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# Analysing the impact of the 50:22 kick law changes in South African rugby tournaments between 2021 and 2022

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## ABSTRACT

Tactical kicking plays a crucial role in rugby union, influencing both attacking and defensive strategies and potentially impacting a team's overall success. The introduction of the 50:22 law requires defensive teams to reposition players to anticipate and counter kicks, thereby reducing the number of players in their defensive front line. This study investigated the impact of the 50:22 kicking law on kicking profiles by comparing the 2021 and 2022 seasons, as well as examining the success rate of 50:22 kicks during the 2022 season in South African rugby union tournaments. A retrospective research design was employed, utilising video-based performance analysis software (Nacsport Scout Plus) for data collection. The analysis encompassed all general play kicks from 177 matches spanning two seasons and tournaments, amounting to a total of 6,479 kicks. Within this dataset, there were 53 successful 50:22 kicks out of 162 attempts. Key findings revealed an upswing in kicks by scrum halves (2021: 20%, 2022: 26%;  $p = 0.00$ ) and a concurrent decline in kicks by fullbacks (2021: 21%, 2022: 18%;  $p = 0.01$ ). Notably, there was a significant increase in the percentage of kicks occurring in the fourth quarter of the match (2021: 20%, 2022: 22%;  $p = 0.01$ ). Furthermore, the study identified a noteworthy increase in the percentage of kicks following a turnover (2021: 2%, 2022: 3%;  $p < 0.01$ ). In conclusion, this research contributes valuable insights into how the 50:22 law shapes kicking strategies in South African rugby union, shedding light on the shifts in player roles and temporal patterns of kicking within the context of this specific law.

## ARTICLE HISTORY

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## KEYWORDS

Law changes; tactical kicking; performance analysis; Currie cup; varsity cup

## Introduction

Tactical kicking is a fundamental aspect of rugby, playing a strategic role in attack and defence, contributing to the success of a team (Bunker and Spencer 2020; Colomer et al. 2022; Scott et al. 2022). Furthermore, it plays a pivotal role in shaping the dynamics and outcomes of matches, exerting pressure, disrupting opponents' plans, and creating scoring opportunities (Bennett et al. 2018, 2021). A study by Colomer et al. (2022) conducted in-depth interviews with three elite international coaches who coached at one or more Rugby World Cup tournaments throughout their careers. The coaches emphasised that tactical kicking can be utilised by teams to gain territorial advantage, create possible counterattacks, and force opponents into positions on the field to enforce pressure (Colomer et al. 2022).

With the professionalisation of rugby in 1995, World Rugby governs the sport, frequently trials and introduces new laws. Law changes may be introduced to improve player safety, ensure the sport retains its principles, allow progressive changes, and ensure the sport remains entertaining for viewers (Kraak et al. 2017). To the authors' knowledge, the only prior law directly impacting tactical kicking is a 2009 change to law 19. The law stated that if a defending player played the ball from outside the 22 and kicked it into touch, no ground was

gained (IIRB 2008). A 2009 amendment established that if the ball went into the defending player's 22 or in-goal area, touching an opponent, or a ruck or maul was formed before being kicked out directly, the throw-in occurred where the ball exited (IRB 2009). This influenced when direct touch kicks were permissible, altering territory-gaining strategies. Kraak et al. (2016) concluded this change forced teams to change their kicking patterns.

Examining tactical kicking is pivotal for comprehending its role within team strategies during matches. Notably, during the 2019 Rugby World Cup knockout stages, winning teams averaged 28 kicks per match compared to the losing teams' 24 (Bunker and Spencer 2020). McCormick (2021) highlighted variations in kick types during the 2019 Rugby World Cup. Punt kicks constituted 52% of all kicks, surpassing other categories (McCormick 2021). Modern rugby has witnessed a substantial increase in box kicks, with their proportion increasing from 6% in the 2003 Rugby World Cup to 23% of all kicks in the 2019 Rugby World Cup (McCormick 2021). Lazarczuk et al. (2020) delved into kick frequency across positions during the 2016/17 and 2017/18 English Premiership seasons. The study revealed that flyhalves executed 46% of all kicks, a substantial lead, while scrum halves were accountable for 27% (Lazarczuk

et al. 2020). The study by Colomer et al. (2022) emphasised that elite coaches highlighted the importance of tactical kicking during the match. The study further highlighted that kicking tactics are dependent on contextual factors, which include the defensive line composition, pace of the match, field position and weather conditions (Colomer et al. 2022).

On the 1<sup>st</sup> of August 2021, World Rugby implemented several trial laws, including the 50:22 law, allowing a team to receive the throw into the lineout when kicking from their half into the opponents' 22 (World Rugby 2021a). Approved in 2022, the law was implemented on the 1<sup>st</sup> of July (World Rugby 2022). It was aimed at compelling teams to move defensive players into the backfield to protect against the kick, which would reduce the number of players in the immediate defensive line. This, in turn, would reduce the option of line speed in defence, a known risk for concussions (Cross et al. 2019) and therefore it would also create more space for the attacking team.

This study aimed to investigate the impact of the 50:22 kicking law on kicking profiles by comparing the 2021 and 2022 seasons, as well as examining the success rate of 50:22 kicks during the 2022 season in South African rugby union tournaments. The tournaments where the laws were implemented in 2022 were the Currie Cup and Varsity Cup. The Currie Cup involves provincial teams, while the Varsity Cup is the highest level of university rugby played by student-athletes. In the 2021 season, both tournaments adhered to previous laws, but in 2022, the new 50:22 law was introduced. The objectives of the study were to describe i) how the law change influenced teams' overall kicking, aiming to contribute to a deeper understanding of how the 50:22 law influenced the tactical approach of the teams, and ii) the success rate of 50:22 kicks.

## Methods

### Research design

This study employed an interrupted time series (ITS) design with a control period (2021 season) to assess the impact of an intervention (2022 season) over time (Ranganathan and Aggarwal 2018), using video-based performance analysis. It focused on examining the effects of the 50:22 law trial in the 2021 and 2022 Currie Cup and Varsity Cup rugby tournaments. To achieve the aim of this study, the two tournaments were combined. The study was approved by the Health Research Ethics Committee at xxx (HREC Reference No: S22/07/124).

### Sample

A total of 177 matches were played during the two rugby seasons of 2021 ( $N=85$ ) and 2022 ( $N=92$ ). Video recordings of the matches were provided by the South African Rugby Union technical department for analysis. The study focused on analysing all general play kicks in the two tournaments. However, certain exclusion criteria were established to maintain data quality, excluding footage with vague angles, blurriness, or obstruction due to players blocking the view.

