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Change of Direction Ability

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Relationships between Sprint, Acceleration, and Deceleration Metrics with Training Load in Division I Collegiate Women's Soccer Players

by
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Player load is a variable derived from GPS technology that quantifies external load demands. Sprints and change-of-direction movements are high-intensity activities that place stress on the body. Research is needed to determine which sprint metrics may relate to and predict player load during practice sessions in collegiate women's soccer players, as coaches could manipulate the most impactful variables. This study analyzed which sprint metrics related to GPS player load in women's soccer players from one Division I team. Data from 19 practice sessions for 18 field players were analyzed. Players wore GPS sensors during all training sessions, and the variables assessed were player load, sprint count, sprint volume, sprint distance, average top speed, maximum top speed, and the number of accelerations and decelerations in different speed zones (±1, ±2, ±3, ±4, ±5 m/s²). Pearson's correlations ($p < 0.05$) analyzed relationships between the sprint variables and player load. Stepwise regression analyses ($p < 0.05$) determined if any metrics predicted player load. The results indicated significant relationships between player load and sprint count, maximum top speed, sprint distance, sprint volume, number of decelerations at –1, –2, and –3 m/s², and accelerations at 1, 2, and 5 m/s² ($r = 0.512$–0.861, $p \le 0.025$). Sprint distance and decelerations at 1 m/s² predicted player load ($p = 0.001$, $r^2 = 0.867$). Maximal sprinting and decelerations and accelerations at different speeds were significant contributors to player load in collegiate women's soccer players. Sprint distance, decelerations, and accelerations could be targeted in training drills via dimension and movement manipulation to adjust training intensity for collegiate women's soccer players.

Key words: *agility, change-of-direction, college, female athletes, GPS, sprinting.*

Introduction

Soccer is an aerobically taxing, physically demanding intermittent team sport involving physical contact and different dynamic tasks that are performed at varying intensities (Stølen et al., 2005). In the USA, the National Collegiate Athletic Association (NCAA) Fall competitive soccer season consists of 16 weeks of competition, with a maximum of 20 matches during the 12-week in-season conference period (NCAA, 2020). This results in about two games per week with 48 hours between games for players competing at this level (McLean et al., 2012). Within a collegiate soccer match, athletes could cover distances of approximately 8–10 kilometers (km) with 70–190 efforts (or 16–17%) performed at higher speeds (>15 km/h) (McFadden et al., 2020). Nearly 250 short-duration anaerobic actions are completed as a result of field dimensions (105.2–109.7 meters [m] x 64.0–68.6 m) and the nature of the game, with the average number of efforts depending on the playing position (i.e., forward, midfielder, or defender) (Bangsbo et al., 2006; Radzimiński et al., 2021; Stølen et al., 2005). In addition to low-intensity aerobic movements, high-intensity anaerobic actions in soccer include jumping, kicking, tackling, agility, and sprinting. These variables relate to match performance; however, it is also important to recognize how they affect training performance.

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To infer external workload demands of soccer players, sport scientists commonly utilize global positioning system (GPS) technology. GPS devices are widely used portable monitoring tools for assessing demands of practices and competitive matches in team-based sports (Coutts and Duffield, 2010; Ravé et al., 2020). A commonly reported variable of relevance extrapolated by GPS technology is player load (Ravé et al., 2020; Vanrenterghem et al., 2017). Player load, or external load, is a numerical value quantified by the amount of physical work performed over time by an athlete in the form of movement (Wallace et al., 2013). As GPS technology provides a collection of data during practice sessions, it is important to decipher which variables are most relevant for sport coaches to focus on. This way, coaches can manage these variables to optimize performance and achieve desired training goals (Ravé et al., 2020; Vanrenterghem et al., 2017). Along with external player load, the GPS device captures specific data for running-related variables. This information has received attention in field sports because running variables can be directly manipulated by coaches. A review by Ravé et al. (2020) documened that relevant GPS variables in monitoring player load in elite soccer include high-speed running distance, sprint distance, specific maximal speed, the number of accelerations (≥ 3 m/s²), and the number of decelerations (≤ 3 m/s²). The rationalization is because these metrics reflect training intensity and can be used to construct specific training sessions. Practitioners often focus on total and high-speed running distance covered as they are some of the most demanding and important qualities for athletes (Cardinale and Varley, 2017). Thus, highlighting these characteristics could prove valuable to sport scientists and soccer coaches at the collegiate level.

