Playing by the Rules: A Developmentally Appropriate Introduction to Rugby Union

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ABSTRACT

The current study examined the effect of rules changes on game behaviours and opinions of under-nine rugby union players. Eighty-nine games were filmed in five counties in England; two governed by the then current rules and three governed by new pilot rules. The pilot rules were designed to create a less structured game; reducing numbers on the pitch and limiting set pieces and specialised skills. Games played under the pilot rules had 25% more ball-in-play time; 55% more runs with the ball; more than twice as many successful passes; and nearly twice as many tries scored ($ps < .001$). 272 players participated in a survey. Irrespective of the rules, players identified that passing, running and tackling were key activities, while having fun and playing with friends were their main reasons for playing rugby. The results suggest that the pilot rules create a competitive game that closely matches child-led informal activities.

Key words: Child-Centred Sport, Deliberate Play, Development Model of Sport Participation, Rugby Football Union, Small-Sided Games

INTRODUCTION

Rugby Union is a complex game with specialised playing positions, complex rules for infringements, a variety of different methods to restart play (e.g., kickoffs, lineouts and scrums), and a high degree of physical contact [1]. The complexity of the senior game presents a real challenge when designing competitive games that introduce children to rugby. There are key issues to be resolved around what behaviours (e.g., scrummaging, rucking, mauling) should be emphasised at the various age group levels and how the rules and structure of the game could be designed to help encourage these behaviours [2]. Competitive games have been identified as one of the main developmental activities during childhood [3, 4], however, there is a lack of empirical evidence to support the design of developmentally appropriate competitive games for children (e.g., see youth development proposals by the Football Association (FA), [5]).

Although there is little research examining the development of competitive games for

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children, there is a large body of research that has examined the structure of children's practice [6, 7]. One of the most contentious issues when designing age-appropriate rules for complex sports is the extent to which the development of specialised skills (e.g., scrummaging, mauling, kicking, etc. in rugby) might be hindered if not trained from an early age. Indeed, Ericsson's 'deliberate practice' proposal would suggest that as there is a monotonic relationship between expertise and time spent practising, children should specialise as early as possible [8]. In support of this contention, Ford and Williams [9] have reported that adolescent footballers (soccer players) who were offered a professional contract on graduating from an elite training programme (Academy) could be differentiated from those who were not offered contracts by the amount of deliberate practice they undertook during their childhood (200 hours per year versus 130 hours per year; [see also 3].

An alternative perspective to the design of practice is offered by Côté's Developmental Model of Sport Participation [DMSP; 10], which suggests that developmentally inappropriate early specialization can result in impaired physical (e.g., overtraining, fewer transferable skills); psychological (e.g., decreased enjoyment); and social (e.g., limited social opportunities to mix) development [11 for discussions, 12]. Instead, children in the so-called sampling years (6-12) should be free to sample a range of sports as such early diversification can have a number of benefits. These outcomes have been measured both in terms of the likelihood of attaining elite status in team sports [13, 14], and in terms of continued participation within the sport [15, 16].

Another key message from the DMSP is that children in the sampling years benefit more from deliberate play (game-like activities) than structured (deliberate) practice and competition [12]. Deliberate play activities are theorized to be essential during early sport experiences because they provide an opportunity for young athletes to develop fundamental motor skills in an enjoyable environment [17]. A key area where involvement in deliberate play and structured practice or competition are different, is in the amount of time that an individual is actively involved in the activity [6]. In deliberate play situations, there are fewer periods of waiting or off-task time than in structured practice and competitive settings (e.g., waiting around to perform the next drill; waiting for a phase of play to be relevant to your position, etc.)

Since the latter part of the twentieth century, there has been an increase in the number of organized team sports played by children in the United Kingdom, with a corresponding decrease in informal child driven activities, such as street soccer [18]. Observations of informal player-controlled and formal adult-controlled games during childhood suggest that child-led games have different aims to adult-led games When children design their own games they are interested in four things: being involved in the action; having action situations that lead to scoring; an exciting experience; and playing with friends [18]. Although these informal games shared similarities with organized games, they were modified to keep the score close, and to produce the highest possible levels of action, scoring and personal involvement (e.g., by applying handicapping systems). In contrast to these action-centred observations of informal games, formal organized adult-controlled games can be described as rule-centred [18]. A key element of formal games is the strict application of the rules by adults (i.e., referees or coaches), with the importance of structure highlighted, for example, through playing positions. The skill level of players determines the amount of playing time, with the less skilled individuals playing least often.

