

Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India*, *International Journal of Multidisciplinary Research & Reviews*, 5(2), 182-205.



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**EXPLORING THE PSYCHOLOGICAL IMPACT OF VIRTUAL
REALITY GAMES ON GEN Z: A STUDY WITH REFERENCE
TO THE NORTH EASTERN REGION OF INDIA**

**Srinivas Rao K^{1*}, Sunil Kumar Pradhan², Tushar Rajan Sahoo³,
& Yadav Devi Prasad Behera⁴**

¹Research Scholar, Berhampur University,

²Assistant Professor (Stage-III), Department of Business Administration, Berhampur University, India.

³Assistant Professor, Amity Business School, Amity University, India.

⁴Department of Commerce, Lxminarayan College, India.

Corresponding Author: Srinivas.kotturti@gmail.com

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Keywords	Abstract
Virtual reality, affordance, Virtual Gaming, Gen Z, Mood Modification, Conflict.	Virtual reality (VR) gaming has emerged as a revolutionary technology, transforming the way we experience and interact with digital worlds. This paper explores the evolution of VR gaming, from its early beginnings to its current state, and discusses its potential future developments especially in Gen Z by taking a sample 253 participants in North East. We delve into the unique features of VR gaming, such as immersive environments, interactive experiences, and the sense of presence, which distinguish it from traditional gaming. Furthermore, we examine the psychological and physiological effects of VR gaming, including its potential impact on cognitive abilities, motor skills, and social interactions. The paper also highlights the challenges and limitations of VR gaming, such as motion sickness, hardware costs, and accessibility. We also explore the role of VR gaming in enhancing player



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	<p>engagement and motivation, and its potential for social interaction and collaboration.</p> <p>The paper further discusses the potential of VR gaming in various industries, such as education, healthcare, and tourism. In education, VR gaming can create interactive and immersive learning experiences, enhancing student engagement and retention. In healthcare, VR gaming can be used for rehabilitation, pain management, and mental health therapy. In tourism, VR gaming can provide virtual tours of destinations, allowing users to explore new places without leaving their homes.</p> <p>Additionally, the paper examines the ethical considerations surrounding VR gaming, such as privacy concerns, addiction, and the impact of violent content on players. The paper also discusses the role of VR gaming in promoting diversity and inclusivity, and its potential for creating new forms of artistic expression.</p> <p>Conclusion, this paper provides a comprehensive overview of the current state and future potential of VR gaming, shedding light on its opportunities and challenges. By exploring the unique features, benefits, and limitations of VR gaming, this paper aims to contribute to the ongoing discourse on the role and impact of this technology.</p>
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1. INTRODUCTION

Gaming in virtual reality (VR) is gaining popularity because it offers gamers an immersive and captivating gaming experience. Its potential to cause addictive behaviour in some customers, however, has aroused concerns. VR gaming addiction is characterized by excessive and compulsive use of virtual reality gaming devices and software, leading to negative consequences such as decreased social interaction, decreased physical activity, and a decline in mental health. The immersive nature of VR gaming, the release of dopamine, the sense of control, the social nature of VR gaming, and the lack of regulation are significant factors that contribute to addiction. To more fully comprehend the contributing factors to VR gaming addiction and identify potential interventions to prevent or mitigate its negative effects, a study is being conducted by Zhai et. al (2020). As mentioned earlier, an outbreak of COVID-19 has resulted in increase in the adoption of virtual technology, including virtual reality games. With people spending more time at home and with limited opportunities for social interaction, VR gaming has emerged as a popular way to socialize and connect with others. However, the possibility for addiction has also been brought up by this rise in VR game usage.

According to research, VR gaming addiction might have a significant impact on a person's mental health. According to a study published in the Journal of Behavioral Addictions, individuals who are addicted to VR gaming have greater anxiety levels, depression, and stress compared to non-addicted individuals (Lee et al., 2019). This suggests that addiction to VR gaming can lead to serious mental health issues and highlights the importance of addressing this problem.

Also, a person's physical health may suffer as a result of a VR gaming addiction. Long-term use of VR equipment can cause physical discomfort like migraines, dizziness, and eye strain. In severe



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cases, prolonged usage of VR devices can lead to a condition called "cybersickness," which is characterized by nausea, vomiting, and disorientation (Jain et al., 2019). This highlights the need for individuals to use VR devices in moderation and to take frequent breaks to avoid negative physical consequences.

To address the issue of VR gaming addiction, researchers are exploring potential interventions to prevent or mitigate its negative effects. One study aims to investigate the impact of perceived experience excitement and VR cognitive satisfaction on VR gaming addiction (Zhai et al., 2020). The study will use a structural equation modelling (SEM), a method to analyse the connection between these factors and VR gaming addiction. The study's conclusions can help inform interventions to prevent or reduce the negative effects of VR gaming addiction. In conclusion, VR gaming addiction is a growing issue that may have harmful consequences on an individual's mental and physical health. While VR gaming can be enjoyed in moderation without negative consequences, individuals who are prone to addiction or who struggle with mental health issues should use caution when engaging in VR gaming. With continued research and awareness, we can better understand the factors that contribute to VR gaming addiction and develop interventions to prevent or mitigate its negative effects.

Virtual reality has revolutionized the gaming business by giving consumers immersive experiences. Gaming addiction is a problem that is becoming more and more widespread. However, VR game addiction is a new problem that needs more investigation. The purpose of this study is to investigate how virtual affordance affects the development of VR gaming addiction as well as how perceived experience excitement affects virtual affordance. Additionally, this study attempts to look into how age and gender affect the link between virtual affordance and addiction to VR gaming. The importance of this study rests in its ability to shed light on the nuanced interactions between virtual affordance and addiction to VR gaming. The study will aid in determining the elements that contribute to the emergence of a VR gaming addiction and offer guidance on how to lessen its damaging consequences. The study will also examine the moderating effects of age and gender, which will aid in the development of interventions and plans of action for various age and gender subgroups.

The study's regional focus on the North East will aid in shedding light on the distinctive cultural and socioeconomic elements that contribute to addiction to VR gaming in that area. The results of this study will be helpful to legislators, medical professionals, and game creators in helping them create successful therapies to address the problem of addiction to VR gaming.

