Weekly training demands increase, but game demands remain consistent across early, middle, and late phases of the regular season in semiprofessional basketball players

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Weekly training demands increase, but game demands remain consistent across early, middle, and late phases of the regular season in semi-professional basketball players

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ABSTRACT

Purpose: To compare weekly training, game, and overall (training and games) demands across phases of the regular season in basketball.

Methods: Seven semi-professional, male basketball players were monitored during all on-court team-based training sessions and games during the regular season. External monitoring variables included PlayerLoad™ and inertial movement analysis (IMA) events per minute. Internal monitoring variables included a modified Summated-Heart-Rate-Zones model calculated per minute and rating of perceived exertion (RPE). Linear mixed-models were used to compare training, game, and overall demands between 5-week phases (early, middle, and late) of the regular season with significance set at $p \leq 0.05$. Effect sizes were calculated between phases and interpreted as: *trivial*, <0.20; *small*, 0.20-0.59; *moderate*, 0.60-1.19; *large*, 1.20-1.99; *very large*, ≥2.00.

Results: Greater (p >0.05) overall IMA events (*moderate-very large*) and RPE (*moderate*) were evident in the late phase compared to earlier phases. During training, more accelerations were evident in the middle (p = 0.01, *moderate*) and late (p = 0.05, *moderate*) phases compared to the early phase, while higher RPE (p = 0.04, *moderate*) was evident in the late phase compared to earlier phases. During games, non-significant, *trivial-small* differences in demands were apparent between phases.

Conclusions: Training and game demands should be interpreted in isolation and combined given overall player demands increased as the season progressed predominantly due to modifications in training demands given the stability of game demands. Periodization strategies administered by coaching staff may have enabled players to train at greater intensities late in the season without compromising game intensity.

Key Words: periodization; microsensor; acceleration; workload; team sport.

INTRODUCTION

Within most basketball leagues, seasons are traditionally comprised of the off-season, pre-season, and regular season. The off-season marks the beginning of an annual season, where the objective is to recover and regenerate the body and mind from the accumulated psycho-physiological stress encountered across the prior season.[1] Following the off-season, the pre-season encompasses various training modalities targeting physical fitness attributes, technical abilities, tactical strategies, and group cohesion to prepare players for competitive games. The regular season follows the pre-season and contains competitive games against other teams in the league. Therefore, the goal during the regular season is to retain developed performance capacities from the pre-season and optimize player readiness to compete considering the game schedule faced. Given game scheduling varies across the regular season with recurring requirements to travel for away games[2] and complete congested schedules where multiple games are played in close succession,[3,4] periodized training approaches should be adopted in basketball teams in line with the recovery needs of players and opportunities available to train.[1]

To ensure appropriate stimuli are prescribed throughout the regular season, player demands can be monitored by high-performance staff in basketball teams. In this regard, the prescribed physical stimuli delivered to players (i.e. external demands) and subsequent responses of players (i.e. internal demands) can be quantified and managed to optimize player readiness for games.[5] Despite the increased research quantifying player demands across the regular season in basketball,[3,6] limited investigation has examined fluctuations in training and game demands across the regular season in basketball players to understand how training approaches are adapted in line with changes in game demands.[3,4,6-9]

Existing basketball research examining fluctuations in player demands across the regular season has predominantly used weekly timeframes.[3,4,6,7] In this way, research has demonstrated weekly total demands fluctuate up to 226% in collegiate, male basketball players[7] and up to 47% in professional, female basketball players.[8] Consequently, researching findings suggest regular season demands fluctuate across weekly timeframes in basketball teams[4,7,8], likely as a product of the game schedule faced.[3,4,6,7] While research exploring weekly changes in player demands offers an understanding of short-term training and periodization strategies,[5,6] further insight is provided through examining player demands across longer segments of the regular season.

