Physical Movement Demands of Training and Matches across a Full Competition Cycle in Elite Netball

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Abstract: Elite netballers perform different training and match sessions across the annual competition cycle. A comprehensive exploration of the physical movement demands imposed on the athletes and the distribution of external workloads across these sessions are yet to be reported in the literature. This study aims to quantify the movement demands of elite netball across all session types (pre-season training, pre-season practice match, pre-season cup matches, in-season training, in-season practice matches, and competition matches). Knowledge of these demands will allow for more precise season planning and may assist with the management of athletes’ workloads. Twelve elite female netballers were monitored across a full competition cycle using a local positioning system (LPS) to collect spatiotemporal (i.e., distance, velocity, and acceleration measures) and accelerometer-derived measures (i.e., PlayerLoad measures). Metreage and PlayerLoad per minute for match-play sessions (practice and competition) were higher than for training sessions for all positional groups. Differences were present across session types, and within and between positional groups, which should be incorporated into full season planning (i.e., pre-season, in-season, and finals). Coaches and support staff should be cognisant of the potential influence of changing a player’s position, or altering session structure or duration, on the workload for the athlete.

Keywords: local positioning system; ultra-wideband; wearable; team-sport; competition

1. Introduction

A well-structured, periodised training program enhances physiological qualities of the athlete through a balanced exposure to stimuli, whilst managing stress and fatigue, with the aim of improving athletic performance [1]. Teams often employ thoroughly considered regimes involving variations in loading and recovery across different facets of physical and skill development preparation, in order to periodise their programmes [2]. Elite team sports such as rugby [3], basketball [4], and Australian football [5] have demonstrated the changes in external load demands that occur in different phases of a competitive season.

The capacity to monitor the physical movement demands of elite netballers during training and competition in indoor environments has improved in recent years, predominantly due to advances in technology. Wearable devices and local positioning systems (LPS) enable outcomes such as accelerometer-derived load (e.g., PlayerLoad) and more recently, spatiotemporal outcomes (e.g., distances covered) to be collected during training and competition [6,7]. Currently, there is a scarcity of published data relating to the physical movement demands across the entire netball season, which limits the understanding of the stimuli imposed on these athletes.
Accelerometer-derived variables (e.g., PlayerLoad) have been used to explore the physical movement demands in netballers [8,9]. These studies revealed new insights into the movement of netballers and demonstrated that the use of movement-tracking sensors (i.e., accelerometers) allows for the simultaneous collection of objective training load data across a netball squad in an indoor environment [8,9]. However, these early studies recruited participants from sub-elite cohorts and focused on differentiating between netballers of different skill-levels [9], or used a small sample of in-season training and competition (4 matches and 15 training sessions) [8]. Two later studies have provided measures of workload over the course of an elite netball season [6,10]. Young et al. [6] were the first to use accelerometer-derived measures of physical movement demands across the whole regular-season timeframe with an elite squad of netballers. Unfortunately, no pre-season training or pre-season competition data were included in their analyses [6]. While the study showed some informative comparisons of activity profiles between netball positions, the reported values are not directly comparable to values shown in this or other published studies [7–9]. This disparity in values may be a result of inconsistencies in definitions and application of the PlayerLoad algorithm in the literature [11].

Another recent study investigated the relationships between external and internal workload variables in elite netball using an extensive data collection period covering the entire pre-season and regular-season [10]. The findings of this correlational analysis identified a number of strong positive relationships that exist between measures of internal workload (heart rate indices, session-rating of perceived exertion) and accelerometer-derived external workload measures [10]. This supports the value of accelerometer-derived measures such as PlayerLoad in netball, as this external measure of load may be useful to infer internal physiological stress. However, the descriptive data for each session type (training/competition) or season phase (pre-season/in-season) were not presented, which precludes its use for the purposes of quantifying specific movement demands or season workload planning.

