

An explorative investigation into the warm-up practices of both professional and amateur rugby league players

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ABSTRACT

PURPOSE: Rugby League (RL) players require high levels of speed, strength, power, agility and psychological readiness. Optimum preparation for performance via warm-up (WU) routines has been an area of research speculation in recent years. This study aimed to survey the WU protocols of professional and amateur RL players, to determine player's perceptions of their featured WU procedures and to establish any significant differences in WU practices and perceptions between the two populations. **METHODS:** An online questionnaire was used to investigate 30 professional and 53 amateur players' WU protocols and their perceptions behind their practices, providing both statistical and descriptive analysis. For a more in depth understanding into the practices and perceptions of the featured protocols, the questionnaire was followed up by two focus groups which included four participants in each (one professional group and one amateur). Raw data was produced from the focus groups which was then placed within higher-order themes and general dimensions. **RESULTS:** The questionnaire revealed a significant between-group difference for the duration of the WU's between the two separate standards ($P = 0.009$). Professionals' WU protocols were considerably longer in duration compared to the amateurs' protocols; 67% of professional players performed WU routines for 15+ min whereas only 42% of amateur players claimed to WU for 15+ min. However, no between-group differences existed for protocols, perception variables, static stretching (SS) duration and similarity of the WU protocol ($P > 0.05$). The questionnaire also revealed the prevalence of SS; 83% of amateur participants and 90% of professional players claimed to perform SS during their WU. The focus group revealed that RL players' protocols and perceptions of their regime are due to the influences of others such as coaches, strength and conditioning practitioners and physiotherapists and emphasises the importance the role such professionals play. **CONCLUSIONS:** The results showed that professional participants WU for a longer period in comparison to amateurs. The high prevalence of SS within RL WU protocols at both a professional and amateur standard was clearly apparent, contradicting the vast amount of literature that would advocate the removal of SS in sports requiring explosive power due to the associated links with decrements in performance. Most professional and amateur RL participants were discovered to perform SS for a duration that has been proven to impair desired physiological attributes. Furthermore, the study revealed the dynamic element of a WU is being consistently placed before SS, by both the professional and amateur domain, which has been previously linked to decreases in body temperature and associated mechanisms related mechanisms. Players associated that there WU practice was heavily influenced by RL coaches and associated practitioners. **PRACTICAL APPLICATIONS:** It is recommended that coaches, strength and conditioning practitioners and other key influential figures are educated on optimal evidence based WU procedures prior to prescription. Important aspects for consideration and education include WU duration, intensity, protocol order and SS elongation, volume and duration. Whilst it is important to link the research in WU to performance, practitioners should be mindful of changing regimes abruptly and the idiosyncratic nature of how athletes prefer to prepare physically and mentally.

INTRODUCTION

Rugby League (RL) players require a plethora of physical qualities including; strength, power, speed and agility (4). To optimise RL performance, efforts should be made to enhance these physiological qualities both longitudinally, through structured training and acutely via a pre-game warm up (WU) (5). Optimal WU, which has beneficial effects upon temperature and non-temperature related physiological mechanisms can aid performance and reduce risk of injury (1).

Certain common elements of WU such as static stretching (SS) have come under critique (11). Authors have reported impairments in strength ($\downarrow 9.5\%$ MVC), power ($\downarrow 4\%$ vertical jump), sprinting ($\downarrow 2.5\%$ 20 m sprint) and agility ($\downarrow 0.10$ s T-drill) when acute bouts of SS have been implemented into a WU protocol (2, 7, 8, 10). It has been suggested that SS should be removed from athletes' WU regimes due to these noted performance impairments (11). However, the incorporation of dynamic WU protocols and competition simulation drills have led to significant benefits in the aforementioned physical qualities (3). Due to the beneficial physiological effects such as post-activation potentiation, an increase in core temperature and a decrease in stiffness within the muscle tendon unit (1). In addition to the aforementioned physiological effects, it is also acknowledged that WU provides athletes with the opportunity to mentally prepare for performance by allowing time to focus and concentrate on the physical task (1).

Despite the depth of research investigating the positive and negative effects that a WU can have on performance, injury and mental preparation there is little evidence to support how this research has transcended to the actual practice of athletes in their sport. Therefore, this study aimed to firstly investigate the WU practices of both amateur and professional RL players and secondly to investigate the players perceptions and beliefs behind their WU protocols.

