

Workloads of Collegiate Female Lacrosse Athletes During a Division II National Championship Season



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Abstract

There is a paucity of data on workloads in collegiate female lacrosse players. **PURPOSE:** Determine internal and external workloads of collegiate female lacrosse players. **METHODS:** Heart rate (HR), perceived exertion, and GPS data were analyzed from 19 collegiate female lacrosse players throughout an entire National Championship season. **RESULTS:** Except for average HR ($p=0.494$), workload variables were significantly less during training compared to games. Average practice duration was shorter than average gameday duration ($p<0.001$). When considering workloads relative to duration, high-intensity accelerations (0.53 ± 0.10 count/min vs 0.40 ± 0.12 count/min, $p<0.001$) and decelerations (0.40 ± 0.08 count/min vs 0.33 ± 0.08 count/min, $p<0.001$) were significantly greater during practice days. All other workload variables were not significantly different when considering the duration of session. **CONCLUSION:** When examining workloads of collegiate female lacrosse, there was significantly less workload during practice compared to gamedays due to the increased duration of gameday.

Introduction

- Lacrosse is known as one of the most strenuous team sports for women and physiological characteristics of female collegiate lacrosse athletes have positioned these athletes amongst the most fit.
- External workloads are the physical demands being asked of the body and are commonly measured via GPS or accelerometers.
- Internal workloads are the physiological responses to the external workloads and can be measured objectively via heart rates (HR) or subjectively via ratings of perceived exertions (RPE).
- The monitoring and adjustments of workload by coaches, trainers, and scientists has become commonplace in athletics with the goal of producing positive training adaptations.
- Few studies have investigated the internal and external workloads of NCAA women's lacrosse athletes throughout an entire competitive season.

Purpose

- This study aimed to determine the internal and external training and game loads of female collegiate lacrosse players during an entire competitive season.

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Methods

Participants

- Data was collected on 28 athletes during the season.
 - Due to early season injury ($n=2$) or lack of playing time ($n=7$), data from 19 athletes (age 21 ± 2 years, height 167.3 ± 5.6 cm, body mass 64.7 ± 8.6 kg, body fat 22.3 ± 5.8 %) were analyzed (figure 1).

Procedures

- Athletes wore Polar Team Pro (Polar Electro Inc.)
- All training ($n=59$) sessions and games ($n=18$) were recorded from the beginning of team warm-up to the completion of all sporting activities.
 - An average of 56 ± 4 training sessions and 17 ± 2 games were analyzed per athlete.