Sweeting et al. [12] were the first to use a LPS in netball, employing radio-frequency tracking to assess the recurring sequences of movement in elite netball match-play. The evolution of LPS technology in sport has moved toward the use of ultra-wideband communication methods [13], as this improves signal stability and may reduce interference when compared to traditional radio-frequency signal communications [14]. A recent analysis of elite netball used a commercially available LPS to monitor the physical demands of match-play using both spatiotemporal and accelerometer-derived variables [7]. Spatiotemporal measures can provide additional context about the physical movement demands, in addition to an overall sum of movement provided by accelerometry. The study profiled all netball positions during elite match-play using a range of measures (distance, velocity, acceleration, etc.) and provided descriptive comparisons between positional demands [7]. However, the study comprised a small number of matches (n = 6) and no training data were provided.

There are limited data available exploring the physical movement demands of elite netball, particularly across different session types or season phases. Currently, no studies have examined spatiotemporal and accelerometer-derived variables across a full season of elite netball, inclusive of all pre-season and in-season on-court training and competition sessions. A wide-ranging evaluation of a full season of elite netball would not only outline trends of load incurred by the athletes but would also quantify the movement demands of a number of session types that have not previously been explored (e.g., pre-season competition matches and practice matches). Additionally, club training sessions from both pre-season and in-season are yet to be quantified using spatiotemporal measures. Therefore, the aim of this study was to describe the sessional on-court movement demands and external workloads across an entire season of elite netball, using both accelerometry and positioning technologies.
2. Materials and Methods

2.1. Participants

Twelve elite female netballers (mean ± standard deviation: age = 25.9 ± 5.1 years; height = 178.6 ± 8.9 cm; body mass = 71.1 ± 7.1 kg) from one team competing in Australia’s premier netball competition (Suncorp Super Netball) provided written informed consent prior to participating in this study. Athletes were categorised according to their positional grouping—defender (GK, goal keeper; GD, goal defence), goaler (GS, goal shooter; GA, goal attack), or midcourter (C, centre; WA, wing attack; WD, wing defence) [15,16]—as many athletes play in more than one specific position throughout the season, but typically remain within their positional grouping. Classifying athletes within positional groups allowed for reporting while protecting the confidentiality of each individual. The athletes recruited for this study covered all netball positional groups: goalers (n = 3), defenders (n = 4), and midcourters (n = 5). Team lists are restricted to 10 main squad athletes; however, injured athletes may be replaced during the season with official team training partners or approved external injury replacement players. Replacement players were included in this study where they both trained with the team and played during an official competition match. Ethical approval was granted by the Deakin University Human Ethics Advisory Group (HEAG-H 206_2018).

2.2. Data Collection

This was a longitudinal single-cohort observational research design for one team. Data collection occurred over an entire pre-season and competitive season of elite netball. Catapult T6 devices containing a 10 Hz LPS receiver tag and 100 Hz inertial sensors (tri-axial accelerometer, gyroscope, and magnetometer) (Catapult Sports, Melbourne, Australia) were worn by each athlete for every training session and match. Devices were held in a fitted pouch built into a sports vest (upper-back) to ensure a close fit for the sensors and unencumbered movement for the athletes. The Catapult ClearSky LPS (Catapult Sports, Melbourne, Australia) consisted of a pre-installed network of anchors in the team’s training centre and home competition venue to communicate with the LPS receiver tags in the T6 devices and track positional movement data using ultra-wideband technology. The ClearSky LPS has shown acceptable validity for time-motion analysis in team sport applications within an indoor environment [17]. Training sessions and matches recorded in stadia with no LPS system were limited to accelerometer-derived variables only.

Data were recorded from all coach-prescribed, on-court, pre-season training sessions (n = 29), pre-season practice matches (n = 8), pre-season tournament matches (n = 4), in-season training sessions (n = 21), in-season practice matches (n = 5), and competition matches (n = 15). A total of 744 unique sessions for all athletes, across all session types over the course of the full season were recorded. LPS anchors were only available in one competition stadium, thereby limiting available LPS data capture to matches played at this venue (n = 6). All pre-season and in-season training sessions (n = 50) were captured using LPS technology, with anchors installed in the training stadium. The total number of unique sessions collected containing LPS variables was 566 of the 744 individual samples.

