

PURPOSE/INTRODUCTION

The CDC recommends at least 150 minutes of moderate physical activity per week for the average adult. More adults fail to meet these requirements every year, including college students [2]. A long-term consequence of not meeting physical activity requirements is obesity, which can lead to future health issues. Active gaming may be an approach to combat inactivity in college aged individuals, specifically using the XBOX Kinect. By changing the instruction on movement to full ROM during gameplay and to continuously stay active during down time, there may be a higher elicited response to exercise. In addition, by monitoring the level of enjoyment throughout the study, comparisons and conclusions can be made from relative and absolute exercise intensity.

Purpose: This study examined if active gaming could stimulate physiological benefits associated with exercise by determining heart rate (HR), rating of perceived exertion (RPE), and level of enjoyment during Mogul Bounce, Piano Step, and Rivals Soccer for Xbox Kinect games.

Hypotheses:

- 1) The implementation of specific instructions for game play will increase heart rate during game play in all 3 games by eliciting more movement at a greater intensity.
- 2) Playing the game at it's intended intensity level will increase the level of enjoyment during the game for all 3 games.

METHODS

Participants

Eighteen healthy, (M=9) college-aged students completed four separate
Mean Height: 67.5 inches (Standard Dev 2.12132)
Mean Weight: 187 pounds (Standard Dev 81.31728)

Experimental Sessions

Session one provided game familiarization. In the remaining sessions, participants played three active videos games: Mogul Bounce, Piano Step, and Rivals Soccer. In each session, each game was played for two 15-minute periods.

Period 1(P1), participants played at a self-selected intensity. Period 2(P2), participants were given instructions designed to enhance movement during game play (*i.e.*, participants jogged in place during any period they were not handling the ball in soccer, jumped when attempting to block in soccer, hop for each note played in piano step, and used full range of motion for each squat in mogul bounce). Participants wore heart rate monitors during game play. HR and RPE were reported every 5 minutes of game play (*i.e.*, 5, 10, and 15). After each period subjects reported their level of enjoyment. Percentage of HR max (%HRmax) was calculated to evaluate the average intensity of physical activity achieved during game play.

Statistical analysis:

Mixed model ANOVAs were used to analyze the data. HR results indicated a Game x Period x Time interaction ($p < .001$). Follow-up tests indicated HR significantly increased from baseline in every game and period.

