Collegiate Female Soccer Athlete Acute To Chronic Training Stress Relationships To Injury Over a Competitive Season

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BACKGROUND & SIGNIFICANCE

- Understanding what increases athlete risk for injury is important with the current era of athlete tracking systems.
- The acute to chronic workload ratio has been shown to be related to injury risks in a variety of populations.
- How this relationship changes depending on sport needs to be further investigated, specifically in female sports.

PURPOSE

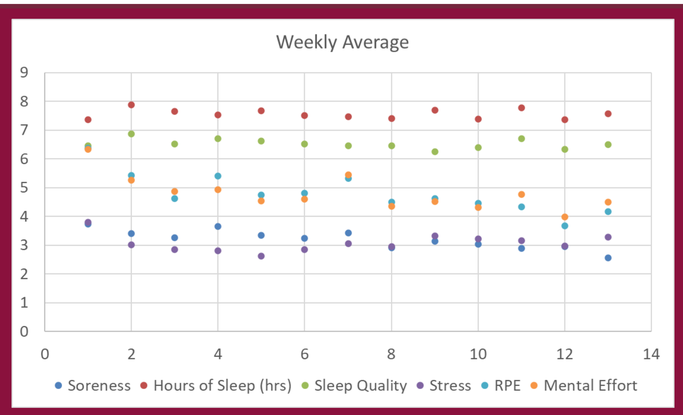
- To analyze weekly training volumes and intensity that soccer athletes encounter throughout a competitive season and examine their relationships to injury rates.

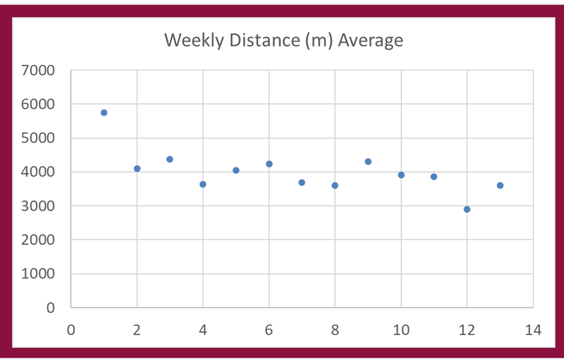
METHODS

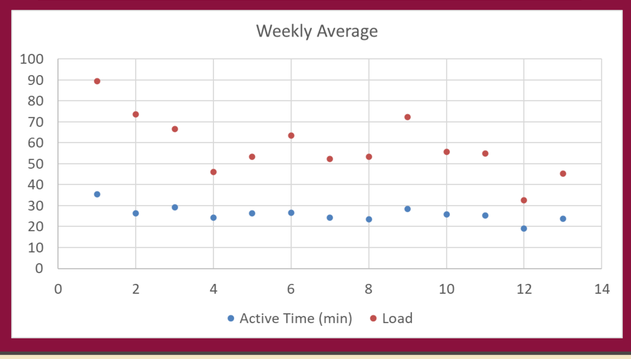
- 34 Division I collegiate women's soccer players participated in this tracking (age, height, 62.4±8.2 kg, Mean±SD, Position Groups: 7 forwards, 9 midfielders, 14 defenders, 4 goalies).
- Athletes wore accelerometer sensors for each of the training and game sessions. Sensors recorded acceleration at 10 Hz and derived velocity and distance covered.
- Player distance covered, active time, and load were used for analysis. Athletes typically practiced 4-5 days per week and played 1-2 games throughout the season. Data was tracked from the start of the preseason until the end of the competitive season.
- Athletes filled out daily questionnaires asking them for their soreness, rating of perceived exertion (RPE), stress, mental effort, sleep quantity (hours), sleep quality (ligert scale 1-10), source of highest stress (athletics, academics, stress free, other), steps per day, resting heart rate upon waking in the morning, and meals eaten on a given day.
- Data was analyzed for acute (1 week) to chronic (4 weeks) ratios and rates of incidences of injury. Injury was defined as any even that caused an athlete to be removed from one or more practices. The acute to chronic ratio of the preceding week and month respectively was used for analysis. Correlations between values was assessed with significance set at an alpha of p<.05.

