INSIDE THE GAMER'S MIND: A COMPREHENSIVE EXPLORATION OF ONLINE GAME ADDICTION ON PSYCHOLOGICAL WELLBEING AND THE MODERATING EFFECT OF PHYSICAL ACTIVITY

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ABSTRACT

The aim of the current study is to study the impact of online game addiction among the university students and to analyse the moderating role of physical activity on the relationship between game addiction and psychological well-being. An adapted questionnaire has been used to collect the responses of university students in the state of Punjab and Haryana. The conceptual model has been analysed using PLS SEM approach. The results of the study show a significant relationship between the game addiction and psychological wellbeing of the students. Also, a significant moderating role of physical fitness has been found the relationship of game addiction and psychological well-being. The results of the study are useful to the academicians, students, and parents by making them understand the negative impact of game addiction on the psychological well-being of students as well as the importance of physical activities on this relationship. S

Keywords: Game Addiction, Gamification, Psychological well-being, Students

Introduction

Owing to the widespread adoption and development of 4G and 5G networks, mobile games are becoming profitable resources for large internet platforms (Li et al., 2022). The use of a mobile phone facilitates social interaction and leisure activities. However, excessive mobile phone use also contributes to problematic mobile phone use, which can have major negative effects like nomophobia and addiction (Liu et al., 2022). Young people are greatly impacted by social media (Mohanan & Shekhar, 2021; Sharma et al., 2023). The population today is exposed to the usage of smartphone and social media right from their childhood (Khan & Sharma, 2024). Compared to female students, male students devote more time to gaming and are more dependent on it (Naaj et al., 2021). The education sector is facing challenges due to the growing usage of the Internet (Ngamije, 2021; Magd & Khan, 2022).

A number of psychological, physiological, and interpersonal problems, including poor academic performance, are linked to internet addiction disorder (Melca et al., 2023). Utilising a mobile phone increase both the advantages and disadvantages (Ma et al., 2022). Resilience is essential to the proper development of teenagers and plays a major role in it. It is crucial to determine when an adolescent's use of a mobile phone turns into an addiction.

One of the main factors that may prevent children and teenagers from developing strong psychophysiological resilience is their excessive usage of digital media (Lissak, 2018). In the digital age, internet gaming disorder and unsafe online conduct have become major issues (Chau et al., 2019). According to current trends, playing video games online has become riskier and can even be fatal for players, as demonstrated by the blue whale game (John et al., 2019).

Students who engage in more problematic internet-related activities report feeling more psychologically distressed (Chen et al., 2021). The increasing prevalence of smartphone addiction (SA) among young individuals has raised concerns about how it may affect lifestyle and nutritional habits, including irregular eating and sleeping patterns (Hasan et al., 2023; Naim et al., 2023).

There was a positive correlation between increased psychological discomfort and schoolchildren's problematic use of the internet (Choi & Lim, 2016). Academic performance and mental health would be impacted by an Internet and video game addiction (Gómez-Galán et al., 2020). Most psychologists' studies on the detrimental impacts of "gaming" have focused on the possible harm associated with aggression, addiction, and depression (Granic et al., 2014). The COVID-19 pandemic has resulted in a significant rise in the use of digital devices due to stay-at-home orders and quarantines, which have not only caused a shift from traditional in-person instruction to online learning (Besalti & Satici, 2022; Khan & Magd, 2021).

Over the past few years, there has been a noticeable increase in interest in the use of technology in the classroom to enhance student learning (Alharthi, 2020; Devers & Gurung, 2015). The population of India has witnessed a rise in Internet and gaming access, primarily among adolescents and young adults (Ansari et al., 2022). The findings show that gamification improves learning in several ways, including increasing student motivation in the classroom (Alharthi, 2020; Aldemir et al., 2018).