Measurement of Internal Workload

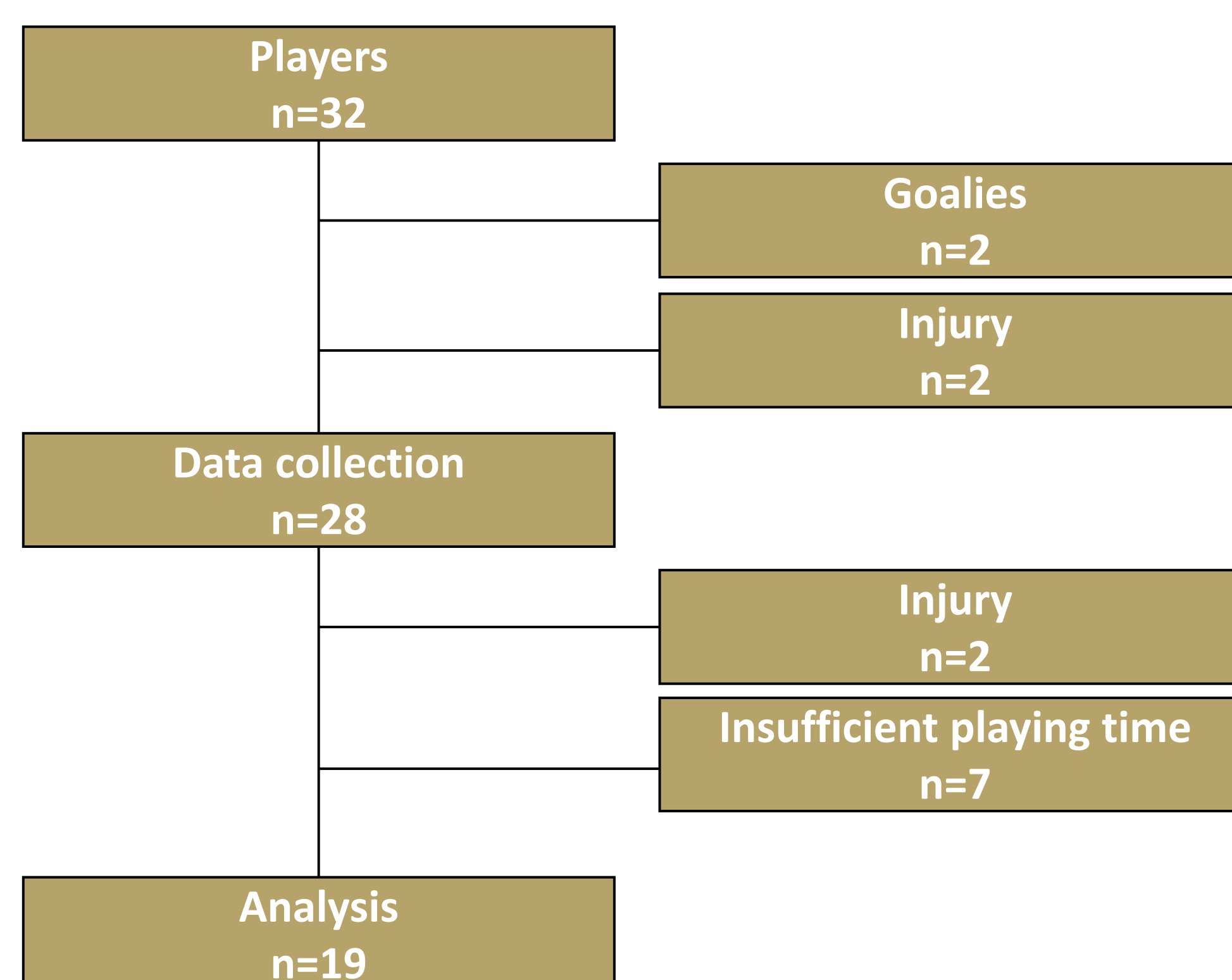
- Training impulse (eTRIMP) was determined using Edwards' formula:
 - (time in $z1*1$) + (time in $z2*2$) + (time in $z3*3$) + (time in $z4*4$) + (time in $z5*5$)
 - $z1=50-60\%$ HRmax, $z2=60-70\%$ HRmax, $z3=70-80\%$ HRmax, $z4=80-90\%$ HRmax, $z5=90-100\%$ of HRmax

- Session ratings of perceived exertion (sRPE) were collected approximately 30-60 minutes following the completion of each session.
 - sRPE was multiplied by duration of session to provide training load (sRPE-TL).