Daily Average Starters	RPE	Mental Effort	Distance (m)	Active Time (min)	Load
Goalies	4.429979	4.932034			
Defenders	6.466703	6.778664	4608.47	31.09364	81.76828
Midfielders	5.506957	5.327983	5099.818	33.14031	75.48913
Forwards	5.29602	4.275868	4538.255	30.48604	69.68825

Daily Average Non Starters	RPE	Mental Effort	Distance (m)	Active Time (min)	Load
Goalies	5.019231	4.51641			
Defenders	4.188153	3.916431	3091.773	18.56586	32.5828
Midfielders	4.137845	4.128114	4421.376	27.27122	67.4929
Forwards	5.276472	5.95391	3211.146	20.03994	40.77698

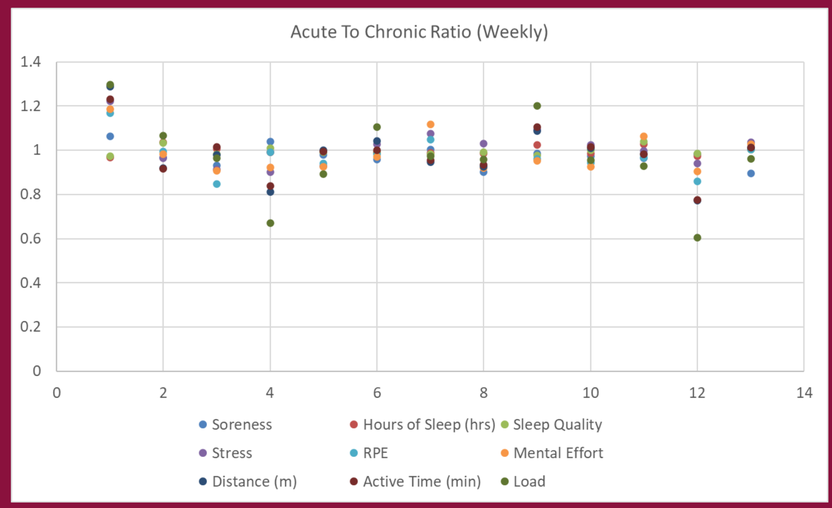






RESULTS

- In total there was 26 documented injuries, 5 contact, 21 non-contact. 20 were soft tissue injuries and 6 were hard tissue.
- There were no significant relationships between injury date and the acute to chronic ratio during the players week of the injury. Values were as follows:
- Distance covered (1.014±.017AU)
- Active time (1.015±.016AU), player load (1.013±.024 AU),
- RPE (.991±.015 AU),
- Mental effort (.997±.013 AU),
- Stress 1.003±.009 AU),
- Soreness (.993±.014 AU),
- Sleep quantity (1.001±.005 AU),
- Sleep quality (1.000±.004 AU).



Date	Soreness	Hours of Sleep (hrs)	Sleep Quality	RPE	Mental Effort	Distance (m)	Active Time (min)	Load
Soreness	1	0.003935	-0.09281	0.102087	0.068094	-0.06631114	-0.04751	-0.07889
Hours of Sleep (hrs)		1	0.434978	0.082796	0.112573	0.26791553	0.270448	0.194883
RPE				1	0.736759	0.587666618	0.618742	0.420395
Mental Effort					1	0.408783091	0.429571	0.289609
Distance (m)						1	0.972749	0.792211
Active Time (min)							1	0.699417
Load								1

CONCLUSIONS

- Overall, there were no relationships between the acute to chronic training load relationship when observed for this population sample.
- This is likely due to the total volume of training never being that great compared to previous work that has shown injury rates rapidly increase when the acute to chronic workload ratio is over 1.5 and highest values observed in this investigation was lower for any metric in this investigation.
- There were however significant relationships between RPE, Distance Covered, Active Time, Player Load, and Mental Effort.

PRACTICAL APPLICATIONS

- Having athletes rate their session RPE can be a method to indicate the total stress that they have undergone in the given session and per week.
- Mental effort is another good proxy, and soreness has some utility, but is much weaker of a relationship.

ACKNOWLEDGEMENTS

The researchers would like to thank the participants for being in the study and specifically Max Payne for his assistance.