National governing bodies have recently been urged to design activities that are more play oriented and more closely aligned with the informal games children play [19, 20]. To date however, there has been limited research that has attempted to experimentally assess the

benefits of this philosophy. Indeed the research supporting the principles espoused in the DMSP has been retrospective in nature [12]. By changing the rules governing organized games, it should be possible to elicit changes in players' behaviours that might be more representative of the outcomes of deliberate play (more skill learning opportunities, less structure, less waiting around, etc.). A recent study by Burton et al. in 4th grade (8 to 9 years old) flag (non-contact) American football provides supporting evidence for the potential of such 'competitive engineering' [21]. Competitive engineering aims to create positive youth sport experiences by modifying the structure, rules, facilities and equipment of competitive games [21, 22]. By introducing a new defensive rule and modifying the size of the ball, scoring increased by over 100% and player dropout levels fell by more than 50% [21]. Player surveys highlighted that two-thirds of respondents preferred these high scoring games with lots of action.

BACKGROUND

The rules of age-group rugby union played in England are overseen by the governing body, the Rugby Football Union (RFU). The RFU recently trialled new rules of play (pilot) at U9 level, where contact is first introduced to children. These rules were based on the overarching principles behind the DMSP (early diversification and reduced structure) [2] and were supported by the views of elite rugby union coaches [22]. During the entire 2010/11 season three English counties were nominated to play the pilot rules and were selected to represent the north, midlands and south of the country. Three counties from the other 26 constituent bodies still playing the traditional rules were selected to represent a similar geographical spread. The previous season (2009/10) at under-8 (U8), these children played a modified non-contact game, where removing a velcro tag from an opponent's belt counted as a 'tackle' (Tag rugby). For the 2010/11 season, the traditional rules, would introduce tackling alongside the set pieces (scrummaging and lineouts), and the breakdown (contact) skills of rucking and mauling. The pilot rules at U9, added only tackling to the evasion game played at U8, with fewer playing numbers compared to the traditional rules (7 a-side compared to 9 a-side). As there was no competition for the ball in a tackle that does not go to ground (a maul), a 3-seconds 'grab/standing tackle' was officiated by the referee.

The aim of the current study was therefore to investigate if the principles for practice from the DMSP could be applied to competitive under-9 rugby union games, by manipulating the rules of play (competitive engineering [21]). As such, this is the first study to explore the impact of rules changes on player behaviours and opinions in a national trial in any youth sport. Matches in end-of-season festivals (county tournaments) at three counties who had been playing the traditional rules for that season were compared with three counties who had agreed to play pilot rules for that season. We hypothesised that the rules governing the pilot game would prioritise play activity (i.e., more ball in play time) and provide more skill learning opportunities (more passes, runs, tackles) than those governing the traditional game [as 23]. We also carried out a brief survey interview with players at these festivals to gain a better understanding of the behaviours that they felt should be prioritised, and their motivations for playing rugby. Given that adults and children may have different opinions about the structure of team games [18], it is important to understand the players' experiences and opinions of sport [24]. We hypothesised that children would prefer a less structured game; irrespective of the formal game they had experience of playing [18].

PHASE 1: BEHAVIOURAL ANALYSIS
METHOD
PARTICIPANTS

In total, 89 games were filmed (57 in pilot counties and 32 in traditional counties) involving 84 teams. Local institutional ethics committee approval was obtained prior to the start of testing. Parental consent was given on two different occasions. In line with RFU guidelines, the parents at clubs in all participating counties gave their consent during player registration for their child to be filmed in matches during the season. The RFU does not allow filming in any mini rugby matches without this consent. Prior to filming, participating clubs in all counties were provided with study information and consent sheets, and asked to confirm parental consent for filming and interviewing. Following consultations with parents, the coaches or team managers provided final informed consent on behalf of the whole club on the day. Participating counties gave final confirmation that parents at each club had given their consent for matches to be filmed and players interviewed for the study. Players involved in the Under-9 age group at the beginning of the season were eight years old at midnight on the 31st August [25].