Reporting the weekly demands experienced by basketball players across phases of the regular season spanning multiple weeks (multi-week phases) provides additional insight not indicated by compartmentalizing player demands performed each week (i.e., microcycle).[3,4,6,7] In this regard, quantifying how player demands fluctuate across multi-week phases (i.e., mesocycles) is needed to comprehensively understand the periodization practices of basketball coaching staff across the regular season given the objectives of each mesocycle will dictate the loading patterns elicited within each microcycle.[10] Furthermore, the demands encountered across multi-week phases of the regular season have been suggested to underpin player readiness for games.[5] Player readiness pertains to the psychological-physiological capacity of players to perform during games,[11] and therefore should be quantified and considered when structuring training plans across the regular season using suitable multi-week timeframes. Limited research has compared player demands across different multi-week phases during the regular season in basketball players.[6,8,9,12] Specifically, Paulauskaset al.[8] showed 4-week rolling averages of training session-RPE fluctuated up to 10% across the regular season in professional, female basketball players. Similarly, training session-RPE across three 4-6-week periods during the regular season differed up to 3% in semi-professional, female basketball players.[13] Additionally, Leite et al.[9] reported an earlier 6-week period during the regular season containing 10 games yielded a greater average weekly RPE (12%) than a later 9-week period containing 10 games in professional, male basketball players. Consequently, weekly demands may fluctuate less when considered across phases of the regular season than when considered in isolation each week in basketball teams. However, the existing literature has only quantified player demands using internal perceptual measures[8,9,13] and does not discriminate between training and game settings.

A combination of external and internal monitoring approaches encompassing objective and subjective variables[5] has been advocated to comprehensively quantify the demands encountered across the season. Moreover, discriminating between training and game scenarios is essential to understand how periodization strategies are adapted in training according to changes in the game demands encountered across multi-week regular season phases. Therefore, further research including a wide selection of monitoring variables gathered during training sessions and games is warranted to better understand how player demands vary across multi-week phases during the regular season in basketball. Thus, the aim of this team-based study was to compare the average weekly training, game, and overall (training and games combined) demands across phases of the regular season (early, middle, and late) in basketball players.

METHODS

Subjects

Semi-professional, male basketball players (n = 7; age: 23 ± 4 yr; height: 1.91 ± 0.08 m; body mass: 87 ± 16 kg) from one team competing in the Queensland Basketball League (QBL) were monitored across the 2018 season. The QBL is a state-level, Australian basketball competition positioned directly below the national league. Given the aim of comparing training and game demands separately across different phases during the regular season, players who participated in training but did not regularly receive playing time in games, as well as players who missed games due to injury across the season, were excluded from the study. Originally, eight players were recruited for monitoring; however, one player was injured during the middle of the season and excluded from all analyses. Health screening was conducted on all players prior to data collection to ensure safe participation. All players provided voluntary, written informed consent prior to participation in the study. Study procedures aligned with the guidelines of the Declaration of Helsinki and were approved by the Central Queensland University Human Research Ethics Committee as part of a wider monitoring project in basketball (no: 0000020849).

Procedures

A longitudinal, observational case series design was followed. Players were monitored during all on-court, team-based training sessions and games across the regular season. Players participated in 0-3 on-court, team-based training sessions per week, with 0-3 games played between Friday and Sunday each week during the monitoring period. Training, game, and overall demands (training sessions and games combined) were calculated across each week for each player. Weekly demands were determined from Monday to Sunday and were categorized according to the phase of the regular season, with details of each phase shown in Table 1. Importantly, the multi-week phases were split into three evenly distributed 5-week blocks (early phase: weeks 1-5; middle phase: weeks 6-10; and late phase: weeks 11-15) to ensure a standardized timeframe was employed in each phase. The approach to separate the season into three evenly distributed blocks has been readily adopted in team sport research when assessing fluctuations in player demands.[12,14,15] The 15-week regular season consisted of 11 single-game weeks, two double-headers (2 games on consecutive days), 1 triple-header (3 games on consecutive days), and 1 bye week (no games or training due to a break in the schedule). On-court, team-based training sessions consisted of games-based drills with variations in team size, court size, and tactical strategies implemented by coaching staff with no manipulation from the research team.

