

Increased Competition Workloads when games are played with Four or more compared to Three Days of Rest in NCAA Division 1 Female Soccer Players

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ABSTRACT

Recovery is an important component to any well-designed training program; however, competition schedules are rigid and do not allow for additional rest should an athlete need it. **PURPOSE:** Examine the influence of different rest periods between competitions on various workload metrics in collegiate female soccer players. **METHODS:** Global positioning system (GPS) data obtained by the coaching staff of a Midwestern NCAA Division I women's soccer program was retrospectively examined. Players wore the GPS integrated with heart rate (HR) analysis during all games through the 2023 season. Data from all 18 regular season matches were separated into games played with three (3DAY; n=8) or four or more (4+DAY; n=10) days of rest, then separated into first and second half. During each game, data was collected continuously on all players regardless of whether they were playing at that time, though only data from players who averaged more than 20 minutes of playing time over the course of the season was included. Data consisted of total number of sprints, sprinting distance, percent of time spent running above (HSR) and below (LSR) 15 km·hr⁻¹, percent of time spent above (HR-HIGH) and below (HR-LOW) 80% HR reserve, total distance and training load (TL). All variables were made relative to the total playing time for each individual player, which exaggerated time proportions in HR-HIGH and HR-LOW due to continuous data collection. Data were analyzed using a 2x2 (rest x half) repeated measures Analysis of Variance with least significant difference pairwise comparisons ($\alpha \leq 0.05$). **RESULTS:** No rest x half interactions were observed for any variables, however, main effects for rest were observed for the number of sprints ($F = 10.69$; $p = 0.007$) and HSR ($F = 21.49$; $p = 0.001$), while a non-significant main effect was shown for TL ($F = 3.33$; $p = 0.093$). Pairwise comparisons indicate all variables were greater following 4+DAY relative to 3DAY (Table 1). Main effects for half were observed for the number of sprints ($F = 6.68$; $p = 0.024$), LSR ($F = 6.92$; $p = 0.022$), HSR ($F = 7.33$; $p = 0.019$), HR-LOW ($F = 40.46$; $p < 0.001$), HR-HIGH ($F = 5.83$; $p = 0.033$) and total distance ($F = 9.00$; $p = 0.011$). The number of sprints, LSR, HSR, HR-HIGH, and total distance were reduced in the second half, while HR-LOW was increased (Table 1). **CONCLUSION:** Data indicate players increase high intensity external workloads with at least one more day of rest and may also be capable of greater training loads with more rest. Moreover, external workloads decrease over the course of a game, with increased time spent in lower intensity HR zones. **PRACTICAL APPLICATIONS:** Practitioners should continue to identify and recommend strategies that may aid in the recovery between games, while also seeking strategies that may be used to combat the decline in performance over the course of a game.

PRACTICAL APPLICATIONS

- One additional day of rest increased the number of sprints and time spent running at high speeds during regular season competition.
- Methods to enhance recovery between games with 3 days of rest are needed.

