

Intra and Inter-Rater Reliability of the Exercise Thresholds App in Identifying Ventilatory Thresholds Using Undergraduate Raters

ANNA GREXTON, DANTE ARGENTO, HOLLAND GASTON, & CORY GREEVER

Human Performance Lab; Kinesiology; California Polytechnic University; San Luis Obispo, CA

Category: Undergraduate

Advisor / Mentor: Greever, Cory (greever@calpoly.edu)

ABSTRACT

Identifying the gas exchange threshold (GET) and the respiratory compensation point (RCP) are the least invasive methods for determining aerobic training zones from maximal graded exercise tests. This process requires a thorough examination of several respiratory gas exchange parameters from breath-by-breath or time binned averages. Given the nature of processing data in this fashion, standardized tools could be useful in improving exercise physiology student's accuracy in identifying these thresholds. The Exercise Thresholds App is a computer application developed to simultaneously visualize eight different respiratory gas exchange parameters (VE, VO₂, VCO₂, VE/VCO₂, VE/VO₂, P_{ET}O₂, P_{ET}CO₂, RER) from maximal exercise tests to identify GET and RCP. **PURPOSE:** To examine the intra and inter-rater reliability of using the Exercise Thresholds App to identify GET and RCP using undergraduate student raters. **METHODS:** Raters were trained to identify thresholds using the app creator's published training materials and practice data sets. Each rater identified the GET and RCP on 40 practice sets twice prior to rating laboratory test results. Raters identified 515 valid maximal exercise tests from metabolic carts in the Cal Poly Human Performance Laboratory. Each rater scored all data sets twice, identifying the two thresholds to the best of their knowledge based on their training. Intra and inter-rater reliability were tested using bi-variate Pearson correlations and intraclass correlation coefficients, respectively. **RESULTS:** The three raters demonstrated high intra-rater reliability for both GET ($r = 0.930$) and RCP ($r = 0.971$). When looking at inter-rater reliability, there was high agreement among raters for both GET (ICC = 0.980, 95% CI = 0.977, 0.983) and RCP (ICC = 0.992, 95% CI = 0.991, 0.993). **CONCLUSION:** These findings tell us that the Exercise Thresholds App is a reliable and repeatable tool that can be used to train undergraduate students in the proper identification of GET and RCP from maximal exercise tests. Exercise physiology instructors can use this application and the associated training materials to improve the accuracy of their student's threshold identification in laboratory, research, and clinical settings.