2. REVIEW OF LITERATURE

The COVID-19 pandemic has caused a surge in the adoption of virtual technology, including virtual reality games. Due to the lack of social interaction and limited opportunities for outdoor activities, people have turned to VR gaming as a way to connect and socialize. However, this rise in VR game usage has raised concerns about the potential for addiction. Research has shown that addiction to VR gaming can have a significant impact on a person's mental health. A study



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published in the Journal of Behavioural Addictions found that addicted individuals have higher levels of anxiety, depression, and stress compared to non-addicted individuals (Lee et al., 2019), emphasizing the need to address this issue. Moreover, excessive use of VR equipment can result in physical discomfort such as migraines, dizziness, and eye strain. In severe cases, it can lead to "cybersickness," characterized by nausea, vomiting, and disorientation, making it crucial for individuals to use VR devices in moderation and take frequent breaks to avoid negative physical consequences (Jain et al., 2019).

According to Zhai et al. (2020) in the paper "Investigating the Mediation and Moderation Effect of Students' Addiction to Virtual Reality Games: A Perspective of Structural Equation Modelling" explores the relationship between addiction to virtual reality (VR) games,

Perceived experience excitement, and academic performance among university students. The paper employs a structural equation modelling approach to analyse data from a sample of 345 Chinese university students. The results indicate that addiction to VR games has a negative effect on academic performance, and perceived experience excitement partially mediates this relationship. Additionally, the authors find that the association between addiction and academic performance is significantly impacted by the moderation effect of perceived experiential excitement, indicating that individuals with higher levels of perceived experience excitement may be more susceptible to the higher effects of addiction on academic performance. Lu and Lien (2020) discovered that students' perceived experience excitement had a direct effect on their intention to play game-based learning environments. According to Balakrishnan and Griffiths (2018), gaming addiction was positively correlated with loyalty to online games and purchase intent towards mobile in-game features. This shows that people who are more emotionally invested in online games and more likely to spend money on in-game extras may be more prone to gaming addiction. Consumer perceptions of value, quality, and price are significant determinants of consumer purchasing behaviour, according to Zeithaml (1988). Similar to this, the perceived excitement and value of a VR gaming experience may aid in the emergence of a gaming addiction. Overall, these studies indicate that the perceived value and excitement of the VR experience may help people become addicted to gaming, especially those who have a stronger bond with online games and are more likely to spend money on in-game extras. Furthermore, those who are predisposed to addictive behaviours in general may also be more likely to develop an addiction to VR gaming.

According to Zhai et al. (2020) in the paper of "Investigating the Mediation and Moderation Effect of Students' Addiction to Virtual Reality Games: A Perspective of Structural Equation Modelling" explores the relationship between addiction to virtual reality (VR) games, VR self- efficacy and university students' academic performance. Additionally, the authors find that the connection between addiction and academic achievement is moderated by VR self-efficacy, suggesting that individuals with higher levels of when it comes to the detrimental impacts of addiction on scholastic achievement, VR self-efficacy may be less vulnerable. According to Lu and Lien (2020) explores the Relationship between game-based learning (GBL) and students' perception



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characteristics, learning self-efficacy, and virtual reality (VR) environment. They then introduce the concept of learning self-efficacy as a key factor influencing students' academic achievement and the importance of understanding how perception traits affect students' learning self-efficacy in game-based learning. The paper employs a mixed-methods approach to analyse data from a sample of 118 college students who participated in a VR-based GBL program. The results indicate that students' perception traits, such as motivation and enjoyment, have an advantageous impact on their self-efficacy for learning in the GBL environment. According to Reid (2002) in the paper of "Benefits of a Virtual Play Rehabilitation Environment for Children with Cerebral Palsy on Perceptions of Self-Efficacy" it explored that impact of a virtual reality (VR) play rehabilitation environment on the perceptions of self-efficacy among children with cerebral palsy. The paper highlights the challenges faced by children with cerebral palsy in engaging in physical play and the potential benefits of VR-based play rehabilitation environments in promoting physical activity and enhancing motor abilities. According to San-Martín et al. (2020) in the paper of "The path between personality, self-efficacy, and shopping regarding games apps" explores the association between personality traits, self-efficacy, and the intention to purchase gaming apps. The study employs a quantitative approach, with data collected from a sample of 311 Spanish gamers using an online survey. The survey measures personality traits, self-efficacy, and the intention to buying gaming apps. In order to analyse the data, structural equation modelling was used. The paper by Meluso et al. (2012) titled "Enhancing 5th graders' science content knowledge and self-efficacy through game-based learning" explores the application of game-based learning to enhance students' understanding of science material and sense of self-efficacy.

The capacity to perform successfully in VR games is referred to as VR self-efficacy. Lu and Lien (2020) found that for game-based learning settings to be effective, self-efficacy is essential. Their study showed that self-efficacy positively influenced learning outcomes, indicating that players with high self-efficacy tend to perform better and become more addicted to VR gaming.

The study by Zhai et al. (2020) seeks to investigate the connection between virtual reality gaming addiction and game-related cognitive satisfaction. The study utilized structural equation modelling to investigate the effects of mediation and moderation of addiction on cognitive satisfaction among 385 university students. The results of the study revealed that virtual reality games addiction negatively predicted cognitive satisfaction. The paper by Zhai et al. (2021) aims to investigate the contribution of motivation and desire to the cognitive-behavioural explanation of students' addiction to virtual reality games, specifically in terms of VR cognitive satisfaction. The authors argue that the cognitive satisfaction experienced by users of VR games can influence their motivation to engage in such activities and their level of addiction to these games. To support their argument, the authors conducted a study using a sample of 542 university students who reported playing VR games. The participants completed a questionnaire that measured their motivation, desire, addiction to VR gaming and Cognitive Satisfaction. Using structural equation modelling (SEM), the data was examined. The findings demonstrated that cognitive satisfaction is a key



