apunts EDUCACIÓN FÍSICA Y DEPORTES

ISSUE 146

Published 01 October 2021
https://doi.org/10.5672/apunts.2014-0983.es.(2021/4).146.07

SPORT TRAINING

OPEN ACCESS

Contextual Variables and Weekly External Load in a Semi-professional Football Team

Daniel Hernández[1], Mario Sánchez[1], Victor Martin[1], Enrique Benéitez-Andrés[2] & Javier Sánchez-Sánchez[1]

[1] Sports Training and Performance Planning and Evaluation Research Group, Pontifical University of Salamanca, Salamanca (Spain).
[2] Department of Statistics. Faculty of Medicine. University of Salamanca, Salamanca (Spain).

Cite this article:
Hernández, D., Sánchez, M., Martin, V., Benéitez-Andrés, E. & Sánchez-Sánchez, J. (2021). Contextual Variables and Weekly External Load in a Semi-professional Football Team. *Apunts Educación Física y Deportes, 146*, 61-67. https://doi.org/10.5672/apunts.2014-0983.es.(2021/4).146.07

ISSN: 2014-0983

***Corresponding author:**
Javier Sánchez-Sánchez
jsanchezsa@upsa.es

Section:
Sport Training

Original language:
Spanish

Received:
5 September 2020

Accepted:
14 May 2021

Published:
1 October 2021

Cover:
Tokyo 2020 Olympics – Taekwondo: Women's Flyweight 49kg. Gold Medal match. Adriana Cerezo Iglesias (Spain) against Panipak Wongpatthanakit (Thailand). Makuhari Messe Hall, Chiba (Japan) 24.07.2021. REUTERS/Murad Sezer

Abstract

The objective of this study was to compare the external load of microcycle training sessions in a semi-professional football team based on player role during competition and match location. Eighteen football players competing in the Spanish third division were monitored by global positioning systems in the course of seven microcycles consisting of five sessions categorised by their position on match day (MD). The data were analysed according to whether the player was a starter or substitute and also whether the team played at home or away. The external load variables used were total distance (DREL), sprint distance (SPD), high (HSD), medium (MSD) and low (LSD) speed distance expressed as a function of session time, and the number of accelerations per minute (ACC n/10). External load was higher in MD+1 ($p < .01$) for substitutes (SPD, HSD and ACC) and in MD-1 ($p < .05$ and ($p < .01$) for starters (DREL, SPD and HSD). Similarly, in the microcycle's middle sessions, load (MD-4: DREL, SPD and HSD; MD-3: DREL, SPD and MSD; MD-2: DREL, MSD and LSD) was higher ($p < .05$ and $p < .01$) when the team played at home than when it played away. The findings of this research are relevant for planning the training process and post-competition recovery strategies.

Keywords: football, GPS, monitoring, performance, periodisation.

Introduction

Load is the physical and psychological stress generated in an athlete by training and competition (Foster et al., 2001). In these activities, stress on an athlete has traditionally been defined by internal load, which is related to physiological response (e.g. heart rate, perceived exertion, etc.), and by external load, which reports the effort made by the athlete (e.g. distance covered, number of sprints, etc.) (Wallace et al., 2014). In recent years, researchers and coaches (Akenhead & Nassis, 2016) have taken an increasingly greater interest in monitoring these variables, as this can help to optimise the training process and plan injury prevention strategies (Jaspers et al., 2017).

Technological progress has made it possible to improve load control processes and has also made it easier for coaches and players to familiarise themselves with training and competition monitoring tools (Rago et al., 2019). More specifically, portable microsensors using global positioning systems (GPS), approved by the International Federation of Association Football (FIFA) (FIFA, 2015), can easily quantify the volume of activity carried out by players during sports by recording variables such as distance travelled, high-speed movements and the number of accelerations and decelerations (Buchheit & Simpson, 2017). Although these instruments have certain limitations when it comes to monitoring high-speed effort, accelerations and decelerations (Buchheit et al., 2014), they are used by many teams for assessing the training process and footballers (Akenhead & Nassis, 2016).