Sprinting is high-intensity anaerobic activity involving repeated impacts and great eccentric stress to the posterior tissues to overcome body mass inertia (Vanrenterghem et al., 2017) and can distinguish between successful match performance in soccer (Vescovi, 2012). Total distance covered while sprinting has been reported as approximately 1.5–2.5 km in elite players (Datson et al., 2014; Mohr et al., 2008), or about 1–10% of total distance in team sports (Girard et al., 2011). Accelerations and decelerations increase metabolic demand due to rapid force application and heavy eccentric loading of directional change efforts (Spiteri et al., 2015). Change-of-direction (COD) describes the preplanned ability to decelerate and re-accelerate in a different direction (Jones et al., 2008). Within competitive soccer matches, a high volume of approximately 700 directional changes can occur at maximal intensity (Bloomfield et al., 2007).

Greater external loads indicate higher intensities and metabolic cost experienced by athletes (Gaudino et al., 2013; Vanrenterghem et al., 2017). Due to the significant amount of high-intensity running actions performed in competitive soccer matches (Datson et al., 2014; Vescovi, 2012), it is plausible that sprint-related metrics may heavily influence a player's workload demands (Thorpe et al., 2017). This includes sprint count, distance, volume, and speed, as well as the number of accelerations and decelerations in different speed zones. However, the current body of literature describing women's soccer is limited, specifically at the collegiate level (Gentles et al., 2018). Further analysis is required to determine which sprint metrics may most affect training loads experienced by players.

The purpose of this study was to determine which sprint metrics correlated with player load in Division I women soccer athletes using GPS technology. A further aim was to determine which sprint variables were the greatest predictor of player load. It was hypothesized that the correlation analysis would demonstrate significant relationships between all sprint metrics and player load. A further hypothesis was total sprint distance and the number of accelerations and decelerations completed by players would predict player load the most of all sprint-related variables.

Methods

Participants

A total of 18 NCAA Division I women field soccer players (6 forwards, 8 midfielders, and 4 defenders) from the same team participated in this study (age = 20.61 ± 1.29 years; body height = 167.99 ± 8.08 cm; body mass = 60.05 ± 6.16 kg). Goalkeepers were excluded from this investigation due to contrasting movement patterns produced and distances covered in comparison to field players (Stølen et al., 2005). The data used in this study arose as a condition of monitoring conducted by the team's coaching staff. As a result, the California State University, Fullerton ethics committee approved the retrospective analysis of pre-existing athletic testing data for this investigation (HSR-18-19-121). Each player had also completed the university-mandated physical examination and read and signed the university consent and medical forms for participation in collegiate athletics. The study also conformed to the recommendations of the Declaration of Helsinki (World Medical Association, 1997).

Procedures

The soccer players in this study trained Monday through Friday on a grass field from 9:00 am to approximately 10:30 am. Training sessions began with a dynamic warm-up progressing from general to sport-specific movement patterns to prepare the girls for activity. The athletes would begin on the sideline of the field and complete movements over about 10 m. The general warm up included glute activation with the use of mini bands. Glute exercises would vary, yet mostly included forward and backward monster walks, lateral marches in either direction, tempo squats, hip abductions, and hip external rotations. General movements during the warm-up aimed to activate total body musculature in the different planes of motion (e.g., lunge and twist, reverse lunge and overhead reach, world's greatest stretch, lateral lunges, inchworms, knee hugs, ankle pulls, and side sweeps). Sport-specific activities included the carioca, high knees, skips for maximal height and distance, and drills involving accelerations, decelerations, and COD actions (such as a sprint, side shuffle right, backpedal, side shuffle left, and sprint to the end line).

Following the dynamic warm-up, the team would transition into ball drills or other skill work such as juggling, passing boxes, partner passing, or tri-, quad-, or large group passing. Variations to these drills would include having defenders present to steal the ball, or adapting rules to one touch, two touches, meaning players alternate the number of touches (single or double) it takes to pass the ball to one another. Activity arrangements varied daily; however, following technical ball drills, the team would typically transition into tactical drills. Tactical drills involved separating the team into mini teams to develop competitive play with the use of various-sided games and goalkeepers to simulate potential opportunities for scoring during match play. These drills will be detailed later within this paper. Additionally, throughout practices, conditioning would take place either as its own component of training (i.e., "marathon runs" [a particular route around the training field], uphill runs, conditioning tests, etc.), or the result of losing sided games. At the conclusion of practice, athletes were granted 10–15 min of "free activity" to work on any elements of their individual performance. This could take the form of practicing shooting goals, the juggling test, corner kicks, penalty kicks, etc. Sessions would end with either a team cool down of full body stretching, individualized cool downs (every player for themselves), and/or ice baths for recovery.