RESULTS

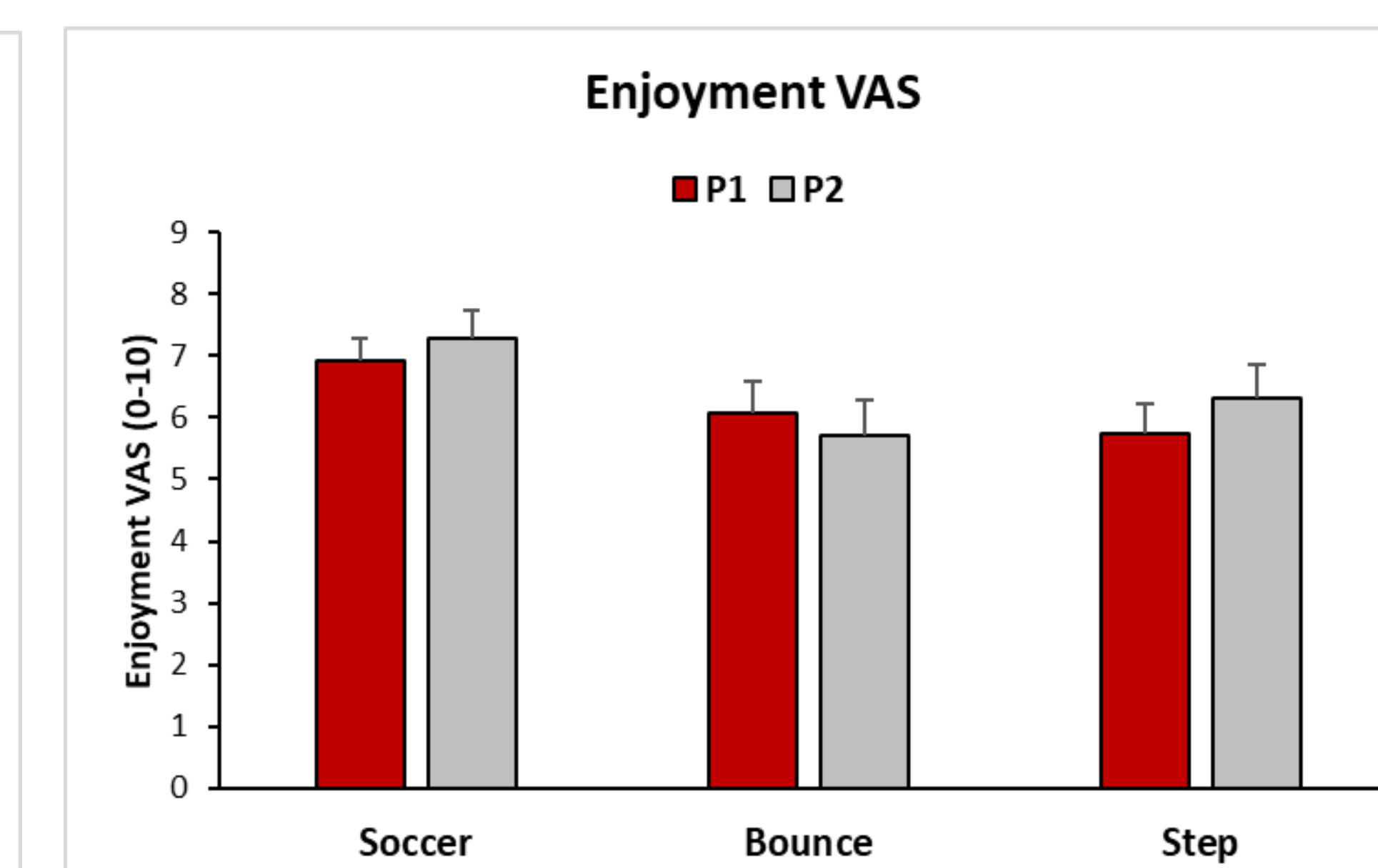