Monitoring primary external load variables has made it possible to describe the training microcycle in professional (Malone et al., 2015; Owen et al., 2017), amateur (Sanchez-Sanchez et al., 2019) and youth (Wrigley et al., 2012) teams. However, the approach used on most occasions might be considered reductionist (Paul et al., 2015), as the microcycle load monitoring was conducted without taking the factors coaches have used to schedule their training sessions into consideration (Rago et al., 2019). Variables such as match location, the result of the competition, the number of matches included in the microcycle, the length of the training week, the upcoming opponent relative ranking and the role of the actual players during the match need to be studied and factored into the interpretation of the load associated with each training cycle (Brito et al., 2016). A recent study conducted with young football players from five teams (Curtis et al., 2020) found differences in weekly training load depending on the season phase (*i.e.*, preseason, regular season and postseason), days between matches (*i.e.*, < 4, 4-5 and > 5 days) and match result (*i.e.*, win, draw and loss). In a similar line, albeit using a sample of professional players from teams competing in the Spanish league, training volume was found to increase and intensity decrease in the week before and after matches against a higher-ranking opponent (Rago et al., 2019). Furthermore, the authors reported that volume rose in the week following a defeat while load intensity increased after home matches.

Monitoring the physical demand associated with the training microcycle without considering aspects such as player role during competition, match location or the relative ranking of the opposing team means ignoring the complexity associated with workload in football (Curtis et al., 2020). Although the number of studies in this area has increased in recent years, further research is needed to clarify the potential cause-effect relationship between certain contextual variables and weekly training load (Rago et al., 2019). Consequently, the main objective of this paper was to compare the external load of microcycle training sessions in a semi-professional football team based on player role during competition and match location.

Methodology

Participants

The study involved 18 semi-professional football players (26.2 ± 3.9 years old; 177.7 ± 5.3 cm height; 73.9 ± 6.4 kg body mass) competing in the Spanish third division. The players trained five times a week and played one official match at the weekend. The study monitored seven consecutive competition microcycles in the first section of the season. The inclusion criteria for choosing the study sample were: i) being an outfield player; ii) taking part in 85 % of the training sessions; iii) completing at least 50 % of the regular matches; iv) not having sustained any injury in the four months prior to data collection (Sánchez et al., 2019). The circumstances intrinsic to the training process meant that 601 of the 630 total records were ultimately used for the study, divided according to the different variables shown in Table 1.

The participating club's coaching staff approved the research and the players signed an informed consent form describing the procedures, risks and benefits associated with taking part in the study. The experimental design fulfilled the requirements of the Declaration of Helsinki.

Table 1
Number of records analysed for each variable under study.

Sessions	Location		Role	
	Home	Away	Starter	Substitute
MD+1	64	50	65	49
MD-4	69	54	70	53
MD-3	68	53	69	52
MD-2	68	53	69	52
MD-1	69	53	70	52

Note. MD+1: first training session of the microcycle; MD-4: second training session of the microcycle; MD-3: third training session of the microcycle; MD-2: fourth training session of the microcycle; MD-1: last training session of the microcycle.

Instruments

The external load measurement during the training sessions was obtained using a GPS unit (K-GPS 10 Hz, K-Sport®, Motelabbate, PU, Italy) with acceptable reliability demonstrated in previous studies (Fernandes-da-Silva et al., 2016). The device was fitted to the player's upper back inside the pocket of a purpose-built vest worn under the training shirt. All the GPS units were switched on at the same time, *i.e.*, 10 minutes before the start of the external load recording. The start and end of each measurement session was noted in order to extract only the gross training time data. The data collected were analysed using the K-Fitness software (K-Sport®, Motelabbate, PU, Italy). A spreadsheet designed for the study was used to tabulate the data.