Training Structure

Training sessions constructed by the coaching staff were mostly a mix of different modalities (e.g., physical conditioning, various-sided games, positional development drills, tactical and technical drills). Generally, all field players completed the same tasks, unless separated by position in preparation for game days. However, for this investigation, days prior to and after matches were excluded due to large alterations in GPS data. The changes in data would occur as a result of starters completing less physical work than players who did not play in the game during practice as a means of workload management. Nonetheless, although the goals of each session may have varied, all were combined due to field players completing the same drills during training.

Players typically trained 4–6 times per week for up to 2 hours depending on the training goals for individual sessions. Per the head coach's request, GPS data were collected for forwards, midfielders, and defenders as part of players' monitoring and workload management throughout the team's annual training plan. Drills completed during each practice session were determined by the coaching staff. As stated, data were analyzed for 19 practice sessions involving conditioning, various-sided games, tactical, and skills training for a total of 18 field players.

Training sessions with an emphasis on conditioning consisted of long slow distance runs, tempo runs, goal runs, 11 vs. 11, six 200-m sprints, ten 100-m sprints, and other high-intensity runs. The coaching staff programmed small-, medium-, and large-sided games during most training sessions. Large- and medium-sided games would incorporate matches of 9 vs. 9, 6 vs. 6 +1 neutral, 6 vs. 6 +2 neutrals passing only, and 7 vs. 7 +2 neutrals. Small-sided games were typically comprised of 5 vs. 2, 5 vs. 3, 5 vs. 5 +1 alternate, 5 vs. 5 possessions, 3 vs. 3, 4 vs. 2, and 4 vs. 4. Practices containing tactical and skills training would involve juggling, 1 vs. 1 with shooting, group possession passing, partner passing, cone agility drills, drills by position, shooting via headers, crossing-and-finishing, speed-of-play passing, dribbling with speed, skill work with the ball, 2 vs. 1 with shooting, passing boxes, possession passing with mannequins, 5 vs. 4 possession and defense transitions with target to score, 4 vs. 1 (one touch, two touches), and situational 11 vs. 11.

GPS Devices

All field players were assigned and fitted with GPS wearable technology for every practice session (Titan2, Titan Sensor, Houston, Texas). The GPS units collect samples at a rate of 10 Hz and are equipped with a 1 KHz accelerometer. Previous investigations have demonstrated that a sampling rate of 10 Hz provides both valid and reliable measures of speed and distance (Johnston et al., 2012; Rampinini et al., 2015; Scott et al., 2016). The devices were encapsulated posteriorly between the scapulae in a specialized polyester and elastane vest, which were supplied by the manufacturer. All devices had a compact design of 3 mm x 1.5 mm x 0.25 mm and weight of 42 g. Prior to each training session, the GPS devices were powered on by the researcher approximately 10 min before activity to allow for satellite signal recognition (Duffield et al., 2010). Data collected from the team warm-up prior to training was included in the analysis for the selected practice sessions. After the cessation of practice, the GPS units were collected and powered off by the researcher. Data were then downloaded to a personal computer using proprietary software for further analysis (V3.0.0, Titan Sensor, Houston, Texas, USA).

GPS Data

The sprint metrics derived from the devices included total sprint distance, sprint count, maximum and average top speed, sprint volume, and the number of accelerations and decelerations in different speed zones (±1 m/s^2, ±2 m/s^2, ±3 m/s^2, ±4 m/s^2, and ±5 m/s^2). Manufacturer definitions for the metrics assessed in this study were defined and are described as follows:

