Difference in rugby league match characteristics following the introduction of temporary law modifications due to COVID-19; A preliminary investigation

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Headline

S uper League (SL) is the highest level of rugby league competition in the Northern Hemisphere. The league competition was postponed on 24th Match 2020, due to the global COVID-19 pandemic, and restarted on the 2nd August 2020. With the aim of reducing the number of close proximity encounters within matches, a number of risk mitigation factors were implemented by the Rugby Football League (RFL). These included the temporary removal of the scrum and the addition of the '6 again' rule. These changes will likely have an effect on the match characteristics (e.g., locomotor variables and match events) albeit this is not causal (1). Whilst the locomotor (2,3), collision (4,5) and match event characteristics (6,7) have been previously described, these were when rugby league was played with scrums.

Aim

To describe the SL match characteristics during the 2020 season, pre-COVID and post-COVID rules.

Methods

A prospective observational cohort design was used to compare the positional match-play characteristics following an enforced break in fixtures (i.e. pre- [30th January – 15th March 2020] and post-COVID rules [2nd August – 4th October 2020]). Microtechnology data from 62 fixtures and 246 unique male professional rugby league players (containing 1,348 player observations; pre-COVID rules n = 828 and post-COVID rules n = 520) and match events also from 62 fixtures (containing 1,812 player observations; pre-COVID rules n = 1073 and post-COVID rules n = 739) were analysed. Players were stratified according to their primary playing position for each match (i.e. the longest duration spent playing in that position during each individual match) and categorised into groups of forwards (props, second rows, and back rows), adjustables (hookers, halves) and backs (centres, wings, full backs). Ethics approval was provided by the university local ethics committee.

Microtechnology observations were excluded in instances where signal quality was deemed poor during the data collection phase (i.e. ¿10% of the raw file was filtered) or match time considered low (i.e. ¡20 minutes on field duration). The mean number of connected satellites and mean horizontal dilution of precision from the final dataset was 11.4 ± 1.3 and 0.9 ± 0.2, respectively. Match events (carries, tackles, play the balls [PTB], tries) were extracted from a commercial match statistics provider (Opta, Leeds, United Kingdom).

To establish locomotor characteristics, each player was fitted with the same model of GNSS microtechnology device sampling at 10 Hz (OptimEye S5, Catapult Sports, Melbourne, Australia). The test-retest reliability of OptimEye S5 microtechnology devices to measure instantaneous speed across a range of starting velocities has been reported to be acceptable (coefficient of variation [CV] = 2.0 to 5.3%) (8).

All statistical analyses were performed using R statistical software (version 3.6.3). Data are presented as mean ± standard deviations (SD). Standardised differences between pre- and post-COVID competition periods were assessed using effect sizes (ES) ± 95% confidence intervals (CI), classified as: <0.20 trivial, 0.20 to <0.60 small, 0.60 to <1.20 moderate, 1.20 to <2.0 large and ≥2.0 very large (9).

Results

Whole-match duration, locomotor characteristics (per player) and total match events (per fixture) for season 2020 pre- and post-COVID rules are shown in Table 1.

Mean locomotor characteristics and mean match event data (per positional group) are presented in Table 2 for pre- and post-COVID rules.

The proportion of BIP durations, for different epochs are presented in Figure 1, and peak locomotor characteristics for positional groups for different epochs are presented in Figure 2.

Discussion

Super League competition implemented COVID-19 related rule changes (e.g., removal of scrums and the '6 again' rule) mid-season in 2020. Following their implementation, there was a reduction in average speed and average acceleration for whole-match and BIP periods; however, differences for peak locomotor characteristics were less apparent. There were more BIP durations between 0-30, 30-60 seconds, and less BIP durations ¿60 seconds. Furthermore, there was an increase in the number carries, tackles, and PTB's; however, the number of tries scored did not change.