There are currently no comprehensive studies evaluating the effects of gamification in education on learning (Cassel et al., 2019). Gamification is a popular strategy to increase motivation and improve learning outcomes (Denden et al., 2020; Dias, 2017). Student commitment and motivation have been increased through the use of gamification as a strategy (Aguiar-Castillo et al., 2021**;** Alcaide-Martínez & Taillefer, 2022; Alshammari, 2020). Gamification has been demonstrated to have a positive impact on people's engagement and motivation to complete tasks (Alami & Dalpiaz, 2017; Alcaide-Martínez & Taillefer, 2022; Alcántara et al., 2022; Bal, 2019). Gamified learning is an innovative idea that can boost student engagement and enhance learning results (Barata et al., 2017; Barbosa & de Ávila Rodrigues, 2020; Bitrián et al., 2020; Craven, 2015;Denden et al., 2020). But Students' subjective well-being at school declines as their addiction to digital games intensifies(Baysan et al., 2019). The impact of sociodemographic characteristics, such as age and gender, or co-occurring mental disorders on symptoms of Internet use disorder (IUD), is highlighted by an expanding corpus of research on the risk factors of IUD (Kindt et al., 2019). Digital media can be used to train the students and the elderly. It can easily overcome the barrier of distance (Korte, 2020). However, negative impact of the digital media on our brains and mind can not be ignored.

When creating programmes to lessen issues associated to IGD or enhance the psychological well-being and sleep patterns of teenagers, healthcare providers might think about including siblings(Lin et al., 2021). Promoting and encouraging university students to take balanced, sensible, and consistent approaches to video gaming is essential to preserving their mental health (Raouf et al., 2022).

The results of the study demonstrate that IGD should be classified as a mental health

disorder since it increases the likelihood of poor psychosocial well-being in late adolescence and early adulthood (Teng et al., 2020). The results presented suggest that in order to reduce IGD and dangerous online activity, educators and clinicians should include psychological resilience training in their intervention strategies (Tsui & Cheng, 2021). Since children typically lack the self-control and cognitive ability of adults or college-age populations, the effects of Internet addiction on this population's health have significant ramifications for both the formation of future human capital and the individuals' personal economic and social results (Zhou et al., 2022).

Review of Literature

The findings of the research ought to be included into training programmes aimed at both parents and teenagers in order to eradicate the detrimental effects of problematic internet use on sleep patterns and the overall health of adolescents (Kokka et al., 2021). Addiction to the internet has grown to be a serious issue that mostly impacts youth. It has a significant impact on how well the person views themselves and how competent they are (Koçak et al., 2021).

The proliferation of internet addiction is a result of technological advancements (Kamaruddin et al., 2019). While the majority of Internet users do not experience any health risks, some users acquire problematic Internet usage patterns and become compulsive online video game players (Jurman et al., 2017). Academic performance is positively impacted by study-related use, but negatively by gaming-related use (Abbasi et al., 2021a). Addiction to online gaming (IGA) is a severe disorder that can have a major negative influence on social and psychological functioning (Ahmed et al., 2022).

Addiction to smartphones is linked to problems with social, physical, and mental health, just as other behavioural addictions(Alageel et al., 2021). Social media usage has become commonplace, which has led to a problematic behaviour of excessive and improper use that has been linked to mental health issues (Alhusban et al., 2022). Students, particularly teenagers, may be exposed to a variety of social and psychological dangers as a result of improper usage of electronic games (Alnaimat et al., 2023). Among these dangers include social isolation, time wastage and indifference, psychological loneliness, inadequate communication between students and others in their immediate vicinity, and similar experiences.

Psychological well being

Psychological well-being is the state of being not only free from stress or mental health issues but also having a mental condition that is seen as healthy and operating at the highest level (Afriwilda & Mulawarman, 2021). In comparison to the students in the control group, the application's results demonstrated how successfully the suggested gamification model worked to improve the psychological wellbeing of the experimental group's students (Alhalafawy & Zaki, 2019). Poor self-esteem, loneliness, and psychological distress were found to be a reliable indicator in the study of Fernandes et al. (2021). According to analysis, gaming disorder is a significant predictor of resilience, economic wellbeing, and burnout (Isralowitz et al., 2022).

Impact of Game Addiction on Psychological well being

Research on the positive and negative effects of video games on people's psychological health currently yields conflicting results regarding factors like the amount of time spent playing these games and the display of aggression (Al-Sharqi & Hasan, 2022; Fajardo-Santamaría et al., 2021).

