Proceedings of ICBioMed 2026 Symposium: Biomedical Engineering and Smart Medicine
DOI: 10.54254/2753-8818/2026.HZ35047

A Comprehensive Review of Video Game Addiction: Sociological, Psychological, and Neurobiological Perspectives

Yu Zhou

College of Science, Xi'an Jiaotong-Liverpool University, Suzhou, China
Yu.Zhou2302@student.xjtlu.edu.cn

Abstract. Video game addiction (VGA), frequently conceptualized as Internet Gaming Disorder (IGD), has gained recognition as a growing clinical and public health concern. This review integrates findings from sociology, psychology, epidemiology, neurobiology, and genetics to provide a broad understanding of VGA. Sociological evidence highlights the influence of family stability, school connectedness, and peer groups, while psychological research emphasizes mechanisms such as low self-esteem, escapism, and personality traits. Epidemiological studies suggest a global prevalence of around 5%, with adolescents and males particularly at risk. Neurobiological investigations reveal similarities with substance addictions, including dopaminergic dysregulation, changes in prefrontal–striatal connectivity, and alterations in brain structure. Genetic findings suggest that polymorphisms in stress-regulation pathways may contribute to vulnerability. Treatment efforts focus on cognitive-behavioral therapy (CBT), motivational interviewing, and family-based interventions, though evidence for pharmacological options remains limited. Together, these insights confirm that VGA is a multidimensional condition that requires interdisciplinary approaches to prevention and treatment.

Keywords: Video game addiction, Internet gaming disorder, Epidemiology, Neurobiology, Treatment

1. Introduction

Video gaming has become a mainstream cultural activity, with global participation surpassing 3 billion players. The industry has rapidly expanded through mobile technology, online multiplayer formats, and immersive environments, reshaping leisure and social interaction worldwide. Although gaming can support cognitive growth, coordination, and social bonding, evidence shows that excessive use can lead to maladaptive consequences. These include academic difficulties, interpersonal problems, and emotional distress [1].

Clinical recognition of problematic gaming has advanced in recent years. The DSM-5 classified Internet Gaming Disorder (IGD) as a condition warranting further investigation, while the ICD-11. recognized Gaming Disorder as a diagnosable mental health issue. These classifications reflect an increasing consensus that compulsive gaming behaviors resemble substance-related addictions in both symptoms and neurobiological underpinnings.

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2753-8818/2026.HZ35047

Given its multifactorial origins, VGA must be considered from a wide range of perspectives. This review synthesizes sociological, psychological, epidemiological, neurobiological, genetic, and treatment evidence to present a comprehensive account of VGA.

2. Sociological factors of VGA

Social environments strongly shape vulnerability to VGA, particularly during adolescence, when peer pressure and family dynamics are especially influential. Parenting practices and household structure play critical roles. Supportive parental monitoring and warm communication reduce risks, whereas inconsistent discipline, family conflict, or low cohesion heighten susceptibility [2]. In some families, adolescents turn to gaming to escape stress or unmet emotional needs.

School Setting. Schools can provide a protective environment through academic engagement and strong student–teacher relationships. By contrast, dissatisfaction with school life, poor academic performance, or weak integration into peer groups are associated with heavier reliance on gaming for validation and belonging [3].

Peer Groups. Online and offline peer networks often reinforce gaming. Adolescents often feel pressured to participate in gaming sessions to maintain social inclusion. Recognition in virtual communities—through rankings, achievements, or collaboration—strengthens reinforcement of play [4].

Cultural and Gender Differences. Cross-cultural research indicates higher VGA prevalence in East Asia, where intense academic expectations and digital saturation increase risks. Gender differences are consistent, with boys more prone to excessive gaming, often due to stronger preferences for competitive or immersive genres [2].

In sum, VGA arises not merely from individual predispositions but from interactions with family, school, peers, and cultural context.

3. Psychological factors of VGA

Psychological mechanisms explain how individuals transition from casual play to compulsive use.

Flow and Time Distortion. Many games are designed to foster "low," a state of complete immersion. Flow promotes enjoyment but can distort time perception, resulting in longer sessions and neglected responsibilities. Hull et al. found that altered time perception during play is a strong predictor of problematic gaming.

Escapism and Coping Strategies. Gaming often serves as a tool for emotional regulation. While it may temporarily relieve stress or sadness, reliance on escapism fosters avoidance coping and increases risk for addiction [5].

Personality and Traits. Certain traits such as impulsivity, neuroticism, and low conscientiousness are linked to greater vulnerability. These tendencies may reduce an individual's ability to regulate impulses or disengage from rewarding stimuli [6].

Psychiatric Comorbidities. VGA is frequently accompanied by conditions like depression, anxiety, or ADHD. These comorbidities interact bidirectionally: psychological distress promotes excessive gaming, and excessive gaming, in turn, worsens distress [7].

Cognitive Biases. Distortions such as overestimating control, minimizing negative consequences, and focusing on gaming-related cues sustain addictive patterns. Taken together, VGA is maintained by a combination of immersion, coping deficits, personality risk factors, and comorbid mental health conditions.