INSERT TABLE 1 AROUND HERE

Descriptive information and anthropometric measurements were obtained from each player prior to the first training session including stature using a portable stadiometer (Seca 213, Seca GMBH, Hamburg, Germany) and body mass using electronic scales (BWB-600, Tanita Corporation, Tokyo, Japan). Across the regular season, microsensors (OptimEye s5, Catapult Innovation, Melbourne, Australia) were fitted to each player between the scapulae in neoprene vests (Catapult Innovations, Melbourne, Australia) prior to each training session and game. Players also wore chest-worn heart rate (HR) monitors (T31, Polar Electro, Kempele, Finland) at the level of the xiphoid process. All HR data were recorded to the microsensor device worn by each player. Players reported ratings of perceived exertion (RPE) to a member of the research team in the absence of any peers within 30 min of completing each training session or game using Borg's Category Ratio 1-10 scale. Microsensor and HR data were downloaded for analyses to a computer with the installed microsensor software (OpenField v8, Catapult Innovations, Melbourne, Australia). Warm-up data were excluded from analyses, while all rest periods across training sessions and games were included in analyses.

Using the microsensors, PlayerLoad™ (PL) and inertial movement analysis (IMA) variables were determined across each week in each phase and calculated relative to training, game, and overall (training and games combined) weekly durations to account for varying exposure times and to represent the average external intensity encountered. PL was determined as the square root of the sum of the squared rate of change in acceleration across each of the three movement planes, multiplied by 0.01 as a scaling factor[16] and reported in arbitrary units ($AU \cdot min^{-1}$). IMA variables were measured based on the direction of movement performed by each player where total accelerations (-45° to 45° direction), decelerations (-135° to 135° direction), and changes-of-direction (-135° to -45° direction for left and 45° to 135° direction for right) were determined. In addition, the total number of jumps performed were determined using proprietary algorithms. All IMA variables were reported as a total frequency relative to training, game, and overall duration ($n \cdot min^{-1}$) for each variable separately and combined (accelerations, decelerations, changes-of-direction, and jumps). Furthermore, the frequency relative to training, game, and overall duration ($n \cdot min^{-1}$) of overall high-intensity IMA events (accelerations, decelerations, and changes-of-direction >3.5 $m \cdot s^{-2}$, as well as jumps >40 cm) was determined. PL (coefficient of variation [CV] = 0.9-1.9%)[17] and IMA variables (CV = 3.1-6.7%)[18] have been shown to possess acceptable reliability in team sport research. PL has been reported to be valid compared to accelerations measured with a force plate (r = 0.74-0.90) [19] and distance measured with global positioning systems (r = 0.79)[20] during sport-based movement tasks performed in different directions and at different intensities.

Weekly internal demands during each phase were determined using HR data exported from the microsensor software in 1-s epochs into a Microsoft Excel spreadsheet (v15, Microsoft Corporation, Redmond, USA). HR data were then entered into a modified summated-heart-rate-zones (SHRZ) model where each HR response was categorized into intensity-based zones, which incrementally increased by 2.5%HR_{max} starting at 50%HR_{max}. The duration (min) spent in each intensity-based zone was multiplied by a weighting factor which incrementally increased by 0.25 in each subsequent zone. Specifically, a weighting of 1.0 was assigned to the first zone corresponding to an intensity of 50-52.4%HR_{max} and a weighting of 5.75 was assigned to the final zone corresponding to an intensity of 97.5-100%HR_{max}.[21] HR_{max} was determined as the peak HR response recorded during any training session or game across the monitoring period.[22] The accumulated weightings in each intensity-based zone were summed across each training session and game to determine the overall SHRZ demands, which was then made relative to training, game, and overall weekly durations ($AU \cdot min^{-1}$) to account for varying exposures and to represent the average internal intensity encountered. Individualized RPE was taken to indicate the perceptual intensity of each training session and game and averaged across each week in each phase during training, games, and overall. The validity and reliability of heart rate- and RPE-based variables have been rated favorably as moderate-high through expert consensus.[5]