- Player Load (arbitrary units: AU): a scoring value accounting for the intensity and duration of effort based on GPS readings. The score is weighted with an exponentially increasing coefficient.
- Sprint (meters/second: m/s): a sprint effort begins when an athlete surpasses 4.76 m/s for at least 1 s and ends when speed decreases below 3 m/s.
- Sprint Count: number of sprints during a session.
- Sprint Total Distance (m): the sum of all sprint distance covered.
- Average Top Speed (m/s): the average of the sprints' top speeds.
- Maximum Top Speed (m/s): the maximum of all the sprints' top speeds.
- Sprint Volume (count/minute): average number of sprints per minute of playing time.
- Acceleration Zones (meters/second²: m/s^2): the instantaneous velocity at a given moment. The brackets included:
  - Decelerations (number):
    - -5 m/s^2 to -4 m/s^2
    - -4 m/s^2 to -3 m/s^2
    - -3 m/s^2 to -2 m/s^2
    - -2 m/s^2 to -1 m/s^2
  - Accelerations (number):
    - 1 m/s^2 to 2 m/s^2
    - 2 m/s^2 to 3 m/s^2
    - 3 m/s^2 to 4 m/s^2
    - 4 m/s^2 to 5 m/s^2

Statistical Analysis

All statistical analyses were computed using the Statistics Package for Social Sciences (version 26.0; IBM Corporation, NY, USA). Descriptive statistics (mean ± standard deviation [SD]) were calculated for each variable. Pearson's correlations (r) were used to calculate relationships between player load and the various sprint metrics from each session (sprint count, distance, and volume, average and maximal top speed, and the number of accelerations and decelerations in different speed zones). An alpha level of $p < 0.05$ was required for significance. Correlation strength was defined as: r between ±0 to 0.3 was considered small; ±0.31 to 0.49, moderate; ±0.5 to 0.69, large; ±0.7 to 0.89, very large; and ±0.9 to 1, near perfect for relationship prediction (Hopkins, 2006). A stepwise regression analysis ($p < 0.05$) was then conducted to determine which metrics predicted player load.

Results

Descriptive data for all variables is displayed Table 1. Significant relationships were found between player load and sprint count (large), maximum top speed (moderate), sprint distance (large), sprint volume (large), the number of decelerations at –1, –2, and –3 m/s^2 (all moderate), and the number of accelerations at 1, 2, 3, and 5 m/s^2 (all moderate) (Table 2). There were no significant relationships found between player load and average top speed, the number of decelerations at –4 and –5 m/s^2, or the number of accelerations at 4 m/s^2. The regression analyses indicated that sprint distance ($p < 0.001$, $r^2 = 0.741$) predicted player load with 72.5% explained variance. When the number of decelerations at –1 m/s^2 was added to the equation, explained variance increased to 85.1% ($p = 0.001$, $r^2 = 0.867$).

Discussion

This study investigated the relationship between sprint-related variables with player load recorded during training sessions in collegiate women field soccer players. The data indicated relationships between player load and sprint count, maximum top speed, sprint distance, sprint volume, the number of decelerations at –1, –2, and –3 m/s^2, and the number of accelerations at 1, 2, 3, and 5 m/s^2. This supports the research hypotheses as these sprint metrics demonstrated significant and positive relationships to player load. The regression analysis revealed that sprint distance predicted player load the most, along with the number of decelerations at –1 m/s^2. These data have important implications for coaches and sport scientists working with collegiate women soccer players.

Table 1. *Descriptive statistics for whole sample player load, sprint count, maximum top speed, average top speed, sprint distance, sprint volume, the number of decelerations at –1, –2, –3, –4, and –5 m/s^2, and the number of accelerations at 1, 2, 3, 4, and 5 m/s^2*

Variable	Mean ± SD
Player Load (AU)	98.34 ± 42.29
Sprint Count (number)	14.25 ± 6.73
Maximum Top Speed (m/s)	6.74 ± 0.30
Average Top Speed (m/s)	5.91 ± 0.13
Sprint Distance (m)	331.19 ± 158.17
Sprint Volume (count/minute)	344.24 ± 161.65
Deceleration at –1 m/s^2 (number)	171.64 ± 71.00
Deceleration at –2 m/s^2 (number)	74.90 ± 31.79
Deceleration at –3 m/s^2 (number)	20.17 ± 10.14
Deceleration at –4 m/s^2 (number)	4.00 ± 3.38
Deceleration at –5 m/s^2 (number)	0.51 ± 0.42
Acceleration at 1 m/s^2 (number)	165.50 ± 66.03
Acceleration at 2 m/s^2 (number)	87.97 ± 41.79
Acceleration at 3 m/s^2 (number)	19.83 ± 10.12
Acceleration at 4 m/s^2 (number)	1.01 ± 0.61
Acceleration at 5 m/s^2 (number)	0.03 ± 0.06

