Individual Variation in Physiological Training Load During a Division III Soccer Season

Tristen Zimmerman*, Mani Campos, PhD*, and Tyler Bosch, PhD**
*College of Saint Benedict | Saint John’s University and **University of Minnesota

Introduction

- Many elite athletic programs are shifting towards a more scientific approach to training by quantifying training load (TL).
- Monitoring heart rate (HR) variability is of the most commonly used methods to assess TL.
- External TL refers to the work completed, regardless of internal characteristics - internal TL reflects the physiological load imparted on each individual.

The purpose of this study was to evaluate variation in individual TL throughout the course of a DIII soccer season given a consistent team external TL prescribed with a periodization training strategy.

Methods

Participants

- 20 (age 18-22) DIII male athletes on 2016 SJU varsity soccer team
- 8 center midfielders (CM), 2 central attacking (T), 6 wide attacking (W), and 4 central defenders (CB)

Procedure

- Athletes wore Polar HR monitors on a chest strap for all practice and game sessions
- Beat-to-beat HR measurements were recorded during training sessions using Polar Team Systems
- Each player had their max HR determined at the start of the season using a standardized fitness test

Data Analysis

- R Studio significance tests: ANOVA and Tukey’s
- Statistical significance p = 0.05

Results

Table 1: Avg. volume during training sessions for individual players by session type arranged into statistically significant groups

<table>
<thead>
<tr>
<th>Player</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Doe</td>
<td>200</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Jane Smith</td>
<td>300</td>
<td>250</td>
<td>200</td>
</tr>
<tr>
<td>Bob Johnson</td>
<td>400</td>
<td>350</td>
<td>300</td>
</tr>
</tbody>
</table>

Table 2: Avg. intensity during training sessions for individual players by session type arranged into statistically significant groups

<table>
<thead>
<tr>
<th>Player</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Doe</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Jane Smith</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Bob Johnson</td>
<td>30</td>
<td>25</td>
<td>20</td>
</tr>
</tbody>
</table>

Discussion

Volume

- Individual variance in volume of work performed during "Game" can be correlated with game minutes played
- As expected, "Practice-1" variance in volume is inversely related to game minutes played - this relationship is intentional to rest starting players the day before a game
- "Practice-2", "Practice-3", and "Practice" had no statistically significant differences in volume of work performed showing that practice plans are prescribing an equal volume of work to all individuals
- A possible recommendation could involve establishing volume thresholds during practice-1 based on anticipated number of game minutes to be played

Intensity

- Individual variation in intensity of work performed during "Game" can also be correlated with game minutes played - the exceptions to this trend can be explained by fitness level of the individual
- Intensity during "Practice-1" mirrors the inverse relationship seen in volume of work, but with greater variation
- As shown earlier, during "Practice-2" and "Practice" each athlete is performing the same volume of work - the variation in intensity on these days does not seem to be caused by positional differences, but rather individual fitness level
- A future recommendation would be to implement an alternate training session of equal intensity to a game session for those beyond the 13 athletes with the most playing minutes to combat de-training and mimic the high intensity of a game

Conclusions

- Individual variation had a statistically significant effect on the volume of work performed during "Game" and "Practice-1"
- Individual variation had a statistically significant effect on the intensity of work performed during "Game", "Practice-1", "Practice-2", and "Practice"

Acknowledgements

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References