be explained by the fact that individuals who participate in social VR games more often tend to have lower levels of depression because they have stronger self-esteem. In a similar vein, the study's findings imply that social connectivity in social VR moderates the association between wellbeing, depression, and participation. Previous research has shown that social connectivity can broaden our cognitive and behavioral repertoires, improving psychological and social well-being (Ruggiero, 2017). Additionally, according to the phase model of psychotherapy, improving wellbeing requires reducing depression symptoms.

Numerous research has looked at psychological well-being and self-esteem. The importance of self-esteem for wellbeing has been highlighted by theoretical research. Research has shown that psychological well-being is significantly predicted by self-esteem. increased psychological well-being is also associated with increased self-esteem, according to another research (Przybylski et al., 2009). These findings lead us to the conclusion that involvement affects depression through the two moderation effects, whereby high levels of social connectivity and self-esteem in social VR reduced depression and improved wellbeing.

The results of earlier studies suggesting virtual environments promote social relationships are supported by this study. The virtual environment's varied selection of themes, rooms, and places, which accommodated varying group sizes and interests and allowed users to have a variety of conversations, was one noteworthy feature that was well-received.

Additionally, interactive items enhanced user engagement and immersion by complementing the themes (Lee et al., 2019). These findings are consistent with earlier research that emphasized how the design of virtual places may enhance user experience and engagement. Additionally, this study shows that social VR platforms have created inclusive spaces that promote a sense of belonging by developing specific places for underrepresented people to connect and engage. This result is in line with studies that showed social VR provided a secure environment for underprivileged groups. In order to create an immersive virtual environment, sound is essential. However, its significance may have been ignored in earlier research assessing social VR design decisions (Hartstein et al., 2022). On the other hand, sound was frequently mentioned by research participants as a crucial social connection enhancer. They commended the ambient noise for giving the scene a more genuine feel, supporting the idea that sound, texture, light, motion, and other aspects may enhance the virtual world's authenticity and

produce a more engaging experience. Additionally, this study emphasizes the need of combining flat and spatial sound to meet various communication objectives (Hutson, 2022).

These disparate impacts can be explained by the variety of VR uses, particularly in entertainment situations. Interactive games and simulations that demand movement are examples of active VR experiences that positively impact entertainment time by introducing physical activity in fresh and captivating ways. However, a lot of VR entertainment activities—especially those that are more passive or focused on gaming—involve little physical activity, which leads to a sedentary lifestyle (Imam & Jarus, 2022). This contrast in VR's effect on exercise in entertainment highlights its complexity: Depending on the kind of entertainment activity and user engagement, virtual reality (VR) has the ability to promote sedentary behaviors as well as active participation (Rothmund et al., 2016). The results of this study are consistent with and complement previous studies on the effects of digital technology on physical activity in entertainment. Previous research has demonstrated a variety of outcomes; some emphasize the beneficial role interactive technologies play in promoting physical activity in entertainment, while others imply that more participation in digital entertainment activities may result in more sedentary behaviors. By emphasizing VR's dual role in entertainment—as a facilitator of both physically active and sedentary experiences—this study expands on the subject matter (Ryan et al., 2006).

Although the notion of social capital has been applied to online gaming, prior research has mostly focused on motivation or orientations, personality, and playing frequency in relation to social capital. This research did not, however, look at the kinds of connections that occur when couples play together independently. Different social consequences are likely to result from playing with players who have different connection kinds. This study showed that interacting with players of various relationship kinds has varying outcomes. The findings demonstrate that while social capital was linked to contact with acquaintances, close friends, or strangers, communication with strangers had the biggest impact on bonding and bridging social capital (Yalon-Chamovitz & Weiss, 2008).

The findings of bridging social assets imply that playing online games may increase players' awareness of caring about the outside world and relating to people because interacting with strangers allows players to learn more new information, develop an international perspective, and be exposed to a wider external network than other relationship types of partners. According to the findings of bonding social capital, playing multiplayer online games not only strengthens already-existing connections but also creates new ones that grow into

close, solid bonds (Yeh et al., 2019). Furthermore, the study demonstrated that the relationship between the creation of new social capital that bonds and people's everyday interactions is weaker. Instead of creating new relationships, playing video games with individuals who are close to you in real life strengthens your bonds with them. Put another way, people have more bonding social capital in the actual world when they are more connected. Instead of creating fresh connecting social capital, the more people play games together in the virtual world, the more bonding capital they already possess.

According to this study, playing online games increases materialists' sense of belonging, bridging social capital, and bonding social capital. This confirms earlier findings that materialism is linked to interpersonal interactions in collectivist cultures. Materialism is valued differently in individualistic and collectivistic civilizations. This finding implies that research on interpersonal interactions in collective cultures should take materialism into account as a way to accomplish important goals. Furthermore, this study demonstrates that while extroverts are more likely to connect and integrate social capital in online games, they do not create a stronger feeling of belonging. This observation suggests that those who are more outgoing acquire greater social capital both in the actual and virtual worlds. However, an individual's subjective sense of group belonging—such as feeling linked, unified, and accepted—is not greatly influenced by extroversion.