Table 2. *Pearson's correlations (r) for player load for the whole sample with sprint count, maximum top speed, average top speed, sprint distance, sprint volume, the number of decelerations at –1, –2, –3, –4, and –5 m/s², and the number of accelerations at 1, 2, 3, 4, and 5 m/s². * Significant ($p < 0.05$) relationship between the two variables.*

	Player Load	
Variable	*r*	*p*
Sprint Count	0.727*	< 0.001
Maximum Top Speed	0.646*	0.003
Average Top Speed	0.200	0.411
Sprint Distance	0.861*	< 0.001
Sprint Volume	0.855*	< 0.001
Deceleration at –1 m/s²	0.678*	0.001
Deceleration at –2 m/s²	0.636*	0.003
Deceleration at –3 m/s²	0.668*	0.002
Deceleration at –4 m/s²	0.402	0.088
Deceleration at –5 m/s²	0.275	0.254
Acceleration at 1 m/s²	0.663*	0.002
Acceleration at 2 m/s²	0.652*	0.003
Acceleration at 3 m/s²	0.610*	0.006
Acceleration at 4 m/s²	0.234	0.336
Acceleration at 5 m/s²	0.512*	0.025

There are very few studies that have examined maximal sprint speeds at the collegiate or professional level for women's soccer. High-speed running in soccer allows players to remain involved in play through their ability to keep up with game transitions. Assessing sprint variables in soccer players is meaningful as the ability to achieve faster running speeds can lead to significant opportunities during match play, such as creating space and scoring goals (Hewitt et al., 2014). In this study, the average maximal speed of all training sessions for the sample was approximately 6.74 m/s. The results indicated maximal sprint top speed had a large correlation to player load, with a positive relationship between the two variables. These data suggest that during training, athletes who achieved faster sprinting speeds experienced higher external loads. Interestingly, average top speed did not have a significant relationship with player load, suggesting that the peak speed attained by players had a greater impact on the external load experienced by players. Indeed, maximal sprinting speed requires high ground reaction forces (Čoh et al., 2018), so it could be expected that faster speeds place greater stress on a soccer athlete. Accordingly, as demonstrated by the results of the current study, when planning drills for practice sessions, sport coaches must consider that incorporating drills which require running at faster speeds will lead to increases in player load.

It is a challenge to compare sprint distance means of previous investigations to the present study due to the use of different GPS technologies, which each defines a sprint as something different. As noted previously, the Titan GPS sensors used in the current study defined a sprint as speeds at or above 4.76 m/s. Additionally, previous investigations have predominantly assessed professional soccer athletes during competition, rather than during training. An investigation of Danish national women soccer teams by Panduro et al. (2021), for instance, calculated an average of 676 m of very high-speed running (specified as speeds faster than 5 m/s), and approximately 245 m covered while sprinting (specified as speeds faster than 6.96 m/s) in field players during competitive games. Another study of Australian national women soccer players conducted by Hewitt et al. (2014) measured an average of 338 m of sprint distance (classified as speeds faster than 5.28 m/s), and approximately 2407 m of high-intensity running (classified as 3.33–5.27 m/s) during matches. These findings from Panduro et al. (2021) and Hewitt et al. (2014), as well as the results from this study, demonstrate why it is important for sport scientists and soccer coaches to recognize the effects of the amount, volume, and distance of sprints as these variables will influence external load demands.

Limited studies have examined sprint count, distance, and volume, particularly during practice sessions and in collegiate women soccer players. In the present study, the analysis of the collective team indicated very large correlations between player load and sprint count, sprint distance, and sprint volume. Sprint distance also predicted player load, with 72.5% explained variance. The average sprint count was approximately 14 sprints per session, average sprint distance was about 331 m per session, and average sprint volume was approximately 344 total sprints. Based on the findings of this investigation, a greater number, distance, and volume of sprints led to higher player load values, with sprint distance being particulalrly impactful. As noted previously, maximal sprinting requires the generation of high external forces (Čoh et al., 2018). In line with the results for maximal sprint speed, a greater number of sprints and distance covered while sprinting will elevate the load experience by the soccer athlete. Thus, training sessions that involve more sprint efforts, and sprints over longer distances, increased the level of difficulty of the session. The distance covered sprinting maximally within training drills could be adjusted up or down to manipulate the intensity of training sessions. Future research could track how training drills manipulated according to this process could affect fitness adaptations experienced by collegiate women soccer players.