All sessions were coded using the accompanying proprietary software—Openfield v1.22.0 (Catapult Sports, Melbourne, Australia). The times when a player was on the bench and breaks between quarters were excluded from match-play data. During training sessions, coaching stops and breaks between drill blocks were excluded from analysis. However, planned rest intervals in drills were included. Spatiotemporal and accelerometer-derived data are reported in this manner to reflect the actual volume and intensity of the drills, quarters, and prescribed tasks—rather than as an average of the entire session. No resistance training or off-court conditioning sessions were included in this analysis, as the focus of this study was on-court workloads.
2.3. Key Season Events

A pre-season tournament occurred on March 8–10 requiring athletes to play up to four matches in a three-day time frame. A scheduled season break occurred between round 9 (23rd June) and round 10 (27th July) for the quadrennial Netball World Cup, coordinated by the International Netball Federation. Training and matches were halted during the Netball World Cup, as many players across the domestic competition were released for international duties.

2.4. Data Analysis

The statistical computing program R (version 3.6.0) was used for data analysis [18]. Standard spatiotemporal and accelerometer-derived variables from Catapult’s Openfield software were assessed based upon a previous study into netball match performance [7]. Spatiotemporal measures include total distance covered (m), metreage per minute (m·min⁻¹), acceleration density (avg acc/dec; m·s⁻²), acceleration density index (avg acc/dec per 10 m; m·s⁻²), and acceleration load (total acc/dec; m·s⁻²). Accelerometer-derived measures include total PlayerLoad (au), PlayerLoad per minute (au·min⁻¹), and total jumps (count). Openfield software was used to summarise and process the variables in the console, and then export them for analysis in R. Descriptive statistics (mean and standard deviation) were calculated using the {dplyr} package (version 0.8.4) for all variables [19]. Figures were produced using the {ggplot2} package (version 3.2.1) [20]. Comparisons are made based on the descriptive data presented, as the limited number of independent samples (squad size) constrained the use of inferential statistics.

3. Results

3.1. Absolute Session Demands

Descriptive statistics (mean and standard deviation) for measures of absolute movement (volume) in each session type and positional grouping are presented in Table 1. All positional groups accumulated their highest mean total distances during in-season practice matches, whereas the session type which accumulated the highest total PlayerLoad differed between positional groups (midcourters—competition matches, defenders—pre-season practice matches, and goalers—in-season practice matches). Positional group summaries of each session type are presented in Table 1. The distribution of total weekly training and competition load (volume) across the full season, as measured using total PlayerLoad, is presented in Figure 1. A summary (mean and standard deviation) for all session types and athletes across the season is presented in Figure 2.
Table 1. Descriptive statistics for parameters of session volume in netball for each positional group. Data are presented as mean ± standard deviation.