METHODS

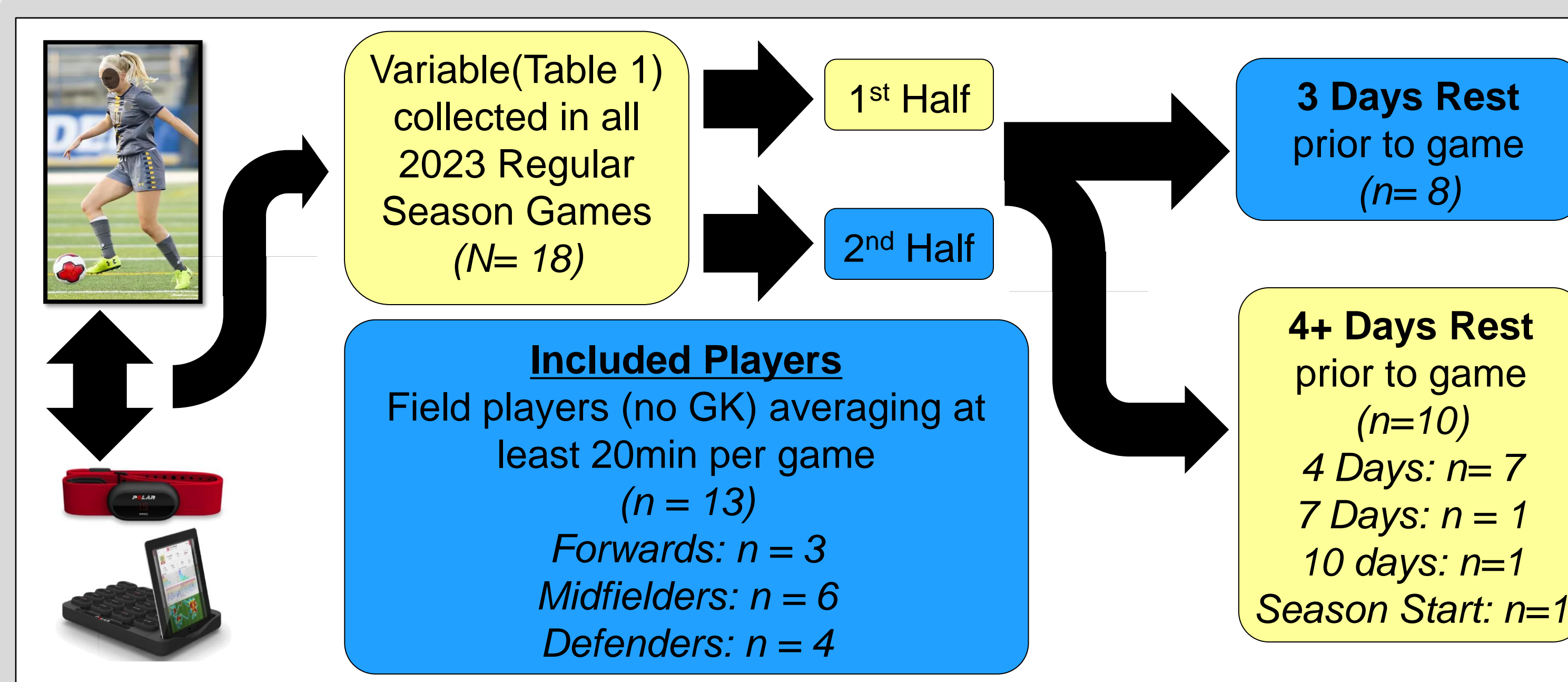


Figure 1: Study Design.

GPS and heart rate data were collected on players for all 2023 regular season games. Data were segmented into 1st and 2nd halves. Data were then analyzed as games with three days of rest prior compared to four or more days of rest. 13 players that averaged over 20 minutes per game were included in the final analysis.

Statistical Analysis

Data were analyzed using 2x2 (rest x half) repeated measures ANOVAs

Table 1: Description of Variables.

Number of sprints	Number of explosive runs made ≥ 15 km·hr ⁻¹ .
Sprint Distance	Total distance covered while sprinting.
Low speed zone	Percentage of time spent running at low speed < 15 km·hr ⁻¹ .
High speed zone	Percent of time spent running at a high speed ≥ 15 km·hr ⁻¹ .
Low HR zone	Percentage of time spent within a heart rate zone less than 75%.
High HR zone	Percent of time spent within a HR zone greater than 75%.
Total distance covered	Total distance covered.
Training load	The intensity of the activity relative to the duration.

CONCLUSION

- Players appear to be more capable of high intensity efforts with four or more days of rest:
 - Reduced number of sprints performed with 3 days of rest
 - Reduced time running at high speeds with 3 days of rest
 - Training load may ($p = 0.093$) be decreased with 3 days of rest
- High intensity efforts appear to decline from the 1st to 2nd half:
 - Number of sprints performed decreased
 - Time running at high speeds decreased
 - Total distance covered decreased
- Players seem to be less capable of maintaining higher workloads during the 2nd half:
 - Time in Low HR zones increases in 2nd half
 - Time in High HR zones decreases in 2nd half

LIMITATIONS

- Data were all analyzed retrospectively; therefore, players' GPS systems were always 'on' during each match.
 - This may lead to an artificial inflation in low intensity HR values during the 2nd half, as substitution patterns generally rested the analyzed players more in the 2nd half than 1st.
 - Similarly, time in High HR zones may have been artificially suppressed in the 2nd half
- A greater proportion of games with four or more days of rest occurred early in the season, and therefore, stage of the season may have influenced results.

