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Impact of wellness indicators in the relationship between external and internal load in football

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INTRODUCTION:

Understanding the relationship between external and internal load according to the wellness monitoring commonly used in elite sports can be of great interest in order to adapt and optimise the athletes' training sessions.

We aimed to determine whether the external load performed in a training session is below or above what is expected for an athlete considering a specific internal load, based on the athletes' individual profile, and then to identify the wellness parameters that may be associated with these variations. **METHODS:**

Training and wellness data from 15 elite female footballers (23.7 ± 4.4 years) was collected during a 7-month follow-up throughout the 2021-22 season.

Wellness data (i.e. sleep duration and quality, perceived fitness, wake up mood), were collected through a daily mobile app questionnaire.

Regarding the training data, the players wore GPS Catapult tracking devices which provide information on their displacements, speeds, accelerations and related metrics,

We chose to use Catapult Player Load, which is the sum of the acceleration across all axes of the internal tri-axial accelerometer during training session as our external load metrics, and Rating of Perceived Effort (RPE) as our internal load metrics [1,2]. A total of 1,419 training sessions containing both Player Load and RPE were collected. The internal-external load pairs were grouped by player and by RPE, to calculate the 15 and 85 percentiles of Player Load for each RPE category. The "expected zone" of external load was determined when the Player Load corresponded to the estimated within the 15 and 85 percentile values; "below the expected " when Player Load is below 15 percentile values and "above the expected" when Player Load is above 85 percentile values.

Thereafter we compared the wellness indicators of the specific days where the external load variable was not in the "expected" range, through a Mann-Whitney U test. **RESULTS:**

The internal training load is highly and significantly associated with the external load (r = 0.65; p = 0.01). Considering the whole group, sleep duration is significantly higher (p-value = 0.011) when external load is above the expected for a specific RPE.

At individual level, sleep duration is significantly higher (p-value < 0.05) when external load is above the expected for 7 players. For other players the factors the most determinants for an external load above the expected is the sleep quality for 2 players, emotional feelings for 4 players and perceived physical condition for 4 player

CONCLUSION:

We showed that RPE is an excellent measure of external load. Yet, variations on such correlation occurs. We showed that increased sleep duration is the wellness indicator that is mostly associated with an external load above the expected for a similar level of internal load, suggesting that increased time of sleep is associated with a lower perception of fatigue.

References:

1) Carey et al. IJCSS (2016)

2) Marynowicz et al, Biology of sport (2022)

Topic: Statistics and Analyses

Presentation

Poster

European Database of Sport Science (EDSS)

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