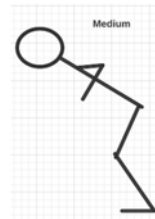
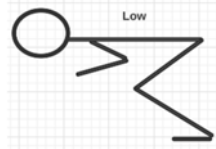
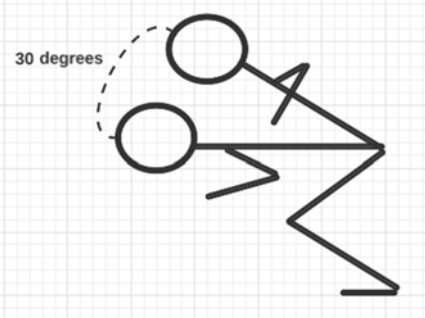


Supplementary Table 1- Tackle descriptors and definitions

General operational variables	Description
Tackle event	an event where one or more tacklers attempt to stop or impede the ball-carrier whether or not the ball-carrier was brought to ground.
Missed tackle	The BC successfully penetrates the attempted tackle and continues to advance
Completed tackle	When a tackle break does not occur, and either player goes to ground or the ball-carrier is held up and cannot progress further.
Defender/Tackler	Player/s involved in the tackle seeking to regain possession of the ball from a ball carrier
Attacker	Player/s involved in the tackle in possession of the ball
Ball-carrier	A player in possession of the ball
CONTEXTUAL VARIABLES	
1. Previous phase or set piece	The phase or set piece preceding the tackle event. Ruck Lineout Scrum Restart
2. Pass number	The number of passes from the previous phase or set piece until the tackle event
3. Match period	1st quarter: 0-20 minutes 2nd quarter: 20-40 minutes 3rd quarter: 40-60 minutes 4th quarter: 60-80 minutes
4. Defensive direction	Direction of movement executed by the defensive line (5 seconds preceding the tackle event)
a) Lateral	a) Approaching the BC laterally
b) Backwards	b) Retreating from the BC
c) Forwards	c) Approaching the BC front-on
d) No direction	d) No identifiable movement direction (not moving lateral, backwards or forwards)
5. Number of defenders	1,2,3,4- how many defenders were involved in the tackle event?
6. Defender being coded	1,2,3,4 e.g. 1= primary tackler, 2=secondary tackler
7. Tackle sequence	The sequence of contact made by either by one or more tacklers (at and immediately after the initial point of contact)
a) One on one	a) One tackler contacts BC
b) Sequential	b) One tackler contacts BC, followed by a second defender joining the contact situation
c) Simultaneous	c) Two tacklers contact BC at the same time
d) Attacking sequential	d) Two attackers contact one tackler after each other
8. Positional grouping of the tackler	a) Backs: position numbers 9-15 b) Forwards: position numbers 1-8
9. Positional grouping of the ball-carrier	a) Backs: position numbers 9-15 b) Forwards: position numbers 1-8
10. Defending team status	a) defending team was winning at the time of the tackle event b) defending team was losing at the time of the tackle event c) defending and attacking teams were drawing at the time of the tackle event
a) Winning	
b) Losing	
c) Drawing	
PRECONTACT VARIABLES	
11. Distance of the BC from tackler at ball reception	Distance between the tackler and BC before the tackle (0.5 seconds preceding the tackle event)
a) Near	a) Less than 2m of the tackler
b) Moderate	b) Between 2-4m of the tackler
c) Distant	c) Greater than 4m from the tackler
12. Anticipation of BC	Evidence that tackler is attuned and aware of BC and impending contact (0.5 seconds preceding the tackle event)
a) Apparent	a) tackler was aware of impending contact
b) Absent	b) tackler was unaware of impending contact
13. Come to balance*	Does the tackler adjust body position and footwork to BC change of direction? (yes/no)
a) Apparent	
b) Absent	
14. Body position of BC	Position of the BC's upper body relative to their lower body i.e. degree of upper body flexion/extension (0.5 seconds preceding the tackle event)
a) Upright	a) BC displayed high body height with knees and hips extended
b) Medium	b) BC displayed moderate flexion at knees and hips
c) Low	c) BC displayed low body height
15. Body position of tackler	Position of the tacklers upper body relative to their lower body i.e. degree of upper body flexion/extension (0.5 seconds preceding the tackle event)
a) Upright	a) tackler displayed high body height with knees and/or hips extended
b) Medium	b) tackler displayed moderate flexion at knees and/or hips
c) Low	c) tackler displayed low body height



