Reliability and Validity of New Test to Measure Anaerobic Power

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My research project consisted of the development of a new anaerobic power test to measure anaerobic metabolism in individuals. Anaerobic power occurs in short powerful bouts in the body using the adenosine triphosphate phosphocreatine system. The standard for measuring anaerobic power is the Wingate Anaerobic Test (WAnT) performed on a cycle ergometer or stationary bicycle. There is another test commonly used named the Margaria-Kalamen test. For both the Wingate Anaerobic Test and the Margaria-Kalamen, test expensive equipment or specific facilities are required. The WAnT test has been validated previously for measuring anaerobic power, and it is considered the “Gold Standard” for these assessments. The test is performed by the subject performing a 5-minute warm-up and then performing a maximal exertion until fatigue lasting 30-seconds. The issues associated with these tests were the motivation to pursue my OUR research study. The Health and Kinesiology department was able to provide the equipment I needed to conduct my study. My study consisted of developing a new anaerobic test and validating it with the Wingate Anaerobic test (WAnT).

The main reasons for developing a new test consisted of the safety of the test, equipment availability, and facilities. My test proposed that all a test administrator needed is a stopwatch and a measuring tape. The study was originally projected to have 30 participants however, I was only able to collect data on 4 participants because of the campus closing in March. The following data was collected; anthropometric data consisting of height, weight, and skinfold measures to calculate percent body fat, anaerobic power collected administering the WAnT to validate the new proposed test; and the new test, called the bounding jump test (BJT). The BJT involves the
participant performing a countermovement jump forward to take 3 bounding steps forward trying to cover as much distance as possible. Data was collected on five jump trials with at least one-minute rest in between each trial.

The trials were recorded with a video camera and analyzed with a video analysis software, (Dartfish v10) measuring the time of the entire jump from start to finish and the distance covered. This time was used in conjunction with the participant’s body mass to calculate power in watts for the jump. After this calculation, Pearson Correlation between new test BJT, and Wingate Test (criterion), was used to establish validity (r = 0.93).

For this project we wrote in our proposal the needs for the study consisting of a GoPro camera, Dartfish software, Tripod, and a 25L ft x 4W ft rubber mat. This request would have been encumbered in the $1000 budget the Office of Undergraduate Research provided. Fortunately, the Department of Health and Kinesiology was able to supply us with a high-speed camera, a laptop with the Dartfish software, tripod, and an area to conduct the trials safely in the gymnasium.