Procedure

To assess the differences between player roles during competition, the footballers were classified as starters, if they had begun the match in the starting eleven, and as substitutes, when i) they had participated in the match once it had started, ii) they had been called up but had not played any minutes, iii) they had not been called up to the squad for that match. To test for the effect of match location, home status, *i.e.*, when the team played at its own ground, and away status, when the team played at the opposing team's ground, was recorded (Table 1). The training sessions were also classified chronologically depending on what the next competition was (Sánchez-Sánchez, et al., 2019). In the first training session of the week (post-match day [MD+1]), the starters in the previous match did recovery work (*i.e.*, low-intensity aerobic and mobility exercises) while the substitutes and non-called-up players performed supplementary work (*i.e.*, specific circuits with high neuromuscular demand). In the second training session (*i.e.*, MD-4), specific work was carried out in the form of small-sided games with high neuromuscular demand (50 m^2 per player) together with preventive work (mobility, eccentric and core strength) for all the squad players. In the third training session of the week (*i.e.*, MD-3), small-sided games (100 m^2 per player) were combined with 11 *vs.* 11 matches with a defensive tactical orientation for all players. In the fourth training session of the week (*i.e.*, MD-2), all the players took part in situations geared towards speed optimisation and 11 *vs.*11 contests with an offensive tactical orientation. In the last training session, held on match day (*i.e.*, MD-1), all the players did activation drills and set pieces. In all the microcycles analysed, the rest day for the players was the day after the MD+1 session.

Measurements

All the variables were expressed in relative values (m·min-1) as a function of each player's participation time during the training session. The external load variables were selected on the basis of previous studies (Sánchez-Sánchez et al., 2019): i) total distance (DREL; m·min-1), ii) sprint distance (SPD; > 19.8, m·min^{-1}), iii) high-speed distance (HSD; 14.4-19.8 km·h-1, m·min^{-1}), iv) medium-speed distance (MSD; 7-14.4 km·h^{-1}, m·min^{-1}), v) low-speed distance (LSD; 0-7 km·h^{-1}, m·min^{-1}) and vi) number of accelerations (ACC; >3.0 m·s^{-2}, n/10·min^{-1}). The external load of each variable analysed was the mean value of the sessions with the same orientation that comprised each one of the seven microcycles analysed. The ACC value was stated in base-10 for better expression of the result.

Statistical analysis

Data were presented as mean ± standard deviation. The normality of the data was verified with the Shapiro-Wilk test ($p > .05$). The Student's t-test for independent samples was used to determine differences in external load, factoring in match location and player role during competition. Significant differences were considered when $p < .05$. Additionally, the effect size (ES) was assessed using Cohen's d-test (Cohen, 1988). The *d* value was interpreted using the following scale: trivial < 0.2, low = 0.2 - 0.5, moderate = 0.5 - 0.8 and high > 0.8 (Hopkins et al., 2009). The Statistical Package for the Social Sciences was used (SPSS, version 25.0, SPSS Inc., Chicago, IL, USA).

Table 2
External load values (mean ± SD) in each training session factoring in the player role during competition.

Variable	MD+1						MD-4						MD-3						MD-2						MD-1					
	Starter			Substitute			Starter			Substitute			Starter			Substitute			Starter			Substitute			Starter			Substitute		
DREL (m·min⁻¹)	74.42	±	12.97	77.19	±	14.56	75.50	±	13.85	76.62	±	15.05	74.06	±	14.13	73.89	±	17.87	70.40	±	6.78	70.42	±	7.29	49.95	±	4.00**	46.85	±	4.60
SPD (m·min⁻¹)	0.64	±	0.95**	1.28	±	1.08	1.03	±	0.66	0.95	±	0.67	2.29	±	1.65	2.09	±	1.72	2.41	±	1.04	2.67	±	1.25	0.50	±	0.40*	0.22	±	0.24
HSD (m·min⁻¹)	1.36	±	1.98**	2.80	±	2.24	8.97	±	7.91	9.50	±	10.88	7.73	±	3.94	7.71	±	5.72	6.90	±	2.03	6.71	±	1.97	1.91	±	1.13**	1.23	±	0.85
MSD (m·min⁻¹)	46.06	±	11.43	43.25	±	11.53	32.43	±	8.78	33.27	±	7.55	31.34	±	9.37	32.05	±	13.06	28.60	±	5.58	28.22	±	5.58	17.37	±	1.82	16.54	±	2.21
LSD (m·min⁻¹)	25.22	±	5.01	28.15	±	5.09	32.03	±	2.89	31.75	±	3.08	31.61	±	3.28	31.00	±	3.56	31.47	±	2.94	31.75	±	2.84	28.76	±	2.50	27.43	±	2.74
ACC (n/10·min⁻¹)	3.87	±	4.22**	7.53	±	4.93	9.94	±	2.44	10.33	±	2.70	9.87	±	6.45	9.26	±	2.06	8.80	±	1.57	9.01	±	1.76	6.03	±	2.11	6.00	±	1.95