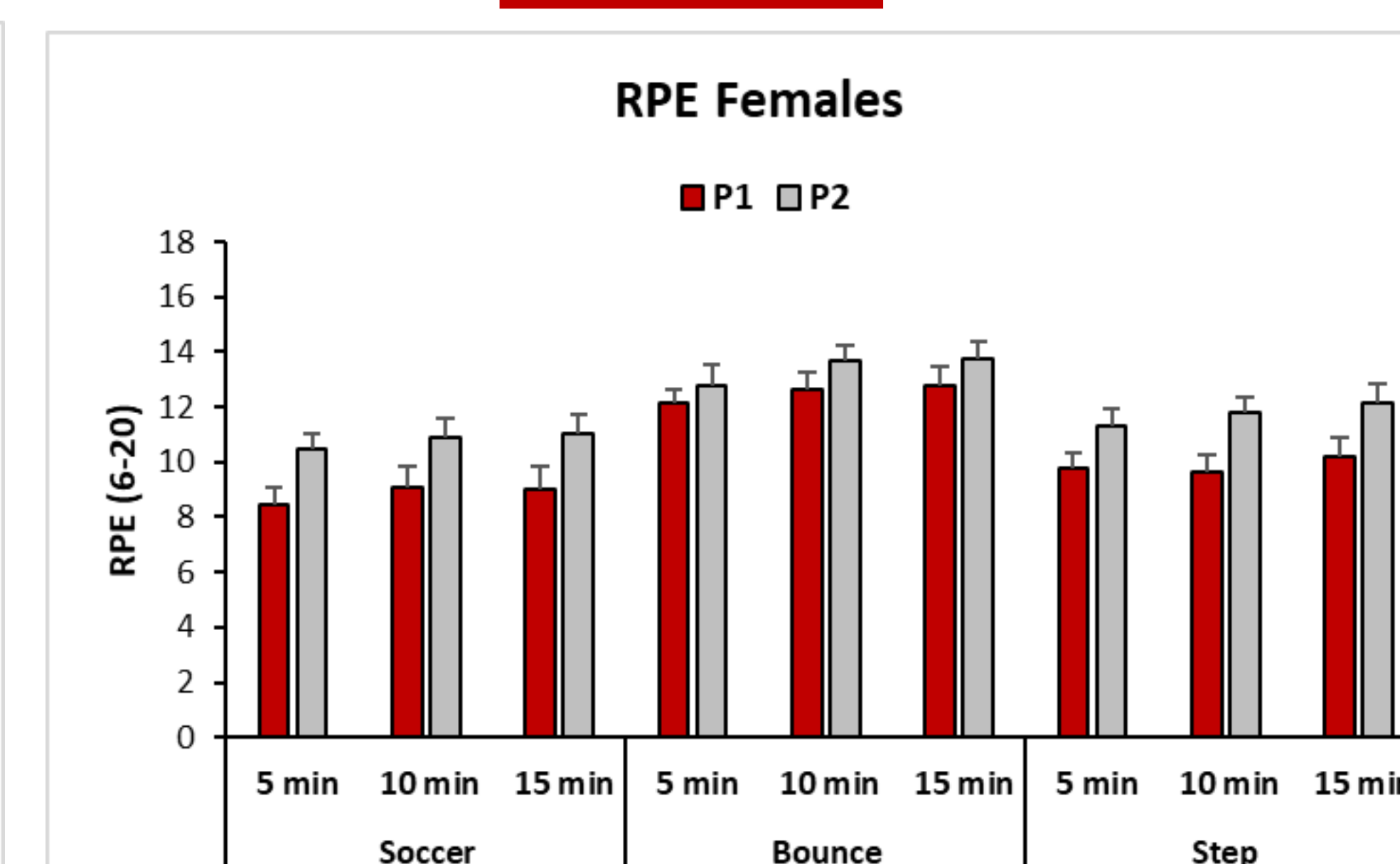