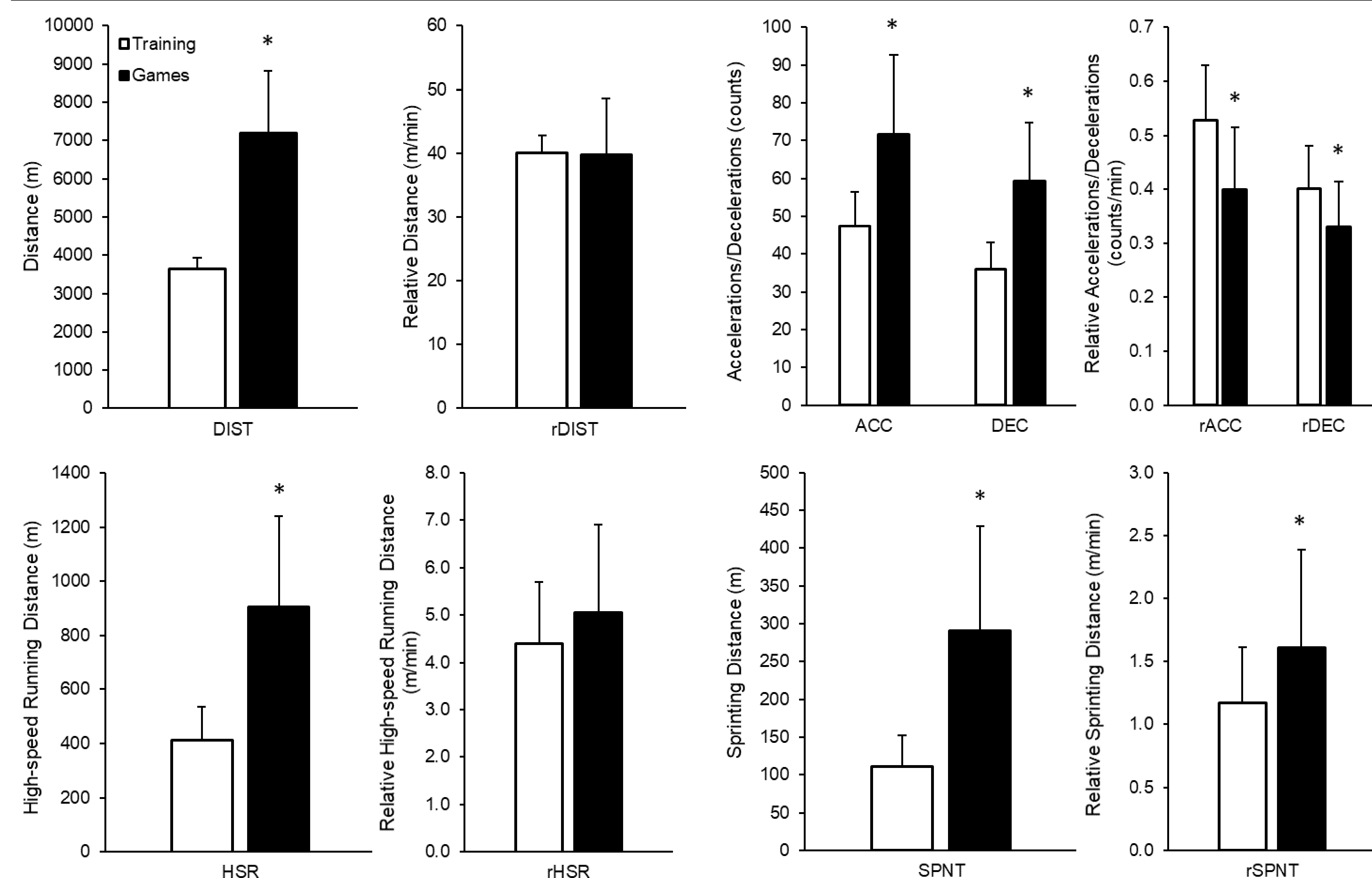
Measurement of External Workload

- The following GPS-derived metrics were utilized:
 - Total distance (TD) throughout entire session
 - High-speed running was distance covered at ≥ 15 km·h⁻¹.
 - Sprint distance was distance covered at ≥ 19 km·h⁻¹.
 - Accelerations ≥ 2 m·s⁻² were counted.
 - Decelerations ≤ -2 m·s⁻² were counted.

Figure 1. Study flowchart



Results



* Signifies a significant difference between training and game workloads.

	Total Workloads		Rate of Workloads (per min)	
	Training	Games	Training	Games
Duration (min)	91.8 ± 0.9	181.4 ± 2.2*	-	-
Max HR (%)	94.5 ± 1.5	97.6 ± 1.7*	-	-
Avg HR (%)	69.5 ± 2.9	70.4 ± 4.7	-	-
sRPE	3.6 ± 0.4	5.7 ± 1.0*	-	-
sRPE-TL (AU)	340.1 ± 37.0	1048.0 ± 199.6*	-	-
eTRIMP (AU)	224.7 ± 26.9	464.9 ± 86.3*	2.5 ± 0.3	2.6 ± 0.5
Total distance (m)	3646.3 ± 273.5	7182.7 ± 1634.0*	40.0 ± 2.9	39.7 ± 8.8
High-speed distance (m)	411.6 ± 123.1	904.2 ± 335.2*	4.4 ± 1.3	5.1 ± 1.9
Sprint distance (m)	110.9 ± 42.1	290.6 ± 138.7*	1.2 ± 0.4	1.6 ± 0.8*
Accelerations (≥ 2 m·s ⁻²)	47.4 ± 9.0	71.8 ± 20.9*	0.5 ± 0.1	0.4 ± 0.1*
Decelerations (≤ -2 m·s ⁻²)	35.9 ± 7.1	59.3 ± 15.6*	0.4 ± 0.1	0.3 ± 0.1*

* Signifies a significant difference between training and game workloads.

Summary

- NCAA Division II National Champion women's lacrosse athletes averaged comparable running distances during training and games as previously reported Division I women's lacrosse athletes.
- Total internal and external workloads were greater during training compared to game days which was mostly due to significant differences in duration of training vs game days.
- When accounting for duration, the rate at which workloads accumulated were similar on training and game days for most variables.
- The higher rates of accelerations/decelerations along with the lower rates of sprint distances during training are likely due to more small-sided training.
- Coaches should examine the rate of workload accumulation during training as this analysis may provide meaningful feedback regarding athlete preparation for game days.

Acknowledgements

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