MD+1: first training session of the microcycle; MD-4: second training session of the microcycle; MD-3: third training session of the microcycle; MD-2: fourth training session of the microcycle; MD-1: last training session of the microcycle ; DREL: total distance; SPD: sprint distance (>19.8 km·h⁻¹); HSD: high-speed distance (14.4-19.8 km·h⁻¹); MSD: medium-speed distance (7-14.4 km·h⁻¹); LSD: low-speed distance (0-7 km·h⁻¹); ACC: number of accelerations (>3.0 m·s⁻²).* Shows starter *vs.* substitute difference, **p* < .05 y ***p* < .01.

Table 3
External load values (mean ± SD) in each training session controlling for match location.

Variable	MD+1						MD-4						MD-3						MD-2						MD-1					
	Home			Away			Home			Away			Home			Away			Home			Away			Home			Away		
DREL (m/min)	74.74	±	16.56	76.87	±	8.58	79.60	±	17.24**	71.20	±	6.82	79.63	±	17.43*	66.46	±	9.12	72.70	±	7.74**	67.41	±	4.33	48.51	±	4.56	48.57	±	4.53
SPD (m/min)	0.91	±	1.06	0.95	±	1.07	1.25	±	0.71**	0.66	±	0.40	2.62	±	1.97**	1.65	±	0.95	2.41	±	1.16	2.67	±	1.10	0.37	±	0.37	0.38	±	0.37
HSD (m/min)	1.88	±	2.12	2.16	±	2.33	12.58	±	11.13**	4.70	±	1.57	9.51	±	5.50**	5.33	±	1.86	7.13	±	2.17	6.41	±	1.68	2.11	±	0.96	2.90	±	0.95
MSD (m/min)	44.81	±	12.73	44.83	±	9.77	33.28	±	9.86	32.17	±	5.39	35.35	±	12.56**	26.74	±	6.10	29.65	±	6.26**	26.83	±	3.99	17.42	±	1.97	17.45	±	1.97
LSD (m/min)	25.93	±	5.15	27.31	±	5.29	31.39	±	3.11	32.59	±	2.63	31.19	±	4.03	31.54	±	2.36	32.37	±	2.99**	30.57	±	2.42	28.61	±	2.61	28.63	±	2.60
ACC (n/10·min⁻¹)	5.33	±	4.67	5.26	±	5.18	10.08	±	2.34	10.15	±	2.83	9.20	±	6.54	9.57	±	2.06	8.81	±	2.07	8.83	±	1.47	6.02	±	2.05	6.02	±	2.03

MD+1: first training session of the microcycle; MD-4: second training session of the microcycle; MD-3: third training session of the microcycle; MD-2: fourth training session of the microcycle; MD-1: last training session of the microcycle; DREL: total distance; SPD: sprint distance (>19.8 km·h⁻¹); HSD: high-speed distance (14.4-19.8 km·h⁻¹); MSD: medium-speed distance (7-14.4 km·h⁻¹); LSD: low-speed distance (0-7 km·h⁻¹); ACC: number of accelerations (>3.0 m·s⁻²).* Shows home vs. away difference, **p* < .05 and ***p* < .01.

Results

Table 2 shows that in the MD+1 session, the SPD (d = 0.63), HSD (d = 0.69) and ACC (d = 0.68) demands were significantly lower ($p < .001$, $p < .000$, $p < .002$ and $p < .000$, respectively) for starters than for substitutes. The results showed no significant differences in the external load obtained between starters and substitutes in the middle sessions of the microcycle (*i .e.*, MD-4, MD-3 and MD-2). However, the values found in DP-1 indicated that the external load for the starting players was significantly higher than for substitutes (Drel: $p < .01$, d = -0.73; DE: $p < .05$, d = -0.83; DAV: $p < .01$, d = -0.51

With regard to match location (Table 3), in MD-4 the Drel (d = -0.61), SPD (d = -0.99) and HSD (d = -0.93) values were significantly higher ($p < .001$, $p < .000$ and $p < <.000$) when the team trained to play at home than when it played away. In MD-3, the results showed that Drel (d = -0.91), SPD (d = -0.6) and HSD (d = -0.96) were significantly higher ($p < .000$, $p < .001$ and $p < .000$, respectively) when the team played at home than when it played away. Similarly, the Drel (d = -0.81), MSD (d = -0.52) and LSD (d = -0.65) values found in MD-2 were significantly higher ($p < <.000$, $p < .005$ and $p < .000$, respectively) when the team played at home as opposed to away.