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predictor of VR game addiction. The paper by Kim and Ko (2019) investigates the effects of virtual reality (VR) technology on sports fans' enjoyment and flow. Specifically, this investigation's objective the relationship between VR technology and the cognitive satisfaction of sport spectators, which is defined as a psychological state of feeling satisfied with the cognitive aspects of an experience. The study employs a quantitative research design and collects data from 150 participants who watch a basketball game through VR technology. The study's findings indicate that virtual reality technology significantly improves the cognitive satisfaction of sport spectators, as well as their flow experience and satisfaction. The article by Wan and Chiou (2006) examines the association between psychological motives and online gaming addiction, specifically testing the application of flow theory and humanistic needs theory to teenagers in Taiwan. The study aimed to understand how cognitive satisfaction and enjoyment in online gaming can lead to addictive behaviour. The paper by Shiau and Huang (2022) aims to develop a scale to analyze the fit of real and virtual world integration using the popular mobile game Pokémon Go as an example. The study focuses on cognitive satisfaction as a factor that contributes to the successful integration of real and virtual worlds in the game. The authors explain that cognitive satisfaction is a crucial element in determining the perceived value of a product or service, which can ultimately influence user behavior and adoption. To develop the scale, the authors conducted a survey of 292 Pokémon Go players in Taiwan, which included questions about their perceived fit of the game's virtual world with the real world, their enjoyment of the game, and their cognitive satisfaction with the integration of the two worlds. The paper by Zhai et al. (2020) explores the relationship from a gaming standpoint, between VR affordability, cognition, and VR addiction. The data gathered from a survey of 302 gamers in China was analysed by the authors using structural equation modelling. Specifically, they examined the impact of VR affordability on cognitive satisfaction, which, in turn, affects VR addiction. The study found that VR affordability had a positive effect on cognitive satisfaction, suggesting that the lower the cost of VR devices, the higher the cognitive satisfaction experienced by the gamers. The paper by Lee et al. (2020) investigates the creation and viability of a virtual reality program designed to help those who suffer from Internet gaming disorder (IGD) choose alternative leisure activities. The study examines the cognitive satisfaction factor of VR in relation to the participants' choice of leisure activities. The program aimed to provide alternative leisure activities that are enjoyable and more beneficial to the individual's overall health and well-being. The results showed that the VR program was well-received by both adolescents and adults with IGD, with high levels of engagement and cognitive satisfaction reported.

The paper by Zastrow (2017) examines the question of whether Video game addiction is a type of addiction in the conventional sense. One of the key factors that is examined in the paper is the concept of mood modification, which is considered a core feature of addiction. Zastrow points out that mood modification is only one of several criteria that must be met for a behaviour to be considered an addiction. The paper also examines the challenges associated with defining and



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diagnosing video game addiction, highlighting the lack of consensus among researchers and mental health professionals. The paper by Sim et al. (2012) presents a comprehensive survey of the literature on problematic internet, video game, and computer use, with a specific focus on the factor of mood modification. The authors argue that mood modification is one of the key characteristics of addiction, and that individuals may engage in excessive computer, video game, or internet use in order to modify their mood, relieve negative emotions, or enhance positive emotions. The paper by Ilgaz (2015) titled "Adaptation of game addiction scale for adolescents into Turkish" aimed to adapt the Turkish translation of the Game Addiction Scale for Adolescents (GASA) and evaluation of the scale's reliability and validity. The GASA measures six dimensions of game addiction, including mood modification. Mood modification refers to the extent to which playing video games is used to change one's emotional state. Ilgaz (2015) administered the Turkish adaptation of the GASA to 402 high school students in Turkey, and The findings showed that the modified scale was accurate and trustworthy. The mood modification subscale had Cronbach's alpha of .85 indicates strong internal consistency. The results also revealed a favourable relationship between mood alteration and the quantity and length of time spent playing video games. The paper by Stetina et al. (2012) provides an overview of the potential applications of virtual reality (VR) for enhancing health and well-being, with a focus on the potential for mood modification. The authors suggest that VR technology could be used to create immersive and engaging experiences that have the potential to positively impact mood and emotional well-being. Overall, the paper by Stetina et al. (2012) highlights the potential for VR technology to be used for mood modification and to promote health and well-being. One such study is Ho et al.'s (2017) research on how children's attitude toward exergames is influenced by their presence, enjoyment, and mood experience. In their study, they investigated the relationship between children's attitudes toward exergames and their levels of presence, enjoyment, and mood experience. The authors conducted a survey of 322 children aged 8 to 12 years old in Singapore, asking them about their attitude toward exergames, their presence and enjoyment while playing exergames, and their mood experience after playing exergames. The findings revealed that satisfaction and presence were positively related to children's attitudes toward exergames, indicating that the more present and enjoyable the exergames were, the more positively the children felt about them. Kosa and Uysal (2020) propose Emotional control, mental health management, coping strategies, and recovery are the four pillars of healthy escapism in gaming. They argue that games can be a healthy and effective means of mood modification, as they offer a controlled environment in which players can practice coping strategies and manage their emotions. Kosa and Uysal's (2020) Four foundations of constructive game escapism offer a useful framework for understanding the potential benefits of game-based mood modification. The paper titled "Evaluating VR driving simulation from a player experience perspective" by Walch et al. (2017) investigates Virtual Reality's effects on mood modification by examining the player experience of a driving simulation game. The study explores the mood enhancement effect of VR and its role in creating an immersive gaming experience.



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Mood modification refers to the ability of VR games to alter the player's mood. San-Martín et al. (2020) found that mood modification has a significant relationship with addiction to gaming apps. The study suggests that VR games can alter the player's mood and lead to addiction.

The paper by Shin et al. (2021) focuses on the creation and analysis of a virtual reality application's viability designed to manage conflict relating to games between young people with internet gaming disorder and their parents. The study is particularly relevant given the growing concern about the negative impact of excessive gaming on individuals, especially young adults, and their relationships with family members. The study conducted a feasibility test of the app with 10 participants, who reported feeling really satisfied with the app. and its content. The study's findings suggest that the app is an effective tool for managing game-related conflict and improving communication and conflict resolution skills. The paper by Zhai et al. (2020) investigates the relationship between addiction to virtual reality games and various factors including conflict. The authors use structural equation modelling to examine the mediation and moderation effects of addiction on academic performance, psychological health, and gaming behaviours. Park et al. (2016) studied the results of a virtual reality (VR) therapy programme for addiction to internet gaming, which is associated with various negative consequences, including interpersonal conflict. The study aimed to explore whether a VR program could improve the symptoms of addiction and related problems, including conflict with family and friends. The study involved 10 participants who were diagnosed with online gaming addiction and showed symptoms of interpersonal conflict due to their excessive gaming. The participants received eight sessions of a VR program, which included cognitive- behavioural therapy and motivational interviewing. The paper titled "Oculus VR Best Practices Guide" by Yao et al. (2014) aimed to provide guidelines for creating immersive virtual reality (VR) experiences that are comfortable and safe for users. The authors highlighted various factors that can impact user experience and contribute to conflicts, such as motion sickness, discomfort, and disorientation. One of the main factors discussed in the paper was the importance of reducing motion sickness in VR experiences. The study by Kim and Kim (2010) aims to assess the psychometric properties of the scale of online problematic game use, which measures the how much of an issue playing online games among adolescents and adults. Specifically, the authors investigate the The POGU scale's validity, convergent, and reliability are all high. The study utilizes a sample of 556 Korean online game users, aged 15 to 50 years.