DOI: 10.54254/2753-8818/2026.HZ35047

4. Epidemiology of VGA

Prevalence rates vary widely due to diferences in methodology, diagnostic definitions, and cultural contexts.

Prevalence Estimates. Global rates range from under 1% to above 25% depending on assessment criteria [8]. A recent meta-analysis calculated an average prevalence of around 5%, indicating that while most players do not meet criteria, a significant minority is at risk [9]. Notably, Table 1 in Limone et al. demonstrates how prevalence rates difer across continents, with Asia showing substantially higher rates than Europe or North America.

Demographic Patterns. Adolescents and young adults show the highest prevalence, with men generally more afected than women. Younger players are particularly vulnerable due to developmental immaturity in impulse control [9]. Cultural Variability. East Asian countries, including South Korea and China, consistently report higher rates. This trend is often linked to academic pressures and widespread internet cafés, which facilitate prolonged play [2]. Risk Factors. Factors such as long daily playtime, preference for multiplayer online games, poor sleep, and elevated stress are consistently associated with greater risk. Longitudinal studies further show that problematic gaming behaviors in early adolescence predict addiction later in development [2]. Epidemiological data reinforce the need for early screening and targeted prevention strategies in vulnerable groups.

5. Neurobiological causes of VGA

Neuroscientific findings increasingly suggest that VGA shares biological pathways with substance addictions. Reward Processing. Gaming activates dopaminergic pathways in the mesolimbic system, particularly the ventral striatum, producing reinforcement efects similar to drugs of abuse [9]. A schematic model of these disrupted mechanisms is illustrated in Figure 1 of Weinstein and Lejoyeux, which summarizes the dopaminergic pathways and prefrontal control deficits underlying Internet Gaming Disorder.

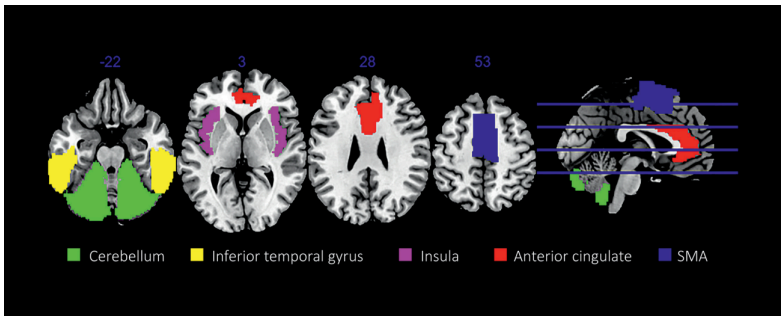

Figure 1. Executive control

Functional impairments in the prefrontal cortex reduce inhibitory control and decision-making capacity (Figure 1). These deficits make it difficult for individuals to disengage from play despite harmful consequences [2]. Emotion Regulation. Abnormal activity in the amygdala and anterior cingulate cortex has been associated with difficulties in managing stress and negative emotions, fostering compulsive gaming as a maladaptive coping strategy [9]. Cognitive Function. Research indicates impairments in working memory and attentional control among those with VGA, suggesting weakened capacity to resist gaming-related cues [2]. llustrative Framework.

DOI: 10.54254/2753-8818/2026.HZ35047

Figure 1 in Weinstein and Lejoyeux provides a schematic representation of these processes, showing disrupted prefrontal–striatal connectivity and heightened dopamine reactivity as core mechanisms.

6. Neurotransmitters and neural pathways

Multiple neurotransmitter systems appear involved in VGA.

Dopamine. Gaming produces dopamine surges in the ventral striatum, reinforcing prolonged engagement [7]. This dopaminergic response parallels that seen with substance use [9]. Serotonin and Glutamate. Dysregulation of serotonergic function may contribute to mood instability and impulsivity, while glutamatergic pathways are implicated in learning and habit formation. Prefrontal-Striatal Circuits. Functional disconnection between prefrontal control regions and striatal reward areas underlies compulsive play. These disrupted circuits reduce the ability to prioritize long-term goals over immediate gratification [2].

7. Changes in brain structure and function

Structural and functional imaging provides additional support for the classification of VGA as an addictive disorder.

Gray and White Matter. Reductions in gray matter volume and white matter integrity have been observed in regions supporting executive control and cognitive regulation [9].

Functional Connectivity. Resting-state studies reveal weakened connections between prefrontal and striatal regions, impairing the ability to suppress cravings [2].

Developmental Impact. Adolescents with heavy gaming exposure show cortical thinning, potentially relecting premature maturation or loss of plasticity [9].

These structural findings highlight the neurological costs of prolonged gaming, particularly in younger populations.

8. Genetics of VGA

Genetic contributions to VGA are emerging but still limited in scope. Park et al. reported an association between Internet gaming addiction and polymorphisms in the corticotropin- releasing hormone receptor 1 (CRHR1) gene in Korean adolescents. As CRHR1 inluences the HPA axis, these results suggest a link between stress regulation and addiction risk. Additional studies have examined dopamine transporter and receptor genes, though findings remain inconsistent. The available evidence points toward gene–environment interactions, where biological predispositions may magnify the impact of sociocultural stressors.