The application of aspects of game design to non-gaming activities, or "gamification," has drawn a lot of interest from both academia and business (Acharya & Gupta, 2020). When it comes to how COVID-19 affects children's mental health, they are a particularly sensitive group. Children are prone to engaging in harmful online gaming while confined to their homes (Chen et al., 2022). The official diagnosis of Internet Gaming Disorder has been made, and major public health issues have already been found with relation to the ability of mental health providers to treat patients of all ages appropriately and the readiness of patients to receive appropriate care (Floros & Mylona, 2023).

There were notable distinctions between the groups with and without smartphone

addiction with regard to gender, the amount of time spent on smartphones during the week and on the weekends, the frequency of smartphone use on the weekends, and the overall health-related Quality of Work Life and its subdomains, which include the physical and psychological well-being and the school environment (Buctot et al., 2020). It has been demonstrated that adding social robots and gamification components to learning settings improves motivation, engagement, or even both (Dovleac et al., 2019).

Findings demonstrated that, while communication skills acted as a powerful mediator between social skills and digital gaming addiction, social skills themselves were strongly adversely correlated with the latter (Erdogan, 2023). When the data are analysed holistically, it is believed that for people with poor social and communication abilities, digital games represent a significant place of escape. Among health care workers and students, smartphone addiction has a detrimental effect on emotional loneliness, poor sleep quality, and psychological distress (Alzhrani et al., 2023). The internet is becoming a necessary tool for everyday living and is fundamentally altering social interactions (Amendola et al., 2019).

Moderating Effect of Physical Activity

Engaging in physical activity is crucial for the proper physical and psychological growth of individuals, particularly in their youth, as it serves as a preventive measure against illnesses and enhances overall well-being (Lozano-Sánchez et al., 2019). Moreover, the detrimental effects of game-related use on academic performance are moderated by physical activity (Abbasi et al., 2021a). It has been discovered that engaging in regular physical activity significantly reduces the amount of time spent on electronic media (Bai et al., 2023). With peer relationship regulation having a less influence, MPA had a more detrimental effect on exercise behaviour (Han et al., 2023).

H1: There is significant negative relationship between 'Game Addiction' and 'Psychological Well-Being'

H2: There is significant moderating role of 'Physical Activity' on the relationship between 'Game Addiction' and 'Psychological Well-Being'

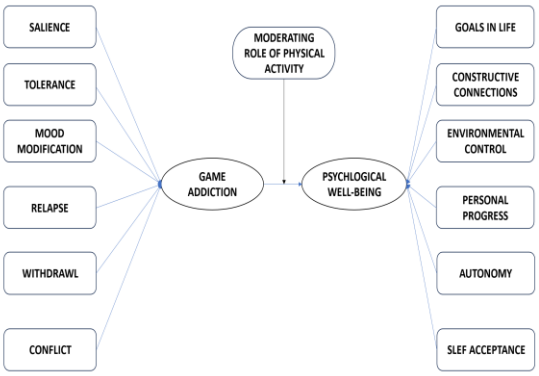


Figure 1 Conceptual Framework

Method

An adapted questionnaire has been used to collect the responses form 385 university students form the state of Punjab and Haryana. A modified version of Ryff's (1989) Psychological Well-Being (PWB) scale and (Lemmens, Valkenburg, and Peter 2009) Game Online Addiction are the sources of the psychological well-being measurement tool. The six interconnected components of the PWB scale include goals in life, constructive connections with others, environmental control, personal progress, autonomy, and self-acceptance. The 42-item medium form of the psychological well-being scale, with three items per component, was utilized in this investigation (Ryff, 2014). The Cronbach Alpha score for this instrument is 908. Then, the seven components of the Game Online Addiction Instrument (Lemmens et al., 2009) are salience, tolerance, mood modulation, withdrawal, relapse, conflict, and issues. There are 21 items on this online game addict behavior scale. Cronbach's alpha of .94 indicates the scale's reliability. The seven GASA requirements are as follows:

Salience: Adolescents who engage in gaming prioritize it over other interests and daily activities, making it the most significant activity in their lives.