Conflict is an independent variable that can have a negative impact on the player's addiction to VR gaming. Shin et al. (2021) suggest that conflict can lead to gaming addiction, and their study aimed to develop a VR app to manage online gaming-related disputes with parents and young adults who have a gaming disorder. The research indicates that conflict can have a negative impact on addiction, and the development of VR apps can help to mitigate this effect.

Shafer, Carbonara and Korpi (2019) conducted a study to investigate the factors that affect enjoyment of VR games, with a specific focus on VR realism. The authors conducted a between-subjects experiment using two different types of VR technology: a high-end HTC Vive and a



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consumer-grade Samsung Gear VR. Participants played two VR games, each on one of the VR technologies, and then completed a survey that measured their enjoyment, presence, and realism levels. The authors found that participants reported higher levels of enjoyment and presence from High-end VR situation is comparison to consumer-grade VR situation. The paper by Zhai et al. (2020) aims to investigate the mediating and moderating effects of addiction to virtual reality (VR) games on the connection between academic success and VR realism. The research employed a structural equation modelling approach to analyse data collected from 210 university students in China. The results showed that addiction to VR games mediates the relationship between VR realism and academic performance. This is in line with earlier studies that have showed the potential negative effects of excessive use of VR games, such as addiction and decreased academic performance (e.g., Kuss et al., 2012). Kaczmarek and Drązkowski (2014) sought to investigate this relationship by examining the impact of MMORPG escapism on player well-being, as moderated by Time spent playing games, attitudes towards game realism, and online help for offline issues. The research employed a survey design with a sample of 238 MMORPG users, evaluating their perceptions of game realism, online social support for offline issues, MMORPG escapism, and well-being. Results indicated that MMORPG escapism was negatively correlated with well-being and that thoughts about game realism were positively correlated with it. The paper by Rogers et al. (2022) provides a thorough analysis of the literature on realism in video games. Specifically, the research examines the concept of realism in the relation of virtual reality games. The authors explore the relationship between realism and player experience, and how game developers can use realism to create more engaging and immersive gaming experiences. The paper identifies four dimensions of realism: visual, audio, haptic, and behavioural. The paper by McMahan (2011) aims to explore higher-fidelity interaction and display impacts on virtual reality games. Specifically, the author investigates how the level of realism in the display and interaction affects users' immersion and enjoyment of the game. To achieve this, the author conducted a study with 64 participants who played a virtual reality game in three different conditions: a low-fidelity display with a standard input device, a high-fidelity display with a standard input device, and a high-fidelity display with a specialized input device. The participants then completed a survey to assess their level of immersion and enjoyment of the game. The study's findings revealed that higher-fidelity displays specialized input devices significantly increased the level of immersion and enjoyment of the game for the participants.

Zhai et al. (2020) did research to find the relationship between virtual reality Affordableness, intelligence, and VR addiction from the perspective of video games. The authors argue that VR has become more affordable and accessible, which has led to an increase in VR gaming addiction. They suggest that VR's affordances important part in addiction and that understanding the affordability, brain function, and addiction in VR is important for designing interventions. The study is based on a theoretical model of addiction, which posits that addiction is a cognitive-behavioral disorder and that cognition plays a crucial role in addiction. The authors conducted a



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survey with 215 undergraduate students in China to assess their VR usage, affordability, and addiction levels. The results showed that VR The use of VR was strongly correlated with affordability, and the use of VR was positively correlated with VR addiction. The literature review conducted by Zhai et al. (2020) highlighted that affordance refers to the features and properties of a technology that enable users to engage in certain activities. In the context of VR, affordance can be understood as the characteristics of the a virtual world that enables users to fully immerse themselves in the game and interact with it. The article by Rajan et al. (2018) investigates the factor of VR affordance in the context of virtual reality gaming addiction. The authors argue that VR affordance plays a crucial role in promoting VR gaming addiction. They suggest that the immersive nature of VR environments, combined with the interactivity and realistic simulation of gaming scenarios, can create a strong a feeling of presence and engagement, which can lead to addictive behavior.

The paper by Parsons (2015) explores the factor of virtual reality (VR) affordance in the context of designing a multi-user VR game for social collaboration and perspective-taking for children with autism. The author explains that VR provides unique affordances that can facilitate social communication and interaction among children with autism, as it creates a virtual space where they can practice social skills and engage in collaborative activities in a safe and controlled environment. The study by Carras et al. (2018) aimed to explore gamers' insights into the phenomenology of normal gaming and game addiction, including the role of affordances in gaming behaviour. Using a mixed-methods approach, the researchers surveyed 630 gamers and conducted 20 in-depth interviews with self-identified addicted gamers. The findings showed that gamers' perceptions of affordances played a significant role in their gaming behaviour.

VR affordance refers to the perceived benefits and capabilities of VR gaming. Hoberman (2013) suggests that VR games have the potential to provide a high level of affordance to the players, leading to an increase in addiction to VR gaming.

Zhai et al. (2021) aimed to explore the significance of desire and motivation in predicting students' virtual reality gaming addiction, using from a cognitive-behavioral angle. The authors suggest that arousal and desire are significant components that support development of VR gaming addiction. The study utilized a sample of 305 students from four different universities in China. The author employed a model of cognition and conduct to explain the mechanism underlying VR gaming addiction. They hypothesized that motivation and desire would mediate the association between VR gaming experience and addiction. The study's findings demonstrated that motivation and desire played a significant role in predicting VR gaming addiction. The paper by Zhai et al. (2020) explores the relationship from a gaming standpoint, the relationship between VR affordability, cognition, and VR addiction. The authors argue that the affordability of VR technology plays a key contribution to determining the accessibility and availability of VR games, which, in turn, may contribute to the development of VR game addiction. They also suggest that cognitive factors, such



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as attitudes and beliefs about VR games, as well as expectations and emotions associated with gaming, may influence the likelihood of addiction.