Statistical analyses

The normality and sphericity of data were confirmed using the Shapiro-Wilk statistic and Levene's Test for equality of variances. Consequently, all dependent variables were calculated as mean ± standard deviation (SD). Separate linear mixed models with Bonferroni post hoc tests were conducted to compare training, game, and overall demands between phases with player included as a random factor (n = 7) and phase included as a fixed factor (early, middle, and late). Statistical significance was accepted when p <0.05. Effect sizes (ES) with 90% confidence intervals (CI) were calculated to quantify the magnitude of differences in each dependent variable between each phase across the regular season. ES magnitudes were interpreted as: *trivial*, <0.20; *small*, 0.20-0.59; *moderate*, 0.60-1.19; *large*, 1.20-1.99; and *very large*, ≥2.00 [23]. Where the 90% CI of a calculated ES spanned ±0.2, the effect was rated as *unclear*.[23] Analyses were performed using IBM SPSS Statistics (v24, IBM Corporation, Armonk, USA) and Microsoft Excel (v15, Microsoft Corporation, Redmond, USA).

RESULTS

Mean ± SD weekly overall demands in early, middle, and late regular season phases, along with pairwise comparisons between phases, are presented in Table 2. Comparisons between phases for all variables were non-significant (p >0.05); however, effect size analyses demonstrated fewer overall accelerations (*large*) and high-intensity IMA events (*moderate*) in the early phase compared to the middle phase. Furthermore, less overall accelerations (*moderate-very large*), changes-of-direction (*large*), jumps (*large*), and total IMA events (*large*), along with lower RPE (*moderate*) were evident in the early and middle phases compared to the late phase. Meanwhile, fewer decelerations (*large*) were evident in the middle phase compared to late phase.

INSERT TABLE 2 AROUND HERE

Mean ± SD weekly demands separated into training and game settings during the early, middle, and late regular season phases, along with pairwise comparisons between phases, are presented in Table 3. During training, significantly fewer accelerations were evident in the early phase compared to the middle (p = 0.01, *moderate*) and late (p = 0.05, *moderate*) phases. Furthermore, a significantly (p = 0.04, *moderate*) lower RPE was evident during training in the early phase compared to the late phase. During games, non-significant (p >0.05), *trivial-small* differences between phases were evident for all variables.

INSERT TABLE 3 AROUND HERE

DISCUSSION

Weekly overall demands revealed non-significant, *trivial-very large* fluctuations across phases of the regular season (early, middle, and late) in basketball players. In general, overall weekly demands were greatest during the late phase compared to earlier phases. However, when examining training and games independently, accelerations and RPE increased during training as the season progressed, whereas game demands were consistent across regular season phases.

Comparisons in the weekly overall demands encountered between phases revealed *moderate-very large* increases in most IMA-derived variables (all except total high-intensity IMA events [*small*]) and RPE across the late phase compared to earlier phases. The increased average overall external (accelerative, change-of-direction, and jumping movements) and internal (RPE) intensities during the late phase may be reflective of variations in the tactical approaches adopted by coaching staff in response to the game schedule faced as the season progressed. In this way, the greater frequency of games in the late phase compared to earlier phases likely led to coaches employing altered substitution strategies during games to best manage player loads and reduce playing time in some players and/or prescribing less training to afford additional recovery between the more frequent games. Indeed, this notion is supported by data in Table 1 showing reduced weekly training (104 ± 55 min vs. 92 ± 61 min) and game durations (119 ± 57 min vs. 108 ± 88 min) in the late phase compared to the middle phase. In turn, players were likely able to train and compete at increased intensities given the reduction in training and game exposure across the late phase compared to earlier phases, ensuring fitness did not deteriorate in preparation for upcoming playoff games. Given perceptual training intensities have been reported to increase across the regular season in several team sports,[24,25] the trends we observed might be indicative of a common periodization strategy adopted by coaching staff across the regular season. The increase in RPE we observed during the late phase (6.1 ± 0.3 AU) compared to the early (5.6 ± 0.2 AU) and middle (5.5 ± 0.2 AU) phases aligns with RPE values reported in previous research demonstrating greater overall RPE (training and games combined) when denser schedules (10 games in 6 weeks, RPE = 6.4 ± 2.3 AU vs. 10 games in 9 weeks, RPE = 5.7 ± 2.1 AU) were encountered across multi-week phases of the regular season in professional, male basketball players.[9] Moreover, the increase in RPE during the late phase may be attributed to an accumulated fatigue across the season,[13] yielding a greater perceptual sensitivity to the demands completed.[26]