BACKGROUND

- Recovery is an important component to well designed training programs (1)
- Competitions schedules are rigid, and do not allow for additional rest between competitions, should the athlete require it.
- Prior work had demonstrated declines in performance for soccer athletes with congested match schedules for several variables (2, 3):
- Prior work has also demonstrated that collegiate female soccer players can see substantial reductions in performance in the 2nd game played each week (4)
 - Comparison between 2 days of rest compared to 5 days of rest.
- Given the potential reductions in performance, a more even split (3 vs 4 days) may limit the reductions in performance.

PURPOSE

The purpose of this investigation was to examine the influence of different rest periods between competitions on various workload metrics in collegiate female soccer players.

RESULTS

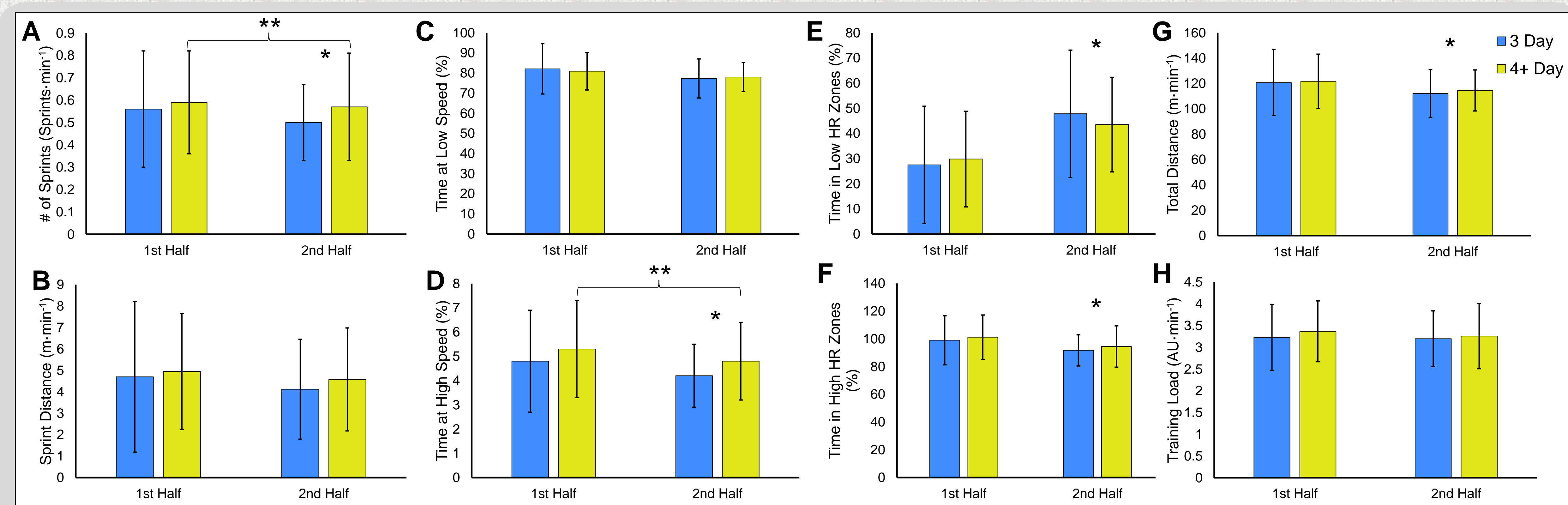


Figure 2: Workloads between Rest Periods.

(A) Number of sprints per minute; (B) Distance while sprinting per minute; (C) Percent of time spent running at low speed; (D) Percent of time spent running at high speed; (E) Percent of time in Low HR Zones; (F) Percent of time in High HR Zones; (G) Total distance covered per minute; (H) Training Load per minute.

* Sig. Different than the 1st Half

** Sig. Different than 3 Days of Rest

ACKNOWLEDGMENTS

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