The paper by Park et al. (2016) aims to investigate the impact of a virtual reality (VR) rehab programme on people who are addicted to online gaming. The study compared the treatment group, which got a six-week VR treatment, using a randomised controlled trial methodology program, with the control group, who received no intervention. The authors hypothesized that the VR treatment program would lead to a decrease in online gaming addiction symptoms. The study found that the VR treatment program led to a significant decrease the seriousness of online gaming addiction symptoms in the treatment contrasted with the control group. Sublette and Mullan (2012) conducted systematic evaluation of the consequences of gaming online, which included the factor of gaming addiction. The authors examined 47 studies to identify the potential effects of online gaming on mental health, physical health, and social functioning. The authors found that online gaming addiction was associated with negative consequences, such as decreased academic performance, decreased physical health, and decreased social functioning. Shin and colleagues (2018) investigated the creation of a virtual environment that can successfully evoke need in young people with Internet gaming disorder (IGD). The authors emphasized that the creation of IGD treatments that work requires a greater comprehension of the neurocognitive mechanisms underlying IGD. Thus, they investigated the neural correlations using functional magnetic resonance imaging (fMRI) of cue-induced craving in IGD participants while they were exposed to a virtual environment.

Zhai et al. (2021) aimed to explore the significance of desire and motivation in predicting students' virtual reality gaming addiction, using a cognitive - behavioural perspective. The authors suggest that arousal and desires are significant factors that contributing to the growth of VR gaming addiction. The authors argue that the affordability of VR technology has a significant impact on determining the accessibility and availability of VR games, which could ultimately result in the development of VR gaming addiction.

3. MODERATING ROLE OF AGE AND GENDER

Blinka and Smahel (2012) emphasised the prevalence of online role-playing game addiction, particularly among teenagers. Additionally, a number of studies have indicated that VR games may be useful in the treatment of gaming addiction (Park et al., 2016). Additionally investigated as moderating factors for gaming addiction are age and gender. According to Zhai et al. (2020), the association between self-efficacy and VR game addiction is moderated by age. According to Aksoy and Erol (2021), women are more likely than men to develop a gaming addiction. Reid (2002) also discovered that VR games helped raise the self-efficacy of kids with cerebral palsy. A VR software was created by Shin et al. (2021) to handle disputes about games with the parents of young adults with internet gaming problem. Saredakis et al. (2020) carried out a systematic study and meta-analysis of the variables linked to VR sickness in head-mounted displays.



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4. OBJECTIVES OF THE STUDY

To investigate the relationship between virtual affordance and virtual gaming addiction and effect of perceived experience excitement on VR affordance among consumers in North-East

Hypothesis

H1: Perceived experience excitement in virtual gaming are associated with higher levels of VR affordance in developing VR gaming addiction.

H2: VR self-efficacy are associated with higher levels of VR affordance in developing VR gaming addiction

H3: VR cognitive satisfaction are associated with higher levels of VR affordance in developing VR gaming addiction

H4: Mood modification are significantly associated with higher levels of VR affordance in developing VR gaming addiction.

H5: conflict has a significant impact on VR affordance in developing of VR gaming addiction.

H6: VR realism are positively associated with higher levels of VR affordance in developing of VR gaming addiction

H7: VR affordance are associated with higher levels of VR gaming addiction

H8: Age significantly affect the relationship between VR affordance and VR gaming addiction.

H9: Gender significantly affects the relationship between VR affordance and gaming addiction.

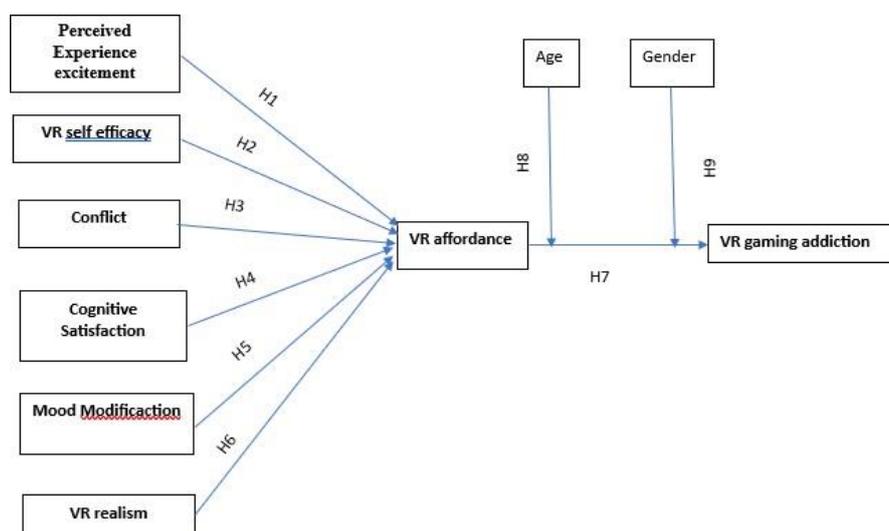


Figure 1: Research Model

1.3. Research Design

For the study of this topic, Descriptive research was done. This type of study is utilized to explain the qualities and phenomenon under investigation. It's one of the three basic research design kinds. It provides answers to the questions of what, where, when, and how the scenario occurred, but not

Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews, 5(2), 182-205.*

why. It is usually carried out when the researcher has some knowledge of the situation. Although qualitative research is also employed for descriptive purposes, it is a quantitative research method that collects measurable information for statistical analysis. In a descriptive study, the variables have no bearing on the outcome. The findings of descriptive research will in the foundation for future research. It usually includes research questions and hypotheses, as well as correct data. Survey research, case study research, and observational research are the three most common data collection methodologies. Survey research method was utilized in the study, which is a well-known data collection strategy in research design. In this method, the researcher creates a set of questions and then asks respondents to answer them. Descriptive research entails a thorough investigation of the study problem, as well as information clarifying the research topic and a high level of detail. However, this type of research is unable to establish a cause-and-effect relationship. It's frequently used in a variety of fields, including nutrition, epidemiology, and behavioral sciences.