Mood Modification: Teenagers who play video games tend to play them to either boost or soothe positive or negative emotions.

Tolerance: In order to get the necessary amount of pleasure or satisfaction from gaming, more time is required.

Withdrawal Symptoms: Adolescents who are unable to play games exhibit withdrawal

symptoms such as restlessness, irritability, and others.

Conflict: Teenagers who continue to game despite having troubles with friends, family, or school are more likely to have disputes as a result of gaming.

Relapse: Adolescents who have tried to cut back or regulate their gaming but are unable to do so end up gaming excessively again.

Problems: An adolescent's involvement in gaming might lead to serious issues in their life, like subpar academic results, neglected obligations, or strained relationships.

Table 1: Construct Validity

CONSTRUCT	SOURCE
Game Addiction	(Lemmens et al., 2009)
Psychological well-being	(Ryff, 2014)
Physical activity	(Abbasi et al., 2021b)

The selection of students in the sample under study has taken place using random sampling technique. A conceptual model has been framed using Game addiction as a higher order construct. For the construct-Psychological Well-being, the mean scores of 'Goals in Life,' 'Constructive Connections with Others,' 'Environmental Control,' 'Personal Progress,' 'Autonomy,' and 'Self-Acceptance' under the indicators- PWB1, PWB2, PWB3, PWB4, PWB5 and PWB6.

Data Analysis and Discussion

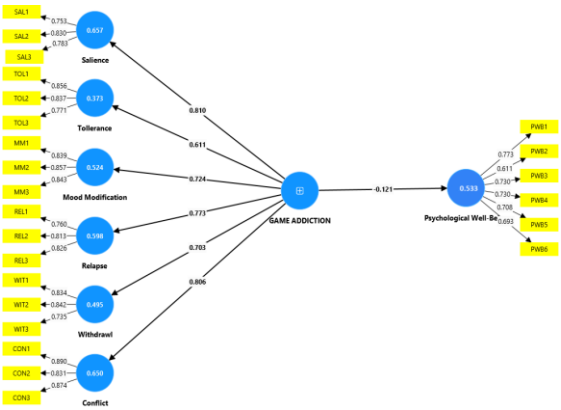
Smart PLS4 has been used to analyse the conceptual model. The model makes use of Reflective-Formative higher-order construct-Game Addiction with Salience, Tolerance, Mood Modification, Relapse, Withdrawal and Conflict as its lower order constructs. Outer loadings are monitored in the PLS-SEM technique, and the latent variable model is estimated using the embedded two-stage method (Becker et al., 2012). The model uses the two-stage procedure recommended for Reflective-Formative HOCs (Sarsted et al., 2011) (Wetzels et al., 2009).

In order to confirm the suitability of the LOCs, the outer loadings (OL), Average Variance Extracted-values (AVE) and composite reliability (CR) are reported in Table 2. Multicollinearity was not found; the VIF values used to check for it ranged from 1.80 to 4.90, below the cutoff value of 5 established by Hair, Sarstedt, Ringle, and Mena (2011). Table 1 shows that all outer loadings are more than 0.7, validating the convergent dependability

Table 2 Valuation of validity and reliability of lower order constructs

LOC	Indicators	Indicator Loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite Reliability (rho_c)	Average variance extracted (AVE)
Salience	SAL1	0.753	0.832	0.701	0.832	0.623
	SAL2	0.830				
	SAL3	0.783				
Tolerance	TOL1	0.856	0.862	0.773	0.862	0.676
	TOL2	0.837				
	TOL3	0.771				
Mood Modification	MM1	0.839	0.883	0.803	0.883	0.716
	MM2	0.857				
	MM3	0.843				
Relapse	REL1	0.760	0.842	0.723	0.842	0.640
	REL2	0.813				
	REL3	0.826				
Withdrawal	WIT1	0.834	0.847	0.758	0.847	0.649
	WIT2	0.831				
	WIT3	0.735				
Conflict	CON1	0.890	0.832	0.837	0.899	0.749
	CON2	0.831				
	CON3	0.874				

(Nitzl, 2016). Cronbach's alpha and the reliability coefficient are used to determine the internal consistency reliability (Hair et al., 2019).