METHODS

Participants

83 of 99 contacted RL players completed the questionnaire (response rate = 84%). RL players from both Amateur ($n = 53$) and Professional ($n = 30$) backgrounds provided informed consent to participate (mean \pm SD, age; 26 ± 8 years, playing experience; 12 ± 12 years). Recruited Professionals performed in the English 'Super League', 'Championship' and 'League One' representing the top three tiers in the English professional ranks. Amateur players played within the 'English National Conference League', the 'Australian Mackay District League' and the 'BUCS University League'. Ethical approval was granted from the School of Sport and Exercise Science institutional ethics committee at the University of Lincoln in line with the Helsinki Declarations.

Research instruments and procedures

Online questionnaire

Participants completed a short online questionnaire created by the authors. Most of the questions were of a categorical nature, whilst the remainder required short depictive responses. Initial questions ascertained the participants' standard of play, the content of their WU protocols (static stretching, dynamic or a mixture of both) and typical duration of overall WU and featured protocols. Latter sections focused on perceptions behind WU protocols.

Focus groups

Focus groups aimed to provide a deeper understanding of the perceptions and protocols to compliment the data gathered in the questionnaire. Two separate focus groups of four participants were conducted for Amateurs and Professionals. Featured questions were generally open-ended in the hope of enabling a free-flowing conversation and for idiosyncratic opinions to surface (12).

Statistical Analysis

Questionnaires

Questionnaire data allowed for statistical and descriptive analysis. A number of categorical questions were of a nominal nature and were analysed using SPSS (IBM SPSS statistic, version 22) and the Pearson's chi-square test, the remaining questions were ordinal in nature and required a Mann-Whitney U test. These tests were chosen to highlight possible differences in WU protocols and perceptions between both the two standards.

Focus groups

The focus groups were transcribed verbatim and coded using thematic analysis. Higher-order themes and general dimensions were established by adopting an inductive content analysis. Once the lead researcher generated the themes the remaining co-authors (two UK Strength and Conditioning Association accredited coaches) validated the data by using deductive analysis to ensure all raw data themes were represented (9). The thematic analysis of the focus groups highlighted various general dimensions rich in information and relevant themes that fit within the dimension, these themes included; 'WU duration', 'Preparatory activity and type', 'Contents and order of WU', 'Perceived benefits of WU', 'Similarity of WU'.

RESULTS

Questionnaire

-There was a significant difference within WU duration for the two standards ($P = 0.009$). Professionals WU protocols were commonly longer in comparison to Amateur protocols (67% of Professionals performed WU for 15+ min, only 42% of Amateurs WU for 15+ min).

-No other significant differences ($P < 0.05$) existed between Professional and Amateur players for 'Protocols (method of WU)', 'Perception variables (benefit of WU routine)', 'Static stretching duration' and 'Similarity of the WU protocol over career-span'.

-In total 73 of 83 Professional and Amateur players claimed to perform static stretching (SS), 41 of these claimed to perform dynamic stretches (DS) and finished with SS, whereas only 22 performed SS before DS. 83% Professional and 70% Amateur players claimed to perform a mixture of SS and DS.

-Most who were surveyed stretched for 0-15 s or longer (56% of Professionals; 75% of Amateurs). In total 81 of 83 claimed to perform a preparatory activity at the beginning of their WU with the aim of increasing their heart rate.

-Although non-significant ($P = 0.074$), it was revealed that 60% of Professional players consider their protocols to have changed throughout the years of participating in RL whereas only 42% of Amateur players believe their protocols have changed.

-Many Professional (50%) and Amateur (51%) players believed their WU protocol reduced risk of injury, choosing this perceived benefit over other aspects such as performance enhancement. 70% of Professionals and 72% of Amateurs claimed their beliefs were influenced by the opinion of others (i.e. Strength & conditioning coach, RL coach).

Focus groups

-The general dimension 'WU duration' witnessed typical responses from Amateurs explaining their WU protocol can be unorganised and rushed on occasions, often affecting the amount of time their WU lasts, whereas, the Professionals reported a consistent WU duration.

