ANALYSIS OF PHYSICAL AND PHYSIOLOGICAL METRICS IN DIVISION I COLLEGIATE WOMEN'S BASKETBALL: EXPLORING WORKLOADS BETWEEN GAME ENVIRONMENTS

Noah K. Nakagawa[1], Harry P. Cintineo[2], Alexa J. Chandler[1], Gianna F. Mastrofini[1], Blaine S. Lints[1], Sten O. Stray-Gundersen[1], Bridget A. McFadden[3], Molly Binetti[4], and Shawn M. Arent[1]

[1]Department of Exercise Science, Arnold School of Public Health, University of South Carolina, Columbia, SC; [2]Department of Kinesiology, Lindenwood University, Saint Charles, MO; [3]Department of Family, Nutrition, and Exercise Sciences, Queens College, City University of New York, Flushing, NY; [4]Department of Athletics, University of South Carolina, Columbia, SC

Introduction

- Physiological demands may be altered by game environments.
- **Training workloads** can be used to inform training programs and help prevent overtraining.
  - **External workload** captures the physical work performed by an athlete, such as total distance covered during a game or training session.
  - **Internal workload** captures the relative biological stressors imposed on an athlete during training and competition and includes metrics like Summated Heart Rate Zones (SHRZ) to assess time spent in each heart rate zone.
- These metrics can be essential to produce training and recovery plans, but the varying demands in different game environments have received less attention.
- **Purpose: To evaluate and compare the internal and external workloads of NCAA Division I women's basketball players across home, away, and neutral game environments.**

Methods

- Ten NCAA Division I collegiate female basketball players wore ECG-based chest-strap heart rate (HR) monitors equipped with accelerometry (Team Pro, Polar Electro Inc., Kempele, Finland) to measure internal and external workloads during all competitive games.
- Top zone speed zones were measured as the distance covered at speeds >3.47 m/s.
- Throughout their 2020-2021 official game schedule, players were equipped with HR monitors (Figure 1).

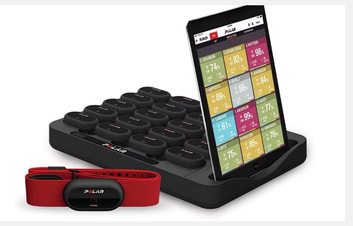
Conclusions and Applications

- SHRZ demonstrated comparable physiological costs across different game environments.
- Players reduced intensity while still winning all neutral games, most of which occurred in the post-season.
- These findings **emphasize** the importance of **continuous monitoring** of internal and external workloads by coaching staff and sports scientists during the season to assess and manage fatigue.
- **Future research** should investigate other potentially more robust measures (e.g., blood lactate, RPE, cognitive tests, etc.) in conjunction with internal and external workload monitoring throughout the season to better elucidate the impact of different game environments.

Figure 1. University of South Carolina Women's Basketball 2020-2021 schedule, detailing the dates and types of game environments.

Table 1. Player demographics (mean ± SD).

Age (y)	Height (cm)	BMI (kg/m^2)
20 ± 1	181.0± 8.6	28.1 ± 2.9



RESULTS

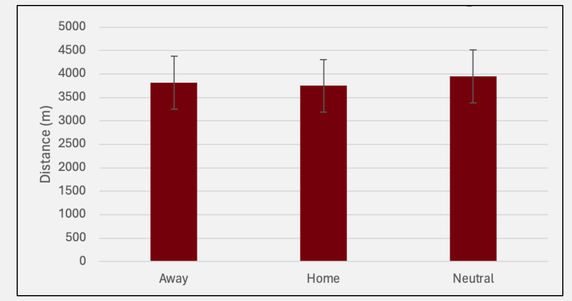


Figure 2. Total distance (m) covered by players in away, home, and neutral game environments (P = 0.34).

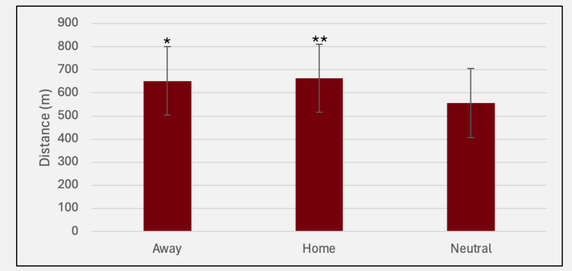


Figure 3. This graph displays the distance covered by players in top speeds in away, home, and neutral game settings. (* indicates P < 0.05 between Away and Neutral [P = 0.022] and ** indicates P < 0.01 between Home and Neutral [P = 0.07]).

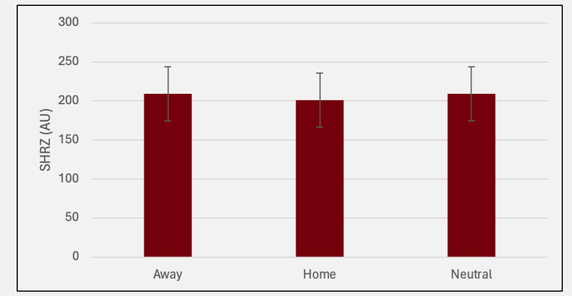


Figure 4: Internal workload measured as Summated Heart Rate Zones (SHRZ) across away, home, and neutral game environments (P = 0.52).

Acknowledgments

This project was also made possible in part by Grant Number T32-GM081740 from NIH-NIGMS award to GFM. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIGMS or NIH.

@uofscsportsci

@UofSCSportSci