Also, the HTMT criteria has also been used in assessing the discriminant validity. Since, all the values are found to be less than 0.90 confirmed the discriminant validity amid the two reflective constructs.

Assessing the Validity of HOCs

In order to establish the validity of HOCs Outer Weights, Outer Loadings are shown in table 3.

The results of path coefficients are shown in table 6, which shows that there is significant negative impact of game addiction on psychological well-being of students (beta value= -0.121, p=0.009). Thus, the increase in game addiction among students impact negatively on the psychological well-being of the students.

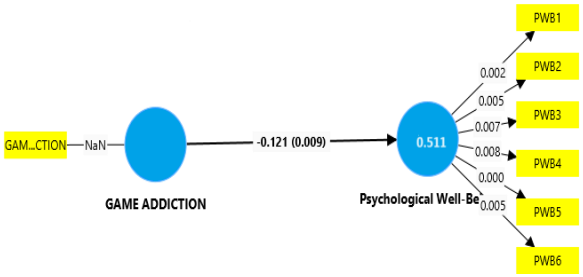


Table 3: LOCs-Discriminant Validity

	Conflict	Mood Modification	Psychological Well-Being	Relapse	Salience	Tollerance
Conflict						
Mood Modification	0.463					
Psychological Well-Being	0.106	0.15				
Relapse	0.601	0.797	0.089			
Salience	0.85	0.654	0.121	0.726		
Tollerance	0.382	0.587	0.082	0.631	0.466	
Withdrawl	0.827	0.335	0.117	0.503	0.75	0.317

Table 4 HOCs-Validity, collinearity and Outer Weight Significance Testing Results

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Psychological Well-Being	0.817	0.811	0.836	0.461

Table 5 HOCs-Discriminant Validity

	GAME ADDICTION	Psychological Well-Being
GAME ADDICTION		
Psychological Well-Being	0.115	

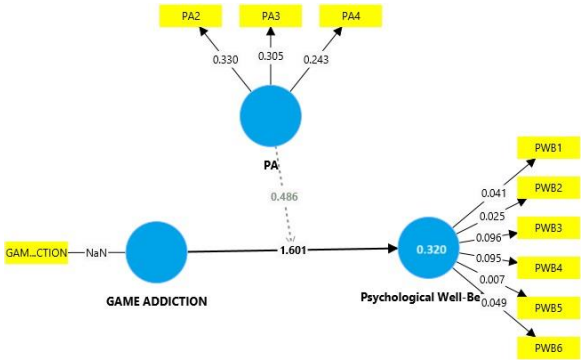
Table 6: Path Coefficient Assessment

Hypothesis	Original sample (O)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Result
H1: Game Addiction → Psychological Well-Being	-0.121	0.046	2.595	0.009	Supported

Moderating Role of Physical Activity

Hypothesis	Original sample (O)	Standard deviation	t statistics	P values	Results
H2: PA x GAME ADDICTION -> Psychological Well-Being	0.028	0.057	0.486	0.028	Supported

As per the results of moderating effect, 'Physical Activity' plays a significant moderating role on the relationship between 'Game Addiction' and 'Psychological Well-Being'. It shows that the negative impact of game addiction among the students on their psychological well-being can be reduced through their physical activities. The students who engaged themselves in physical activities keep themselves away from mental stress and improve their physical well-being.



Managerial Implications of the study

1. Students who are addicted to video games must get help in order to solve these problems. School counsellors, therapists, and addiction specialists can assist students in creating more time-efficient gaming routines and time management skills.
2. Sometimes, beating game addiction and enhancing mental health calls for an organised therapy programme. Furthermore, having honest conversations with loved ones can be a great way to support them during the healing process.
3. It is important to prepare students for independent learning (Abidin et al., 2019). Any subject that is within their skill level with educational activities that they consider delightful and find the subjects to be appealing.
4. Students' critical thinking skills will be strengthened through gamification, as they strive to create an accomplishment that will satisfy them but students should not be addicted in order to have good psychological wellbeing.
5. It may be helpful to provide university students with smartphone education that focuses on the negative effects smartphone addiction has on their physical and mental health (Alotaibi et al., 2022).