LIMITATION AND RECOMMENDATION FOR FURTHER RESEARCH

This study, which explores the effects of virtual reality on entertainment, finds a number of basic limits, each of which suggests worthwhile avenues for further investigation. Although useful for quick evaluation, the cross-sectional form restricts the research to a certain period of time and makes it difficult to investigate long-term patterns or causal linkages. Longitudinal designs might be used in future research to document the changing effects of VR over time. Additionally, while enlightening, the results' generalizability is limited by the focus on a university student group. Future studies should be expanded to include a wider variety of people in order to improve the results' applicability.

Additionally, using a structured questionnaire to collect self-reported data may limit the depth of research and introduce biases. In order to better comprehend VR's function in entertainment, future research might benefit from using mixed-methods approaches and qualitative techniques like focus groups or interviews. By addressing these issues, the research

will be more comprehensive and the complex impact of virtual reality in entertainment situations will be better understood.

Due to a number of limitations, this study's findings cannot be broadly applied. First, the kinds of social VR games that were examined in this study were not within our control. Social VR games come in a variety of forms, and depending on whether a given game demands or encourages competition, a person's psychology may change. Therefore, we recommend that future research either compare the impacts of cooperative and competitive games or perform a direct experiment to unify the types of games. The fact that the majority of our research participants were men was a further limitation. further on the aforementioned restrictions, men and women may have different preferences for social VR games and may react to them psychologically in various ways. In order to generalize the findings, we advise that either research comparing male and female ratios be carried out or that follow-up studies include equal involvement from males and females.

FINAL CONSIDERATIONS

The study looked at the potential of social VR platforms as a platform for mental health care services, identified important facilitators, and assessed how well they promoted social contact among college students. The data collected for this study shows that social gatherings fostered a feeling of VR gaming is expanding and changing, communication methods enabled an efficient flow of information, and the virtual space, sound, and avatars engrossed students in the virtual world. New platforms (like social VR and the metaverse), new acquisition strategies (like online app stores), and technological advancements that offer new ways to engage and experience game content with the gaming community (like watching streamers or e-sports tournaments) are making it more accessible. Playing in virtual reality environments with friends, family, coworkers, and strangers is a growing trend. According to academics, these social exchanges help gamers by meeting their basic needs for connection and belonging.

Numerous parts of video games have been shown in studies to have a positive effect on numerous facets of wellbeing. However, there was previously no comprehensive review of this topic that specifically examined the ways in which the most well researched aspects of gaming positively connect to well-being. This is the first narrative review to concentrate on theoretically significant parts of video games (physical exercise, violence, and social aspects) and how they have been positively correlated with wellbeing via empirical research.

This study focuses at how VR affects college students in different ways, with a focus on how it may be used for entertainment. The results offer a thorough examination of how this generation's social relationships, physical activity, and general attitudes are impacted by virtual reality, a developing entertainment technology. The theories that VR use affects attitudes and perceptions of entertainment activities, modifies social interaction patterns, and has a dual effect on physical activity level—increasing engagement in active experiences while raising the possibility of reinforcing sedentary habits—are supported by empirical data. Understanding the wider ramifications of integrating VR into entertainment situations, especially for young people in academic settings, depends on these findings. The study highlights the potential for VR to improve entertainment activities and highlights possible disadvantages, emphasizing the significance of adopting a balanced approach to its use.

It highlights how important it is to create VR apps and content that engage people and improve their physical and social wellbeing. Additionally, the study adds to the theoretical underpinnings of social interaction, physical activity, and entertainment studies, calling for these frameworks to be revised to take into consideration the challenges presented by immersive technologies like virtual reality. The results offer useful guidance for integrating virtual reality (VR) into educational and recreational programs, suggesting strategies that optimize VR's advantages while minimizing hazards. Future research on VR's long-term impacts on the social and physical aspects of entertainment as well as the creation of therapies that optimize VR's beneficial benefits are made possible by this study. Lastly, the study shows how VR has revolutionary potential in entertainment, offering crucial information for its successful incorporation into the entertainment activities of college students and the general public.

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CRediT Author Statement

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- **Ethical approval:** This study was conducted in accordance with the ethical standards of institutional and national research committees. Informed consent was obtained from all individual participants involved in the study. The research involved no experimental procedures with human or animal subjects that required approval from an ethics committee beyond standard protocols for survey-based data collection. Anonymity and confidentiality of all responses were strictly maintained throughout the research process.
- **Data and materials availability:** The data generated and analyzed during the current study are not publicly available to protect the privacy and confidentiality of the participants, as the survey collected personal information and responses. However, aggregated data and the research instrument are available from the corresponding author upon reasonable request, subject to ethical approval and data protection considerations.
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