PROCEDURE

Matches were filmed at end-of-season festivals in each of the six Counties in March and April 2011 and again in 2012. This timing was designed to allow players to get used to playing these rules in training and competitive matches throughout the season. The study ran over two seasons to enable sufficient data to be collected (between 14 and 25 games per county). Unfortunately, the 2012 festival in one of the traditional counties was cancelled due to flooding, so full data were only available for the other five counties. The camera was set up on a tripod on the halfway line on the pitch and tracked the ball as the games progressed.

MEASURES

A notational analysis system was developed based on a clear identification of critical behaviours for comparing the Traditional and Pilot games [26]. Categories for analysis were identified following examination of the International Rugby Board [27] game analysis categories and discussions with coaches at the RFU about the fundamental behaviours desired in under-9 matches. Behaviours of interest were tagged using Dartfish (Fribourg, Switzerland) Connect Plus video analysis software (see Data Analysis).

Percentage Ball In Play (PBIP)

In any organized competitive sport, there will be times when the ball is not in 'play' – i.e., waiting for restarts or for set pieces to form. For the traditional game, PBIP was defined as: (total game time – time for restarts and set pieces to set) / total game time. For the pilot game, where there were no set pieces, PBIP was defined as: (total game time – time for restarts) / total game time.

Tries

The primary aim in rugby is to score tries (touching the ball down over the opposition's try line).

Runs

A run was defined as a movement of at least 3 steps in any direction that led to a pass, a try, going into touch, or being tackled.

Open Play Passes

In rugby, the ball can only be passed backward. We analyzed the number of successful passes made in open play - i.e., made before, or during a tackle.

Tackles
A tackle is considered to have occurred when an opponent brings an attacker to the ground.

Breakdown: Rucks And Mauls
A ruck begins when one or more players from each team close around the ball on the ground. A maul begins when a ball carrier is held by one or more opponents, and is joined by one or more of the ball carrier's team-mates.

Set-Pieces: Scrums And Lineouts
A scrum is formed in the field of play, following an infringement, when players from each team (three in the U9 game) bound together and interlock with the opposition team. A lineout restarts play after the ball has gone into touch, with a throw-in between two lines of three players.

DATA ANALYSIS
As game durations varied due to different interpretations by referees / counties, the number of behaviours occurring in each game were standardised to a nominal, 10 minutes duration to allow meaningful comparisons. An experienced mini-rugby coach / performance analyst blindly re-coded all measures from five pilot and five traditional games (11.2% of the data). Inter-rater reliability analyses [28] revealed satisfactory percentage error scores, ranging from 1.75% to 7.02%. Differences in the dependent variables (ball-in-play and fundamental behaviours) were compared using independent *t*-test analyses (pilot vs traditional) with Cohen *d* used to express effect size[1].

RESULTS
PERCENTAGE BALL IN PLAY
The ball was in play for significantly longer in the pilot games compared to traditional games, $t(84) = -9.93$, $p < .001$, $d = 0.53$ (see Table 1). Additionally, the traditional rules include four specialised elements not included in the pilot rules; the set pieces of scrums and lineouts and the breakdown skills of rucks and mauls. On average across the 32 traditional games analysed there were 10.18 ($SD = 4.89$) rucks; 6.95 ($SD = 3.14$) mauls; 3.45 ($SD = 1.85$) scrums; and 2.82 ($SD = 1.61$) lineouts in a ten minute game. On average each ruck lasted 54s ($SD = 34$s); each maul lasted 67s ($SD = 47$s); each lineout lasted 92s ($SD = 61$s); and each scrum lasted 115s ($SD = 59$s). As the ball in play time for the traditional game (6.45 minutes) includes the time spent in rucks and mauls, only 4.45 minutes is available for open play activities (running, passing, tackling).