When considering training and game demands separately, differences were statistically significant or reached at least a *moderate* effect only during training in comparisons between regular season phases with non-significant, *trivial-small* differences present for game demands. Specifically, weekly accelerations completed during training were lowest in the early phase compared to later phases and RPE during training was highest in the late phase compared to earlier phases. While these findings may be attributed to the tactics adopted by coaching staff in response to the game schedule faced already discussed, the specific focus of training sessions across the season may also explain the increased accelerative and perceptual demands during training in the late phase. For instance, tactical training drills were likely performed more readily during the early phase of the regular season to familiarize players with the offensive and defensive team schemes. Given tactical drills generally involve players working at lower intensities in half-court settings to learn team schemes with frequent stoppages for feedback and instructions from coaching staff, players may have performed a lower rate of accelerations at lower perceptual intensities during these drills compared to other full-court, games-based drills.[27] The higher perceptual intensities we observed during the late phase of the regular season compared to the early (22%) and middle (18%) phases contrast previous research reporting low fluctuations in perceptual training demands across rolling 4-week phases ($\leq$10% difference between phases)[8] and fixed 4-6 week phases (3% difference between phases)[13] of the regular season in professional and semi-professional, female basketball players. The lower number of weekly training sessions monitored in our study (1.6 on-court sessions per week on average) compared to past research examining professional (4-6 on-court and conditioning sessions per week)[8] and semi-professional (3 on-court sessions per week)[13] female basketball players may underpin the higher fluctuations in training demands we observed across phases. In this way, manipulations to training by coaching staff likely exerted a greater relative (%) change in training demands between phases in our study given the low weekly training exposure experienced by players compared to past basketball studies.[8,13] Furthermore, given various demographic factors can impact player demands in basketball, the differences in findings between this study and previous work[8,13] may be due to variations in the sex, geographical location, or playing level of the players examined.[28] Specifically, previous research investigated female players competing in national[8] or regional,[13] European leagues, while, our sample consisted of male players competing in a semi-professional, Australian league.

In contrast to training, the consistent weekly game intensities encountered by players may be reflective of the stability in game demands documented for different contexts faced by basketball teams across the season. Specifically, *trivial-small* changes in average intensity variables have been documented in game demands when comparisons were made according to the number of games played each week (1 vs. 2 vs. 3 games),game outcome (win vs. loss),[29,30] game location (home vs. away),[30] and overtime vs. regular games.[31] Furthermore, existing data suggest external intensities can remain stable during games between subsequent seasons in Division I, collegiate, female basketball players.[29] In turn, this collective evidence suggests basketball coaching staff may embed effective strategies to promote maintenance of similar demands during games across the season. For example, coaches may motivate players to apply consistent effort during games,[29] as well as adopt in-game player management strategies (e.g. substitutions, strategic use of time-outs) to provide needed recovery opportunities during the regular season.[32]

Despite providing the first comparison of external and internal training and game demands across regular season phases in basketball players, this study was subject to some limitations. Specifically, for this case series, only a single team was able to be recruited limiting the sample size monitored (n = 7). However, the added travel, costs, and labor, as well as the potential for coaching staff to perceive a conflict of interest when recruiting multiple teams from the same league made it difficult to recruit players from more than one team. Future research should examine fluctuations in training and game demands across multi-week phases of the regular season in other teams and leagues to confirm our findings in a wider sample of players. Furthermore, we split the regular season into 5-week phases to create three even timeframes (early, middle, and late). Therefore, our findings may not be representative of differences between phases spanning different durations or using rolling (vs. fixed) methods. Finally, only on-court team-based sessions were able to be monitored during training in this study. Consequently, the reported training demands are not indicative of individualized conditioning sessions completed by players across the season.