## Data collection

### Identification and selection of performance indicators

Before commencing data collection, validation of the selected performance indicators and operational definitions was undertaken. The validation process followed the methods proposed by Watson et al. (2017), which were as follows: firstly, to gain insights into the impact of the law change, a footage review was conducted, utilising established performance indicators to code specific characteristics during the matches. Secondly, the initial performance indicators and operational definitions were developed based on published peer-reviewed studies in the research area, by the research team (Hughes et al. 2017; den Hollander et al. 2018; Painczyk et al. 2018; Migdalski and Stone 2019; Bunker and Spencer 2020; Hendricks et al. 2020; Lazarczuk et al. 2020; World Rugby 2021b, 2023). Lastly, consultation with an expert panel of 7 members, consisting of coaches, specialist kicking coaches, players, and sport scientists working in professional rugby, assessed the appropriateness of the performance indicators and the clarity of the operational definitions. The same expert panel members were consulted once more to assess the validity, relevance, and clarity of the proposed performance indicators and operational definitions. If the panel deemed the selected performance indicators and operational definitions appropriate and clear, no further modifications were necessary. To ensure the validity of player action descriptions, the list of performance indicators was intentionally designed to be inclusive rather than exclusive. The performance indicators and operational definitions for the study are presented in Table 1. For the purpose of this study, two levels of analysis were conducted. Firstly, all the kicks during general play for the 2021 and 2022 seasons were coded, with 'kicks' as the category and other performance indicators as the descriptors. For the second level of analysis, the coder re-examined all the kicks during general play from the 2022 season that was initiated from the team's own half, with all the attempted '50:22 kicks' as the category and other performance indicators as descriptors.

### Reliability

Cohen's kappa coefficient was utilised to evaluate the reliability of the coding process. The primary investigator initially coded a complete match before data collection and adjusted the coding window, if necessary, to enhance the reliability of the data collected for better flow and order before the start of the data collection. After the data collection (30 days after completing data collection), a random sample of 44 matches (25% of the total matches) underwent independent coding by the primary investigator (intra-rater reliability) and an external coder (inter-rater reliability) to assess reliability. The external coder was a post-graduate student at the time of data collection, with 5 years of coding experience in rugby and 4 years of experience using the Nacsport software analysis system. The interpretations were categorised as follows: less than chance agreement ( $<0$ ), poor agreement (0.01–0.20), fair agreement (0.21–0.40), moderate agreement (0.41–0.60), good agreement (0.61–0.80), and very good agreement (0.81–0.99) (Painczyk et al. 2018). The resulting Cohen's kappa coefficients demonstrated very good agreement for both intra-coder ( $r=0.98$ ) and inter-coder ( $r=0.97$ ) reliability.

**Table 1.** Performance indicators and operational definitions used for the study.

Performance indicators	Operational definitions
Kicks during general play. World Rugby (2021b)	Purposefully striking the ball with any part of the foot or leg, except the heel. Excluding kicks for restart purposes.
50:22 Kick World Rugby (2023)	The ball bounces indirectly into touch in the opposition's 22, with the kick originating inside the kicking teams own half.
50:22 Kick outcome Jack 2022; World Rugby (2023)	Successful: If the team in possession kicks the ball from inside their own half indirectly into touch inside their opponents' 22, they will throw in at the resultant lineout during the Currie Cup and receive a free kick in the Varsity Cup. Unsuccessful: If the team in possession attempts to execute a 50:22 kick but fails to kick the ball from inside their own half indirectly into touch inside their opponents' 22, they will not gain the advantage of a lineout throw-in during the Currie Cup or a free kick in the Varsity Cup.
Time in match	Quarter 1: 0–20 Quarter 2: 20min.01seconds-40 Quarter 3: 40min.01seconds-60 Quarter 4: 60min.01seconds-80 Half 1: 0–40> Half 2: 40–80>
Away and Home Match outcome Hughes et al. (2017), Bunker and Spencer (2020)	Based on whether the kicking team was the home or away team regarding match location. Whether the attacking team won, lost, or drew the match at the end of the match.
Match status Positions Lazarczuk et al. (2020)	Based on whether the kicking team was winning, losing, or drawing at the time of the kick, based on the score. Forwards 1–8; 9 Scrumhalf; 10 Flyhalf; 11 Left wing; 12 Inside centre; 13 Outside centre; 14 Right wing and 15 Fullback
Footedness Type of kick (from hand). Painczyk et al. (2018), Lazarczuk et al. (2020).	Whether the kicker used their right or left foot to kick. Punt kick, grubber kick, up and under, box kick, chip kick, cross kick, or drop kick.
Event preceding the kick (2020)	Ruck; lineout; maul; scrum; kick-off receipt; kick receipt from opposition in open play; knock on by opposition; turnover; or line break.
The objective of the kick	Touch: Intended to kick the ball directly into touch Contestable: Kick the ball high in the air to give time for a teammate to recollect the ball in the air. Pressure relieving: a player kicks the ball downfield straight back to the opponents. Space in behind: To kick the ball into a space where there is not a defender in the back field. Short kick: (grubber, chip). Points: Drop goal
Total number of passes from the last event Hendricks et al. (2020)	Count of passes (number of times the ball is transferred between attacking players) from the preceding event leading up to the kick.
Zonal locations den Hollander et al. (2016); Migdalski and Stone (2019)	Zone A: Attacking area between 22m area and the try line. Zone B: Attacking area between 22m area and the 50m line. Zone C: Defence area between 22m area and the 50m line. Zone D: Defence area between 22m area and the try line. Channel 1: From left touchline to 15m lines. Channel 2: In between the 15m. Channel 3: 15m to right touchline line.