-Regarding 'Preparatory activity', it became apparent that the Professionals tend to incorporate a ball handling drill whereas as the Amateurs seem to take part in jogging activities alone (Table 1).

-The focus group findings were in agreement with the questionnaire concerning 'Contents and order of WU', where in general, static stretching was reported to follow dynamic stretching (Table 2).

-Concerning the theme 'Perceived benefits of WU', injury prevention was the most popular perceived benefit of WU, however, both focus groups highlighted that all four sub-themes are perceived to benefit from a WU (Table 3).

-The dimension 'Similarity of WU protocol' derived from the focus group also supported findings from the questionnaire. Interviewed Amateurs perceive their WU to be very similar since they began playing RL, whereas, Professionals considered their WU to have changed throughout their playing career. These changes outlined by Professionals highlighted the inclusion of dynamic movements, more specific movements / drills and a longer WU duration.

Table 1. Preparatory activity and type; A = Amateur, P = Professional

High order themes	Number of responses		Select raw data representing responses to the question
	A	P	
Simple forms of running	3	0	-We will probably have a small jog around the half the pitch. -Jog out from the club house to the sticks and then get on with some dynamic stretching.
Simple forms of running, incorporating a ball handling drill	1	4	-Running widths of the field in fours with the ball in hand, going there and back. -Get into groups of 4 with the ball in hands and pass it along the line whilst jogging up and down the field.

Table 2. Contents & order of warm up

High order themes	Number of responses		Select raw data representing responses to the question
	A	P	
Dynamic stretches, rugby specific drills, static stretches	0	2	-A bit of dynamic stretching, then ball through hands in teams of 4 then into static stretching.
Dynamics stretches, static stretches, rugby specific drill	2	1	-Some dynamic stretching or we do a corner drill so every time you get to like a corner on the field, you add your dynamic stretching to get your body warm. Then into a giant circle for static stretching, then we get into a passing drill in groups in teams of 4.
Dynamic stretches, rugby specific drills	1	0	-We would go under the posts in lines of 4, we'd do dynamic stretches just try and get the muscles warm, and then we'll jump back into lines of 4 again, just soft hands, after that we will get into a square, for another ball handling drill just to get the ball through our hands, and then we will run through some good ball sets.
Statics stretches, rugby specific drill	1	1	-Come in for a stretch then get back into groups again and get the ball in our hand and practice our moves, and get our body used and legs used to the change of direction, maybe get on the pads, get your body used to taking the hits that you're going to take during the game.

Table 3. Perceived benefits of warm up

High order themes	Number of responses		Select raw data representing responses to the question
	A	P	
Mental preparation	5	1	-Your in a big circle as a team, you just talk about your opponents, and how the games going to go today, anything that's on your mind really, just looking to motivate one and other, preparing yourself mentally.
Physical preparation	3	5	-Starting to get different muscle groups warm, starting to get fired up.
Performance enhancement	3	1	-Obviously performing, if your warmed up you feel like you can perform at higher level rather than just going into it cold.
Injury prevention	8	5	-Yes obviously I would go for the legs, more specifically the hamstrings, I've had a couple of injuries there and like the same goes for the shoulders as well. -I've had bad experience before with not warming up properly and picking up injuries so obviously, I take it a lot more serious now than I previously have.

CONCLUSIONS

This study highlighted the high prevalence of static stretching within Rugby League warm up protocols at both a professional and amateur level and rejects the opinions that suggest static stretching has been removed from most major sports such as Rugby League. It is also interesting to note the order (dynamic then static) in which the majority of both amateur and professional players utilise static stretching, which is contrary to the majority of the research conducted in this area and could lead to performance decrements. This study also concluded that the protocols and perceptions of players are predominantly due to the influences of others such as coaches.

PRACTICAL APPLICATIONS

It is recommended that coaches, strength and conditioning practitioners and other key influential figures are appropriately educated on optimal evidence based warm up procedures prior to prescription. Important aspects for consideration and education in relation to warm up include protocol duration, intensity, order and static stretching elongation, volume and duration. However, recommendations to improve an athletes warm up may only be applied if the athletes are willing to make changes to their current warm up routine to further enhance their physiological preparation. This is due to the perceptions of the athletes who may believe that their current warm up routine psychologically prepares them for performance.

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