

A Narrative Review on the Mechanisms of Video Games Affecting Minors' Mental Health

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Abstract: The minors' engagement with video games has become a global phenomenon. Meanwhile, in relevant research and psychological health interventions, the impact of video games on minors' mental health has been confirmed to exist, and the impact is significant for their development. Based on existing findings, this study will analyze the mechanisms through which gaming behavior affects adolescents' mental health. From the perspective of how the impacts on the minors present, the articles that author reviewed can be categorized into three main themes regarding the mechanisms of affects: Mechanisms of Negative Impacts, Protective and Mitigating Factors, and Cultural and Demographic Variations. The study shows that video gaming's impact on adolescent mental health is shaped by intricate interactions between individual behaviors, social contexts, and cultural influences. Emotional dysregulation and social withdrawal resulting from Internet Gaming Disorder (IGD) can lead to significant risks. Appropriately designed gaming interventions can promote the minors' mental health, enhancing emotional regulation and cognitive abilities.

Keywords: Mental health, Children, Adolescents, Minors, Video games

1. Introduction

The audience for video games is expanding, with an increasing number of people, including minors, participating. According to statistics, U.S. girls aged 13 to 17 spend an average of 2 hours and 55 minutes per school day playing video games on portable devices, while boys spend slightly more time—3 hours per day doing the same. Simultaneously, system and service designers are working to harness the motivational aspects of games and apply them to create similar engagement in other domains.[1] The involvement of minors in video games has become a global issue, prompting a range of regulatory responses. China, for example, has implemented strict time limits for minors' gaming, while South Korea has abolished its "Cinderella law", [2] which put strict limitations on the minors' video gaming.

During minors' development, mental health is a key factor in determining whether they grow up in a healthy environment. Mental health issues in children and adolescents can have significant effects on their overall growth and future development. Therefore, it is crucial to analyze the specific mechanisms through which gaming behavior influences adolescents' mental health and to consider how gaming can be used as a tool for mental health interventions. Current research on the impact of gaming behavior on minors' mental health has yielded valuable insights. Some studies focus on specific gaming behaviors, while others examine the impact of video game features on adolescents.

Additionally, numerous experiments are being conducted under specific societal contexts, such as the research on the rehabilitation of war trauma in Ukrainian children through gaming programs.[3] As video game expands and the market continues to grow, research in the gaming field is becoming increasingly specialized, with more areas being explored.

To better understand the current state of research on the use of video games and the mental health of adolescents, documentary research method is employed in the research. To ensure the timeliness and relevance of the study, only data from the last three years (2022 - 2024) were included, resulting in 278 articles. Aiming to identify which characteristics of minors' gaming behavior impact their mental health, the research must focus on specific mechanisms or influencing factors on the minors' gaming. This study will provide a reference for future mental health study by revealing the causal relationship between gaming behavior and mental health outcomes.

2. Study Character

From a regional distribution perspective, the studies selected for this research include cross-national and cross-regional comparative studies as well as studies focused on specific regions such as China, India, the United States, and Japan. Collectively, these studies reflect a global and cross-cultural trend. Based on different research methodologies, these studies can be categorized into two main types. The first type involves statistical analysis of minors' gaming behavior and mental health using social research or survey data. The second type involves constructing specific gaming environments to conduct psychological interventions for minors, testing the feasibility of these interventions and their underlying theories. Both methods share a common focus on identifying factors that are more likely to influence the mental health of minors.

The influencing factors emphasized in these twenty studies can be broadly classified into three categories. The first category includes gaming behaviors beneficial to minors' mental health, sometimes involving specially designed video game interventions. The second category consists of gaming behaviors detrimental to minors' mental health, with particular emphasis on game disorder. The third category encompasses gaming behaviors that have neither clear advantages nor disadvantages but influence adolescents' psychological patterns under specific gaming conditions, such as differences in gaming behavior and psychological patterns among minors from different cultural backgrounds. From the perspective of impact effects, this classification aligns with the classification of influencing factors and can also be divided into positive impacts, negative impacts, and neutral psychological patterns. This research aims to explain the mechanisms through which gaming behavior affects minors' mental health, based on the outcomes of these influences.