CONCLUSIONS

The average weekly overall demands fluctuated across phases (early, middle, and late) of the regular season in semi-professional, male basketball players. Specifically, increases in IMA variables and RPE were evident across phases as the season progressed when training and games were combined. When monitoring variables were analyzed separately during training and games, weekly accelerations and RPE increased during training whereas consistent demands were apparent during games across phases of the regular season. In this way, coaching staff appeared to reduce player exposure to training and games in the late phase of the regular season to permit increased training intensities and maintenance of game intensities.

PRACTICAL APPLICATIONS

Our results reinforce the need for basketball coaches and high-performance staff to consider training and game demands in tandem when monitoring players across the regular season. The average weekly game demands across regular season phases (early, middle, and late) indicate the strategies adopted by basketball coaches may promote consistent player intensities across games. In turn, the stability in weekly game demands across phases (*trivial-small* differences) may afford basketball coaches with flexibility in modifying training requirements according to the needs of players during the regular season. Indeed, our data suggest players may be able to train at higher external and internal intensities in response to periodization strategies delivered by coaching staff that reduce overall (training and game) exposure durations later in the season.

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TABLE CAPTIONS

Table 1. Training and game factors underpinning each phase during the regular season examined in this study.

Table 2. Mean ± standard deviation weekly overall (training sessions and games combined) demands during the early, middle, and late regular season phases in semi-professional, male basketball players (n = 7).

Table 3. Mean ± standard deviation weekly training and game demands during the early, middle, and late regular season phases in semi-professional, male basketball players (n = 7).

Table 1. Training and game factors underpinning each phase during the regular season examined in this study.

Factor	Phase of regular season		
	Early	***Middle***	***Late***
Timeframe (weeks of regular season)	1-5	6-10	11-15
Average weekly training duration (min)†	68 ± 53	104 ± 55	92 ± 61
Number of total training sessions in phase (n)†	8	9	8
Average weekly game duration (min)	86 ± 67	119 ± 57	108 ± 88
Number of total games in phase (n)	5	6	7
Number of home games in phase (n)	3	2	4
Number of away games in phase (n)	2	4	3
Weeks with 0 games played in phase (n)	1	0	0
Weeks with 1 game played in phase (n)	3	4	4
Weeks with 2 games played in phase (n)	1	1	0
Weeks with 3 games played in phase (n)	0	0	1
Average weekly travel duration for games (hr)*	1.2	3.5	1.0
Team record (wins-losses)	4-1	2-4	3-4
Average opponent win percentage (%)	64.4%	53.3%	43.3%

Note: † Indicative of on-court team-based sessions. *A home game was given a travel distance of 0 km and travel duration of 0 hr. Distances travelled for away games were determined between playing venues and travel durations for away games were determined when travelling between towns/cities as return trips. Opponent win percentage determined at end-of-season.

Table 2. Mean ± standard deviation weekly overall (training sessions and games combined) demands during the early, middle, and late regular season phases in semi-professional, male basketball players (n = 7).