16. Drop height* a) Apparent b) Absent	Does the tackler stay big and drop height appropriately at the correct time? (yes/no)
17. Dominant contact angle*	Does the tackler demonstrate a straight line posture through hips, spine, head up, chin off chest and eyes on target? (yes/no)
	
18. Head position of tackler a) Up and forward b) Away c) Down	Position of the tackler's head in relation to the position of the BC a) Gaze focused on BC b) Gaze away from BC c) Gaze towards the ground
19. Arm position of tackler a) Hands above shoulders b) Hands dropped c) Boxer stance/claws up elbows in*	Position of the tackler's arms before the tackle (0.5 seconds preceding the tackle event) a) Hands of the tackler are raised above their shoulders b) Hands of the tackler are dropped below the level of their elbows c) tackler's elbows are bent with at least one hand raised above the level of their elbow
20. Foot placement close to BC* a) Apparent b) Absent	Does the tackler get their foot as close as possible to the BC? (foot placement in line with BC centre of mass e.g. point on ground directly below BC's hips) (yes/no)
21. Shoulders in front of hips*	Are the tacklers shoulders in front of hips in a loaded body position? (yes/no)
22. Speed of tackler a) Fast (maximal) b) Moderate (sub-maximal) c) Slow (static)	Estimation of the tackler's running speed (subjective assessment) (0.5 seconds preceding the tackle event) a) Running or sprinting (purposeful running with maximal effort, with high knee lift) b) Jogging (non-purposeful slow running with low knee lift) c) Stationary or walking (no visible knee lift or rapid foot movement)
23. Speed of BC a) Fast (maximal) b) Moderate (sub-maximal) c) Slow (static)	Estimation of the BC's running speed (subjective assessment) (0.5 seconds preceding the tackle event) a) Running or sprinting (purposeful running with maximal effort, with high knee lift) b) Jogging (non-purposeful slow running with low knee lift) c) Stationary or walking (no visible knee lift or rapid foot movement)
24. Direction of movement of BC a) Straight b) Side Step c) Arcing run d) Lateral run e) Diagonal run	Movement of the BC before the tackle (0.5 seconds preceding the tackle event) a) BC ran straight at the defence b) BC performed an evasive step initiated by either leg c) BC performed arcing run d) BC performed a run from touchline to touchline e) BC runs at an angle, instead of straight at the tackler
25. Orientation of tackler in relation to BC* a) In-front b) Side c) Oblique d) Behind	Position of the tackler in relation to the BC (0.5 seconds preceding the tackle event) a) Tackler and BC moving head on toward each other b) Tackler moving in from the BC's side c) Tackler moving towards BC at an angle somewhere between the front-on and side-on positions. d) Tackler chasing BC toward own try-line