## Statistical analysis

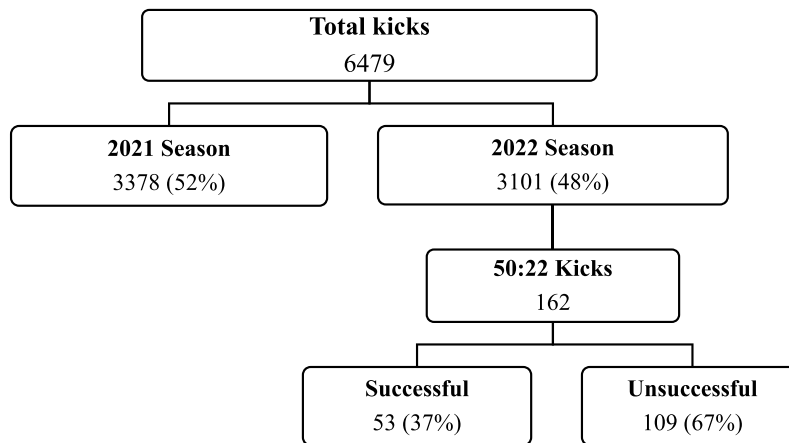
The Centre for Statistical Consultation Services of Stellenbosch University analysed the research data. Statistical analyses were performed using Statistica (14.0.1.25) data processing package at a predetermined level of significance ( $p < 0.05$ ) to determine the statistical significance of the findings. Descriptive statistics of all kicks were reported in the form of frequency and percentages. A Fisher's exact test was performed to examine the association between the categorical variables, across the 2021 and 2022 seasons. Multivariable logistic regression analysis was performed to classify the binary outcome of the two years. Odds Ratio (OR) was used to measure the strength of association between the categorical variables. A 95% Confidence Interval (95% CI) was performed to examine the difference between the outcomes of the two years, allowing an assessment of the potential range within which the true differences in population parameters lie.

## Results

The study found that over two seasons (Figure 1), 6,479 kicks were attempted, averaging 37 per match. In 2021,

3,378 kicks were made, averaging 40 per match, while in 2022, 3,101 kicks were attempted, averaging 34 per match. In 2022, there were 162 attempts at executing the 50:22 kick, with 53 successful and 109 unsuccessful kick attempts.

Table 2 provides an overview of the total kicks and their respective proportion by quarter, team (home or away), match outcome, and score when the kick was made. The number of kicks made in the fourth quarter and the second half was significantly higher in 2022 compared to 2021 (22% vs 20%, 95% CI: 1.05–1.33;  $p = 0.01$ ). Teams were significantly less likely to kick when losing the match (48% when winning vs 36% when losing in 2022, for example), but the proportion of kicks made by teams who were behind decreased significantly in 2022 (39% in 2021 vs 36% in 2022; 95% CI: 0.81–0.98;  $p = 0.02$ ). By playing position, scrum halves and inside centres kicked more frequently in 2022 compared to 2021, while fly-halves, outside centres, and fullbacks kicked less frequently in 2022 than in 2021. Even though most of the kicks were kicked by the right foot for both seasons, there was a significant increase from 2021 to 2022 (15% to 18%; 95% CI: 1.03–1.34;  $p = 0.04$ ) for kicks made by the left foot.



**Figure 1.** Total kicks per season and 50:22 kicks success ratio.

**Table 2.** Kick overview by tournament, season, and performance indicators.

	Total number of kicks					50:22 kicks attempted	
	k = 6479					k = 162	
	2021 3378 (52)	2022 3101 (48)	OR	95% CI	p=	Successful 53 (33)	Unsuccessful 109 (67)
<i>Quarters</i>							
1	917 (27)	802 (26)	0.94	0.84–1.05	0.25	13 (25)	34 (31)
2	917 (27)	780 (25)	0.9	0.81–1.01	0.07	15 (28)	29 (27)
3	875 (26)	820 (26)	1.03	0.92–1.15	0.63	12 (23)	22 (20)
4	669 (20)	699 (22)	1.18	1.05–1.33	0.01*	13 (25)	24 (22)
<i>Halves</i>							
1	1,834 (54)	1,582 (51)	0.88	0.80–0.97	0.14	28 (53)	63 (58)
2	1,544 (46)	1,519 (49)	1.14	1.03–1.26	0.11	25 (47)	46 (42)
<i>Teams</i>							
Home	1,701 (50)	1,538 (50)	0.97	0.88–1.07	0.72	30 (57)	54 (50)
Away	1,677 (50)	1,563 (50)	1.03	0.94–1.14	0.72	23 (43)	55 (50)
<i>Match outcome</i>							
Win	1,737 (51)	1,621 (52)	1.03	0.94–1.14	0.69	26 (49)	55 (50)
Draw	138 (4)	16 (1)	0.12	0.07–0.20	0.00*	-	1 (0)
Lose	1,503 (44)	1,464 (47)	1.12	1.01–1.23	0.18	27 (51)	53 (49)
<i>Match status</i>							
Ahead	1,644 (49)	1,486 (48)	0.97	0.88–1.07	0.55	27 (51)	49 (45)
Behind	1,306 (39)	1,109 (36)	0.88	0.81–0.98	0.02*	17 (32)	36 (33)
Tied	428 (13)	506 (16)	1.34	1.17–1.54	<0.01*	9 (17)	24 (22)
<i>Position</i>							
Forwards	19 (1)	24 (1)	1.38	0.75–2.52	0.36	-	1 (0)
9	685 (20)	792 (26)	1.35	1.2–1.51	0.00*	10 (19)	24 (22)
10	1,577 (47)	1,340 (43)	0.87	0.79–0.96	0.01*	25 (47)	48 (44)
11	80 (2)	67 (2)	0.91	0.66–1.26	0.62	-	1 (0)
12	134 (4)	182 (6)	1.51	1.2–1.9	<0.01*	6 (11)	6 (5)
13	93 (3)	49 (2)	0.57	0.4–0.8	<0.01*	1 (2)	-
14	72 (2)	75 (2)	1.14	0.82–1.58	0.45	-	1 (0)
15	718 (21)	572 (18)	0.84	0.74–0.95	0.01*	11 (20)	28 (26)
<i>Footedness</i>							
Right	2,860 (85)	2,557 (82)	1.22	1.08–1.39	0.47	40 (75)	87 (80)
Left	518 (15)	544 (18)	1.17	1.03–1.34	0.04*	13 (25)	22 (20)

OR = Odds Ratio; 95% CI = 95% Confidence Intervals; \* statistically different between the 2021 and 2022 season.

When analysing the 50:22 kicks as presented in Table 2, it was observed that the most successful kicks 50:22 kicks occurred predominantly in the second quarter of the match (28%). Conversely, the highest rate of unsuccessful 50:22 kicks was recorded in the first quarter (31%). The first half of the match saw more attempts at 50:22 kicks ( $k = 91$ ) compared to the second half ( $k = 71$ ). Teams tended to make more 50:22 kick attempts when they were leading (45%). Among the positions,

flyhalves made the most attempts ( $k = 73$ ; 45%), accounting for the highest success rate (47%). Fullbacks (20%) and scrum halves (19%) followed with the next highest attempts. Interestingly, home teams had a higher success rate for 50:22 kicks compared to away teams (57% vs 43%), although both had an equal number of unsuccessful attempts.

