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Effects of VR Games on Mental Health Among College Students: A Review of Literature

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Abstract

This article aims to conduct a literature review on how VR games affect the mental health of college students. The review was systematically conducted to identify articles on this topic. A total of seven papers related to mental health were identified and these studies proved that VR games are effective against depression, anxiety, enjoyment, and stress. The review of literature found that research on VR games is still insufficient and needs to be studied and more research in the future.

Introduction

For decades, VR-related technologies and quality have improved. With the advancement of this technology, people can have a different experience in the new world. People have the opportunity to experience various experiences in a world other than the real world. Kyaw et al (2019) noted that virtual reality (VR) is a technology that allows users to acquire practical knowledge by exploring and manipulating real or artificial three-dimensional multimedia sensory environments created by computers in real-time.

VR technology is expanding to various fields such as education, games, and medical care, and has a significant impact. Many educational institutions are challengingly adopting VR classes and applying them to education using technology. However, despite the increase in interest and value of VR, research on the effectiveness of VR games is still insufficient.

Purpose

The goal of this study is to review various ranges of literature on the effectiveness of VR games on mental health and to know how VR games will be effective for college students in mental health.

Methodology

This paper conducts a literature review. Wee and Banister (2015) have noted that literature reviews are highly useful for both researchers and readers, as they can provide well-organized, up-to-date overviews and add value to the studies. According to Denny and Tewksbury (2012), literature reviews are important because authors can use them to access a wealth of information about their subjects of interest and gain knowledge of prior research to strengthen their writing. In addition, literature reviews are key resources for ensuring the reliability and integrity of an author's argument.

Inclusion criteria: Criteria were specified to select appropriate studies to include in the review. First, the data needed to relate to VR games. Second, studies had to include both VR games and mental health term (e.g., disability, anxiety, stress) as keywords.

Study selection: Approximately 160 potentially relevant studies were found. Titles, keywords, and abstracts were reviewed to identify articles that met the qualification criteria. The selection excluded duplicate papers, studies on VR subjects beyond the scope of the study (e.g., VR game development), and literature that was not related to mental health. Ultimately, seven studies fulfilled the eligibility criteria.

Results

The literature review yielded numerous findings concerning the effects of VR games on mental health. For instance, Shaw and Lubetzky (2021) have investigated whether short VR exercise games can reduce stress and anxiety in adolescents. In their experiment, two groups (VR group n=16, non-VR group n=14) were randomly assigned to play similar dodgeball games for 10 minutes. The authors assumed that VR exercise would offer benefits, but both groups had less anxiety and lower stress scores after 10 minutes of exercise (modulate Effect Size).

In order to prevent negative mental health in the future, Rodriguez et al (2015) introduced a GameTeen (GT) system and conducted a study by selecting adolescents (n=51) between the ages of 9-14 to find out the effects of emotional regulation strategies such as depression and anxiety through VR-based serious games. As a result, it was found that VR-based GT systems are sufficiently effective tools for ER strategies related to mental health.

With the aim of reducing anxiety and destructive behavior, Bossenbroek et al. (2020) have conducted a single case study experiment with secondary school students (n=8) for VR games. The participants completed a VR biofeedback game session over a four-week period. Data were collected through interviews and post-questionnaires. The authors detected significant decreases in anxiety and destructive classroom behavior among participants.

In research by Song et al. (2015), stroke patients (n=40) were randomly divided into virtual reality group and ergometer training group to compare their effects on psychological and physical characteristics. During the eight-week experiment, the researchers observed significant improvement ($p<0.05$) in psychological characteristic scores (Beck Depression Inventory and the relationship change scale) in both groups. In particular, the VR game groups demonstrated more significant improvement

compared to the other groups. Lee et al. (2012), who are cited in this paper, have also noted that engagement with VR games can mitigate depression. Shin et al. (2015) have conducted a similar randomized controlled group study in which stroke patients were assigned to one of two groups (VR+OT, OT). The researchers evaluated participants by using Short Form Health Survey-36 (SF-36) to collect data on health-related quality of life (HRQOL). Studies have indicated that game-based VR rehabilitation and existing occupational therapy (OT) can improve specific HRQOL items, depression, and upper limb functions in chronic stroke patients.

Yen et al. (2021) have performed a study to improve mental health through VR exercise games in participants aged 60 or older. Based on 18 randomized tests, the findings suggest that VR exercise games may have positive effects for the elderly with respect to perception, memory, and depression. Fallavicini et al. (2020) have carried out a study of young adults (n=36) to explore the ability of VR games to induce positive emotions (e.g., joy and happiness) and reduce negative emotions (e.g. fear and sadness). They found a statistically significant increase in happiness and feelings of surprise; meanwhile, fear and anxiety diminished significantly.

SWOT Analysis on Mental Health of Virtual Reality Games

In terms of **advantages**, VR games offer the benefits of VR and the enjoyment of games. Greg et al. (2007) have noted that the potential benefits of VR may vary. Overall, VR games can be an important means of improving the quality of physical and mental health. Students can use VR games to overcome their fears and partake in a range of experiences. In this regard, Singh et al. (2020) have stated that VR improved the skills and confidence of medical workers by providing an advantage in defending against and coping with COVID-19.

With respect to **disadvantages**, Yildirim (2019) has found that VR games can cause more intense cyber motion sickness compared to regular desktop games. Severe cyber motion sickness symptoms can lead to a lower level of enjoyment. The displays of VR devices may also have a direct negative effect on people. In addition, since VR games are expensive, they may be shared by many people, which introduces hygiene-related concerns (Table 1).

Conclusion/Discussion

This paper has synthesized data from research on the effects of VR games on mental health in college students. A total of seven studies on VR games and mental health were subject to the final analysis. Overall, the use of VR games among individuals of various ages had positive impacts on the mental health of most participants (e.g., mitigating depression, anxiety, fear). Thus, this paper highlights the potential of VR games to improve mental health.

This paper has conducted a literature review for the purpose of assessing how VR games can influence the mental health of college students. Most of the articles in the review reveal that VR games may improve mental health. Although the results are encouraging, certain limitations should be considered. Specifically, the sample of the study is relatively small, and most of the research was conducted in controlled trials. Thus, it should be reviewed carefully.

Table 1. Strengths, Weakness, Opportunity, and Threats Analysis (SWOT) on Mental Health of Virtual Reality Games.

Strengths (S) Improve physical & mental health, Enjoyment of games	**Weaknesses (W)** Cyber motion sickness, Lead to a lower level of enjoyment
Opportunity (O) Improving the quality of physical and mental health, Overcome their fears and partake in a range of experiences	**Threats (T)** VR games are expensive, Hygiene-related concerns

Through a review of the literature on VR games, this study has illustrated the potential efficacy of VR games for supporting the mental health of college students. However, the data on VR are notably insufficient. Since VR gaming is a new field, there is scarce research on its relation to mental health. In the literature selection process, it was difficult to find data on VR games and mental health, as most of the results related only to VR or video games. According to Srivastava et al. (2014), the technology is still in its infancy, and it requires extensive work, including controlled tests, before it can enter routine use. The definition of VR games is insufficient and in the development stage. One implication of existing studies is that further research should include variables, such as cybersickness, in studies of VR games and health. The research area of VR games is currently limited, and more studies are needed in the future.

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