Variable	Overall demands			Effect size (90% CI), magnitude		
	Early	***Middle***	***Late***	***Early vs. Middle***	***Early vs. Late***	***Middle vs. Late***
External demands						
PlayerLoad™ ($AU \cdot min^{-1}$)	5.61 ± 0.24	5.54 ± 0.24	5.62 ± 0.23	0.29 (-0.11 to 0.68), *small*	-0.04 (-0.44 to 0.35), *trivial*	-0.34(-0.73 to 0.06), *small*
Accelerations ($n \cdot min^{-1}$)	0.59 ± 0.03	0.63 ± 0.03	0.65 ± 0.03	-1.33 (-1.75 to -0.88), *large*	-2.00 (-2.46 to -1.50), *very large*	-0.67 (-1.06 to -0.26), *moderate*
Decelerations ($n \cdot min^{-1}$)	1.19 ± 0.07	1.15 ± 0.07	1.21 ± 0.007	0.57 (0.16 to 0.97), *small*	-0.40 (-0.79 to 0.00), *small*	-1.21 (-1.62 to -0.77), *large*
Changes of direction ($n \cdot min^{-1}$)	3.86 ± 0.18	3.82 ± 0.18	4.15 ± 0.17	0.22 (-0.17 to 0.61), *small*	-1.66 (-2.09 to -1.18), *large*	-1.88 (-2.33 to -1.39), *large*
Jumps ($n \cdot min^{-1}$)	0.64 ± 0.04	0.64 ± 0.04	0.70 ± 0.04	0.00 (-0.39 to 0.39), *trivial*	-1.50 (-1.93 to -1.04), *large*	-1.50 (-1.93 to -1.04), *large*
High-intensity IMA events ($n \cdot min^{-1}$)	0.64 ± 0.04	0.60 ± 0.04	0.62 ± 0.04	1.00 (0.57 to 1.41), *moderate*	0.50 (0.10 to 0.89), *small*	-0.50 (-0.89 to -0.10), *small*
Total IMA events ($n \cdot min^{-1}$)	6.28 ± 0.29	6.24 ± 0.29	6.72 ± 0.28	0.14 (-0.26 to 0.53), *trivial*	-1.54 (-1.97 to -1.08), *large*	-1.68 (-2.12 to -1.21), *large*
Internal demands						
SHRZ ($AU \cdot min^{-1}$)	2.17 ± 0.09	2.18 ± 0.09	2.22 ± 0.09	-0.16 (-0.55 to 0.24), *trivial*	-0.56 (-0.95 to -0.15), *small*	-0.44 (-0.84 to -0.04), *small*
RPE (AU)	5.86 ± 0.31	5.72 ± 0.31	6.05 ± 0.29	0.45 (0.005 to 0.84), *small*	-0.63 (-1.03 to -0.22), *moderate*	-1.10 (-1.51 to -0.67), *moderate*

Note: All pairwise comparisons are presented as early vs. middle, early vs. late, and middle vs. late. * p <0.05. *Abbreviations*: CI = confidence intervals, AU = arbitrary units, IMA = inertial movement analysis, SHRZ = summated-heart-rate-zones, RPE = rating of perceived exertion.

Table 3. Mean ± standard deviation weekly training and game demands during the early, middle, and late regular season phases in semi-professional, male basketball players (n = 7).