Table 3 provides a breakdown of kicks, categorised by kick type, preceding event before the kick, and kick objective. Upon



**Table 3.** Kick type, preceding event, objective, and passes for 2021–2022 seasons.

Year	Total number of kicks					50:22 kicks attempted	
	k = 6479					k = 162	
	2021 3378 (52)	2022 3101 (48)	OR	95% CI	p=	Successful 53 (33)	Unsuccessful 109 (67)
<i>Types of kick</i>							
Punt kick	2,120(63)	1,966(63)	1.03	0.93–1.14	0.61	48 (91)	106 (97)
Box kick	272 (8)	299 (10)	1.22	1.03–1.45	0.03*	-	-
Up & under kick	337 (10)	261 (8)*	0.83	0.7–0.98	0.03*	-	-
Grubber kick							
Chip kick	297 (9)	242 (8)	0.88	0.74–1.05	0.16	5 (9)	3 (3)
Cross kick	247 (7)	229 (7)	1.01	0.84–1.22	0.92	-	-
Drop kick	99 (3)	99 (3)	0.98	0.73–1.31	0.94	-	-
	6 (0)	15 (0)*	2.73	1.06–7.05	0.05*	-	-
<i>Preceding event</i>							
Ruck	1,832(54)	1,669(54)	0.98	0.89–1.08	0.75	28 (53)	38 (35)
Kick received	856 (25)	694 (22)	0.85	0.76–0.95	0.01*	14 (32)	38 (35)
Scrum	163 (5)	181 (6)	1.22	0.98–1.52	0.08	2 (4)	14 (13)
Kick-off receipt	97 (3)	118 (4)	1.34	1.02–1.76	0.04*	1 (2)	-
Free kick	93 (3)	111 (4)	1.31	0.99–1.73	0.06	3 (6)	3 (3)
Turnover won	68 (2)	101 (3)	1.64	1.2–2.24	<0.01*	3 (6)	10 (9)
Line out	93 (3)	66 (2)	0.77	0.56–1.06	0.11	-	4 (4)
Maul	53 (2)	44 (1)	0.9	0.6–1.35	0.68	-	1 (<1)
Line break	43 (1)	38 (1)	0.96	0.62–1.49	0.91	1 (2)	-
Knock on_ Interception	80 (2)	79 (3)	1.08	0.79–1.48	0.69	1 (2)	4 (4)
<i>Kick Objective</i>							
Space in behind	859 (25)	797 (26)	1.01	0.91–1.13	0.84		
Touch	856 (25)	814 (26)	1.05	0.94–1.17	0.52		
Contestable	703 (21)	648 (21)	1.01	0.89–1.13	0.94		
Pressure relieving	574 (17)	502 (16)	0.94	0.83–1.08	0.46		
Short kicks	380 (11)	325 (10)	0.92	0.79–1.08	0.37		
Drop goal	6 (0)	15 (0)	2.73	1.06–7.05	0.05*		
<i>Passes</i>							
0	1,290(38)	1317(42)	1.19	1.08–1.32	0.02*	18 (34)	40 (36)
1	1,714(51)	1496 (48)	0.90	0.82–1.00	0.24	30 (57)	60 (55)
2	244 (7)	196 (6)	0.87	0.71–1.05	0.17	4 (8)	5 (5)
3	82 (2)	66 (2)	0.87	0.63–1.21	0.43	1 (2)	2 (2)
4+	48 (1)	26 (1)	0.59	0.36–0.95	0.02*	-	2 (2)

OR = Odds Ratio; 95% CI = 95% Confidence Intervals; \* statistically different between the 2021 and 2022 seasons.

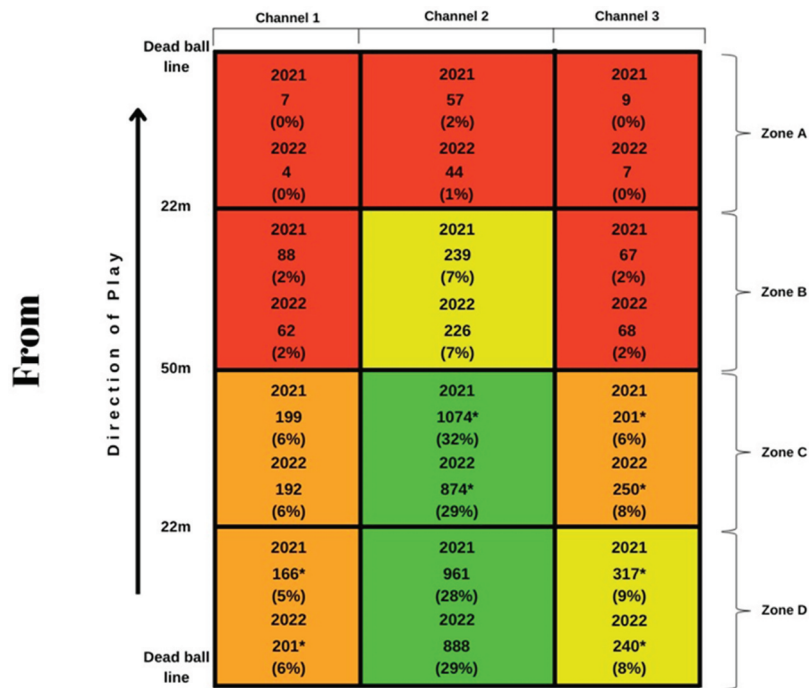
reviewing the two seasons, the punt kick was the most prominent in both. The number of 'Box kicks' ( $p = 0.03$ ) and 'Drop goals' ( $p = 0.05$ ) significantly increased in 2022. Conversely, the number of up-and-under kicks decreased significantly ( $p = 0.03$ ) during the same period. In both seasons, the 'Ruck' was the most evident preceding event from which kicks were taken. The number of kicks following 'Kick-off receipt' significantly increased in 2022 ( $p = 0.01$ ), along with kicks from turnovers that were won ( $p = 0.00$ ). In contrast, the number of kicks originating from 'Kicks receipt' in open play decreased significantly ( $p = 0.01$ ) in 2022. Regarding the kick objectives for the different kicks in the two seasons, 'Space in behind' and 'Touch' were predominantly used. Most kicks occurred after one '1' pass in both 2021 (51%) and 2022 (48%) seasons. In 2022, a significant increase ( $p = 0.02$ ) was observed for kicks from '0' passes and a significant decrease ( $p = 0.02$ ) in kicks from '4+' passes.

