Environmental Influence on Students Participating in a Campus-Based Virtual Reality Equine-Assisted Wellness Program

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Introduction

With the rise of mental health challenges seen on today's campuses, universities have begun targeting student emotional well-being, including the use of campus-based animal-assisted therapy (AAT). Although canines have been the most widely used therapy animal on campuses, equine-assisted wellness (EAW) programs have recently been observed within the campus setting (Holtcamp et al., 2023). These programs utilize the horse to facilitate emotional wellness through awareness and acceptance of emotions and learning to positively manage feelings. Despite the benefits observed with utilizing horses within these campus programs, horses require a unique environment that can be challenging to provide on all campuses. Thus, the use of virtual reality (VR) has been offered as an alternative method for delivering equine experiences (Deconinck, 2023; Na & Dong, 2023; Sulaiman et al., 2022). The equine environment, even without direct equine interaction, has been shown to positively influence stress levels (Friend et al., 2023), but research is lacking concerning environmental influence when participating in on-campus VR EAW programs. Therefore, the objective of this study was to compare environmental influence on emotional state using physiological biomarkers (heart rate and cortisol levels) of college students participating in a campus-based VR EAW program.

Conceptual Framework

Our study is guided by the attachment theory framework. Animal assisted therapy within the context of mental health is a relatively new therapeutic modality utilized by mental health professionals, and as such, it was only until Geist (2011) explored literature associated with AAT within the context of mental health that a theoretical framework was identified. Geist (2011) conceptualized a psychological, physiological, and cognitive model for this therapeutic modality based on attachment theory. Attachment theory explains how humans form strong emotional bonds with key individuals, starting early in life, to help manage emotions. Attachment theory hypothesizes that relationships established in childhood become developmental foundations, both socially and emotionally. However, change is possible throughout an individual's life due to establishment of emotional relationships during various life stages. The theory within the context of AAT emphasizes development of a human-animal bond within the therapeutic intervention; and this bond creates a sense of security, functioning as a natural mechanism for regulating and managing emotions. Attachment theory as it relates to AAT has been tested utilizing a diverse range of animals, and with the evolution of technology, studies have tested this theory to examine the effectiveness of a virtual animal within AAT (Deconinck, 2023; Na & Dong, 2023; Sulaiman et al., 2022). Conclusions drawn are supportive of this theoretical framework for AAT, including the use of a virtual animal. However, to the best of our knowledge, no formal investigation has been conducted to examine the influence of the environment for which a VR EAW program is offered; and thus, findings such as this can guide recommendations for implementation of campus-based programming for student emotional wellness.

Methods

College students were recruited for one of the following on-campus VR EAW programs during the fall semester of 2024: 1) classroom environment (n = 10) or 2) equine environment (n = 13).

Sessions lasted for 15-30 minutes. Both programs took place on the Mississippi State University campus. The equine environment included participants utilizing the VR headset within an open-sided covered arena. The classroom setting was a large seminar room on the first floor of a centralized campus building with doors closed during the program. Both programs were open to all students with the programs offered on one day and during the afternoon for a total of five hours. Students could sign up for the program prior to the day of the program or could stop by during the program and wait for a headset to become available. The VR headset utilized was a Meta Quest 1 VR All-in-One headset set with stereoscopic, three-dimensional videos of horse riding and ground activities that were set on a loop. Students for both groups could sit during the use of the VR headset. As for tracked biomarkers associated with emotional wellness, heart rate measures and cortisol levels were selected for indicating emotional state, specifically stress levels, associated with activities. Participant heart rate was collected via a Fitbit worn during the use of the VR headset for both groups. Salivary cortisol samples were collected pre- and post- the use of the VR headset for each group. Data was analyzed using a two-tailed t-test to compare pre- and post- values with significance set at 0.05 and tendencies set at 0.10. Additionally, a mix linear model in SAS was utilized to determine differences between groups.

Results

A total of 17 students participated in the classroom VR EAW program, however, only 10 students agreed to participate in the biomarker sampling. For the equine facilities, a total of 14 students participated in the VR EAW program with 13 students participating in the biomarker sampling. Despite being able to sit during the use of the VR headset, a trend in increasing heart rate was demonstrated in the equine environment ($P = 0.06$), while the classroom environment demonstrated a significant reduction in heart rate ($P = 0.02$). Both groups fell within normal ranges for heart rate and remained under aerobic threshold. Cortisol levels increased for both environmental types, but the increase was insignificant for the equine environment ($P = 0.19$) and only a trend was observed for the classroom environment ($P = 0.07$). Cortisol levels for both groups fell within normal levels for college-aged adults. A correlation was only observed between the equine environment and salivary cortisol levels ($r = 0.62$, $P = 0.04$).

Conclusions/Implications

Given the persistent mental health challenges faced by college students, campuses have begun exploring and promoting alternative therapeutic programs including campus-based EAW programs. However, not all campuses have the resources to support such environments, leading to the use of VR equine interaction. Determining programming, nonetheless, includes where to offer the interactive experience in which results indicated that both environmental types had a physiological impact. Previous equine interaction studies have reported a rise in heart rate with the initial interaction with the horse (Friend et al., 2023), which may explain the tendency observed in rising heart rate within the equine environment in the current study. This is important to note as the only correlation observed was that associated with the equine environment. Despite the changes in biomarkers with both environmental types, all measures fell within normal levels. Interestingly, the majority of the participants noted using the VR headset for the first time. This indicates the use of the VR headset does not cause a significant rise in biomarkers associated with stress even for first-time users; and in fact, a significant reduction in heart rate was observed within the classroom setting. This is promising for campuses lacking an equine environment.

References

Deconinck, E. (2023). *Stress restoration in virtual reality: Comparing the effects of equine, nature, and urban conditions*. University of Tasmania. Thesis. https://doi.org/10.25959/25602327.v1.

Friend, M. M., Nicodemus, M. C., Cavinder, C. A., Lemley, C. O., Prince, P., Holtcamp, K., & Swanson, R. M. (2023). Physiology of human-horse interactions during substance withdrawal within psychotherapy participants. *Comparative Exercise Physiology*, *20*(1), 55-68. https://doi.org/10.1163/17552559-20230023.

Geist, T. S. (2011). Conceptual framework for animal assisted therapy. *Child & Adolescent Social Work Journal, 28*(3), 243–256. https://doi.org/10.1007/s10560-011-0231-3.

Na, H., & Dong, S. Y. (2023). Mixed-reality-based human-animal interaction can relieve mental stress. *Frontiers in Veterinary Science*, *10*, 1102937. https://doi.org/10.3389/fvets.2023.1102937.

Sulaiman, N. B., Anuar, N., & Yunos, H. (2022). Virtual Equine-assisted Therapy (iEAT) to Reduce Depression, Anxiety, and Stress Symptoms. *International Journal of Academic Research in Business and Social Sciences*, 12(11), 1489 – 1498. http://dx.doi.org/10.46886/IJARBSS/v12-i11/11523.