3. Factors of the Effect of Gaming on Mental Health

3.1. Mechanisms of Negative Impacts

Minors may develop mental disorders such as anxiety, depression, low mood, and even trauma from problematic gaming behavior. Emotional dysregulation is strongly associated with problematic gaming, characterized by heightened emotional symptoms like anxiety and depression. Adolescents using games for escapism often exhibit more severe emotional difficulties.[4] Violent gaming content worsens these issues by promoting impulsive behavior and aggression.[5] Severe problematic gaming among minors may lead to Internet Gaming Disorder (IGD). Five of the twenty studies confirmed the adverse effects of IGD. A positive correlation was evident between IGD, anxiety, and depression.[6] In Malaysia, minors with IGD are nine times more likely to experience severe stress compared to others.[7] These adverse psychological states caused by IGD may further lead to higher levels of social withdrawal, bullying behavior, and experiences of being bullied, all of which are associated with increased suicide risk.[8] Problematic gaming behavior may also be linked to past psychological

trauma. Adolescents exposed to four or more adverse childhood experiences (ACEs) had 3.1 times higher odds of problematic video game use and 1.6 times higher odds of problematic mobile phone use compared to peers with no ACEs.[9]

The impact of negative gaming behavior on minors' social development is significant in their psychological growth. IGD is notably associated with adolescents' relationships with family and friends. This is also related to the gaming devices and gaming modes used by minors. In Madrid, many minors reduced social interactions due to using convenient devices like mobile phones and spending significant time on single-player games, negatively affecting their social perceptions. High-risk gamers often show increased suicide risks and reduced social engagement.[10] This trend varies among different genders. Gaming problems are associated with increased risk of non-suicidal self-harm and suicidal ideation among females. Among males, no differences were observed between engaged, problem and addicted gamers.[11] Multi-players games are pointed out to affect the mental health of minors from the perspective of their social functions. While multiplayer games may foster connectivity, they can also contribute to social withdrawal and dependency in adolescents susceptible to IGD. Children who were multi-players had a higher proportion of online risk such as mobile gaming addiction and exposure to mobile violence/pornography and cyber aggression/victimization compared with single-players and non-players.[12]

Minors' cognitive levels and psychological regulation abilities may be impaired by negative gaming behavior. There is a significant negative correlation between game addiction and self-control, and a significant positive correlation with narcissism. Narcissism, serving as a mediator, enhances adolescents' aggression through its positive correlation with youth aggression.[13] The type of game plays a critical role in cognitive outcomes. Loot boxes in online games can function like gambling, causing adolescents to become addicted. Researchers found that teens who played the game EmpowerED had more positive beliefs and attitudes after the intervention than teens who didn't play the game[14] while the intervention was going on.

3.2. Protective and Mitigating Factors

Video games can regulate minors' mental health through specific gaming behaviors or scenarios, which have been widely applied in interventions for minors' mental health. Generally, gaming behavior offers minors an escape from negative emotions and events, improving depression, anxiety, and other psychological symptoms in the short term. However, long-term use may lead to dependency, exacerbating psychological issues.[15] Casual puzzle games play a significant role. Casual games with mental health content have shown promise for therapeutic effects.[16] Playing casual puzzle games (e.g., Bejeweled 3) for 30 minutes, three times a week, effectively reduces short-term stress, anxiety, and depression.[17] In mental health interventions for Lebanese refugee adolescents, the serious game "Hand in Hand" taught healthy coping strategies through blended learning, significantly reducing anxiety and depression while enhancing overall well-being.[18]

Video games can also improve minors' mental health by enhancing cognitive levels. From an educational tool perspective, the serious game GamEmotion designed different levels based on six emotions—joy, sadness, fear, anger, surprise, and disgust—to teach adolescents how to perceive and regulate emotions through immersive experiences.[19] Direct intervention studies, such as those involving 72 children at a community summer camp using the heart rate biofeedback-based game Mightier, showed significantly improved emotional regulation and reduced emotional dysregulation after six weeks.[20] The game empowerED, designed to enhance adolescents' cognitive reappraisal, led to higher reported levels of positive beliefs and attitudes among students after the intervention compared to those without the intervention.

3.3. Cultural and Demographic Variations

Gaming's impact on mental health varies across cultures and demographics, often manifesting through differences in gaming behavior. Regional cultural characteristics or norms greatly influence how video games affect minors' mental health. Cultural gaming norms (i.e., the percentage of gamers per country) influence the strength of the relationship between problematic gaming and adolescents' well-being. Problematic gaming prevalence among school-aged children is 16.1% in Azerbaijan but only 4.3% in the Netherlands. Interestingly, Azerbaijan reported the lowest gaming intensity, while the Netherlands and England reported the highest. However, national backgrounds did not show a clear impact on the relationship between problematic gaming and minors' mental health.[21]

Gender differences also play a role. In Madrid, male minors comprise the majority of video game users, approximately twice that of females, and report higher IGD levels and more withdrawal symptoms and substance use disorder symptoms.[22] Grade level differences also affect how gaming behavior impacts minors. Violent video game exposure influences deviant peer affiliation, leading to internalization problems (e.g., depression, anxiety) in elementary students and externalization problems (e.g., emotional instability, irritability) in middle school students.