When examining the 50:22 kick attempts, it was found that over 90% of both attempts and successful 50:22 kicks were punt kicks, with the grubber kick being the only other type contributing to a successful 50:22 kick. The 'Ruck' was the most frequent event preceding a successful 50:22 kick (53%), despite an equal number of unsuccessful 50:22 kicks originating from a 'Ruck' and a 'Kick receipt' (35%). Only 4% of successful 50:22 kicks occurred from a 'Scrum', whereas

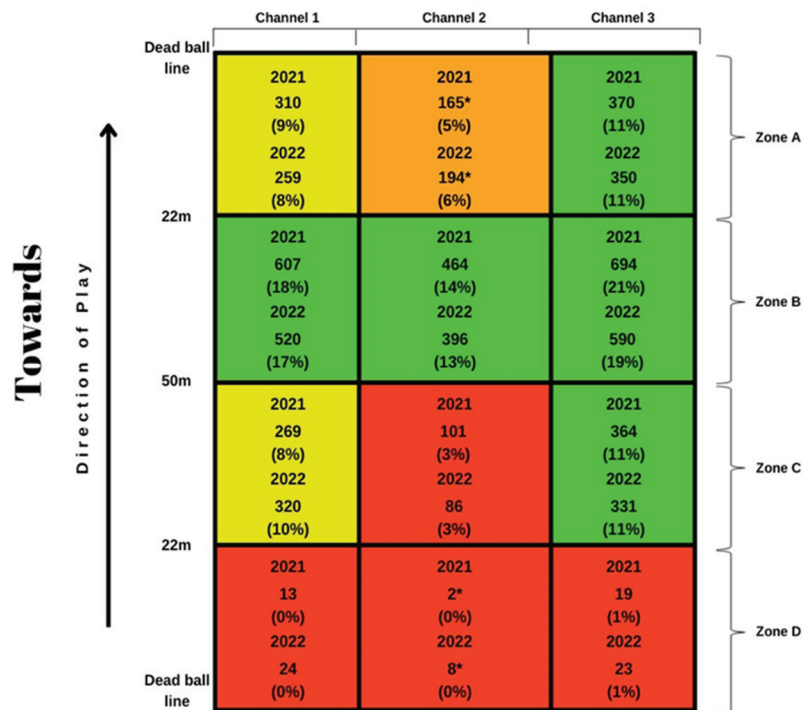
14% of unsuccessful 50:22 kicks were attempted from a scrum. Regarding the number of passes preceding the attempts, most 50:22 attempts occurred after '1' pass (57%), followed by '0' passes (34%).

Figure 2(a,b) provide an overview of the zonal locations of where kicks were taken from, and where it was kicked towards. The results showed statistically significant findings. There was an increase in kicks from Channel 1 – Zone D (OR: 1.34; 95% CI 1.09–1.66;  $p = 0.01$ ) and Channel 3 – Zone C (OR: 1.39; 95% CI 1.14–1.68;  $p = 0.00$ ) in the 2022 season, and a decrease from Channel 2 – Zone C (OR: 0.84; 95% CI 0.76–0.94;  $p = 0.01$ ) and Channel 3 – Zone D (OR: 0.81; 95% CI 0.68–0.97;  $p = 0.00$ ). The noteworthy differences in where it was kicked towards, was an increase in kicks towards Channel 2 – Zone A (OR: 1.30; 95% CI 1.05–1.61;  $p = 0.02$ ) and Channel 2 – Zone D (OR: 4.37; 95% CI 0.93–20.58;  $p = 0.04$ ) in 2022. Most successful 50:22 kicks (81%) and 50:22 attempts occurred from Channel 2 – Zone C (80%). More successful 50:22 kicks occurred when kicking towards the left-hand side of the field (57%), even though more attempts were made towards the right-hand side of the field (60%).

Figure 3 provides an overview of the zonal locations from which the 50:22 kicks were taken and the target zones. The results reveal that 82% ( $f = 43$ ) of the successful kicks and 80%



**Figure 2a.** Zonal locations of where kicks were taken from are represented as the number of observations and percentage of the total number of kicks. K = Kicks; Green zone = 10%> Yellow zone = 7–9%; Orange zone = 4–6%; Red zone = 0–3%; \* = Statistically significant difference ( $\leq 0.05$ ) between the 2021 and 2022 seasons.

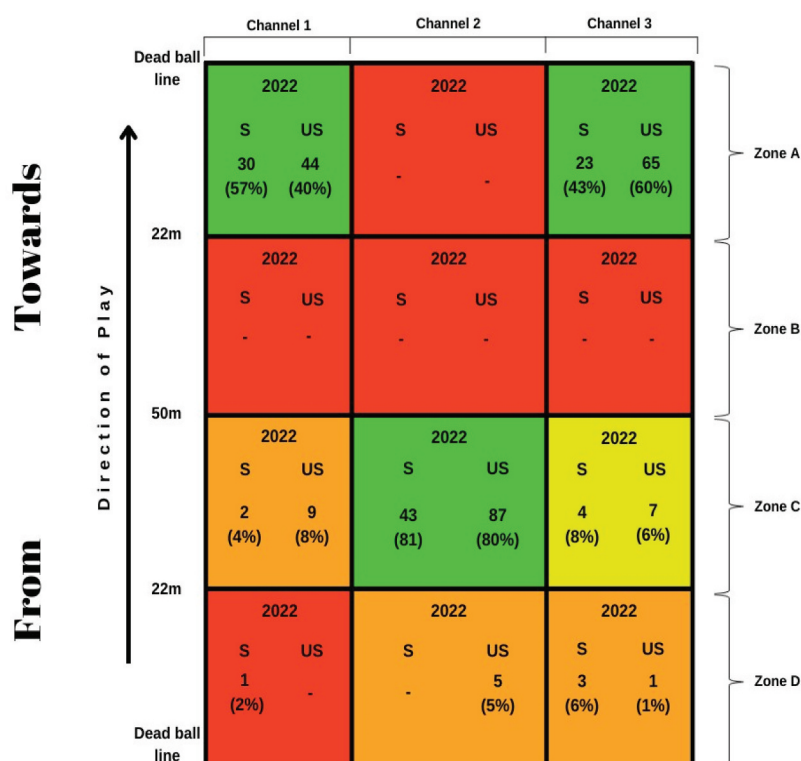


**Figure 2b.** Zonal locations of where the kick landed represented as the number of observations and percentage of the total number of kicks. K = Kicks; Green zone = 10%> Yellow zone = 7–9%; Orange zone = 4–6%; Red zone = 0–3%; \* = Statistically significant difference ( $\leq 0.05$ ) between the 2021 and 2022 seasons.

( $f = 87$ ) of the unsuccessful kicks were taken from Zone C – Channel 2. Regarding the direction of the successful kicks, Zone A – Channel 1 accounted for 57% ( $f = 30$ ), while the highest proportion of unsuccessful 50:22 kicks, 60% ( $f = 65$ ), were aimed towards Zone A – Channel 2.