9. Intervention and treatment

Interventions for VGA draw on models of both behavioral and substance addictions. Cognitive-Behavioral Therapy (CBT). CBT addresses maladaptive thoughts and behaviors, improves impulse control, and encourages alternative coping strategies. Evidence suggests it can significantly reduce gaming time and distress [1]. Motivational Interviewing. This technique helps individuals resolve ambivalence toward reducing gaming and supports the development of intrinsic motivation for change. Family-Based Approaches. Family therapy targets communication patterns and strengthens parental monitoring, especially beneficial for adolescents. Pharmacological Trials. Early evidence suggests that SSRIs and bupropion may reduce gaming symptoms by alleviating mood disturbances,

DOI: 10.54254/2753-8818/2026.HZ35047

though large-scale trials are lacking [7]. Prevention. Preventive measures include digital literacy programs, public awareness campaigns, and school-based monitoring. Given the high vulnerability of adolescents, prevention is critical alongside treatment.

10. Discussion

While significant progress has been made, several challenges remain.

Conceptual Ambiguity. Diagnostic boundaries for VGA are still debated, leading to inconsistent prevalence estimates across studies [6]. Methodological Issues. Reliance on self-report surveys and cross-sectional designs limits causal inference. More longitudinal and experimental research is needed. Cultural Generalizability. Much neurobiological and genetic research has been conducted in East Asia. Broader cross-cultural studies would clarify the universality of findings. Future Directions. Integrating social, psychological, and neurobiological frameworks could yield more efective treatment strategies. Additionally, more work is needed to identify protective factors, such as resilience and supportive peer environments.

11. Conclusion

Video game addiction emerges from an interplay of sociological, psychological, and neurobiological inluences. Family dynamics, peer interactions, and cultural contexts create fertile ground for vulnerability. Psychological processes such as immersion, escapism, and comorbid conditions interact with alterations in neural reward and control pathways. Genetic predispositions further increase risk, though environmental stressors remain central triggers. Treatment strategies, particularly CBT and motivational interviewing, show promise, but prevention remains essential in protecting at-risk populations. As gaming becomes increasingly embedded in daily life, interdisciplinary collaboration will be critical for balancing the benefits of gaming with the risks of addiction.

References

[1] Griffiths, M. D., & Meredith, A. (2009). Videogame addiction and its treatment. Journal of Contemporary Psychotherapy, 39(4), 247–253. https: //doi.org/10.1007/s10879-009-9118-4

[2] Rehbein, F., & Baier, D. (2013). Family-, media-, and school-related risk factors of video game addiction: A 5-year longitudinal study. Journal of Media Psychology, 25(3), 118–128. https: //doi.org/10.1027/1864-1105/a000093

[3] Jin, Y., Qin, L., Zhang, H., & Zhang, R. (2021). Social factors associated with video game addiction among teenagers: School, family and peers. In Proceedings of the 4th International Conference on Humanities Education and Social Sciences (ICHESS 2021) (pp. 763–770). Atlantis Press. https: //doi.org/10.2991/assehr.k.211220.131

[4] Kuss, D. J., Pontes, H. M., & Griffiths, M. D. (2018). Neurobiological correlates in Internet gaming disorder: A systematic literature review. Frontiers in Psychiatry, 9, 166. https: //doi.org/10.3389/fpsyt.2018.00166

[5] Mohammad, S., Jan, R. A., & Alsaedi, S. L. (2023). Symptoms, mechanisms, and treatments of video game addiction. Cureus, 15(3), e36957. https: //doi.org/10.7759/cureus.36957

[6] Sussman, C. J., Harper, J. M., Stahl, J. L., & Weigle, P. (2017). Internet and video game addictions: Diagnosis, epidemiology, and neurobiology. Child and Adolescent Psychiatric Clinics of North America, 26(2), 307–326. https: //doi.org/10.1016/j.chc.2017.11.015

[7] Park, J., Sung, J. Y., Kim, D. K., Kong, I. D., Hughes, T. L., & Kim, N. (2018). Genetic association of human corticotropin-releasing hormone receptor 1 (CRHR1) with Internet gaming addiction in Korean male adolescents. BMC Psychiatry, 18, 396. https: //doi.org/10.1186/s12888-018-1974-6

[8] Limone, P., Ragni, B., & Toto, G. A. (2023). The epidemiology and efects of video game addiction: A systematic review and meta-analysis. Acta Psychologica, 241, 104047. https: //doi.org/10.1016/j.actpsy.2023.104047

[9] Weinstein, A., & Lejoyeux, M. (2020). Neurobiological mechanisms underlying internet gaming disorder. Dialogues in Clinical Neuroscience, 22(2), 113–126. https: //doi.org/10.31887/DCNS.2020.22.2/aweinstein