4. Discussion

Based on the content of these studies, gaming's impact on mental health reflects a balance between positive and negative outcomes, often influenced by the type of game and usage patterns. Through researches on these impacts, we can summarize the mechanisms that lead to such effects. Recent studies have emphasized or updated the following mechanisms.

The impact of video game addiction on the mental health of minors is a significant concern. The general problematic gaming behaviors of adolescents may manifest as excessive time spent on video games, addiction, and similar behaviors, which, when severe enough, can lead to a disorder—specifically, gaming disorder (IGD). IGD has been a key focus in academia over the past three years, typically caused by excessive gaming. IGD may be related to various psychological issues, including anxiety, depression, aggression, narcissistic tendencies, excessive psychological stress, suicidal tendencies, and social withdrawal. The prevalence of IGD is closely linked to the prevalence of these mental health issues. Several factors may contribute to or exacerbate the symptoms of IGD, including adverse childhood experiences, gender, game type, gaming devices, parental influence, school environment, national culture, and escapism, as well as mental health problems such as high psychological stress. From a research perspective, IGD can be considered an intermediary variable for exploring the impact of other factors on the mental health of minors. In certain cases, IGD diagnostic scales can directly describe the mental health status of research subjects.

Suicide and self-harm among minors have also become key research topics in the past three years. Overall, engaged and addicted gamers had a higher risk of suicide attempts than non-gamers and recreational gamers. This phenomenon is more pronounced in adolescents aged 11-17 than in those aged 18-35. This might be due to adolescence being a phase with significant psychological, biological, and social changes. During this period, individuals are still developing their emotional regulation and impulse control abilities, making their brains particularly susceptible to the impact of adverse environmental experiences, thus increasing the risk of suicidal and self-harming thoughts. Current studies are insufficient to elucidate the specific mechanisms by which gaming behaviors affect self-harm and suicide. A longitudinal design needs to be used in more research to find out how internet gaming habits and IGD affect the development or trajectory of suicidal behaviors in young people over time. However, interventions using video games to address suicidal behavior have proven effective, and specific serious games can be used to screen minors with suicidal tendencies, thus expanding suicide prevention efforts to online gaming environments.

Research on gaming interventions is becoming more diverse, with more comprehensive studies on the psychological functions of adolescents and the methods of game-based interventions, including exploration of unknown branches and expansion of existing intervention methods. Game interventions for children in disaster-stricken areas have been shown to be effective in experiments conducted in Ukraine and Lebanon. In both studies, a game called Helping Hand was used. Unlike general intervention methods, this game focuses on psychological health regulation and emotional trauma recovery for minors in disaster-stricken or resource-poor areas. Using casual puzzle video games for intervention may distract from anxious thoughts through the induction of flow and redirection of attention toward the game, thus away from anxious thoughts. On the other hand, the bidirectional link between weak attentional and higher anxiety has led to the design of interventions aimed at improving attentional control, such as working memory training studies. Video games can also serve as immersive educational tools to improve minors' cognitive abilities and psychological regulation skills. Designing different game scenarios for different emotions can help minors better experience and adapt to emotional regulation. Group-based emotional learning games can also have this effect.

More demographic variables and cultural backgrounds are being explored for their role in shaping the mechanisms through which gaming influences minors' mental health. However, due to the lack of longitudinal research, the specific mechanisms of influence require further investigation. Factors such as gender, grade level, family background, and gaming devices have been observed to correlate significantly with minors' mental health or IGD levels. In cross-national contexts, the likelihood of IGD and its psychological effects on minors differ based on the amount of time spent on video games, but these factors do not affect the overall impact of IGD on minors' mental health. This indicates the importance of implementing different gaming interventions tailored to different family backgrounds and local cultural norms.

5. Conclusion

Video gaming's impact on adolescent mental health is shaped by intricate interactions between individual behaviors, social contexts, and cultural influences. Emotional dysregulation and social withdrawal often emerge as significant risks among adolescents using gaming as an escape or engaging in problematic patterns. Conversely, protective factors like prosocial gaming experiences and biofeedback To address these dynamics, interventions should focus on tailoring digital solutions to the needs of at-risk adolescents. For example, integrating emotion regulation tools in gaming frameworks and promoting prosocial multiplayer experiences can reduce adverse impacts while enhancing emotional resilience. Culturally informed approaches are also essential, particularly in regions where gaming norms and family dynamics strongly influence outcomes.

Future research should prioritize longitudinal studies to uncover the causal pathways linking gaming behaviors with mental health outcomes. To make interventions like cognitive-behavioral therapy-based games and biofeedback systems more useful, it will also be important to look at how scalable and easy to get they are. By fostering evidence-based strategies, stakeholders can promote healthier gaming practices that leverage the benefits of gaming while minimizing its risks.

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