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Objective measures of brain health: a pilot study with a somatosensory device in rugby union

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Purpose Rugby union has one of the highest incidences of sport related concussion of any contact sport. Despite considerable media interest and research, the underlying relationship between participation in university rugby union and the manifestation of concussion is poorly understood. To address this problem, novel, non-invasive technologies have been developed to quantitatively measure brain health and provide real-time feedback. The'Brain Gauge somatosensory system' provides a diagnostic system for overall brain health through the measurement of a variety of measures of mental acuity. The purpose of this pilot study was to explore the potential of the Brain Gauge somatosensory device to monitor changes in aspects of brain health in university-level rugby players, at baseline and over a six-week period.

Methods Five university-level rugby union players and four non-rugby player controls gave informed consent and were recruited for the study. A physiotherapist used the Brain Gauge technology to measure: Reaction Time (RT), Sequential (SEQA) and Simultaneous Amplitude Discrimination (SIMAD) and Reaction Time variability (RTVar). In addition, the Rivermead Post Concussion Questionnaire was completed every week by participants to monitor symptoms commonly associated with concussion. All data was assessed for normality and analysed with the SPPS (v.24). Analysis of Variances (ANOVA) and Pearson's correlations were used to test for differences within and between individuals, and for changes across the six-week testing period. In addition, the Rivermead Post Concussion Questionnaire was used to monitor changes in symptoms across the 6-week testing period.

Results Preliminary results demonstrated that the Brain Gauge system could be used to measure brain health of rugby union players and non-players. Specifically, there were significant differences between the groups for three of the four brain health (RT $p = 0.001$], SIMAD $p = 0.00968$], RTVar $p = 0.0083$]) measurements. This suggests that the Brain Gauge may be effective in measuring various brain health outcomes between rugby players and non-players. Only one of the four brain health measurements (SIMAD) displayed statistically significant improvement [F(2.160, 17.278) = 3.846.p = 0.039] over the six- week testing period in participants, suggesting there were no significant changes in other measures of mental acuity over time. Therefore, the Brain Gauge system may provide quantification of changes in brain health over time.

Conclusion(s) This pilot study showed that the Brain Gauge somatosensory system can feasibly measure aspects of brain health in rugby union players and non-players, providing quantitative data to inform clinical decisions or physiotherapy practice. Further research with a larger cohort across a whole season of games is required to establish a causal relationship between brain health, concussion and participation in university-level rugby union.

mplications Overall this pilot study has demonstrated the potential use of non-invasive technology by physiotherapists to screen and track changes in measures of mental acuity of rugby union players, which could be applied to assess and monitor concussion recovery.

Funding acknowledgements No funding was received as part of this project. development of the ACL pathway the paediatric physiotherapy team are able to deliver more effective rehabilitation as shown by the outcomes. These results have been shared with the orthopaedic surgeons leading to an increase in pre-operative referrals. Additionally, completing this review allowed for identification of improvements required for more efficient implementation of the pathway including creating a booklet with high level exercises, a spreadsheet to facilitate ongoing data collection, and objective measurement of high level function for many patients returning to sport with asymmetrical injury.

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Patient perception of rehabilitation in the community following hip fracture surgery. A systematic review of qualitative research

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Purpose: Hip fracture is one of the most common injuries in older people and the main cause of reduced mobility in adults over the age of 65. Hip fracture can be a life changing experience. Many patients are ill-prepared for the changes in daily living that occur once discharged from hospital. To date there are no systematic reviews that synthesised qualitative data with regard to this. The aim of this review was to understand the views and experiences of patients after hip fracture surgery, of their physiotherapy rehabilitation in the community. This will enable improvements to hip fracture rehabilitation services following hospital discharge to be identified, to enhance the patient experience of community