1.4. SEM

To analyse the data, structural equation modelling (SEM) is performed. SEM is a statistical technique used to test and develop theoretical models using observed variables. The researcher uses SEM to analyse the relationships involving the dependent and independent variables. The results of the study will be presented in a report that includes the findings of the study, the relationships between the independent and dependent variables, and a explanation of the results' consequences and suggestions for further study.

1.5. Measurement Model

1.6. Demographics

The questionnaire was administered to people living in Guwahati, Tezpur, Silchar, Meghalaya, and Mizoram. Data was gathered from 253 residents. It can be seen that the number of male respondents were 143 and female respondents were 110; thus, 56.5% male and 43.5% female. 129 respondents fall into the age group of 20-25, and 123 respondents are falls into the age group of above 25 and 1 respondents fall into under 20 age group. Thus, 51% falls under 20- 25, 48.6 % falls under above 25 and other 0.4 % in under 20.

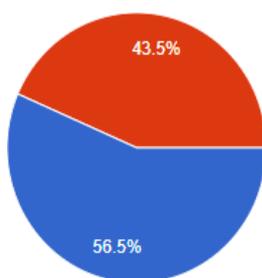
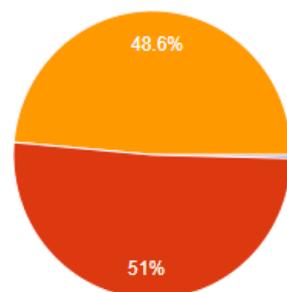


Figure 3: Gender

● Male
● Female



● Under 20
● 20-25
● Above 25

Figure 4: Age



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Measurements and structural models are the two core components of the structural equation modelling (SEM) used in this study. The segment that looks at the relationships between relevant manifest indicators and latent variables relates to the measurement model of the SEM. The validity and reliability of the measuring devices used in a research are determined with the help of these elements being established. Measurement model calculations were used to determine reliability and validity. Here, Average Variance Extracted (AVE) was calculated to confirm the convergence validity of the constructs. Cronbach's alpha values for each construction were higher than the minimum threshold advised by Nunnally (1978). Additionally, Hair et al. (2016) found that the AVE values of the constructs were higher than 0.5, indicating considerable convergent validity. In general, the model showed adequate construct validity and dependability.

The reliability and validity analysis conducted on the constructs used in the study of "Consumers VR gaming addiction towards virtual gaming with the help of virtual reality". The constructs include Virtual Affordance, virtual gaming addiction, Conflict, VR Cognitive satisfaction, Mood Modification, perceived experience excitement, Virtual reality realism, and VR self-efficacy.

Reliability refers to the the consistency of the methods employed to assess the constructs. The study used to verify the internal consistency of the measurements, use Cronbach's alpha, composite reliability (rho_a), and composite reliability (rhoc). The results show that all constructs have the values of Cronbach's alpha, which range from 0.76 to 0.85, indicate acceptable levels of reliability, Between 0.79 and 0.85 for composite reliability (rho a) and 0.86 to 0.91 for composite reliability (rho c). The term "validity" describes how much the measures used in the study assess what they are supposed to measure. The convergent validity of the measurements was examined using outer loading and average variance extracted (AVE). The results show that all constructs have acceptable levels of convergent validity, with between 0.74 and 0.89 for outer loading and 0.67 to 0.77 for AVE

Table 2: Reliability and Validity Test

Construct	Item	Outer Loading	VIF	Cronbach alpha	Composite reliability (rhoc)	Average variance extract (AVE)
Virtual Affordance	VA1	0.887	2.206	0.850	0.909	0.769
	VA2	0.886	2.217			
	VA3	0.859	1.936			
Virtual gaming addiction	VGA1	0.856	1.774	0.760	0.863	0.677
	VGA2	0.748	1.330			
	VGA3	0.861	1.808			
Conflict	CON1	0.863	1.992	0.847	0.907	0.766
	CON2	0.883	2.074			
	CON3	0.879	2.069			
VR Cognitive satisfaction	CS1	0.873	1.810	0.787	0.875	0.701
	CS2	0.830	1.597			



Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews, 5(2), 182-205.*

	CS3	0.807	1.602			
Mood Modification	MM1	0.847	1.660	0.801	0.883	0.715
	MM2	0.829	1.687			
	MM3	0.860	1.884			
Perceived experience excitement	PEX1	0.878	2.714	0.816	0.891	0.732
	PEX2	0.816	1.554			
	PEX3	0.871	2.039			
Virtual reality realism	VRR1	0.872	1.924	0.786	0.876	0.701
	VRR2	0.808	1.503			
	VRR3	0.831	1.704			
VR self-efficacy	VSE1	0.846	1.785	0.800	0.882	0.714
	VSE2	0.856	1.674			
	VSE3	0.832	1.688			

1.6. Discriminant validity

The table displays a matrix of correlations between several variables connected to virtual reality gaming addiction among customers. The values in the table indicate the Pearson correlation coefficient, which has a range of -1 to +1, and the variables are grouped in rows and columns in the table. The table's diagonal values, which always equal 1, show the correlation between the same variable. The values that are not diagonal show the correlation between two variables, the first of which is in the row and the second of which is in the column. The table reveals a significant positive correlation between virtual affordance ($r = 0.742$), conflict ($r = 0.764$), cognitive satisfaction ($r = 0.837$), mood modification ($r = 0.852$), perceived experience excitement ($r = 0.796$), virtual reality realism ($r = 0.792$), and VR self-efficacy ($r = 0.836$) as well as addiction to virtual gaming. According to the table, virtual affordance, conflict, cognitive satisfaction, mood alteration, perceived experience excitement, virtual reality realism, and VR self-efficacy are all connected to an addiction to virtual gaming. These findings may be useful to game designers and developers in determining the causes of gaming addiction and in formulating management or prevention plans.

Table 3: Discriminant validity (HTMT Criterion)

	Virtual affordance	Virtual gaming addiction	Conflict	Cognitive satisfaction	Mood Modification	Perceived Experience excitement	Virtual reality realism	VR self-efficacy
Virtual affordance								
Virtual gaming addiction	0.742							
Conflict	0.764	0.900						



Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews*, 5(2), 182-205.