## Discussion

This study investigated the impact of the 50:22 kicking law on kicking profiles by comparing the 2021 and 2022 seasons, as well as examining the success rate of 50:22 kicks during the 2022 season in South African rugby union tournaments. The



**Figure 3.** Zonal locations of where the kick was kicked from and landed represented as the number of observations and percentage of the total number of kicks. K = Kicks; S = Successful; US = Unsuccessful; Green zone: 10%> Yellow zone: 7–9%; Orange zone: 4–6%; Red zone: 0–3%.

authors acknowledge that numerous factors influence tactical kicking decisions and execution in the sport, and so the law change introduced between the 2021 and 2022 seasons is only one contributor to the observed findings. The discussion will be presented as follows: firstly, examining the effect of the law changes on the kicking profile by comparing the 2021 and the 2022 seasons, and secondly, analysing the 50:22 kicks, including the number of kick attempts and comparing successful and unsuccessful kicks.

### **Change in kicking profile (2021 vs 2022)**

The study indicated a decrease in kicks from 2021 to the 2022 season, potentially due to several factors. These include an adaptation period, during which players and teams need time to adjust to new laws, leading to a temporary reduction in kicks as strategies are refined. Changes in the risk-reward balance of kicking may prompt teams to pursue alternative strategies such as running or passing, resulting in fewer kicks overall. Coaches may also make tactical adjustments to minimise the impact of law changes, potentially reducing reliance on kicks in certain situations. A study by Nicholls et al. (2023) indicated Winning teams may benefit from effective game management, where coaches guide players in making sound decisions during matches. Coaches can emphasize the importance of timing, execution, and control when it comes to kicks from hand. This includes recognising situations where kicking may be advantageous, managing the tempo of the game, and adapting strategies based on the evolving match dynamics. Additionally, teams may anticipate opponents' responses to new laws and

adapt their tactics, accordingly, further decreasing kick frequency as they seek to exploit opportunities or mitigate risks. Even though there was less kicks in the 2022 season when examining match status, the study revealed that teams in the lead tend to kick more, and winning teams kick more than losing teams. This finding aligns with research conducted by Bunker and Spencer (2020) during the 2019 World Cup tournament, as well as Nichols et al. (2023) when comparing winning and losing teams in the Super Rugby tournament. According to Bennett et al. (2018), it can therefore be conjectured that kicking has an impact on match outcomes beyond revealing a team's possession levels. In rugby, kicking away possession might be advantageous when teams have exhausted other options and are under pressure to avoid turnovers or penalties in unfavourable positions.

The findings of this study indicated an increase in the percentage of kicks that took place in the fourth quarter of the match. During the closing stages of a match, teams that are in the lead seek to secure victory by managing the match tempo, while trailing teams adopt an attacking approach, actively pursuing scoring opportunities (Kilduff et al. 2023). Another finding of the study was that teams kicked more after winning a turnover. When a team concedes a turnover, the transitional phase from attack to defence leaves defensive structures momentarily unstructured, often resulting in exposed backfield areas as players shift position. This will most likely leave space open in the backfield, as the players are still in transition back. A possible cause for the increase in kicks after a turnover is that with the open space in the backfield, it is a great opportunity to kick a successful 50:22.



When comparing the kicking profile of the 2021 vs 2022 season the results revealed a significant decrease in the number of kicks by flyhalves and fullbacks and an increase by scrum halves and inside centres. This indicates a broader distribution of kicking responsibilities across players, likely driven by the utilisation of left and right-footed combinations within various positions. Elite coaches have previously stated that having a left and right foot option enhances the tactical kicking of a team (Colomer et al. 2022). The results from the current study showed that scrum halves kicked relatively more in 2022 than in 2021, and that box kicks and kicks with '0' passes before the kick took place increased compared to the 2021 season. This trend aligns with what has been observed in other findings, with an increase in box kicks observed from the 2011 Rugby World Cup to the 2019 Rugby World Cup (McCormick 2021). The box kick is an effective contestable kick for teams to use to gain territory, put the opposition team under pressure, and possibly regain possession. The study by Colomer et al. (2022) showed that elite coaches use a tactical approach of having low possession and focus on gaining territory, which would motivate the use of box kicks during the match. There was no significant change in the number of punt kicks from 2021 to 2022, however, the punt kick remains the most utilised kick, a trend previously noted in research (Lazarczuk et al. 2020; McCormick 2021).

### **50:22 kick attempts (successful vs unsuccessful)**

With the incorporation of the 50:22 law, teams may seek to establish a ruck at the midfield, presenting an opportunity for executing a 50:22 kick to either side of the field, making it more difficult for the opposing team to defend. This tactic gains enhanced effectiveness when players are positioned on each side of the ruck, capable of executing the 50:22 kick to the designated side of the field. Teams appear to allocate kicking roles based on field positioning and players' dominant feet, thereby optimising their kicking tactics. According to Nicholls et al. (2023) coaches of winning teams should recognise the importance of a well-executed kicking game. They can emphasise the strategic value of kicks from hand to gain territorial advantage, create scoring opportunities, or disrupt the opposition's defensive structure. A possible cause for this increase is that teams are aiming to execute a successful 50:22 kick as an attacking strategy. The lineout a team receives after a 50:22 kick provides the kicking team an opportunity to set up a driving maul in the opponent's 22 m area, which is the most frequent try-scoring event (Coughlan et al. 2019). Research by Migdalski and Stone (2019) showed that more tries are scored from a driving maul originating near the try line. This finding encourages teams to utilise the 50:22 kick as an attacking tactic, which could assist teams when chasing or closing out matches. This finding is strengthened by the result that the second highest number of successful 50:22 kicks occurred in the fourth quarter, even though the least number of kicks occurred during this period.