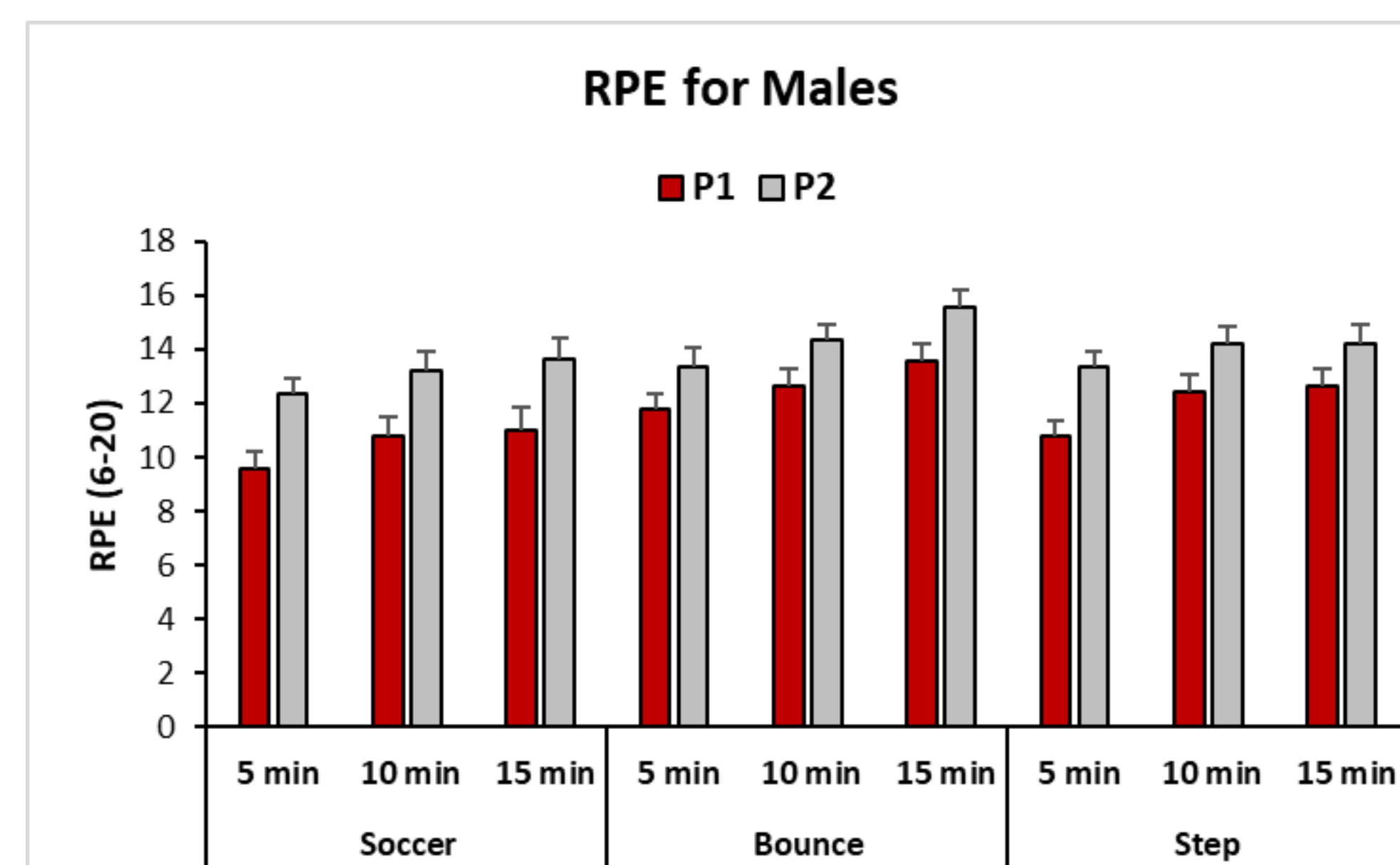


