

## Comparison of Lacrosse Player Metrics in Games and Practices in High School Males

Kinta Schott, Dr. Paul N. Whitehead, Department of Kinesiology

### Introduction

Current research, shows clinical testing on lacrosse players utilizing common maximal effort tests such as one repetition max tests, the Bruce Protocol test (1), and the Wingate test (2). However, there is very little real-time data collected during field testing. Although laboratory methods are ideal for testing peak performance, they do not measure the actual demands on lacrosse players during competition. The field collection of these data can be used to measure an athlete's ability and readiness to perform in game situations. The data can also be used to quantify an athlete's performance in a given session. The purpose of this study was to observe and quantify the physiological demands of individual players in game-like play, including but not limited to inter-squad scrimmages, small sided field play and full-time games in the sport of lacrosse. The comparison of factors including time in sprint zones, distance traveled, and heart rate between positions may highlight a need for varied conditioning and training requirements for each specific player based on their position.

### Methods

Thirteen male athletes (mean  $\pm$  SD; 16.23  $\pm$  1.54 years; 175.32  $\pm$  7.72 cm; 69.89  $\pm$  13.60 kg) playing for a local high school club lacrosse team were utilized for data collection. The Polar Team Pro System (PTPS), a commercially available monitoring system was used to record the data from games. The PTPS records time spent in designated heart rate zones, calories burned by each individual, and time in defined sprint zones while utilizing global positioning system (GPS) to measure distance traveled, speed, and time in defined sprint zones (3). The system was placed onto players at the start of each of three practices and one game. Using IBM SPSS Statistics 24 for Windows (IBM Corp., Armonk, NY, USA) the internal physiological measures average heart rate percentage, minimum heart rate percentage, maximum heart rate percentage, and Calories Expended were compared between game and practice as well as an overall comparison of these measures between positions including data from practices and games. The external factors including duration, total distance covered, distance rate, maximum speed reached, average speed, and number of sprints were recorded and compared in the same manner. The overall demand for players during a game versus practice were compared using a Paired Samples T-test while the positional demands between attacking, midfield, defensive, and FOGO players were compared using Independent Samples T-tests. Effect size ( $r$ ) was also found for each comparison.

### References

1. Enemark-Miller, Emily A., Jeff G. Seegmiller, and Sharon R. Rana. "Physiological Profile of Women's Lacrosse Players." *The Journal of Strength & Conditioning Research* 23, no. 1 (2009): 39-43.
2. Steinhagen, Michelle R., Michael C. Meyers, Howard H. Erickson, Larry Noble, and Melanie T. Richardson. "Physiological Profile of College Club-Sport Lacrosse Athletes." *The Journal of Strength & Conditioning Research* 12, no. 4 (1998): 226-31.
3. Conners, Ryan T., Paul N. Whitehead, Tyler S. Shimizu, and Jonathan D. Bailey. "Coaching and Technology: Live Team Monitoring to Improve Training and Safety." *Strategies* 31, no. 5 (2018): 15-20.

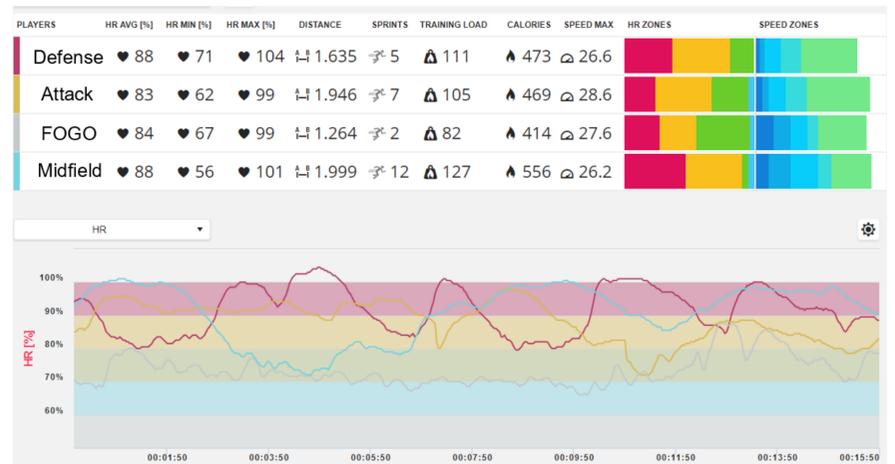


Figure 1. Second half game data for a player from each field position

### Results

A standard  $p$  value  $\leq .05$  was utilized as the cutoff level to accept significance for the analyses. Results show significant differences between game data and practice data for the external factors ( $t \geq 2.32$ ,  $p \leq .049$ ,  $r \geq .253$ ). Significant differences between internal factors were also found ( $t \geq 4.2$ ,  $p \leq .003$ ,  $r \geq .590$ ).

Variable	Practice	Game	$p$ -value	Effect Size ( $r$ )
Duration (min)	130.92 $\pm$ 5.28	39.58 $\pm$ 00.00	$p < .001$	0.997 VL
Total Distance (km)	3957.43 $\pm$ 329.10	1848.00 $\pm$ 607.595	$p = .024$	0.907 VL
Distance Rate (m/min)	33.63 $\pm$ 7.45	46.69 $\pm$ 15.35	$p < .001$	-0.476 M
Sprints	9.09 $\pm$ 3.57	7.11 $\pm$ 3.98	$p = .049$	0.253 S
Average HR (%max)	73.89 $\pm$ 5.21	84.56 $\pm$ 5.15	$p < .001$	-0.717 VL
Training Load	233.52 $\pm$ 64.31	128.22 $\pm$ 32.33	$p = .001$	0.719 VL
Training Load Rate	1.78 $\pm$ .47	3.24 $\pm$ .82	$p = .001$	-0.738 VL
Calories (kcal)	1266.87 $\pm$ 232.21	539.333 $\pm$ 132.78	$p < .001$	0.887 VL
Calorie Rate (kcal/minute)	9.69 $\pm$ 1.81	13.63 $\pm$ 3.35	$p = .003$	-0.590 L

### Discussion

Based on data recorded, the internal, physiological metrics and the external movement metrics can be significantly different. Players, during the games, show higher average heart rates, and more sprints at faster speeds. Although they burn about half the amount of calories in total, players burn a mean amount of 13.63 calories/minute versus during practice where they burn a mean of 9.69 calories/minute. These data show a higher intensity, on average, for games than practice, encouraging a high intensity, low duration practice should coaches wish to train with close relation to games.

### Acknowledgements

Special thanks to Dr. Ryan Conners. Thanks to Dave Cook and Dr. Vogler of the RCEU Staff, UAH Office of the Provost, UAH Office of the Vice President for Research and Economic Development and the Alabama Space Grant Consortium for sponsorship of this project.