Rule and law modifications aim to alter game conditions with specific objectives in mind, including improving players' performance, attracting spectators, addressing commercial pressures, accommodating children's needs, preventing

injuries, and attracting athletes (Arias et al., 2011; Kraak et al. 2017). When new laws are introduced, players and coaches undergo a phase where they must unlearn the old laws and relearn the new ones, potentially leading to errors. Several factors could contribute to the high rate of unsuccessful kicking attempts observed in the current study following the implementation of a new kicking law in the 2022 season. Firstly, players may struggle due to a lack of familiarity with the new law, as understanding its nuances and adapting their techniques and decision-making processes takes time (Ashford et al., 2021). Additionally, the increased complexity or ambiguity introduced by the new law might lead to confusion among players and officials, resulting in more errors during kicks. Moreover, the pressure to perform under the new law, particularly in high-pressure situations, could affect players' confidence and decision-making abilities, leading to rushed or ill-considered kicking actions. According to Nicholls et al. (2023), coaches should foster a cohesive team environment where players understand and support the kicking strategies. This involves effective communication, a shared understanding of game plans, and ensuring that players are confident and comfortable with executing kicks. Additionally, coaches can encourage teamwork and coordination in terms of chase lines, kick receipts, and defensive positioning after kicks. Technical challenges, such as alterations in kicking angles, distances, or timing requirements, may also contribute to the higher error rate as players struggle to master these adjustments. Variations in refereeing interpretations or enforcement of the new law could create inconsistency and uncertainty on the field, making it difficult for players to predict how officials will apply the law. Additionally, opposing teams may exploit vulnerabilities or uncertainties associated with the new kicking law, using aggressive defence or strategic positioning to disrupt kicking accuracy.

### **Practical implementation**

This study's practical implication is significant for coaches, players, and performance analysts, providing valuable insights for adjusting training programs and tactics to accommodate the changes introduced by the 50:22 law in rugby. Understanding how players kick and the potential strategies teams can employ against their opponents involves considering several key factors. Firstly, conducting a foot preference analysis allows teams to identify which foot players predominantly use for various types of kicks, aiding in understanding their dominant kicking feet. Additionally, analysing players' preferred direction for kicking, whether straight downfield or towards touchlines, provides crucial insights into tactical preferences and trends. This study revealed that the majority of the 50:22 kicks were executed by right-footed players, yet having both right and left-footed kickers on the team can offer coaches more options based on their zonal location. Assessing kicking accuracy through analysing successful and unsuccessful kicks, the study revealed a high error rate for kicks. However, if players gain more exposure by adhering to the law, it will lead to improved accuracy. Additionally, analysing the outcomes of zonal locations (the results revealed that the best zonal location to kick from was Zone C Channel 2) highlights

players' strengths and areas for improvement in terms of accuracy. Furthermore, measuring the distance achieved by players with their kicks informs how it impacts field position and tactical outcomes during matches. Evaluating how players perform under pressure situations, such as when being chased by opposition players or facing an organised defence, sheds light on their composure and decision-making abilities. Moreover, studying the defensive patterns of opposing teams reveals areas where kicks may be most effective, enabling teams to develop strategies to exploit weaknesses in the opposition's defence (Nicholls et al. 2023). Finally, analysing how opposing teams chase kicks helps teams understand the effectiveness of their kicks in applying pressure, and facilitating adjustments to maximize the effectiveness of kick-chase tactics. Overall, integrating these findings into training programs can enhance teams' preparedness and strategic approach in response to the 50:22 rule and other tactical aspects of the game. Coaches can prioritise and enhance the kicking skills of their players to increase the accuracy of the kicking. This includes improving accuracy, distance, and the ability to execute different types of kicks (e.g., punt kicks, grubber kicks, cross-field kicks). Training sessions can focus on technique, decision-making, and situational awareness regarding when and where to use kicks effectively (Nicholls et al. 2023).

### Future studies and limitations

The study's focus solely on South African tournaments limits the generalizability of its findings to global rugby tournaments across various levels. However, analysing all televised matches from two seasons helps counter selection bias. Future research should expand to include a broader range of domestic and international tournaments from both hemispheres. The analysis only covers the control period (2021) and the intervention period (2022) following the implementation of the 50:22 law. Other factors, such as team composition changes, coaching strategies, and environmental factors, may have influenced outcomes. Incorporating data from multiple years would improve the review of the law change. We acknowledge that due to the many comparisons conducted, there is a risk of increasing Type I error. Future studies should investigate the impact of the 50:22 law in Southern and Northern hemisphere tournaments and international rugby. It is essential to examine if different nations adopt distinct strategies post-implementation. Additionally, research should focus on successful 50:22 kick profiles and changes in defensive structures for deeper insights. The effects of the 50:22 law on women's rugby remain unexplored, necessitating further investigation in future studies.

### Conclusion

The study first revealed a broader distribution of kicking responsibilities across the backline. An increase in the number of kicks by scrum halves and box kicks was observed, which aligns with the trend that has been seen in modern rugby in previous studies. A decrease in kicking by fullbacks was observed, likely due to teams deploying additional backfield players to counter the 50:22 kick, thereby enhancing counter-attacking opportunities upon receiving kicks. The results showed that flyhalves attempt and kick the most

50:22 kicks, with the punt kick the most effective type of kick. The study found a high error rate for 50:22 kicks, linking it to factors like the adjustment period to new rugby laws and potential confusion during implementation, indicating a phase of higher error rates as players and teams adjust to the changing laws.

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### Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article.

### References

- Arias JL, Argudo FM, Alonso JL. 2011. Review of rule modification in sport. *J Sports Sci Med*. 10(1):1–8.
- Ashford M, Abraham A, Poolton J. 2021. A communal language for decision making in team invasion sports. *Int Sport Coach J*. 8:122–129.
- Bennett M, Bezodis N, Shearer DA, Locke D, Kilduff LP. 2018. Descriptive conversion of performance indicators in rugby union. *J Sci Med Sport*. 22(3):330–334. doi: [10.1016/j.jsams.2018.08.008](https://doi.org/10.1016/j.jsams.2018.08.008).
- Bennett M, Bezodis N, Shearer DA, Locke D, Kilduff LP. 2021. Predicting performance at the group-phase and knockout-phase of the 2015 Rugby World Cup. *Eur J Sport Sci*. 21(3):312–320. doi: [10.1080/17461391.2020.1743764](https://doi.org/10.1080/17461391.2020.1743764).
- Bunker RP, Spencer K. 2020. Performance indicators contributing to success at the group and play-off stages of the 2019 Rugby World Cup. *J Hum Sport Exerc*. 17(3):683–698. doi: [10.14198/jhse.2022.173.18](https://doi.org/10.14198/jhse.2022.173.18).
- Colomer CME, Pyne DB, Mooney M, McKune A, Serpell BG. 2022. A qualitative study exploring tactical performance determinants from the perspective of three Rugby World Cup coaches. *Int J Sports Sci Coa*. 17(4):734–741. doi: [10.1177/17479541221087384](https://doi.org/10.1177/17479541221087384).
- Coughlan M, Mountfield C, Sharpe S, Mara JK. 2019. How they scored the tries: applying cluster analysis to identify playing patterns that lead to tries in super rugby. *Int J Perform Anal Sport*. 19(3):435–451. doi: [10.1080/24748668.2019.1617018](https://doi.org/10.1080/24748668.2019.1617018).
- Cross MJ, Tucker R, Raftery M, Hester B, Williams S, Stokes KA, Ransom C, Mathema P, Kemp S. 2019. Tackling concussion in professional rugby union: a case-control study of tackle-based risk factors and recommendations for primary prevention. *Br J Sports Med*. 53(16):1021–1025. doi: [10.1136/bjsports-2017-097912](https://doi.org/10.1136/bjsports-2017-097912).
- den Hollander S, Brown J, Lambert M, Treu P, Hendricks S. 2016. Skills associated with line breaks in elite rugby union. *J Sports Sci Med*. 5;15(3):501–508. doi: [10.1016/0006-291x\(75\)90508-2](https://doi.org/10.1016/0006-291x(75)90508-2).
- den Hollander S, Jones B, Lambert M, Hendricks S. 2018. The what and how of video analysis research in rugby union: a critical review. *Sports Med - Open*. 4(1). doi: [10.1186/s40798-018-0142-3](https://doi.org/10.1186/s40798-018-0142-3).
- Hendricks S, Till K, den Hollander S, Savage TN, Roberts S, Tierney G, Burger N, Kerr H, Kemp S, Cross M, et al. 2020. Consensus on a video analysis framework of descriptors and definitions by the Rugby Union video analysis consensus Group. *Br J Sports Med*. 54(10):566–572. doi: [10.1136/bjsports-2019-101293](https://doi.org/10.1136/bjsports-2019-101293).