Discussion

The main purpose of this paper was to compare the external load of microcycle training sessions in a semi-professional football team based on player role during competition and match location. To our knowledge, most studies have examined weekly training load in terms of contextual variables, although few have investigated the effect of these factors in the microcycle sessions. The most outstanding results of this study indicated a higher external load in the MD+1 session for substitutes and in the MD-1 session for starters. Similarly, training load was higher in the MD-4, MD-3 and MD-2 sessions when the team was playing at home than when they played away.

There were no differences between starters and substitutes in external load in the middle sessions of the microcycle (*i.e,*. MD-4, MD-3 and MD-2). Previous studies reported similar results when analysing weekly training load as a function of player role in competition (Curtis et al., 2020). Due to the short time interval between competitions, during regular training weeks (*i.e.*, 5-7 days between matches), coaches tend to concentrate training load days in the middle part of the microcycle (Rago et al., 2019). This allows starters and substitutes to receive sufficient training stimulus to maintain their level of fitness without compromising their readiness for imminent competition (Martín-García et al., 2018). Although player fitness depends largely on the training done during the week, competition load also influences the footballer's preparation (Morgans et al., 2018). Based on this result, it transpired that substitute players, whose yearly match/game time only amounts to 20% may have less-developed aerobic fitness than starters (Curtis et al., 2020). Therefore, in these players, the load of the middle microcycle sessions should be supplemented by training to offset the lack of game time (Anderson et al., 2016). On most occasions, the post-match session (*i.e.*, MD+1) was used to replicate competition load for players who had had less game time (Martín-García et al., 2018).

Our results show higher load values for substitutes in MD+1 (*i.e.*, SPD, HSD and ACC) and for starters in MD-1 (*i.e.*, DREL, SPD and HSD). The differences found in MD+1 are consistent with the results of previous studies (Martín-García et al., 2018). In these sessions, the training load is diversified to meet the needs of the players depending on their role in competition. More specifically, the load differences found in the MD+1 session are due to the fact that the starters do recovery training based on aerobic load, whereas the substitutes engage in tasks to make up for their lack of game time (Stevens et al., 2017). Given that it is hard for a training session to replicate match demands (Sánchez-Sánchez et al., 2019), the MD+1 session usually includes high neuromuscular demand and little by way of high speed (Martín-García et al., 2018), as it usually involves few players and small areas (Owen et al., 2011). However, as high speed appears to be a skill that is increasingly more associated with success in football (Faude et al., 2012) and with the prevention of hamstring injuries (Malone et al., 2018), coaches should include activities that encourage this type of drills in substitutes during the MD+1 session.

When the external load of the sessions was analysed in terms of match location, the MD-4, MD-3 and MD-2 sessions in general presented higher load values when the team was playing at home. These results are consistent with those of other studies conducted with elite youth football players (Brito et al., 2016). It may be that neuromuscular load is lower in the microcycles used to prepare for away matches to offset the fatigue associated with these weeks caused by travel and disrupted sleep routines (Rago et al., 2019). To cope with this problem, coaches regulate session loads and the actual players adapt their weekly training rhythm to keep fatigue within acceptable limits that allow them to compete successfully at the weekend (Brito et al., 2016).

Studies investigating the effect of the contextual variables related to training load in football should use a full training period, multiple teams and several seasons for the analysis (Rago et al., 2019). However, our study was conducted at a specific point in the season using a small sample of semi-professional players. In addition, given that football players may respond differently to training load (Brito et al., 2016), the load control process should take each player's individual characteristics into consideration. To this end, it would seem advisable to use individual speed thresholds to monitor external load (Abt & Lovell, 2009). Nevertheless, our study was based on general references for speed ranges.

