

Analysis of GPS-Acquired Distance Data in NCAA Division 1 Women's Soccer



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SPORTS MEDICINE

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PURPOSE

- Analyze and evaluate four years of retrospective data from an NCAA Division I Women's Soccer team's Global Positioning System/Heart Rate Monitoring (GPS/HRM) units.
- These position-specific performance metrics add to sparsely existing data, in this demographic of female athletes, to increase awareness of optimal conditioning levels, for each position, when evaluating sport demands.

METHODS & DESIGN

- Four years of retrospective GPS/HRM data for a collegiate women's soccer team was analyzed for total distance traveled by player position during conference and non-conference matches.
- Sensors are worn via chest harness during training and matches.
- Data was analyzed for all players as a simple mean per position.
 - Data for starters was also analyzed separately
- Goalkeepers were excluded
- Playing position is defined as Defender (D), Midfielder (M), or Forward (F).

LIMITATIONS

- Data was pre-existing, not allowing for optimization of sample collection
- Data was collected for all players regardless of minutes played
 - In several previous studies data was collected on selected individual players allowing for optimization of important variable such as playing time
- Data for the 2020 season was significantly limited due COVID-19 schedule alterations, resulting in conference only matches
- Data is collected from a single Division I women's soccer team

DATA

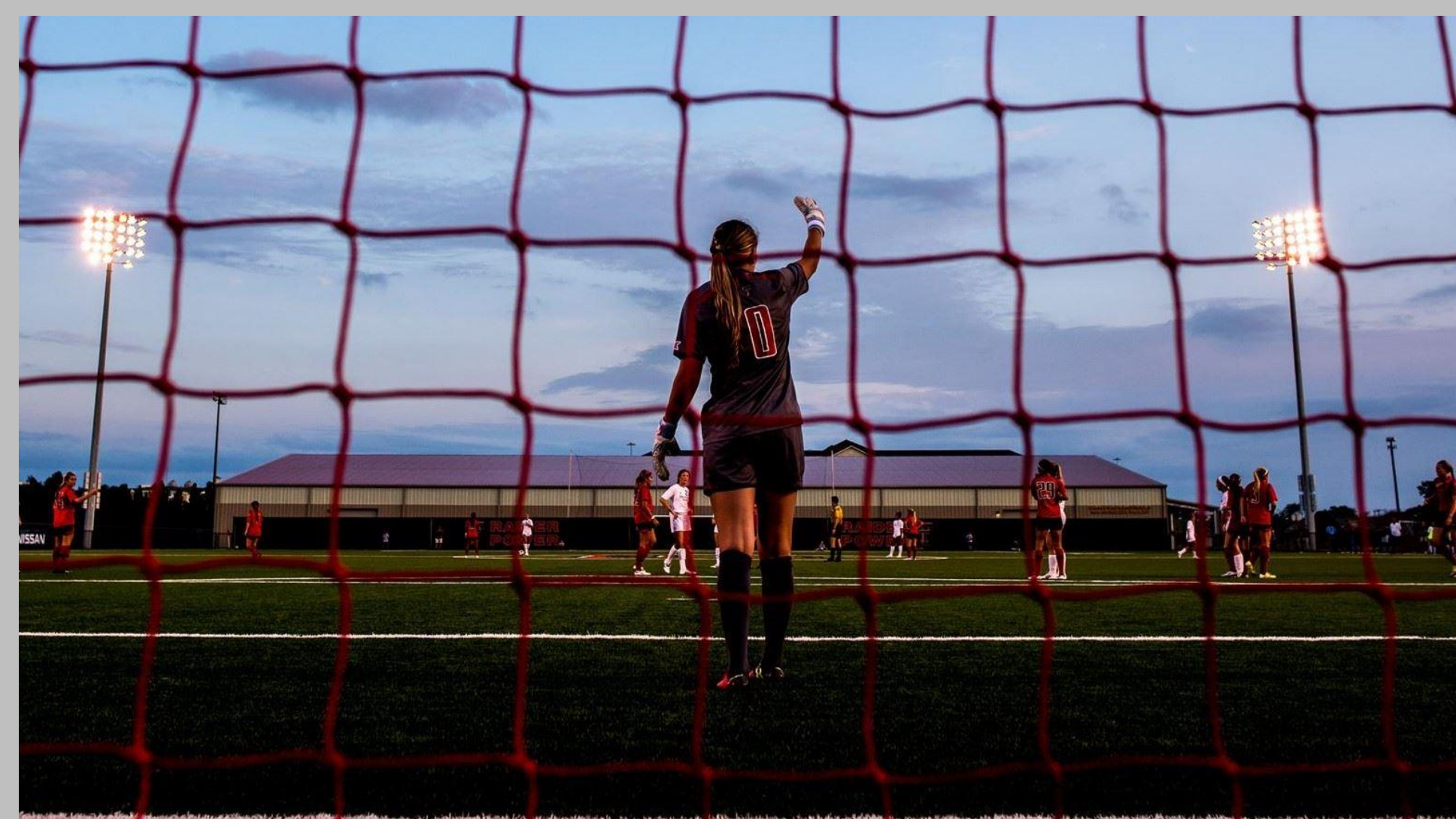
Non-Conference							
All Players:	Forwards	Mids	Defenders	Starters:	Forwards	Mids	Defenders
	2017	4.83	4.99		5.02	5.98	6.67
2018	5.57	4.14	4.53	5.57	7.10	6.20	
2019	5.53	4.56	4.79	5.53	5.10	5.13	
2020							
AVERAGES:	5.31	4.56	4.78	5.69	6.29	5.81	