The removal of the scrum and introduction of the '6 again' appeared to result in a moderate increase in whole-match duration whilst the increase in BIP duration was small. Whole-match duration could be influenced by other factors (e.g., injury, extra time), therefore it is unclear if this was due to the new rules (1). That said, it could be an indirect consequence (e.g., no scrums result in more injury stoppages), as whilst

Table 1. Comparison of player locomotor and fixture match event characteristics during Super League matches between pre- and post-COVID rule modifications (Mean ± SD).

	Variable	Pre-COVID	Post-COVID	△ (Effect Size; ±95% CL)
Duration	Whole-match (min)	88.3 ± 9.3	94.4 ± 5.9	*Moderate*; 0.78; ± 0.09
	Ball-in-play (min)	57 ± 6.7	60.4 ± 5.6	*Small*; 0.55; ± 0.09
Whole match	Total Distance (m)	5527 ± 1958	6120 ± 2084	*Small*; 0.29; ± 0.09
	Average speed (m·min^{-1})	79.9 ± 8.5	71 ± 13.9	*Moderate*; -0.77; ± 0.09
	High speed running distance (m)	373 ± 213	431 ± 229	*Small*; 0.26; ± 0.09
	Average acceleration (m·sec^{-2})	0.43 ± 0.04	0.38 ± 0.07	*Moderate*; -0.83; ± 0.09
Ball-in-play	Total distance (m)	4365 ± 1532	4790 ± 1659	*Small*; 0.27; ± 0.09
	Average speed (m·min^{-1})	99.8 ± 10.2	91.9 ± 12.3	*Moderate*; -0.70; ± 0.09
	High speed running distance (m)	347 ± 197	400 ± 209	*Small*; 0.26; ± 0.09
	Average acceleration (m·sec^{-2})	0.58 ± 0.06	0.54 ± 0.06	*Moderate*; -0.67; ± 0.09
Peak locomotor characteristics	1 min (m·min^{-1})	161.6 ± 23.3	164.6 ± 19.4	*Trivial*; 0.14; ± 0.09
	5 min (m·min^{-1})	110.9 ± 16.4	111.6 ± 14.6	*Trivial*; 0.05; ± 0.09
	10 min (m·min^{-1})	97.8 ± 14.9	98.2 ± 14.7	*Trivial*; 0.03; ± 0.09
Events	Carries (n·fixture^{-1})	349 ± 20	381 ± 24	*Large*; 1.45; ± 0.10
	Tackles (n·fixture^{-1})	653 ± 47	697 ± 49	*Moderate*; 0.92; ± 0.09
	Play-the-balls (n·fixture^{-1})	258 ± 21	283 ± 22	*Large*; 1.16; ± 0.09
	Tries (n·fixture^{-1})	5 ± 2	6 ± 2	*Trivial*; 0.10; ± 0.09

Table 2. Comparison of positional locomotor and match event characteristics during Super League matches for pre- and post-COVID rule modifications (Mean ± SD).

