

## Using Virtual Reality Exergaming to Improve Health of College Students

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**Abstract :** Introduction: Exergames, VR games used as a form of exercise, are being used to reduce sedentary lifestyles in a vast number of populations. However, there is a distinct lack of research comparing the physiological response during VR exergaming to that of traditional exercises. The purpose of this study was to create a foundational investigation establishing changes in physiological responses resulting from VR exergaming in a college aged population. Methods: In this IRB approved study, college aged students were recruited to play a virtual reality exergame (Beat Saber) on the Oculus Quest 2 (Facebook, 2021) in either a control group (CG) or training group (TG). Both groups consisted of subjects who were not habitual users of virtual reality. The CG played VR one time per week for three weeks and the TG played 150 min/week three weeks. Each group played the same nine Beat Saber songs, in a randomized order, during 30 minute sessions. Song difficulty was increased during play based on song performance. Subjects completed a pre- and posttests at which the following was collected: • Beat Saber Game Metrics: song level played, song score, number of beats completed per song and accuracy (beats completed/total beats) • Physiological Data: heart rate (max and avg.), active calories • Demographics Results: A total of 20 subjects completed the study; nine in the CG (3 males, 6 females) and 11 (5 males, 6 females) in the TG. • Beat Saber Song Metrics: The TG improved performance from a normal/hard difficulty to hard/expert. The CG stayed at the normal/hard difficulty. At the pretest there was no difference in game accuracy between groups. However, at the posttest the CG had a higher accuracy. • Physiological Data (Table 1): Average heart rates were similar between the TG and CG at both the pre- and posttest. However, the TG expended more total calories. Discussion: Due to the lack of peer reviewed literature on exergaming using Beat Saber, the results of this study cannot be directly compared. However, the results of this study can be compared with the previously established trends for traditional exercise. In traditional exercise, an increase in training volume equates to increased efficiency at the activity. The TG should naturally increase in difficulty at a faster rate than the CG because they played 150 hours per week. Heart rate and caloric responses also increase during traditional exercise as load increases (i.e. speed or resistance). The TG reported an increase in total calories due to a higher difficulty of play. The song accuracy decreases in the TG can be explained by the increased difficulty of play. Conclusion: VR exergaming is comparable to traditional exercise for loads within the 50-70% of maximum heart rate. The ability to use VR for health could motivate individuals who do not engage in traditional exercise. In addition, individuals in health professions can and should promote VR exergaming as a viable way to increase physical activity and improve health in their clients/patients.

**Keywords :** virtual reality, exergaming, health, heart rate, wellness

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