

Exploring the impact of virtual reality nature exposure on emotional well-being and experience satisfaction: A study on international students

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INTRODUCTION

The rising internationalization of higher education has increased international student mobility. Foreign students numbered 6.39 million worldwide in 2021 (worldmigrationreport.iom.int) and 208,900 in Korea by 2024 (Yoon,2025). Studying abroad has academic and professional benefits but also psychological issues. Studies show that international students struggle to adapt to a new language and culture, and a lack of social networks might increase feelings of isolation (Dingle et al., 2022; Greenland et al., 2021; Humphrey & Forbes-Mewett, 2021). Furthermore, academic pressure, cultural displacement, and inadequate social support severely impact students' well-being. In the UK, 36% of international students report 'poor mental health,' including anxiety and stress (Atack, 2018; Kennedy, 2018). In light of these serious concerns, unique and accessible stress-reduction and mental health-improvement solutions for students are needed.

Virtual reality (VR) can improve mental wellness. VR has moved beyond entertainment to be used in mental treatment because to immersive technologies. VR tourism creates realistic, interactive environments that allow visitors to feel like they're there (Guttentag, 2010). This technology lets international students experience local history, culture, and festivals without travelling (Huang et al., 2016). According to Attention Restoration Theory and the Biophilia Hypothesis, Virtual reality environments, especially those that resemble natural or cultural surroundings, reduce stress and anxiety (Browning et al., 2020). Virtual reality also improves well-being by helping users cope with isolation, loneliness, and psychological distress (Walters et al., 2024). Current research stress virtual reality's therapeutic advantages, but less is known about its effects on abroad students' emotional well-being and VR tourism.

This study examines how VR and nature connectedness affect international students' emotional well-being and enjoyment. This study examines whether VR pleasure influences continuing usage. This initiative will improve mental health therapy research and virtual reality utilization.

LITERATURE REVIEW

Attention Restoration Theory (ART) and the Biophilia Hypothesis

According to Attention Restoration Theory (ART), nature helps refill cognitive resources and improve mental health (Fisher & Zeaman, 1973). Nature helps people release tension and relax, boosting attention and relaxation. Although traditional nature exposure has these benefits, virtual portrayals have shown similar restorative effects, making VR an excellent stress-relieving tool (Walters et al., 2024).

The Biophilia Hypothesis states that people's innate connection to nature enhances psychological well-being (Neilson et al., 2021; Gaekwad, 2022). Nature provides us with peace, calm, and cognitive clarity, according to this idea. Nature exposure has therapeutic benefits; therefore, VR tourism may help abroad students with mental health issues.

Virtual Reality Tourism and Mental Health

VR tourism provides immersive and engaging travel experiences to boost emotional well-being (Guttentag, 2010). According to Attention Restoration Theory (ART) and the Biophilia Hypothesis, which states that nature improves cognitive and emotional well-being, virtual reality environments, especially those that mimic natural or cultural contexts, can significantly reduce stress and anxiety (Browning et al., 2020). Virtual reality reduces isolation and psychological discomfort, making it a

promising treatment for mental health difficulties like foreign students transitioning to new environments (Walters et al., 2024).

Virtual Reality Interactivity and Connection to Nature

User engagement with and navigation in virtual environments is called VR interaction. Holt (2023) found that engagement enhances absorption and emotional involvement. Consumer autonomy and engagement increase when they can explore and regulate their VR experience. Nature connectedness, which measures a person's psychological connection to nature, reduces stress and improves well-being (Pritchard et al., 2020).

Perception of Presence

The sensation of presence the perception in a virtual environment is essential for the efficacy of VR experiences (Kim et al., 2021). When individuals are completely involved in a virtual reality environment, they are more inclined to enjoy emotional and cognitive advantages. Previous studies indicate that presence mediates the connection between VR characteristics and psychological effects, establishing it as a crucial element in comprehending VR's emotional influence (Freeman et al., 2017).

Virtual Reality Intent to Continue Usage

User satisfaction with virtual reality experiences strongly influences participation (Buckley, 2023). Positive emotional experiences in virtual reality tourism can encourage repeat use and lasting habits. Sustainable VR-based mental health therapies need understanding the relationship between emotional well-being and VR uptake (Kim et al., 2020).

METHOD

This study will recruit overseas students stressed by cultural adaptability and academics. Participants will complete baseline evaluations before experiencing 360-degree VR natural landscapes in a pre-post experimental design. Pre-exposure surveys will measure baseline emotional well-being using the Perceived Stress Scale (PSS) (Qin, 2019) and Connectedness to Nature Scale (CNS) (Pritchard et al., 2020). Participants will then experience immersive VR natural landscapes using 360-degree movies with 3D sound for a set time.

Participants will complete a post-exposure survey to assess VR interactivity, nature connectedness, sense of presence, emotional well-being, VR continuous use intention. Structural Equation Modeling (SEM) will be used to evaluate variable correlations.

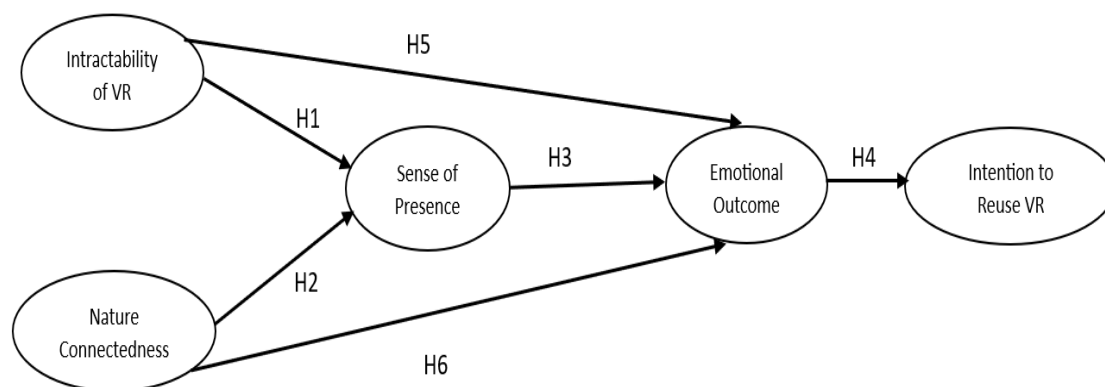


Figure1: Conceptual Model

Hypotheses:

H1: Interactivity in VR experiences will positively influence the sense of presence.

H2: Nature connectedness will positively influence the sense of presence.

H3: Interactivity will positively influence emotional outcomes.

H4: Nature connectedness will positively influence emotional outcomes.

H5: Sense of presence will positively influence emotional outcomes.

H6: Emotional outcomes will positively influence VR Experience Satisfaction.

IMPLICATIONS OR CONCLUSION

Theoretical Contributions

This study contributes to existing literature by expanding the application of ART and the Biophilia Hypothesis within virtual environments. By demonstrating how VR nature exposure fosters emotional well-being, this research strengthens the understanding of digital nature experiences. Additionally, it highlights the role of interactivity and presence in shaping user perceptions and emotions, providing valuable insights for VR-based well-being studies.

Practical Applications

The findings from this study have practical implications for various industries. Higher education institutions can integrate VR-based relaxation programs to support international students' mental health. The tourism industry can leverage insights to enhance virtual tourism experiences, making them more engaging and beneficial for users. Moreover, mental health practitioners can explore VR therapies to help individuals manage stress and emotional distress effectively.

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