| Positional Group | Session Type                | Duration (min) | Total Distance (m) | Total Acceleration Load (total ac/dex; m·s⁻²) | Total PlayerLoad (au) | Total Jumps (count) | Metrage Per Minute (m·min⁻¹) | PlayerLoad Per Minute (au·min⁻¹) | Acceleration Density Index (avg ac/dex per 10 m; m·s⁻²) | Acceleration Density (avg ac/dex; m·s⁻²) |
|------------------|-----------------------------|----------------|-------------------|-----------------------------------------------|-----------------------|----------------------|-------------------------------|-----------------------------------|-----------------------------------|--------------------------------------|
| Defender         | Competition Match           | 55.4 ± 23.4    | 175.2 ± 109.5     | 263.2 ± 110.9                                | 614.5 ± 239.0         | 43.6 ± 22.9          | 76.30 ± 9.74                  | 9.38 ± 1.39                       | 6.01 ± 0.38                       | 0.71 ± 0.09                          |
|                  | Pre-season Practice Match   | 61.2 ± 20.9    | 2303.5 ± 1173.7   | 2530.5 ± 713.7                               | 455.4 ± 152.5         | 62.4 ± 24.9          | 59.56 ± 21.02                 | 7.16 ± 1.74                       | 6.67 ± 1.21                       | 0.62 ± 0.14                          |
|                  | Pre-season Cup Match        | 48.9 ± 16.7    | 357.8 ± 146.1     | 227.2 ± 94.3                                 | 60.0 ± 24.2           | -                    | 7.64 ± 1.60                   | -                                 | 6.05 ± 1.53                       | 0.48 ± 0.09                          |
|                  | Pre-season Training         | 66.4 ± 15.8    | 1957.1 ± 561.3    | 257.8 ± 87.4                                 | 40.1 ± 22.6           | -                    | 10.51 ± 11.1                 | -                                 | 7.36 ± 1.19                       | -                                    |
|                  | In-Season Training          | 58.3 ± 12.2    | 2798.9 ± 859.7    | 233.1 ± 74.9                                 | 47.6 ± 22.9           | -                    | 47.66 ± 9.16                 | -                                 | 6.91 ± 0.64                       | -                                    |
|                  | In-Season Training          | 58.3 ± 12.2    | 373.9 ± 117.0     | 233.1 ± 74.9                                 | 47.6 ± 22.9           | -                    | 47.66 ± 9.16                 | -                                 | 6.91 ± 0.64                       | -                                    |

Abbreviations: Defender: goal defence, goal keeper; Midcourter: centre, wing attack, wing defence; Goaler: goal shooter, goal attack; m: metres; ac/dex: acceleration and deceleration; m·s⁻²: metres per second; au: arbitrary units; m·s⁻¹: metres per minute; avg: average. - symbol: denotes no positioning data available.
3.2. Relative Session Demands

Movement parameters relative to time (intensity) are presented in Table 1. Metreage per minute for all match-play session types (pre-season practice match, in-season practice match, and competition match) was higher than training sessions for all positional groups. Midcourters worked at the highest average running intensity (m·min\(^{-1}\)) in every session type, followed by defenders and then goalers. Similarly, accelerometer-derived movement intensity (PlayerLoad per minute; au·min\(^{-1}\)) showed the same pattern of intensities across session types and positional groups. A visual representation of the movement intensity for each positional group, during each session type (including the distributions), is presented in Figure 3.

All positions recorded the highest acceleration/deceleration demands (acceleration density) during match-play sessions, specifically during in-season practice matches. Midcourters showed the highest acceleration density, followed by defenders and then goalers for in-season practice matches. When average acceleration and deceleration are standardised by the amount of area covered...
(acceleration density index; average per 10 m covered), all positional groups show the highest demands during pre-season training sessions. All three positional groupings experienced higher acceleration density index values in training sessions than in any match-play sessions.

![Image 1](image1.png)

**Figure 3.** PlayerLoad per minute by session type and positional group. Each point on the vertical axis represents a single session. The raincloud plot shows the raw data (points), distribution (split violin), and summary statistics (boxplots). Abbreviations: au/min = arbitrary units per minute.

4. Discussion

To our knowledge, this is the first study to present on-court movement and external workload demands across an entire season of elite netball (pre-season and in-season) using both positional and accelerometer sensors. Minor undulations across the season for all positions were observed in player load variables (see Figure 1); they align with key events across the season. Load management strategies can be identified in Figure 1, where increased weekly PlayerLoad occurs in the pre-season and precedes periods of extended recovery (e.g., Netball World Cup break), whereas weekly PlayerLoad decreases leading into the start of the season and around finals. There are clear outliers that show an acute increase in weekly load during early March, which directly corresponds to the pre-season cup, where athletes played up to four matches in three days, albeit with shortened quarters (10-min quarters) and rolling-substitutions. It appears that the shortened time per quarter resulted in the lowering of total movement demands (volume) per match, as indicated by the lower total PlayerLoad across all positional groups when compared to standard competition matches (see Table 1). However, the intensity was similar when compared to standard competition matches. While it is possible that players’ intensities were higher due to a lack of residual season fatigue (being pre-season competition), they were required to play with a higher frequency than usual and less recovery time. Therefore, the use of shortened quarters and rolling substitutions, which were not standard for the regular-season competition, may be useful in practice match-play when coaches aim to restrict the volume, while maintaining or increasing the intensity of the session.