Table 1. Mean (SD) percentage ball in play time (%) and number of behaviours exhibited by U9 participants playing either the pilot or traditional rules

Behaviour (/10 minutes)	Pilot	Traditional
Percentage ball in play (PBIP; %)	81.84 (8.29)	64.47 (7.20)
Runs	41.54 (6.15)	26.86 (5.51)
Successful passes	26.63 (8.74)	9.78 (4.40)
Successful tackles	23.45 (8.51)	19.17 (5.30)
Tries	5.16 (2.47)	2.81 (1.42)

[1] We first ran one way ANOVA (5 levels) with post hoc Tukey homogeneous subsets analyses to determine if the counties grouped together as would be expected by our hypotheses: with pilot rule counties having more play time and more skill opportunities than traditional rules counties. For each of the dependent variables of interest (apart from number of successful tackles) Tukey subset groupings were as expected, supporting our use of summary *t*-tests statistical analyses. The single subset solution for number of tackles was in the direction predicted and as the ANOVA approached significance ($p = .083$) we felt that it was appropriate to run the *t*-test for number of tackles too.

BEHAVIOURS

There were significantly more runs, $t(84) = -4.94$, $p < .001$, $d = 0.47$; passes, $t(84) = -11.83$, $p < .001$, $d = 0.79$; tackles, $t(84) = -2.92$, $p = .012$, $d = 0.30$; and tries, $t(84) = -5.69$, $p < .001$, $d = 0.52$; in the standardised ten minutes of pilot games compared to traditional games (see Table 1).

PHASE 2: INTERVIEW SURVEY
METHOD
PARTICIPANTS

Participants in the interview surveys were 272 under-9 rugby union players. The players were from two pilot counties (25.4% and 22.4% of participants) and two traditional counties (21.3% and 30.9% of participants) attending the festivals where game behaviours were also assessed. There were no official figures available from the RFU for the exact total player numbers during the 2011/12 season; however, there were 657 mini rugby teams playing the game (RFU 2011, October internal document for Player Development Sub-Committee). Based on an estimate of a squad of ten players (population of 6,570) this research captured the views of around 4.1% of the background playing population.

MEASURES

In this study, the objective was to examine U9 mini rugby union players' opinions of important behaviours in matches and identify key experiences when playing competitive games. As such, the interview survey consisted of two multiple-choice questions with nine and eight variables respectively. The decision to use multiple-choice questions was taken to simplify the process for participants, as pilot testing had revealed that some children had difficulty answering scalar or open-ended responses[2]. The aim of the first question was to identify which two game behaviours (e.g., lots of passing, lots of tackling, lots of mauling) were most important to children, if they were responsible for designing their own U9 game. The second question followed the same format, although considered the two game experiences children found most important during matches.

PROCEDURE

The researcher approached team managers at festivals and players from that team were then selected by the manager to take part in the survey. At the start of the interviews, the purpose of the study was explained to participants, and they were reminded that they could refuse to answer questions and withdraw at any stage. Anonymity was preserved with only the participant's initials and club name recorded during the survey.

DATA ANALYSIS

The chi square test of independence using Fisher's exact test was used to analyse the data, with phi (ϕ) used as a measure of effect size. As the players could give two choices for each question, the data couldn't be analysed as a single variable and using the chi square test of independence for a 2 x 9 (questions 1 and 2) or 2 x 8 (questions 3 and 4) cross tabulations was not possible [29]. Therefore, in all questions each variable was treated as a yes/no question. This allowed the data to be analysed using the Fisher's exact test for nine 2 x 2 cross tabulations in question 1, and eight 2 x 2 cross tabulations for question 2. Bonferroni correction was applied to the p value required for significance to avoid increasing the chances of making a Type 1 error [29]. In all questions, only p values of 0.006 or less were considered significant.

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[2] Pilot surveys were first developed and conducted with 84 U9 players at two festivals during the previous 2010/11 season. The pilot survey included rating scales and open-ended questions relating to the most and least enjoyable aspects of the game.

RESULTS

MOST IMPORTANT COMPONENT OF U9 RUGBY

Table 2 shows the results for what U9 mini rugby players thought were the most important behaviours if they were charged with creating their own game. The Fisher's Exact Test showed no significant association between individual game behaviours and the rules played (all p's > 0.02). The top two most important behaviours selected were the same for players playing both rules; with lots of tackling the most popular (pilot 34.1%, traditional 34.9%), followed by lots of passing (pilot 20.9%, traditional 21%).