CONTACT VARIABLES

26. Body region of the tackler struck	The initial anatomical location contacted on the tackler by the BC (at and immediately after the initial point of contact)
a) Lower leg	a) Area below the knee
b) Hip	b) On the shorts line (belly button to bottom of shorts)
c) Upper leg	c) Area between bottom of shorts and knees
d) Torso	d) Above the BC's belly button to the armpit
e) Shoulder	e) Armpit to the shoulder
f) Arm	f) Contact only to the arm initially
g) Head and neck	g) Above the shoulder (contact with the head/neck)
27. Body region of the BC struck*	The initial anatomical location contacted on the BC by the tackler (at and immediately after the initial point of contact)
a) Lower leg	a) Area below the knee
b) Hip	b) On the shorts line (belly button to bottom of shorts)
c) Upper leg	c) Area between bottom of shorts and knees
d) Torso	d) Above the BC's belly button to the armpit
e) Shoulder	e) Armpit to the shoulder
f) Arm	f) Contact only to the arm initially
g) Head and neck	g) Above the shoulder (contact with the head/neck)
h) Ball	h) Contact to the ball initially
28. Type of tackle	The type of tackle technique executed by the tackler (at and immediately after the initial point of contact)
a) Arm tackle	a) Tackler impedes BC with the upper limbs
b) Jersey tackle	b) Tackler holds BC's jersey
c) Smother tackle	c) Tackler uses chest and wraps both arms around BC
d) Shoulder tackle	d) Tackler makes initial contact with their shoulder and wraps the BC with their arm
e) Tap tackle	e) Tackler trips BC with hand on lower limb below the knee
29. Direction of tackle	The direction from where the tackler makes contact with the BC (at and immediately after the initial point of contact)
a) Front-on	a) Tackler makes initial contact head-on with BC
b) Side-on	b) Tackler makes initial contact with the BC's side
c) Oblique	c) Tackler makes initial contact with BC at an angle
d) Behind	d) Tackler makes initial contact with BC from behind
30. Head placement of the tackler	The position of the tackler's head in relation to the BC (at and immediately after the initial point of contact)
a) Above	a) Head higher than BC's body during contact
b) Beside	b) Head next to BC's body during contact
c) In-front	c) Head in front of BC's body during contact
d) Behind	d) Head at the back of BC's body during contact
31. Ear to body *	Does the tackler's ear stay in contact with BC's body? (arrowhead- extra clamp with head) yes/no
32. Arm wrap and clamp*	Does the tackler use arms to wrap and clamp the BC?
a) No attempt to wrap	a) Tackler makes no attempt to wrap BC
b) Wrap	b) Tackler wraps BC
c) Failed wrap	c) Tackler attempts to wrap BC but loses grip
33. BC fend	Arm movement of the BC to repel the efforts of the tackler(s) (at and immediately after the initial point of contact)
a) Absent	a) BC provided no fend
b) Moderate	b) BC provided a light to moderate fend (e.g. swat or slap technique)
c) Strong	c) BC provided strong fend (e.g. push technique)
34. Tackler shoulder usage	Use of a shoulder by the tackler after initial contact (0.5 seconds after the tackle event)
a) Shoulder usage	a) Tackler uses shoulder during or after initial contact is made
b) No shoulder usage	b) No shoulder usage from tackler after initial contact is made
35. Shoulder usage active or passive or N/A?*	If shoulder was used, was it active or passive Active: first contact with the tacklers shoulder, and the tackler drives or attempts to drive the BC backwards Passive: first contact with the tacklers shoulder, and no attempt to drive the BC backwards N/A
36. Roll over front foot*	Does the tackler weight shift to the front foot? (yes/no)
37. Studs in the grass*	Are the tacklers studs in the grass, no dragging toes? (yes/no)
POSTCONTACT VARIABLES	
38. Tackler leg drive*	Leg drive executed by the tackler after initial contact (0.5 seconds after the tackle event)
a) Absent	a) No leg drive
b) Moderate	b) Moderate knee movement, with no high lift
c) Strong	c) High, rapid knee lift
39. BC leg drive	Leg drive executed by the BC after initial contact (0.5 seconds after the tackle event)
a) Absent	a) No leg drive
b) Moderate	b) Moderate knee movement, with no high lift
c) Strong	c) High, rapid knee lift
40. Post tackle effort*	First effort made by the tackler (0.5 seconds after the tackle event)
a) Bounce	a) Bounce: When the tackler gets up from the ground and returns to the defensive line before the ball is played from the ruck.
b) Jackal/poach	b) Jackal/Poach: Tackler picks the ball up from a tackled player while remaining on feet, from arriving on the correct side of the tackle, all before the ruck is formed.
c) Barge/disrupt attempt	
d) Disrupt success	
e) LOG	