Conclusion

While the sources mention the growing interest in gamification as an educational tool, they also highlight the lack of comprehensive research on its potential downsides. The study identifies a relationship between game addiction and psychological well-being, the cross-sectional design prevents drawing definitive conclusions about cause and effect. The mental health of students can be significantly impacted by game addiction. It may have a variety of negative effects on their wellbeing, some of which may be concentrated in their social lives, academic achievement, and emotional well-being. The detrimental effects of online gaming on psychological wellbeing can be lessened by fostering appropriate gaming behaviours, encouraging in-person social contacts, and offering assistance to those who need them. In the end, happier, healthier lives can result from a balanced approach to technology use and careful evaluation of any possible negative effects

Limitations of the Study:

The study has faced limitation on few fronts such as its inclusion of the respondents base, as it is limited to the students from the states of Punjab and Haryana in India, there can be issues related to the generalizability of the study. Further, the study utilized a cross-sectional design where the data was collected at the single point of time, that implies that longitudinal dimensions that are not covered in this study that can draw better causal conclusions about the relationship between games addiction and psychological well-being.

Further, the study cannot ignore the aspect of suffering from a bias, as the students who are addicted to games are less likely to report the true level of addiction. Having said this, there are chances that the level of addiction is higher than the one reported in this study. The physical activity mechanisms underlying this moderation are not covered in this study, because of which the study doesn't specifically mention the mechanism that can protect against the negative effect of game addiction. Although these limitations do not make the findings of the present study invalid, they establish a base for proposing directions for future studies.

Future Research Directions

There can be several recommendations for the future studies that can mainly overcome the limitations mentioned in the previous section. The study was limited to the university students of the Punjab and Haryana in India, the study can be revalidated by conducting a study on other locations, other age groups, culture, and socio-economic background. Further, in order to draw casual conclusions, longitudinal studies are recommended that would collect the data over a period of time and can help to determine whether the online addition can lead to poor psychological well-being. Further, the psychological effects of the games are influenced highly by their genre, a study focused on specific games like social games, violent games, management games etc. can be conducted. Furthermore, the future studies can be conducted to investigate whether physical activity improves mood, reduces stress, or enhances social support, that in turn can mitigate the negative impact of excessive gaming. Also,, qualitative methods such as interview or focus groups can provide better insights into experiences of the students who might not open up or mis-report their actual level of addiction in a quantitative research.

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Appendix: LIST OF STATEMENTS

Game Addiction
How often during the last six months
Salience
SAL1 Did you think about playing a game all day long?
SAL2 Did you spend much free time on games?
SAL3 Have you felt addicted to a game?
Tolerance
TOL1 Did you play longer than intended?
TOL2 Did you spend increasing amounts of time on games?
TOL3 Were you unable to stop once you started playing?
Mood Modification
MM1 Did you play games to forget about real life?
MM2 Have you played games to release stress?
MM3 Have you played games to feel better?
Relapse
REL1 Were you unable to reduce your game time?
REL2 Have others unsuccessfully tried to reduce your game use?
REL3 Have you failed when trying to reduce game time?
Withdrawal
WIT1 Have you felt bad when you were unable to play?
WIT2 Have you become angry when unable to play?
WIT3 Have you become stressed when unable to play?
Conflict
CON1 Did you have fights with others (e.g., family, friends) over your time spent on games?
CON2 Have you neglected others (e.g., family, friends) because you were playing games?
CON3 Have you lied about time spent on games?
Problems
PRO1 Has your time on games caused sleep deprivation?
PRO2 Have you neglected other important activities(e.g., school, work, sports) to play games?*
PRO3 Did you feel bad after playing for a long time?

Physical Activity
PA1 If I had a choice, I would almost always rather do something physical than something mental.
PA2 I almost always feel better when I am on the move than when I am sitting and thinking.
PA3 I like to get out and do things more than I like to read or contemplate ideas.
PA4 I seem to have more energy and a greater need for activity than most other people my age.