Variable	Training demands			Effect size (90% CI), magnitude		
	Early	*Middle*	*Late*	*Early vs. Middle*	*Early vs. Late*	*Middle vs. Late*
Training						
External demands						
PlayerLoad™ (AU·min^{-1})	5.77 ± 1.09	5.89 ± 0.83	6.24 ± 0.61	-0.12 (-0.32 to 0.07), *trivial*	-0.53 (-0.73 to -0.33), *small*	-0.48 (-0.68 to -0.28), *small*
Accelerations (n·min^{-1})	0.50 ± 0.22	0.65 ± 0.22	0.70 ± 0.19	-0.68 (-0.88 to -0.48), *moderate**	-0.97 (-1.18 to -0.76), *moderate**	-0.24 (-0.44 to -0.05), *small*
Decelerations (n·min^{-1})	1.25 ± 0.43	1.30 ± 0.39	1.34 ± 0.29	-0.12 (-0.32 to 0.08), *trivial*	-0.25 (-0.44 to -0.05), *small*	-0.12 (-0.31 to 0.08), *trivial*
Changes of direction (n·min^{-1})	4.16 ± 0.92	4.32 ± 1.19	4.49 ± 1.57	-0.15 (-0.35 to 0.05), *trivial*	-0.26 (-0.45 to -0.06), *small*	-0.12 (-0.32 to 0.08), *trivial*
Jumps (n·min^{-1})	0.77 ± 0.23	0.82 ± 0.27	0.85 ± 0.28	-0.20 (-0.40 to 0.00), *small*	-0.31 (-0.51 to -0.11), *small*	-0.11 (-0.31 to 0.09), *trivial*
High-intensity IMA events (n·min^{-1})	0.59 ± 0.25	0.69 ± 0.22	0.70 ± 0.25	-0.42 (-0.62 to -0.22), *small*	-0.44 (-0.64 to -0.24), *small*	-0.04 (-0.24 to 0.15), *trivial*
Total IMA events (n·min^{-1})	6.72 ± 1.45	7.10 ± 1.73	7.45 ± 2.05	-0.24 (-0.43 to -0.04), *small*	-0.41 (-0.61 to -0.21), *small*	-0.18 (-0.38 to 0.01), *trivial*
Internal demands						
SHRZ (AU·min^{-1})	2.21 ± 0.51	2.44 ± 0.60	2.52 ± 0.65	-0.41 (-0.61 to -0.21), *small*	-0.53 (-0.73 to -0.33), *small*	-0.13 (-0.32 to 0.07), *trivial*
RPE (AU)	4.31 ± 1.35	4.51 ± 1.52	5.50 ± 1.34	-0.14 (-0.34 to 0.06), *trivial*	-0.88 (-1.09 to -0.68), *moderate**	-0.69 (-0.89 to -0.49), *moderate*
Games						
External demands						
PlayerLoad™ (AU·min^{-1})	5.51 ± 1.83	5.17 ± 1.85	4.83 ± 2.32	0.18 (-0.01 to 0.38), *trivial*	0.33 (0.13 to 0.52), *small*	0.16 (-0.04 to 0.36), *trivial*
Accelerations (n·min^{-1})	0.63 ± 0.24	0.59 ± 0.20	0.64 ± 0.20	0.18 (-0.02 to 0.38), *trivial*	-0.05 (-0.24 to 0.15), *trivial*	-0.25 (-0.45 to -0.05), *small*
Decelerations (n·min^{-1})	1.14 ± 0.96	1.04 ± 0.98	1.11 ± 1.05	0.10 (-0.09 to 0.30), *trivial*	0.03 (-0.17 to 0.23), *trivial*	-0.07 (-0.27 to 0.13), *trivial*
Changes of direction (n·min^{-1})	3.48 ± 1.34	3.45 ± 1.15	3.65 ± 1.42	0.02 (-0.17 to 0.22), *trivial*	-0.12 (-0.32 to 0.07), *trivial*	-0.15 (-0.35 to 0.04), *trivial*
Jumps (n·min^{-1})	0.53 ± 0.23	0.52 ± 0.19	0.60 ± 0.21	0.05 (-0.15 to 0.24), *trivial*	-0.32 (-0.51 to -0.12), *small*	-0.40 (-0.60 to -0.20), *small*
High-intensity IMA events (n·min^{-1})	0.68 ± 0.36	0.56 ± 0.29	0.60 ± 0.32	0.37 (0.17 to 0.56), *small*	0.23 (0.04 to 0.43), *small*	-0.13 (-0.33 to 0.07), *trivial*
Total IMA events (n·min^{-1})	5.77 ± 2.17	5.61 ± 1.85	5.79 ± 2.53	0.08 (-0.12 to 0.28), *trivial*	-0.01 (-0.21 to 0.19), *trivial*	-0.08 (-0.28 to 0.12), *trivial*
Internal demands						
SHRZ (AU·min^{-1})	2.20 ± 0.73	1.96 ± 0.62	2.04 ± 0.52	0.35 (0.16 to 0.55), *small*	0.25 (0.05 to 0.45), *small*	-0.14 (-0.34 to 0.06), *trivial*
RPE (AU)	7.14 ± 2.07	6.61 ± 2.03	6.75 ± 1.52	0.26 (0.06 to 0.46), *small*	0.21 (0.02 to 0.41), *small*	-0.08 (-0.27 to 0.12), *trivial*

Note: All pairwise comparisons are presented as early vs. middle, early vs. late, and middle vs. late. * $p < 0.05$. *Abbreviations*: CI = confidence intervals, AU = arbitrary units, IMA = inertial movement analysis, SHRZ = summated-heart-rate-zones, RPE = rating of perceived exertion.