		Forwards			Adjustables			Backs		
	Variable	Pre-COVID	Post-COVID	△ (Effect Size; ±95% CL)	Pre-COVID	Post-COVID	△ (Effect Size; ±95% CL)	Pre-COVID	Post-COVID	△ (Effect Size; ±95% CL)
Whole match	Total Distance (m)	4426 ± 1788	4797 ± 2425	*Trivial* 0.17; ± 0.13	6353 ± 1869	7022 ± 1520	*Small*; 0.39; ± 0.19	6855 ± 900	7045 ± 860	*Small*; 0.22; ± 0.16
	Average speed (m·min^{-1})	79.7 ± 8	63.3 ± 16.3	*Large*; -1.28; ± 0.14	83.6 ± 8.7	78 ± 9.3	*Moderate*; -0.62; ± 0.19	77.8 ± 8.5	75.2 ± 8.9	*Small*; -0.29; ± 0.16
	High speed running distance (m)	255 ± 153	281 ± 196	*Trivial*; 0.15; ± 0.13	372 ± 184	423 ± 176	*Small*; 0.28; ± 0.19	579 ± 158	599 ± 168	*Trivial*; 0.12; ± 0.16
	Average acceleration (m·sec^{-2})	0.43 ± 0.04	0.34 ± 0.09	*Large*; -1.29; ± 0.14	0.45 ± 0.04	0.41 ± 0.04	*Moderate*; -1.00; ± 0.20	0.41 ± 0.03	0.39 ± 0.03	*Moderate*; -0.67; ± 0.16
Ball-in-play	Total Distance (m)	3558 ± 1446	3827 ± 1945	*Trivial*; 0.16; ± 0.13	5036 ± 1459	5547 ± 1212	*Small*; 0.38; ± 0.19	5274 ± 825	5432 ± 768	*Small*; 0.20; ± 0.16
	Average speed (m·min^{-1})	100.9 ± 8.6	88.3 ± 13.6	*Moderate*; -1.11; ± 0.14	105.1 ± 9.4	100.7 ± 7.9	*Small*; -0.50; ± 0.19	94 ± 10.7	90.9 ± 10.4	*Small*; -0.29; ± 0.16
	High speed running distance (m)	242 ± 145	268 ± 184	*Trivial*; 0.16; ± 0.13	346 ± 174	392 ± 157	*Small*; 0.27; ± 0.19	529 ± 154	550 ± 156	*Trivial*; 0.13; ± 0.16
	Average acceleration (m·sec^{-2})	0.6 ± 0.05	0.55 ± 0.06	*Moderate*; -0.83; ± 0.13	0.46 ± 0.05	0.58 ± 0.05	*Small*; -0.40; ± 0.19	0.53 ± 0.05	0.51 ± 0.05	*Small*; -0.40; ± 0.16
Match Event Characteristics	Carries (n)	10 ± 4	11 ± 4	*Small*; 0.25; ± 0.13	8 ± 4	9 ± 5	*Small*; 0.23; ± 0.19	13 ± 4	14 ± 5	*Trivial*; 0.16; ± 0.16
	Tackles (n)	25 ± 10	28 ± 11	*Small*; 0.28 ± 0.13	23 ± 12	23 ± 12	*Trivial*; 0.01 ± 0.19	8 ± 6	8 ± 6	*Trivial*; 0.02 ± 0.16
	Play-the-balls (n)	8 ± 4	9 ± 4	*Small*; 0.27 ± 0.13	3 ± 2	4 ± 13	*Trivial*; 0.24 ± 0.19	10 ± 4	11 ± 4	*Trivial*; 0.17 ± 0.16

descriptive data are presented as a preliminary analysis, these observations should not be ignored.

Following the restart of the SL season, a small increase in total distance and high-speed running (HSR) distance was found for both whole-matches and BIP periods. A moderate reduction in average speed and average acceleration was found for whole-matches and BIP periods. Given the scrum was removed (12 ± 4 previously (10)), and some penalties were replaced by the '6 again', it is likely that play is more continuous and could explain these findings. Of note, the decrease in average speed and acceleration suggest that players are down-regulating their overall physical output, which is supported by

the trivial difference for peak locomotor characteristics (e.g., players are on average performing at the same 'peak intensity' when required).

Importantly, there was a large increase in the total number of carries and moderate increase in the total number of tackles and PTBs following the rule change. This is likely explained again by the continuous play and may explain why the average speed and average acceleration was reduced for players. Johnston et al. (4) found a concurrent reduction in running during the peak 5-minute collision frequency in NRL and SL matches. Therefore, players are either unable to maintain high running and collision intensities, or the duration of time in the tackles

reduces the ability to run as players need to stay behind the player with the ball, who will be in the tackle.

For positional comparisons, forwards experienced a large and moderate reduction in both average speed and average acceleration for both whole-match and BIP. This may be due to their small increase in tackles and carries, which has been previously reported (4,5). This will likely change the players recovery profile following a match (11), and therefore should be considered when planning post-match microcycles.