Cognitive satisfaction	0.837	0.893	0.695					
Mood Modification	0.852	0.864	0.811	0.842				
Perceived Experience excitement	0.796	0.630	0.616	0.690	0.672			
Virtual reality realism	0.753	0.792	0.543	0.857	0.756	0.655		
Virtual self-efficacy	0.836	0.679	0.670	0.804	0.807	0.771	0.619	

1.7. Discriminant Validity (Furnell-Larcker criterion) :

The discriminant validity matrix (Furnell-Larcker criterion) shown here illustrates the relationships between many constructs connected to consumer gaming addiction towards virtual gaming with the use of virtual reality. The AVE for the entire model is shown by the number 0.845 in the matrix's lower right corner. For appropriate convergent validity, the AVE should be above 0.5. By examining the matrix, we can observe that all of the constructs have square root AVE values that are higher than their correlations with other constructs, which suggests that they are valid as discriminants. Virtual affordance and virtual gaming addiction have the highest correlation coefficient ($r = 0.877$), indicating a close connection between these concepts. The high correlation of 0.875 between conflict and cognitive satisfaction also shows that there is a significant relationship between these two domains. Conflict ($r = 0.720$), cognitive satisfaction ($r = 0.686$), and mood modification ($r = 0.673$) all have somewhat strong correlations with virtual gaming addiction, suggesting that these categories are linked to gaming addiction. The connections between perceived experience excitement and virtual reality realism and addiction to virtual gaming are somewhat smaller ($r = 0.495$ and $r = 0.529$, respectively), suggesting that these two dimensions may not be as strongly associated to addiction as the others.

Table 4: Discriminant validity (Furnell Larcker Criterion)

	Virtual affordance	Virtual gaming Addiction	Conflict	Cognitive Satisfaction	Mood Modification	Perceived Experience Excitement	Virtual Reality realism	Virtual Self-Efficacy
Virtual affordance	0.877							
Virtual gaming Addiction	0.597	0.823						



Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews*, 5(2), 182-205.

Conflict	0.649	0.720	0.875					
Cognitive Satisfaction	0.688	0.686	0.570	0.837				
Mood Modification	0.705	0.673	0.675	0.672	0.846			
Perceived Experience Excitement	0.666	0.495	0.514	0.556	0.544	0.856		
Virtual Reality realism	0.617	0.612	0.446	0.669	0.599	0.525	0.838	
Virtual Self Efficacy	0.694	0.529	0.556	0.642	0.647	0.626	0.491	0.845

1.8. Predictive Relevance using R square and coefficient of determination:

Table 6: Assessment of predictive relevance and coefficient of determination

	R Square	Q Square
Virtual Affordance	0.691	0.657
Virtual Gaming Addiction	0.357	0.497

The term "virtual affordability" describes how much virtual reality technology allows players to explore, immerse themselves in, and participate inside a virtual gaming environment. The second column, "Virtual Gaming Addiction," assesses how addicted users are to utilising virtual reality technology to play virtual games. R Square is the percentage of the variation in virtual affordance that can be accounted for by the variation in virtual addiction. Virtual affordance in this instance has a R Square value of 0.691, meaning it explains 69.1% of the variation in virtual gaming addiction. The percentage of the variance in virtual affordance that can be anticipated by the variance in virtual addiction is shown by the symbol Q Square. Virtual affordance in this instance has a Q Square value of 0.657, which shows that it can predict 65.7% of the variation in virtual gaming addiction. The level of consumer addiction to playing virtual games with virtual reality technology is referred to as virtual gaming addiction. The percentage of the variance in virtual gaming addiction that can be explained by that variance is shown in the third column, "R Square." Virtual gaming addiction in this

Instance has a R Square value of 0.357, which means that it explains 35.7% of the variation in virtual gaming addiction. The percentage of the variance in virtual gaming addiction that can be anticipated by the variance in virtual game addiction is shown by the symbol Q Square. Virtual gaming addiction in this instance has a Q Square value of 0.497, which means that it can predict 49.7% of the variation in virtual game addiction.



Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews, 5(2), 182-205.*

2.0. Model Fitness

Table 7: Model Fitness

	Saturated Model	Estimated Model
SRMR	0.060	0.092

The difference between the correlations between variables that are actually observed and those that are predicted by the model is measured by the SRMR (Standardised Root Mean Square Residual). The model fits the data more well the lower the SRMR value. According to the table, the saturated model has a better fit than the estimated model, with an SRMR value of 0.060 as opposed to 0.092 for the estimated model. This shows that the saturation model may provide a more realistic understanding of the relationship between consumer gaming addiction and virtual gaming with the aid of virtual reality and may be a better depiction of the data.

2.1. Moderation Effect

Regression Weights: (Moderation Analysis Andrew F. Hayes)

Table 8: Moderation Analysis

			Estimate(Beta)	S.E.	C.R.	LLCI	ULCI	CI	Support
VGA	<---VA		0.536	0.068	7.925	.4	.81	***	Yes
VGA	<---int1		0.021	0.023	0.879	-1.66	-0.51	0.379	No
VGA	<---int2		0.024	0.024	1.019	.032	.166	0.308	No

Int1 <- Interaction of Age with Virtual Affordance, Int2 <- Interaction of Gender with Virtual Affordance. 0.379 <- A crucial ratio with an absolute value of 0.879 has a.379 chance of occurring. In other words, at the 0.05 level (two-tailed), the regression weight for interaction of age with virtual affordance in the virtual gaming addiction prediction is not substantially different from zero. 0.308 <- A crucial ratio with an absolute value of 1.019 has a.308 chance of occurring. In other words, at the 0.05 level (two-tailed), the regression weight for interaction of Gender with virtual affordance in the virtual gaming addiction prediction is not substantially different from zero. So we can conclude that Age and Gender does not play any moderating affect between VR affordance and VR gaming addiction.

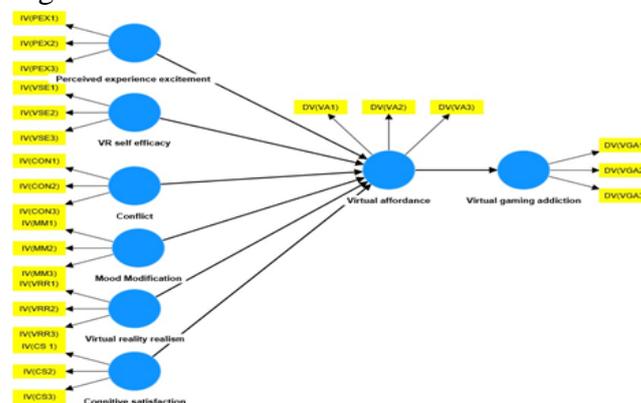


Figure 5: Research model by PLS-SEM



Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews*, 5(2), 182-205.