The results of this study indicated that the number of decelerations and accelerations at slower speeds seemed to have a greater effect on player load in collegiate women's soccer athletes. Specifically, the number of decelerations at –1, –2, and –3 m/s² and the number of accelerations at 1, 2, 3, and 5 m/s² had large correlations with player load. The number of decelerations at –1 m/s² also predicted player load; when added to the regression equation with sprint distance, the explained variance was 85.1%. These results were anticipated as pace and directional changes are physically demanding, even at submaximal speeds (Douchet et al., 2021). Accelerations require an increase in momentum to propel the body in a new direction (Spiteri et al., 2015). Decelerations involve braking mechanisms that induce stressful loading to the posterior tissues (Papla et al., 2020). In this investigation, athletes executed over 500 accelerations and decelerations in the different speed zones per training session. Due to the high number of acceleration and deceleration efforts in soccer, athletes require exposure to these actions to prepare them for the demands of competition. Considering the significant number of pace changes completed by soccer athletes (Bloomfield et al., 2007), it is not surprising that these actions, even at relatively lower intensities, had a large impact on player load.

There was a greater total number of decelerations and accelerations at or below ±2 m/s² in comparison to decelerations and accelerations at or above ±3 m/s². These submaximal acceleration and deceleration efforts led to increases in player load likely due to the high volume of repetitions during training (approximately 246 decelerations below –2 m/s² and 253 accelerations below 2 m/s²). Douchet et al. (2021) found that an increased number of accelerations and decelerations in training led to an increase in perceptual exercise intensity and fatigue in elite professional women soccer players. The authors attributed this finding to produced muscle damage and soreness as a result of these metabolically demanding tasks. Considering the results from this study and those from Douchet et al. (2021), it would seem that drills involving a greater number of pace and COD actions could increase the intensity of training sessions for collegiate women's soccer players. As an example, if a coach wished to increase the stress of a training session, designing training drills that required more direction changes should achieve this. This could include 2 x 3 or 4 x 4 grids, various cone drills that incorporate dribbling and other on-ball skills, and different variations of small-sided games with reduced playing field dimensions and fewer players. Using training drills with reduced COD demands should decrease the stress experienced. Any training adaptations experienced by collegiate women soccer players according to training drill manipulation relative to player load could be investigated in future studies.

The number of decelerations at –4 and –5 m/s^2 and accelerations at 4 m/s^2 did not demonstrate significant correlations to player load. These results could have been influenced by some of the inherent limitations to GPS devices (Coutts and Duffield, 2010). Accelerations and decelerations may be harder to record via GPS equipment if they are faster and shorter in duration (Windt et al., 2020). Nonetheless, the deceleration and acceleration data do reflect the demands of these actions relative to player load in collegiate women soccer players.

There are certain limitations of the study that should be considered. The sample size was relatively small (N = 18), and only one NCAA Division I collegiate women's soccer team was assessed for this investigation. The number (N = 19) and type of practice sessions analyzed may have presented different results compared to a greater number of sessions or competitive match data. Workload demands of players vary depending on the playing position, thus, specific drills may affect certain positions more than others. Relationships between player load and sprint metrics specific to positions in collegiate women's soccer players could be studied in future research. GPS technology may have shortcomings in the assessment of short, high-intensity actions such as accelerations and decelerations (Coutts and Duffield, 2010; Ravé et al., 2020). Nonetheless, GPS devices with higher sampling rates such as those used in this investigation have demonstrated greater reliability and validity (Rampinini et al., 2015). Furthermore, the use of GPS data in high-level soccer matches is commonplace, and thus has application in collegiate women's soccer.

In conclusion, the results showed relationships between player load and sprint count, maximum top speed, sprint distance, sprint volume, the number of decelerations at –1, –2 and –3 m/s^2, and the number of accelerations at 1, 2, 3, and 5 m/s^2 in collegiate women soccer players. Sprint distance and the number of decelerations at –1 m/s^2 predicted player load. Understanding the impact of these variables on athlete workloads could allow coaches to design training drills to manipulate the difficulty of the session. This could also lead to improved application of drills and training modalities to better enhance performance and fitness of players. For example, training games could be altered via the number of players (i.e., 4 vs. 4 and 6 vs. 6), adapted rules (i.e., one touch, two touches, the target number of passes, etc.), and modified pitch dimensions to either increase or decrease the sprint distance and COD actions required. This could allow coaches to adjust player load as needed for collegiate women's soccer players over the course of a season.

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