Conclusion

The most salient results of our study indicated a higher external load in the MD+1 session for substitutes and in the MD-1 session for starters, with no other differences for this player role in the other sessions. Our findings are relevant for training planning processes and recovery strategies for football players taking part in a sport with a match-intensive competition period. Consequently, when coaches plan their sessions, they should consider the interaction between the variables analysed in this study and others included in previous research in order to understand player response to the training stimulus. In a highly complex sport, training load needs to be tailored to all the aspects that may impact the adaptation process during a prolonged and competition-intensive period.

References

Abt, G., & Lovell, R. (2009). The use of individualized speed and intensity thresholds for determining the distance run at high-intensity in professional soccer. *Journal of Sports Sciences*, *27*(9), 893-898. https://doi.org/10.1080/02640410902998239

Akenhead, R., & Nassis, G. P. (2016). Training load and player monitoring in high-level football: Current practice and perceptions. *International Journal of Sports Physiology and Performance*, *11*(5), 587-593. https://doi.org/10.1123/ijspp.2015-0331

Anderson, L., Orme, P., Di Michele, R., Close, G. L., Milsom, J., Morgans, R., Drust B. & Morton, J. P. (2016). Quantification of seasonal-long physical load in soccer players with different starting status from the English premier league: Implications for maintaining squad physical fitness. *International Journal of Sports Physiology and Performance*, *11*(8), 1038-1046. https://doi.org/10.1123/ijspp.2015-0672

Brito, J., Hertzog, M., & Nassis, G. P. (2016). Do match-related contextual variables influence training load in highly trained soccer players? *Journal of Strength and Conditioning Research*, *30*(2), 393-399. https://doi.org/10.1519/JSC.0000000000001113

Buchheit, M., Haddad, H. Al, Simpson, B. M., Palazzi, D., Bourdon, P. C., Salvo, V. Di, & Méndez-Villanueva, A. (2014). Monitoring accelerations with gps in football: Time to slow down. *International Journal of Sports Physiology and Performance*, *9*(3), 442-445. https://doi.org/10.1123/IJSPP.2013-0187

Buchheit, M., & Simpson, B. M. (2017). Player-Tracking Technology : Half-Full or Half-Empty Glass ? *International Journal of Sports Physiology and Performance*, *12*, S235-S241.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Lawrence Earlbaum Associates.

Curtis, R. M., Huggins, R. A., Benjamin, C. L., Sekiguchi, Y., Adams, W. M., Arent, S. M., Jain, R., Miller, S. J., Walker, A. J. & Casa, D.J. (2020). Contextual Factors Influencing External and Internal Training Loads in Collegiate Men's Soccer. *Journal of Strength and Conditioning Research*, *34*(2), 374-381. https://doi.org/10.1519/JSC.0000000000003361

Faude, O., Koch, T., & Meyer, T. (2012). Straight sprinting is the most frequent action in goal situations in professional football. *Journal of Sports Sciences*, *30*(7), 625-631. https://doi.org/10.1080/02640414.2012.665940

Fernandes-da-Silva, J., Castagna, C., Teixeira, A. S., Carminatti, L. J., & Guglielmo, L. G. A. (2016). The peak velocity derived from the Carminatti Test is related to physical match performance in young soccer players. *Journal of Sports Sciences, 34*(24), 2238-2245. https://doi.org/10.1080/02640414.2016.1209307

FIFA. (2015). Approval of electronic performance and tracking system (EPTS) devices. Federation Internationale de Football Association, Circular 1494.

Foster, C., Florhaug, J. A., Franklin, J., Gottschall, L., Hrovatin, L. A., Parker, S., Doleshal, P. & Dodge, C. (2001). A new approach to monitoring exercise training. *Journal of Strength and Conditioning Research*, *15*(1), 109-115. https://doi.org/10.1519/00124278-200102000-00019

Hopkins, W.G.; Marshall, S.W.; Batterham, A.M., & Hanin, J. (2009). Progressive statistics for studies in sports medicine and exercise science. *Medicine and Sciences and Sports Exercises 41*(1), 3-13. https://doi.org/10.1249/MSS.0b013e31818cb278

Jaspers, A., Brink, M. S., Probst, S. G. M., Frencken, W. G. P., & Helsen, W. F. (2017). Relationships Between Training Load Indicators and Training Outcomes in Professional Soccer. *Sports Medicine*, *47*(3), 533-544. https://doi.org/10.1007/s40279-016-0591-0