Table 2. The most important behaviours identified by players if creating their own u9 rugby game

Behaviour	Pilot	%	Traditional	%	Total	%	Fisher	phi	χ^2
Tackling	88	34.1	98	34.9	186	34.5	0.896	0.014	0.055
Passing	54	20.9	59	21	113	21.0	1	0.001	0.001
Tries	46	17.8	36	12.8	82	15.2	0.086	0.109	3.244
Running	36	14	38	13.5	74	13.7	0.892	0.010	0.3
Kicking	11	4.3	15	5.3	26	4.8	0.681	0.036	0.347
Rucking	8	3.1	22	7.8	30	5.6	0.019	0.149	6.032
Scrums	9	3.5	5	1.8	14	2.6	0.274	0.077	1.609
Mauling	5	1.9	3	1.1	8	1.5	0.485	0.051	0.714
Lineouts	1	0.4	5	1.8	6	1.1	0.216	0.094	2.382
Total	258	100	281	100	539	100			

MOST IMPORTANT EXPERIENCES IN U9 RUGBY

Table 3 shows the results for what U9 players thought were the most important game experiences when playing mini rugby. There were no significant associations between any of the individual game experiences and the rules played (all p's > 0.089). The most important game experience selected by pilot participants was playing with friends (30.0%), followed closely by having fun (29.6%), and being involved in the action (22.3%). The same three experiences recorded the highest amount of selections among traditional participants, but the order was different with having fun having the highest number of selections (33.1%), followed by playing with friends (26.1%), and being involved in the action (18.0%).

Table 3. The most important experiences identified by u9 players when playing rugby

Experiences	Pilot	%	Traditional	%	Total	%	Fisher	phi	χ^2
Playing with friends	78	30.0	74	26.1	152	27.9	0.22	0.08	1.71
Having fun	77	29.6	94	33.1	171	31.4	0.26	0.07	1.41
Involved in the action	58	22.3	51	18.0	109	20	0.17	0.09	2.14
Playing well	16	6.2	27	9.5	43	7.9	0.14	0.09	2.37
Winning the game	17	6.5	16	5.6	33	6.1	0.71	0.03	0.21
Not being a substitute	7	2.7	7	2.5	14	2.6	1	0.01	0.03
A close game	4	1.5	5	1.8	9	1.7	1	0.01	0.04
Playing in a certain position	3	1.2	10	3.5	13	2.4	0.09	0.11	3.34
Total	260	100	284	100	544	100			

DISCUSSION

The development of players from novice to expert levels, and the continued participation of players in a sport are key objectives for any sport governing body [3]. An important question therefore is the extent to which age-group rules are appropriate for the physical and cognitive development levels of these young participants [2, 23]. How and when should critical skills be developed and to what extent should the structure and rules of adult versions of the game be modified for children? The current study is the first to test the possibility of increasing skill learning opportunities in competitive games, using the DMSP [10] as a framework for modifying rules. The sampling pathway of the DMSP provides a useful structure for a governing body like the RFU as it strives to meet its objectives [30]. A program based on these principles has potential benefits for both mass participation (increased involvement, enjoyment etc.) and elite athlete development (e.g., improved decision-making), and therefore represents both an efficient and effective structure for athlete development [12].

Differences in the behaviours that emerged (Phase 1) were evident between counties, supporting our predictions for the efficacy of the pilot rules. Specifically, the pilot rules appear to produce a game that provides more opportunities for developing attacking skills. Indeed over a standardised ten-minute period the pilot game produced 55% more occasions when children ran with the ball; and more than twice as many successful passes; resulting in almost twice as many tries being scored, compared to the traditional game. The findings are therefore consistent with previous research that has shown that competitive engineering can encourage high player involvement, with increased opportunities for scoring and basic skill development [21]. Interestingly, there was only a marginal difference in the number of tackles made between counties, suggesting that tackling performance may lag the development of attacking skills in the pilot game at U9. However, this marginal difference is likely due to differences in the rules concerning a standing tackle. When these standing tackles are added to the traditional tackles to ground, the gap between defensive and attacking skills in the pilot game is reduced[3]

A key reason for this increased opportunity for skill development in the pilot is the additional time afforded to the creation of these behaviours by having a significantly higher percentage ball in play time (Table 1). In comparison, over half a traditional game on average (five and a quarter minutes) was spent in the specialised skills of scrums, lineouts, rucks and mauls, providing less time to further develop the basic attacking and defensive skills learned at U8. The results therefore support our hypotheses that a game that emphasises play elements (evasion, passing and tackling skills) at the expense of structured elements (scrums, lineouts, rucks, mauls), will provide more opportunities to develop these core skills that are crucial for all rugby players [22].