The parameters of session volume presented in Table 1, such as total distance and total PlayerLoad, follow the expected pattern of midcourters accumulating higher loads than defenders or goalers, based on position-specific movement demands during match-play [7]. However, within the positional groupings there appears to be substantial spread, particularly for match-play session types. This large spread indicates that there may be clustering within groups, based on the position played for the session (match). There are distinctly different demands for some positions within their positional groupings [6–8,21]. For example, goal attack covers the second highest distance in competition matches (5337 ± 165 m), while goal shooters cover the least (2134 ± 103 m), yet both are classified as goalers [7]. The raincloud plots in Figure 3 identify these separations as demonstrated by the binomial distribution.
shape for sessions involving match-play [22]. This is most apparent for the defender and goaller groups in competition matches but can also be observed to a lesser extent during in-season practice matches.

The training sessions appear to distribute intensity more evenly between athletes within each positional group. Midcourt players appear to show a more consistent range of intensities both within and between all session types. The midcourters’ intensity is consistently higher than goalers or defenders across all session types (training and match-play). The different spatial constraints on a netball court imposed on each playing position likely contribute to these findings (e.g., goal attack can move in two thirds of the court, whereas goal shooters can only move within one third) [23]. Graham et al. [24] investigated the differing peak PlayerLoad intensity demands in state-level netball using accelerometers, finding that for epochs larger than 30 s, intensity demands largely correspond to the athlete’s zone constraints (highest peak demands for three-thirds—centre position). Movement demands may differ substantially between positions, even within typically used tactical positional groupings (defenders, goalers, midcourters). The results of the current study highlight that current training practices appear to generalise positions and do not show the same distribution of intensities as can be seen in match-play.

The highest volume of running, across all positions, elicited during in-season practice matches is likely due to the flexible nature of these sessions. Coaches have more control over increasing the number of quarters played, running additional set-plays, testing new combinations of players/positions, or extending the clock-time. More time or load may be accumulated during the less strictly scheduled warm-ups, skill drills, or half-court drills that occur prior to the start of the practice match, when compared to the strictly timed schedule in competition. It is considered appropriate to expose athletes to similar movement and skill demands during training as they would experience in matches, as this provides the stimulus for athletes to adapt in preparation for performance [24–26].

Training session intensity as measured by PlayerLoad per minute (au·min⁻¹) does not appear to reflect the demands of match-play, with both training session types (pre-season and in-season) showing lower values across all positional groups. This is likely due to the large variation within training sessions (e.g., high intensity drills and slower technical components) where some portions aim to expose athletes to peak demands, while others focus on technical or tactical information and skill development. Future analysis should further differentiate the specific components of netball training (within-session drills), in order to better understand whether the athletes are exposed to the types of movement demands incurred in competition during specific drills or training activities.

There are a few potential limitations with the current study, which should be considered when interpreting these findings. First, the Netball World Cup was held during the regular season timeframe (12–21 July), resulting in a four-week halt of the domestic competition. Unfortunately, this resulted in a large gap in the data collection, as labelled on Figures 1 and 2. The break may also have impacted the coach’s standard prescription of training characteristics, as they potentially attempted to re-adjust athlete workloads. Second, the data presented in this study were compiled from one team and may not be representative of the other elite netball teams. Third, small squad sizes (n = 10) in the Suncorp Super Netball competition limit the available options for statistical analysis. The use of positional groupings (i.e., defenders, goalers, and midcourters) also does not allow for athlete/position-specific findings. However, athlete anonymity is paramount given the novelty of this data set. Fourth, there are a number of factors that can impact training and match demands that may be specific to the team’s circumstances, such as quality of the opposition, number of days between games, and travel demands [27]. Therefore, where possible, teams should monitor the movement demands of their athletes across the season, to provide specific feedback to coaches and support staff about the trends in physical movement demands within their own programs, and aim to forecast and adapt to known or emerging challenges.