Of note, both adjustables and backs saw a trivial change in tackles, but adjustables did undertake more (small) carries and PTBs. This may suggest a requirement to carry the ball due to other positional groups not being available for the carry. Alternatively, adjustables may have been trying to evade and find holes in the defensive line, which may be possible if indeed forwards were fatigued due to the higher number of tackle involvements. The specific explanation is likely unique to every match and player (1), given the variability between matches, players and teams. Yet these data still provide practitioners with interesting data to consider when preparing for the remaining stages of the season with the temporary rules.
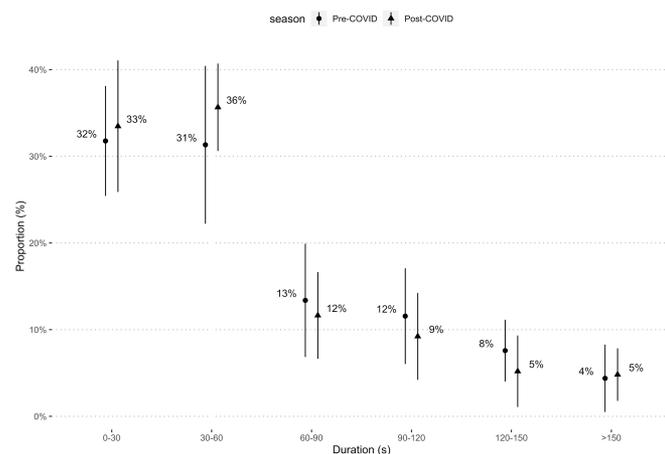

Fig. 1. Proportion of ball-in-play durations, in 30-second windows during Super League matches pre- and post-COVID rule modifications. Data presented are Mean ± SD.
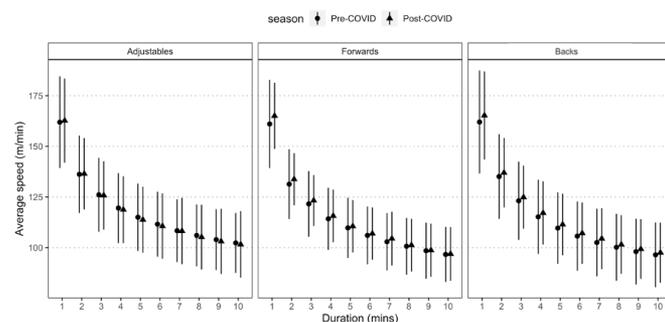

Fig. 2. Peak locomotor characteristics for adjustables, forwards, and backs during Super League matches for 1–10-minute windows pre- and post-COVID rule modifications. Data presented are Mean ± SD.

As a consequence of the COVID-19 global pandemic, several sports have chosen to temporarily change their laws of competition in effort to protect the wellbeing of players and staff. For example, within Australian Football League (AFL) match quarters have shortened from 20-minutes to 16-minutes playing time and within the Scottish Premier Football League number of permitted player replacements has increased from 3 to 5. Whilst anecdotal comments from certain incumbent AFL players have suggested the reduced playing time may be of benefit to from a physiological perspective (12), the effects of recent rule changes are lacking investigation and therefore their potential influence on performance characteristics are unknown.

Practical Applications

The temporary rule changes to rugby league resulted in:

- An increase in whole-match and BIP duration.
- A reduction in average speed and average acceleration.
- No change in peak running demands.
- An increase in the number of carries, tackles, passes and PTBs.
- Coaches and support staff should be aware that forwards are involved in more tackle events, and therefore may need longer to recover post-match.

Limitations

Previous research investigating the variability of rugby league locomotor characteristics, using statistical models to account for team and player (as random effects) found no overall effect between the 2018 and 2019 seasons (13). Therefore the match characteristics observed in this study may not be due to the new rules, and may simply be a due to the change in player fitness status, as a consequence of the long 4-month enforced 'lock down', and constraints of a 2-3-week preseason to prepare for the season restart (14). Further research with more data could help overcome these limitations. Although given the rules changes are temporary, the dissemination of this information is required to be timely, to provide practitioners with information which could help player preparation and recovery.

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