Interestingly, the behaviours that were increased matched the behaviours that U9 players felt were important; irrespective of whether they played the pilot or traditional rules (Phase 2). Players identified that the four most important behaviours were lots of passing, running, tries and tackling; while lineouts, scrums, mauls and rucking were deemed the least important (Table 2). The findings from the second question imply that U9 players value experiences in organized games that are typically associated with deliberate play and child-led informal activities (Table 3). The three most important selected experiences; having fun, playing with friends and being involved in the action are game experiences observed in informal games [18] and in previous research that has asked children what they prefer about

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[3] When standing tackles are added to the number of tackles to the ground (23.45, SD = 8.51) in the pilot game, the total tackle count increases to 35.83 (SD = 8.94) – see Table 1 for comparison.

competitive games [21]. In contrast, the qualities associated with formal organized sports; structure, playing positions and winning the game, were rated as less important experiences.

While it could be argued that children are not best placed to suggest what is the optimal structure for the game they play, it is interesting to note that their views were largely echoed by elite rugby coaches asked to discuss what they believed were the key components for organized rugby union participation during childhood [22]. The coaches identified the importance of an age-appropriate competitive games pathway, where more specialized skills are built sequentially on top of the foundations of basic evasion, handling and tackling skills. In particular, elite coaches identified that an emphasis on less structured games (deliberate play) and early diversification (sampling) were beneficial for player development in the mini rugby years (under 12) [22].

A limitation of the current research is that there is a potential philosophical issue in attempting to apply the DMSP to the design of competitive rules for sampling years' sport. The DMSP suggests that the sampling years should consist of backyard, unsupervised games (deliberate play) without the need for structured, competitive sport [6]. However, in recent years the growth of organized sporting activities has coincided with a decline in the number of children playing informal sporting activities [18]. With over 700 clubs playing mini-rugby in England alone, it may be productive to guide national governing bodies to make the rules governing these games as developmentally appropriate as possible - in line with the principles espoused in the DMSP [2]. As a controlled 'trial' of the principles of the DMSP, the current study is also able to make a novel contribution to the DMSP literature, extending support beyond those from retrospective accounts [12]. Such experimental research can act as a launch pad for future longitudinal examinations of the benefits of sampling and deliberate play and may serve to inform further development of the model. Indeed there may be the potential for the sampling pathway to be modified to include developmentally appropriate competition in the sampling years (cf. the early engagement pathway in soccer, espoused by Ford et al. [3])

CONCLUSION
The current study initiates enquiry into the impact of rules changes on player behaviours in youth sport. The results revealed that changes to the rules governing age-group rugby could influence the game-related behaviours of children playing [21]. The pilot rules were designed to encourage more opportunities for children to perform fundamental attacking and defensive skills, at the expense of structured, specialized behaviours, and this aim was met. As the pilot rules put less emphasis on more specialised contact skills; negate the need for formalised positions; and reduce the involvement of the referee (there are fewer structured rules to enforce); the ensuing game is more closely aligned to the principles of deliberate play [10] and the type of action-centred game that children organise for themselves [18]. In games governed by the pilot rules, there were significantly more examples of attacking behaviours, less waiting around and more involvement in 'play', when compared to the traditional games.

The results provide initial support for the utility of applying the principles of the DMSP to competitive (organised) games, and provide a useful starting point for the design of child-centred and developmentally appropriate competitive rules for rugby union. While some of the issues driving this competitive engineering [21] might be specific to rugby union, there are also implications for other sports when designing rules for competitive youth sport. It is important that national governing bodies prioritise key behaviours and skills from specific games, rather than being constrained by what adult versions of the game might look like.

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