5. Conclusions

All phases of the netball season’s cycle should be monitored, as there are differences across session type and season phase for each positional group. Monitoring throughout the full competition cycle may allow for more responsive and agile session planning and periodisation. Alterations to
the structure and duration of sessions or quarters have impacts on the demands imposed on the athletes. A greater understanding of the interactions among these factors, along with match scheduling, to identify dates when multiple matches are planned in a short time frame (such as pre-season tournaments), may enhance training load planning and athlete preparation. Players from within the defender and goaller groupings may need training modifications (such as increased running volume or change of direction drills in restricted space) to prepare them for a positional change in match-play, given the highly specialized positional movement demands in netball, even from within the same positional grouping.

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**References**

1. Campbell, B.I.; Bove, D.; Ward, P.; Vargas, A.; Dolan, J. Quantification of Training Load and Training Response for Improving Athletic Performance. *Strength Cond. J.* 2017, 39, 3–13. [CrossRef]  
2. Gamble, P. Periodization of training for team sports athletes. *Strength Cond. J.* 2006, 28, 56–66. [CrossRef]  
3. Black, C.J.; Till, K.; O’Hara, J.P.; Davidson, J.; Jones, B. Top secret training data? External training loads of a cup winning English Super League rugby league team. *Int. J. Sports Sci. Coach.* 2017, 13, 236–242. [CrossRef]  
4. Paulauskas, H.; Kreivyte, R.; Scanlan, A.T.; Moreira, A.; Siupsinskas, L.; Conte, D. Monitoring Workload in Elite Female Basketball Players During the In-Season Phase: Weekly Fluctuations and Effect of Playing Time. *Int. J. Sports Physiol. Perform.* 2019, 14, 941–948. [CrossRef]  
5. Ritchie, D.; Hopkins, W.G.; Buchheit, M.; Cordy, J.; Bartlett, J.D. Quantification of Training and Competition Load Across a Season in an Elite Australian Football Club. *Int. J. Sports Physiol. Perform.* 2016, 11, 474–479. [CrossRef]  
6. Young, C.M.; Gastin, P.B.; Sanders, N.; Mackey, L.; Dwyer, D.B. Player Load in Elite Netball: Match, Training, and Positional Comparisons. *Int. J. Sports Physiol. Perform.* 2016, 11, 1074–1079. [CrossRef]  
7. Brooks, E.R.; Benson, A.C.; Fox, A.S.; Bruce, L.M. Physical movement demands of elite-level netball match-play as measured by an indoor positioning system. *J. Sports Sci.* 2020, 38, 1488–1495. [CrossRef]  
8. Chandler, P.T.; Pinder, S.J.; Curran, J.D.; Gabbett, T.J. Physical Demands of Training and Competition in Collegiate Netball Players. *J. Strength Cond. Res.* 2014, 28, 2732–2737. [CrossRef]  
9. Cormack, S.J.; Smith, R.L.; Mooney, M.M.; Young, W.B.; O’Brien, B.J. Accelerometer Load as a Measure of Activity Profile in Different Standards of Netball Match Play. *Int. J. Sports Physiol. Perform.* 2014, 9, 283–291. [CrossRef]  
10. Simpson, M.J.; Jenkins, D.G.; Scanlan, A.T.; Kelly, V.G. Relationships Between External- and Internal-Workload Variables in an Elite Female Netball Team and Between Playing Positions. *Int. J. Sports Physiol. Perform.* 2020, 15, 841–846. [CrossRef] [PubMed]  
11. Bredt, S.D.G.T.; Chagas, M.H.; Peixoto, G.H.; Menzel, H.J.; De Andrade, A.G.P. Understanding Player Load: Meanings and Limitations. *J. Hum. Kinet.* 2020, 71, 5–9. [CrossRef] [PubMed]  
12. Sweeting, A.J.; Aughey, R.J.; Cormack, S.J.; Morgan, S. Discovering frequently recurring movement sequences in team-sport athlete spatiotemporal data. *J. Sports Sci.* 2017, 35, 2439–2445. [CrossRef]  
13. Serpiello, F.R.; Hopkins, W.G.; Barnes, S.; Tavrou, J.; Duthie, G.; Aughey, R.J.; Ball, K. Validity of an ultra-wideband local positioning system to measure locomotion in indoor sports. *J. Sports Sci.* 2017, 36, 1727–1733. [CrossRef]
14. Alarifi, A.; Al-Salman, A.; Alsaleh, M.; Alnafessah, A.; Al-Hadhrami, S.; Al-Ammar, M.A.; Al-Khalifa, H.S. Ultra Wideband Indoor Positioning Technologies: Analysis and Recent Advances. *Sensors* **2016**, *16*, 707. [CrossRef] [PubMed]