- Hughes A, Barnes A, Churchill S, Stone J. 2017. Performance indicators that discriminate winning and losing in Elite Men's and Women's Rugby Union. *Int J Perform Anal Sport*. 17(4):534–544. doi: [10.1080/24748668.2017.1366759](https://doi.org/10.1080/24748668.2017.1366759).
- [IRB] International Rugby Board. 2008. Playing Charter. Dublin, Ireland: IRB. [accessed 16 Aug 2023].
- [IRB] International Rugby Board. 2009. Laws of the game: rugby union. Dublin, Ireland: IRB. [accessed 16 Aug 2023].
- Jack D. 2022. Why the Varsity Cup has shook up the 50/22 law in the 2022 season. SA Rugby magazine. [accessed 4 Mar 2022]. <https://www.sarugbymag.co.za/we-want-to-lift-tempo-of-game-create-more-space-1za/>.
- Kilduff LP, Pyne DB, Cook CJ. 2023. Performance science domains: contemporary strategies for teams preparing for the Rugby World Cup. *Int J Sport Physiol*. 18(9):1085–1088. doi: [10.1123/ijsp.2023-0179](https://doi.org/10.1123/ijsp.2023-0179).
- Kraak WJ, Coetzee F, Venter R. 2017. Analysis of the general match profile of International Rugby Union between 2007 and 2013. *Int J Perform Anal Sport*. 17(3):303–318. doi: [10.1080/24748668.2017.1336689](https://doi.org/10.1080/24748668.2017.1336689).
- Kraak WJ, Venter R, Coetzee F. 2016. Scoring and general match profile of super rugby between 2008 and 2013. *Int J Perform Anal Sport*. 16(2):786–805. doi: [10.1080/24748668.2016.11868923](https://doi.org/10.1080/24748668.2016.11868923).
- Lazarczuk SL, Love T, Cross M, Stokes KA, Williams S, Taylor AE, Fuller CW, Brooks JHM, Kemp SPT, Bezodis NE. 2020. The epidemiology of kicking injuries in professional rugby union: a 15-season prospective study. *J Med Sci*. 30(9):1739–1747. doi: [10.1111/sms.13737](https://doi.org/10.1111/sms.13737).
- McCormick J. 2021. Revolutionising rugby – a statistical analysis on how the game has evolved. Stats Perform; [accessed 25 July 2023]. <https://www.statsperform.com/resource/revolutionising-rugby-a-statistical-analysis-on-how-the-game-has-evolved/>.
- Migdalski A, Stone J. 2019. Investigating lineout performance between the top and bottom four English premiership rugby union teams in the 2016/17 season. *Int J Perform Anal Sport*. 19(1):131–141. doi: [10.1080/24748668.2019.1570459](https://doi.org/10.1080/24748668.2019.1570459).
- Nicholls M, Coetzee D, Schall R, Kraak W. 2023. Analysing match-related performance indicators in super rugby competitions: a study of the 2017–2019 seasons. *Int J Sports Sci Coa*. 0(0). doi:[10.1177/17479541231198211](https://doi.org/10.1177/17479541231198211).
- Painczyk H, Hendricks S, Kraak W. 2018. Intra and inter-reliability testing of a South African developed computerised notational system among western province club rugby coaches. *Int J Sports Sci Coa*. 13(6):1163–1170. doi: [10.1177/1747954118796368](https://doi.org/10.1177/1747954118796368).
- Ranganathan P, Aggarwal R. 2018. Study designs: part 1 – an overview and classification. *Perspect Clin Res*. 9(4):184–186. doi: [10.4103/picr.PICR\\_124\\_18](https://doi.org/10.4103/picr.PICR_124_18).
- Scott GA, Bezodis N, Waldron M, Bennett M, Church S, Kilduff LP, Brown LP. 2022. Performance indicators associated with match outcome within the United rugby championship. *J Sci Med Sport*. 26(1):63–68. doi: [10.1016/j.jsams.2022.11.006](https://doi.org/10.1016/j.jsams.2022.11.006).
- Varsity Cup. 2022. FNB varsity cup unique rules and laws. FNB Varsity Cup; [accessed 1 July 2023]. <https://www.varsitycup.co.za/rules>.
- Watson N, Durbach I, Hendricks S, Stewart T. 2017. On the validity of team performance indicators in rugby union. *Int J Perform Anal Sport*. 17(4):609–621. doi: [10.1080/24748668.2017.1376998](https://doi.org/10.1080/24748668.2017.1376998).
- World Rugby. 2021a. Global law trials. World.Rugby. [accessed 7 Feb 2022]. <https://www.world.rugby/the-game/laws/global-law-trials>.
- World Rugby. 2021b. World rugby Coaching. World rugby. [accessed 5 May 2022]. <https://www.coaching.worldrugby.org/?Module=1&ion=3&sub-section=15>.
- World Rugby. 2022. World Rugby Confirms Adoption of Welfare-Driven Laws. World.Rugby. [accessed 18 May 2022]. <https://www.world.rugby/news/714829/world-rugby-confirms-adoption-of-welfare-driven-laws>.
- World Rugby. 2023. Laws of the game: rugby union. World Rugby, Dublin, Ireland. [accessed 28 May 2023].