Conference							
All Players:	Forwards	Mids	Defenders	Starters:	Forwards	Mids	Defenders
	2017	5.27	5.53		5.48	6.68	7.75
2018	5.78	4.38	4.37	5.78	7.77	6.33	
2019	6.70	4.71	5.05	6.70	6.38	6.16	
2020	4.10	6.90	6.10	6.10	7.09	6.52	
AVERAGES:	5.46	5.38	5.25	6.31	7.25	6.43	

Season							
All Players:	Forwards	Mids	Defenders	Starters:	Forwards	Mids	Defenders
	2017	5.05	5.26		5.25	6.32	7.21
2018	5.70	4.28	4.44	5.70	7.43	6.25	
2019	6.40	4.70	5.00	6.40	5.70	5.80	
2020	4.10	6.90	6.10	6.10	7.09	6.52	
AVERAGES:	5.31	5.29	5.20	6.13	6.86	6.25	



Heart Rate and GPS Monitoring Equipment



RESULTS

- Team data was analyzed from 89 matches over four seasons.
- Data for 27 starters was also analyzed separately and is the focus of this report
- Consistently, the Midfielders covered the most distance for both non-conference and conference matches, followed by Defenders, and then Forwards.
- Distance covered by all positions was found to be greater in Conference vs. Non-conference matches
- Four-year averages for Non-conference vs. Conference Matches were:
 - Midfielders 6.29 miles vs. 7.25 miles
 - Defenders 5.81 miles vs. 6.43 miles
 - Forwards 5.69 miles vs. 6.31 miles
- For Non-conference matches, the absolute difference between positions was 0.60 miles and for Conference matches it was 0.93 miles.
- In Conference play, the maximum total distance by a single player (Midfielder) was 10.7 miles.
- In Non-conference play, the maximum total distance covered was 8.9 miles by both a Midfielder and a Forward.
 - This difference may be accounted for by the level of competition in conference versus non-conference play.

CONCLUSION & SIGNIFICANCE

- The sports axiom "defense creates offense" applies to the soccer midfielder whose role it is to connect the defense to the offense.
- In that process, data supports the active midfielder will cover more distance than the other positions on the pitch.
- This single metric in monitoring player dynamics and performance heightens awareness of the demands for each position.
- While forwards score more often, the fit midfielder covers more ground to help create those scoring opportunities, and her conditioning should reflect those demands.
- This data may be used to implement conditioning programs for female soccer athletes, focusing on:
 - each position's demands
 - optimizing performance and recovery
 - fine-tuning training
 - monitoring training loads to assess risk for injury
 - developing robust injury resilient athletes.

REFERENCES/ADDITIONAL INFORMATION

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