15. Thomas, C.; Ismail, K.T.; Simpson, R.; Comfort, P.; Jones, P.A.; Dos’santos, T. Physical Profiles of Female Academy Netball Players by Position. *J. Strength Cond. Res.* **2019**, *33*, 1601–1608. [CrossRef]

16. Bruce, L.M.; Farrow, D.; Raynor, A.J.; Mann, D.L. But I can’t pass that far! The influence of motor skill on decision making. *Psychol. Sport Exerc.* **2012**, *13*, 152–161. [CrossRef]

17. Luteberget, L.S.; Spencer, M.; Gilgien, M. Validity of the Catapult ClearSky T6 Local Positioning System for Team Sports Specific Drills, in Indoor Conditions. *Front. Physiol.* **2018**, *9*, 115. [CrossRef] [PubMed]

18. R Core Team. R: A Language and Environment for Statistical Computing. 2018. Available online: [https://www.r-project.org/](https://www.r-project.org/) (accessed on 14 April 2020).

19. Wickham, H.R.; François, R.; Henry, L.; Müller, K.; Henry, L.; RStudio. Dplyr: A Grammar of Data Manipulation. 2019. Available online: [https://CRAN.R-project.org/package=dplyr](https://CRAN.R-project.org/package=dplyr) (accessed on 14 April 2020).

20. Wickham, H. *ggplot2: Elegant Graphics for Data Analysis*; Springer: New York, NY, USA, 2016. Available online: [https://ggplot2.tidyverse.org](https://ggplot2.tidyverse.org) (accessed on 14 April 2020).

21. Fox, A.S.; Spittle, M.; Otago, L.; Saunders, N. An investigation of in-game landings in elite netball: Implications for injury risk. *J. Sci. Med. Sport* **2012**, *15*, S229. [CrossRef]

22. Allen, M.; Poggiali, D.; Whitaker, K.; Marshall, T.R.; Kievit, R.A. Raincloud plots: A multi-platform tool for robust data visualization. *Wellcome Open Res.* **2019**, *4*, 63. [CrossRef]

23. International Netball Federation. International Rules of Netball. England. 2018. Available online: [http://netball.org/wp-content/uploads/2017/12/INF-Rules-of-Netball-2018-Edition-text.pdf](http://netball.org/wp-content/uploads/2017/12/INF-Rules-of-Netball-2018-Edition-text.pdf) (accessed on 1 May 2020).

24. Graham, S.; Zois, J.; Aughey, R.; Duthie, G. The peak player load™ of state-level netball matches. *J. Sci. Med. Sport* **2019**, *23*, 189–193. [CrossRef]

25. Dawson, B.; Hopkinson, R.; Appleby, B.; Stewart, G.; Roberts, C. Player movement patterns and game activities in the Australian Football League. *J. Sci. Med. Sport* **2004**, *7*, 278–291. [CrossRef]

26. Farrow, D.; Pyne, D.B.; Gabbett, T. Skill and Physiological Demands of Open and Closed Training Drills in Australian Football. *Int. J. Sports Sci. Coach.* **2008**, *3*, 489–499. [CrossRef]

27. Kelly, V.G.; Coutts, A.J. Planning and monitoring training loads during the competition phase in team sports. *Strength Cond. J.* **2007**, *29*, 32–37. [CrossRef]

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