Malone, J. J., Michele, R. Di, Morgans, R., Burgess, D., Morton, J. P., & Drust, B. (2015). Seasonal Training-Load Quantification in Elite English Premier League Soccer Players. *International Journal of Sports Physiology & Performance*, *10*, 489-497. https://doi.org/10.1123/ijspp.2014-0352

Malone, S., Owen, A., Mendes, B., Hughes, B., Collins, K., & Gabbett, T. J. (2018). High-speed running and sprinting as an injury risk factor in soccer: Can well-developed physical qualities reduce the risk? *Journal of Science and Medicine in Sport*, *21*(3), 257-262. https://doi.org/10.1016/j.jsams.2017.05.016

Martín-García, A., Gómez Díaz, A., Bradley, P. S., Morera, F., & Casamichana, D. (2018). Quantification of a Professional Football Team's External Load Using a Microcycle Structure. *Journal of Strength and Conditioning Research*, *32*(12), 3511-3518. https://doi.org/10.1519/JSC.0000000000002816

Morgans, R., Di Michele, R., & Drust, B. (2018). Soccer Match Play as an Important Component of the Power-Training Stimulus in Premier League Players. *International Journal of Sports Physiology and Performance*, *13*(5), 665-667. https://doi.org/10.1123/ijspp.2016-0412

Owen, A. L., Lago-Peña, C., Mendes, B., & Dellal, A. (2017). Analysis of a training mesocycle and positional quantification in elite European soccer players. *International Journal of Sports Science & Coaching*, *12*(5), 665-676. https://doi.org/10.1177/1747954117727851

Owen, A. L., Wong, D. P., McKenna, M., & Dellal, A. (2011). Heart rate responses and technical comparison between small- vs. large-sided games in elite professional soccer. *Journal of Strength and Conditioning Research*, *25*(8), 2104-2110. https://doi.org/10.1519/JSC.0b013e3181f0a8a3

Paul, D. J., Bradley, P. S., & Nassis, G. P. (2015). Factors affecting match running performance of elite soccer players: shedding some light on the complexity. *International Journal of Sports Physiology and Performance*, *10*(4), 516-519. https://doi.org/10.1123/IJSPP.2015-0029

Rago, V., Rebelo, A., Krustrup, P., & Mohr, M. (2019). Contextual Variables and Training Load Throughout a Competitive Period in a Top-Level Male Soccer Team. *Journal of Strength and Conditioning Research*, (25), 1-7. https://doi.org/10.1519/jsc.0000000000003258

Sánchez, M., Hernández, D., Carretero, M., & Sánchez-Sánchez, J. (2019). Level of Opposition on Physical Performance and Technical-Tactical Behaviour of Young Football Players. *Apunts Educación Física y Deportes, 137*, 71-84. https://doi.org/10.5672/apunts.2014-0983.es.(2019/3).137.06

Sánchez-Sánchez, J., Hernández, D., Martin, V., Sánchez, M., Casamichana, D., Rodríguez-Fernández, A., Ramírez-Campillo, R. & Nakamura, F. Y. (2019). Assessment of the external load of amateur soccer players during four consecutive training microcycles in relation to the external load during official match. *Motriz. Revista de Educaçao Física*, *24*(1), e101938. https://doi.org/10.1590/s1980-65742019000010014

Stevens, T. G. A., de Ruiter, C. J., Twisk, J. W. R., Savelsbergh, G. J. P., & Beek, P. J. (2017). Quantification of in-season training load relative to match load in professional Dutch Eredivisie football players. *Science and Medicine in Football*, *1*(2), 117-125. https://doi.org/10.1080/24733938.2017.1282163

Wallace, L. K., Slattery, K. M., & Coutts, A. J. (2014). A comparison of methods for quantifying training load: relationships between modelled and actual training responses. *European Journal of Applied Physiology, 114*(1), 11-20. https://doi.org/10.1007/s00421-013-2745-1

Wrigley, R., Drust, B., Stratton, G., Scott, M., & Gregson, W. (2012). Quantification of the typical weekly in-season training load in elite junior soccer players. *Journal of Sports Sciences*, *30*(15), 1573-1580. https://doi.org/10.1080/02640414.2012.709265

Conflict of Interests: No conflict of interest was reported by the authors.