f) Tackler trapped	c) Barge/Disrupt attempt: Tackler gets up from ground and tries to disrupt attacking ruck- no change to ruck ball. d) Disrupt success: Tackler gets up from ground and tries to disrupt attacking ruck- ruck ball is slowed. e) LOG: Tackler lying on the ground when attacking team plays ball f) Trapped: Tackler is too slow to roll away, cannot escape ruck – may concede penalty for not rolling away
41. Finish on top/dominance*	Who dominated the contact:
a) Tackler dominance	a) Tackler finishes on top of BC
b) BC dominance	b) BC finishes on top of tackler
PERFORMANCE OUTCOMES	
42. Which player achieves contact territorial/gainline dominance?	The direction of progression the tackler and ball-carrier made (as a single unit) towards the opposition try-line from the previous ruck to the point where both players went to ground (completed tackle) or when a maul is formed.
a) BC	a) Tackle finishes closer to defensive try-line
b) Tackler	b) Tackle finishes closer to attacking try-line
c) No change	c) Tackle finishes in same place as previous ruck
43. Tackle result	Overall outcome after the tackle (5 seconds post the tackle event)
a) Offload	a) Offload: ball-carrier is able to pass the ball to a teammate during the tackle.
b) Tackle break	b) Tackle break: the BC successfully penetrates the attempted tackle and continues to advance.
c) Ruck formed	c) Ruck formed: a phase of play whereby one or more players from each team, who are on their feet, in physical contact, close around the ball on the ground.
d) Turnover won	d) Turnover won: the attacking team is unable to advance through an offload or tackle break, or form a ruck, and lose the ball either through an infringement or error.
e) Tackler penalty conceded (pen -)	e) Tackler concedes penalty.
f) BC penalty conceded (pen +)	f) BC concedes penalty.
g) Other (try scored)	g) BC scores try.
*- relevant to TackleReady performance criteria (World Rugby, 2022). LOG- lying on ground, BC- ball-carrier, pen- penalty against defending team, pen+ penalty against attacking team.	

Supplementary Table 2 Descriptive summary of ball-carrier technical actions in n=1500 coded tackle events. Values are numbers, percentages, mean per match and confidence intervals.

Variable	n	%	Mean per match (95% CI)
Total events	1500	100	282 (274-290)
Pre-contact variables			
Body position of BC			
Upright	862	58	162 (151-173)
Medium	562	37	106 (97-115)
Low	76	5	14 (11-18)
Speed of BC			
Slow	157	11	30 (25-35)
Moderate	498	33	94 (86-102)
Fast	845	56	159 (148-170)
BC direction of movement			
Straight	486	32	91 (83-100)
Lateral	66	4.4	12 (10-16)
Side step	452	30	85 (77-93)
Diagonal	338	23	64 (57-71)
Arc	158	11	30 (25-35)
Contact variables			
BC fend			
Absent	717	48	135 (125-145)
Moderate	424	28	80 (72-88)
Strong	359	24	67 (61-75)
Post-contact variables			
BC leg drive			
Absent	361	24	68 (61-75)
Moderate	493	33	93 (85-101)
Strong	646	43	121 (112-131)

CI confidence interval, BC ball-carrier

Supplementary Table 3 Frequency percentages for tackle performance outcomes (n=1500). Values are numbers, percentages, mean per match and confidence intervals.

