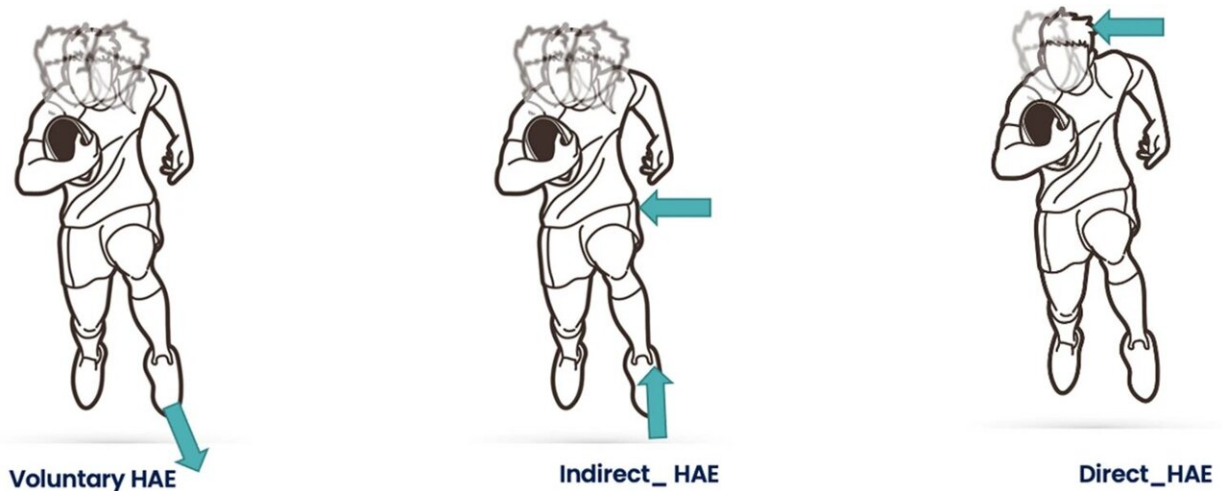


Independent studies using smart mouthguard data sheds light on playing rugby like never before

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Schematic of the three types of head acceleration events (HAEs): voluntary, indirect and direct (L–R). A voluntary HAE (left) is generated through an individual’s self-acceleration or deceleration events such a running, changing direction or jumping. An indirect HAE (middle) is generated when contact is made with the player’s body resulting in an inertial loading of the head. Lastly, a direct HAE (right) is caused by direct contact with the head. Credit: *Sports Medicine* (2023). DOI: 10.1007/s40279-023-01923-z

World Rugby Chairman Sir Bill Beaumont has welcomed results from the largest ever studies into the forces experienced by rugby players. The results, which provide players and parents with greater clarity and

confidence than ever before into the benefits and safety of rugby, are a first anywhere in world sport.

The Otago Community Head Impact Detection study (ORCHID) a joint project between World Rugby, Prevent Biometrics, New Zealand Rugby, Otago Rugby and the University of Otago, has published the first independent, peer-reviewed findings into community [rugby](#) following almost two years of trail-blazing research. The study measures over 17,000 separate head acceleration events across more than 300 players from senior rugby through to U13s level.

This work was followed by the Elite Extension of the ORCHID study in partnership with the Ulster University and Premiership Rugby. Further updates into the women's community game are currently being prepared for peer review and publication.

Both studies used smart mouthguard technology, supplied by Prevent Biometrics, to understand the forces on the head experienced by players both in matches and training situations. The mouthguards measure g-forces which are experienced for less time than it takes to blink, using technology independently verified both in research laboratories and on the field of play.

The ORCHID paper shows that in the men's community game:

- 86 percent of forces measured are the same as or less than those experienced in other forms of exercise such as running, jumping or skipping
- 94 percent of forces are lower than those previously measured on people riding a rollercoaster
- The large majority of events resulting in the highest measured forces are as a result of poor technique in the tackle and at the breakdown

The Elite Extension study also showed that:

- Most contact events in elite rugby do not result in any significant force to the head.
- Where low, medium and high force events do occur they are most common in tackles and carries, followed by rucks
- Both men's and women's forwards were more likely to experience force events than backs

World Rugby has already used preliminary findings from the ORCHID study to inform [trials of a lower tackle height in the community game](#). The international federation has also expanded and enhanced the range of training for players and coaches available for free online including the [Tackle Ready](#) and new [Breakdown Ready](#) programs.

At the elite level, in a world first, World Rugby announced in October that [smart mouthguards will be added to the Head Injury Assessment \(HIA\) protocols from January 2024](#).

Dr. Melanie Bussey, Associate Professor in Biomechanics at the University of Otago said, "Our ultimate goal as researchers is to make a meaningful impact through our work. Therefore, we are extremely pleased to see our work integrated into new strategies and guidelines designed to enhance player safety. We appreciate World Rugby's approach, which granted us the time to ensure robustness in our analysis and the autonomy to let the data speak for itself."

"Looking ahead, we believe that Smart mouthguard technology holds immense potential for advancing player safety and performance analysis in rugby and beyond. Our research has opened doors to a wealth of insights, and we are committed to further exploring this innovative field. We envision continued collaboration with World Rugby and other stakeholders to harness the full potential of this technology, driving

advancements that will benefit players and the sport as a whole. The journey has just begun, and we are excited to embark on it."

Dr. Gregory Tierney, Assistant Professor in Biomechanics at Ulster University said, "These studies put in the groundwork so that we can now monitor player head impact exposure in rugby and develop strategies to ensure the game is played in the safest possible manner. Smart mouthguards can aid sideline [medical decision](#) making and it is exciting that our research has contributed to World Rugby implementing the technology into the Head Injury Assessment protocol."

World Rugby Sir Bill Beaumont welcomed the world-leading study: "Using the latest research and technology is at the heart of our six point plan to make rugby the most progressive sport in the world on player welfare. These studies are concrete proof that World Rugby us putting our time, energy and efforts in to back up our words and the insights gained are already helping us make evidence-led moves to make the sport even safer, we will never stand still on player welfare.

"I'd like to thank the players all across the world who took part in the study, what they have helped to shed light on will be invaluable in advancing player welfare in rugby at all levels. Using this data we can say with some certainty that community and elite level rugby are very much the same game, but played very differently.

World Rugby Chief Medical Officer Dr. Eanna Falvey said "It is encouraging to see that alongside our recent research into the health benefits of rugby, we now have the data that offers a more complete picture of what it is like to play our sport. These studies gives us the ability like never before to understand the causes of head impacts and accelerations and we will leave no stone unturned, making whatever changes may be needed to reduce large forces to the head in our game."

New Zealand Rugby General Manager Community Rugby Steve Lancaster said, "New Zealand Rugby has an absolute commitment to making the game as safe as possible and reducing the risk of injury to our participants at all levels. We believe that there are so many benefits to playing rugby and are committed to balancing those with the need to respond to the research and risks in an appropriate way."

"We're particularly proud that our New Zealand rugby community has been at the forefront of this research, and we are already seeing this contribution make a material difference through initiatives like the reduced tackle height in community rugby that has been positively received."

The study is [published](#) in the journal *Sports Medicine*.

More information: Melanie D. Bussey et al, Head Acceleration Events in Male Community Rugby Players: An Observational Cohort Study across Four Playing Grades, from Under-13 to Senior Men, *Sports Medicine* (2023). [DOI: 10.1007/s40279-023-01923-z](https://doi.org/10.1007/s40279-023-01923-z)

Provided by University of Otago

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