Figure 1. RPE for each game, period, and time point (separated by player sex). RPE significantly differed between games ($p < .001$), with Bounce ($M=13.2$, $SE=.38$) eliciting a greater RPE compared to Soccer ($M=10.8$, $SE=.44$) and Step ($M=11.9$, $SE=.37$). Across all games, RPE was greater during P2 ($M=12.9$, $SE=.33$) compared to P1 ($M=11.1$, $SE=.32$; $p < .001$). The results revealed a significant Time x Sex interaction ($p=.015$). RPE increased from 5 to 15 minutes in males. RPE at 10 and 15 minutes in males was greater than RPE at all time points in females.

Figure 2. Enjoyment for each game and period. No significant differences existed in enjoyment between games and periods.

RESULTS CONTINUED

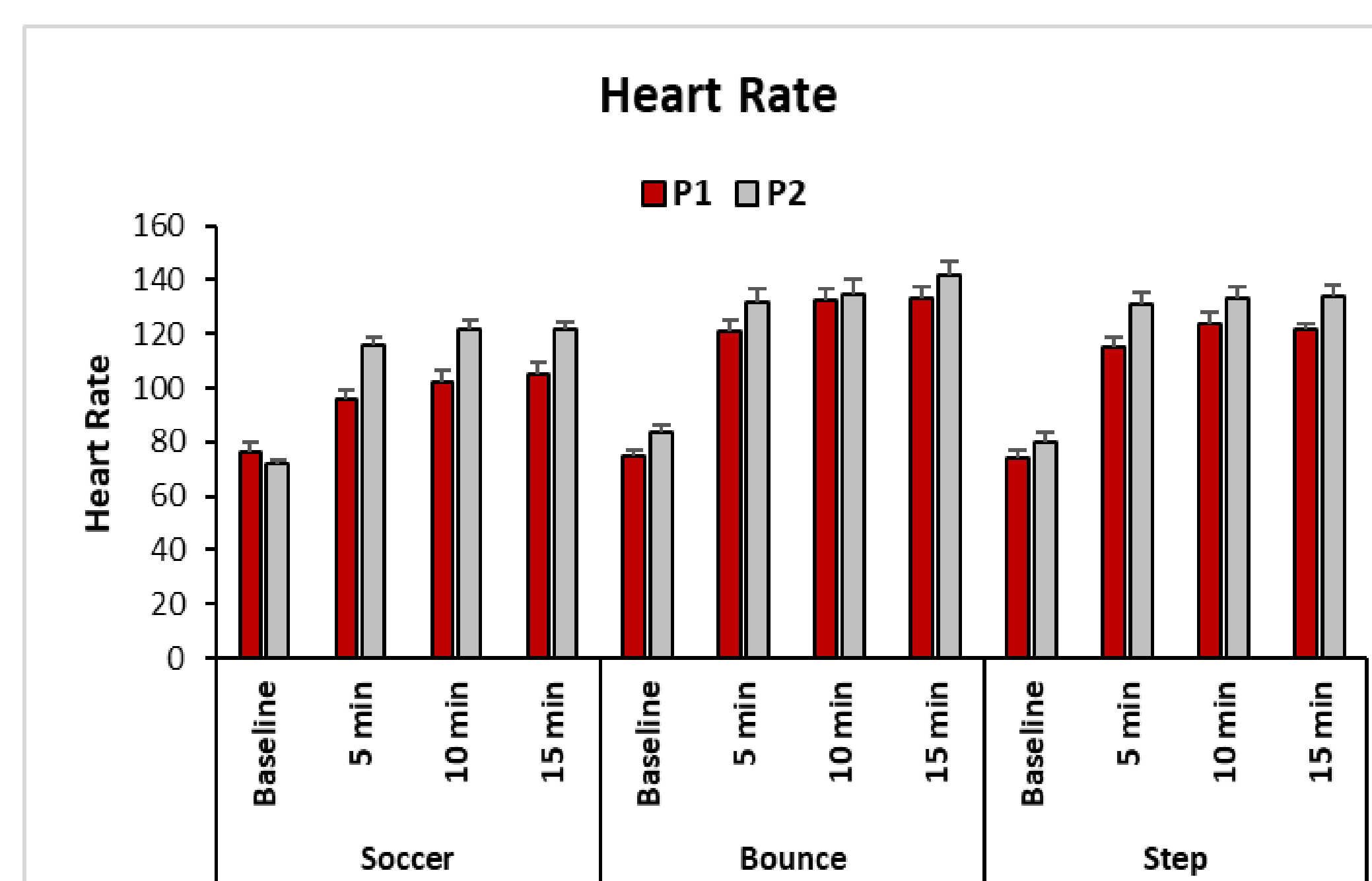


Figure 3. HR for each game, period, and time point. HR results indicated a Game x Period x Time interaction ($p < .001$). Follow-up tests indicated HR significantly increased from baseline in every game and period. HR significantly increased P1 to P2 during Soccer and Step at all time points. For Bounce, HR was only greater during P2 compared to P1 at 5 minutes. HR was significantly higher during Step and Bounce compared to Soccer during all periods and time points of play. HR was significantly higher during Bounce compared to Step at 15 minutes during P1. Evaluation of the %HRmax data indicated that intensity of physical activity during P1 was light ($< 57%$), except females reached moderate intensity during Bounce (67.5-71.5%). During P2, moderate intensity physical activity (64%-76%) was reached for Bounce and Step but not Soccer.

CONCLUSIONS/PRACTICAL APPLICATIONS

- The XBOX Kinect demonstrated to be an adequate source for exercise based on the physiological responses of HR associated with exercise. Both Period 1 and 2 signify that playing the XBOX Kinect games induced an increase response to both HR and RPE.
- The results suggest that with the correct instructions and movement implementations (*i.e.*, participants jogged in place during any period they were not handling the ball in soccer, jumped when attempting to block in soccer, hop for each note played in piano step, and used full range of motion for each squat in mogul bounce), the XBOX Kinect can be an efficient tool for an adequate physiological response for cardiorespiratory exercise in college aged students based on HR and RPE.
- Identifying the markers of gameplay that create the best environment for proper intensity and enjoyment levels could be used to create a standard level for active video gameplay to aid in the reduction of sedentary behavior of college aged students.
- Although there was not a significant difference in enjoyment level between the two periods of game play, the XBOX Kinect could still prove to be more enjoyable than traditional sources of exercise and just as effective.

REFERENCES

- Barry G, van Schaik P, MacSween A, Dixon J, Martin D. Exergaming (XBOX Kinect™) versus traditional gym-based exercise for postural control, flow and technology acceptance in healthy adults: a randomised controlled trial. *BMC Sports Sci Med Rehabil.* 2016 Aug 23;8(1):25. doi: 10.1186/s13102-016-0050-0. PMID: 27555917; PMCID: PMC4994315.
- CDC. (2019, September 25). Lack of physical activity. Centers for Disease Control and Prevention. Retrieved March 27, 2022, from <https://www.cdc.gov/chronicdisease/resources/publications/factsheets/physical-activity.htm>