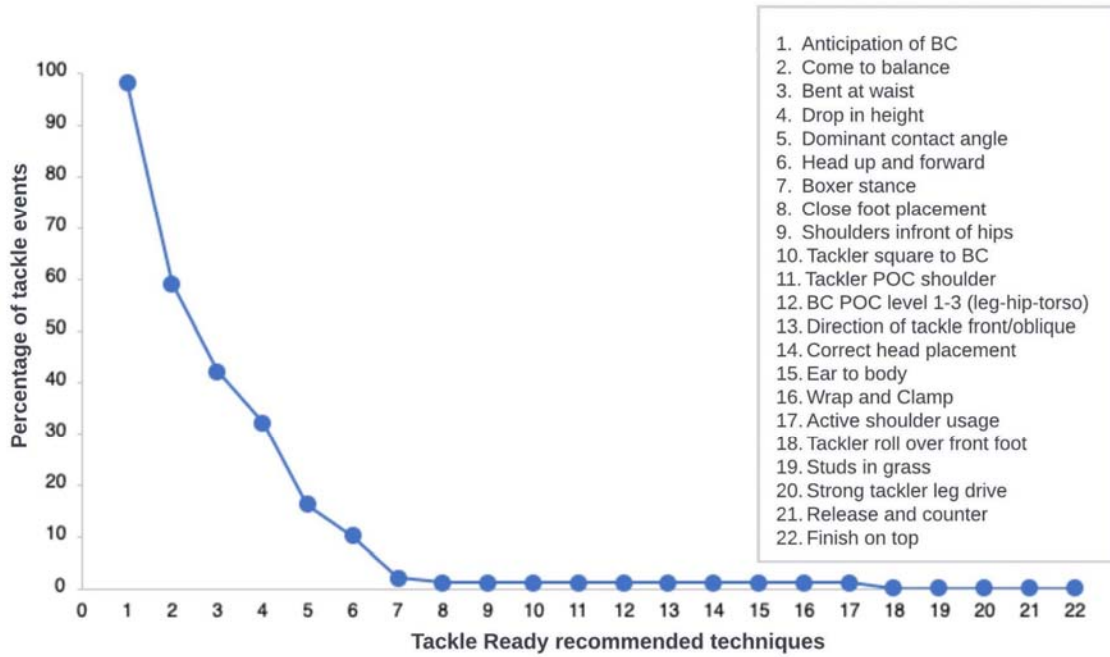
Tackle performance outcomes	n	%	Mean per match (95% CI)
Total events	1500	100	282 (274-290)
Tackle gainline advantage			
Tackler gainline	413	28	78 (70-86)
BC gainline	784	52	147 (137-158)
No change	303	20	57 (51-64)
Tackle Result			
Ruck	1016	68	191 (179-203)
Break	170	11	32 (27-37)
Offload	102	7	19 (16-23)
Penalty +	45	3	8 (6-11)
Penalty -	54	3	10 (8-13)
Turnover	70	5	13 (10-17)
Other (try or injury)	43	3	8 (6-11)

CI confidence interval, BC ball-carrier, penalty + penalty for the defensive team, penalty – penalty against the defensive team

Supplementary table 4 Descriptive summary of Tackle Ready tackle techniques in n=1500 coded tackle events. Values are numbers and percentages

Pre-contact Tackle Ready variables	n	%	Mean per match (95% CI)
Anticipation of BC	1468	98	276 (262-290)
Come to balance	919	61	173 (162-184)
Bent at waist	1053	70	198 (186-210)
Drop in height	726	48	136 (127-147)
Dominant contact angle	316	21	59 (53-66)
Head up and forward	745	50	140 (130-150)
Claws up elbows in/Boxer stance	329	22	62 (55-69)
Shoulders in front of hips	893	60	168 (157-179)
Foot in the hoop/close foot placement	316	21	59 (53-66)
Tackler approach square to BC	230	15	43 (38-49)
Contact Tackle Ready variables			
Tackler point of contact- shoulder	536	36	101 (92-110)
Point of contact- BC torso level 3	570	38	107 (99-116)
Point of contact- BC Hip level 2	388	26	73 (66-81)
Point of contact- BC Leg level 1	147	10	28 (23-32)
Direction of tackle- Front/Oblique	509	34	96 (88-104)
Correct head placement	1269	85	239 (226-252)
Ear to body	462	31	87 (79-95)
Wrap and clamp	1039	69	195 (184-208)
Shoulder jab/active shoulder usage	236	16	44 (39-50)
Tackler roll over front foot	659	44	124 (115-134)
Studs in grass	858	57	161 (151-172)
Post-contact Tackle Ready variables			
Strong tackler leg drive	435	29	82 (74-90)
Tackler release and counter	694/1151	60	170 (158-183)
Finish on top/Tackler dominance	334	22	63 (56-70)

BC ball-carrier, CI confidence interval



Supplementary Figure 1 Survival plot showing percentage of tackles demonstrating Tackle Ready recommended techniques. (BC ball-carrier, POC point of contact, level 1=leg, level 2=hip, level 3=torso)