5. DISCUSSIONS

With the aid of virtual reality, gaming addiction towards virtual games has become a major worry. This study looked at various factors, including conflict, VR cognitive satisfaction, mood modification, perceived experience excitement, virtual reality realism, and VR self-efficacy, with the goal of determining how virtual affordances affect virtual gaming addiction. The findings demonstrated that virtual affordance had a favourable impact on virtual gaming addiction ($\beta = 0.492$, $p < 0.001$) Virtual affordance was also favourably influenced by VR self-efficacy ($\beta = 0.199$, $p = 0.03$), perceived experience excitement ($\beta = 0.209$, $p = 0.001$), conflict ($\beta = 0.178$, $p = 0.03$), mood modification ($\beta = 0.166$, $p = 0.028$), and virtual reality realism ($\beta = 0.137$, $p = 0.047$). Virtual affordance was not significantly influenced by VR cognitive satisfaction, according to the study ($\beta = 0.139$, $p = 0.068$). The results suggest that people who experience virtual affordance in virtual gaming may become more prone to gaming addiction because they would find it challenging to step away from the experience. Additionally, people who sense virtual affordance in virtual gaming more strongly may have high levels of VR self-efficacy, reported experience enthusiasm, and realism. These results are in line with earlier research (Reid, 2002; Lu & Lien, 2020), which emphasises the importance of self-efficacy in gaming behaviour.

➤ Theoretical Implication:

The study's findings have a number of theoretical implications for research on consumers' virtual gaming addictions supported by virtual reality. The study emphasises the significance of virtual affordance in virtual gaming addiction in the first place. The term "virtual affordance" describes how beneficial and simple virtual reality gaming technology is thought to be. The study discovered a link between virtual affordance and virtual gaming addiction, indicating that users are more likely to become addicted to virtual reality gaming if they believe it to be helpful and simple to use. Future research should focus on determining the variables that affect virtual affordance and how they relate to virtual gaming addiction, according to this conclusion. The study also discovered that perceived experience excitement significantly influences virtual affordance. This result shows that customers who think virtual gaming is more thrilling are more likely to think virtual reality technology is more practical and simple to use, increasing the danger of developing a dependence on it. Future research should therefore look into the elements that affect reported experience excitement and how it impacts virtual affordance and gaming addiction. From this study it is possible to know that age and gender provides the insignificant affect between VR affordance and VR gaming addiction. Conflict, cognitive satisfaction, mood modification, virtual reality realism, and virtual self-efficacy are among the characteristics connected to virtual gaming addiction that were discovered by the study. These results imply that virtual game addiction is a complicated phenomenon driven by a variety of variables. Future research should therefore look into how some other variables interact to affect the addiction to virtual gaming.

In conclusion, the study provides a number of theoretical ramifications for research on consumers' virtual gaming addiction using virtual reality. The results emphasise the significance of perceived



Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews*, 5(2), 182-205.

experience excitement and virtual affordance in virtual gaming addiction and offer a set of metrics for evaluating the validity and reliability of notions. To gain a more thorough understanding of virtual game addiction and its underlying causes, future research should expand on these findings.

➤ **Practical Implication**

There are various practical implications for dealing with this issue based on the study by Zhai et al. (2020), which used structural equation modelling to explore the impact of virtual reality (VR) gaming addiction on students. The study discovered that the perceived advantages and opportunities offered by VR technology, or VR affordance, is a strong predictor of VR gaming addiction. Additionally, the study discovered that while VR cognitive satisfaction is not connected to Virtual affordance, conflict and mood modification are. It's critical to concentrate on lowering students' perceptions of virtual affordance in order to solve the problem of VR gaming addiction. This can be accomplished by drawing attention to the possible drawbacks of excessive VR gaming, including physical health issues, social isolation, and poor academic performance.

Finally, the study discovered that reported experience excitement, virtual reality realism, and conflict are associated to addiction to VR gaming, suggesting that addressing these characteristics may help avoid VR gaming addiction. This study's overall findings emphasise the necessity for thorough interventions that address the various causes of VR gaming addiction.

6. CONCLUSION

The study examined the relationship between consumers' gaming addiction towards virtual gaming with the help of virtual reality and various constructs like virtual affordance, conflict, VR cognitive satisfaction, mood modification, perceived experience excitement, virtual reality realism, VR self-efficacy. The study found that virtual affordance, conflict, mood modification, VR self-efficacy, virtual reality realism, and perceived experience excitement had a significantly positive impact on virtual gaming addiction. The outcomes also showed that the virtual affordance construct had the highest impact on virtual gaming addiction, followed by perceived experience excitement, mood modification, VR self-efficacy, virtual reality realism, and conflict.

7. LIMITATION

Despite the study's contributions, It has some restrictions that need be addressed in follow-up studies. First, In this investigation, a sample size of was relatively small, and the sample was limited to a specific geographic region. Consequently, to improve the generalizability of the results, future study should take into account using a bigger sample size from other geographic regions. Second, the investigation was limited to the impact of virtual affordance, conflict, VR cognitive satisfaction, mood modification, perceived experience excitement, virtual reality realism, and VR self-efficacy on virtual gaming addiction. Future research should consider other factors, such as personality traits and social factors, to enhance the understanding of the phenomenon.

8. AUTHOR(S) CONTRIBUTION

The writers affirm that they have no connections to, or engagement with, any group or body



Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews*, 5(2), 182-205.

That provides financial or non-financial assistance for the topics or resources covered in this Manuscript.

9. CONFLICTS OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, And/or publication of this article.

10. PLAGIARISM POLICY

All authors declare that any kind of violation of plagiarism, copyright and ethical matters will\ Take care by all authors. Journal and editors are not liable for aforesaid matters.

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Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India*, *International Journal of Multidisciplinary Research & Reviews*, 5(2), 182-205.

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Srinivas Rao K, Sunil Kumar Pradhan, Tushar Rajan Sahoo, Yadav Devi Prasad Behera, (2026). *Exploring the Psychological Impact of Virtual Reality Games on Gen Z: A Study with Reference to the North Eastern Region of India, International Journal of Multidisciplinary Research & Reviews*, 5(2), 182-205.

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