

Test-retest reliability of the ImPACT® with a Canadian sample of healthy young athletes



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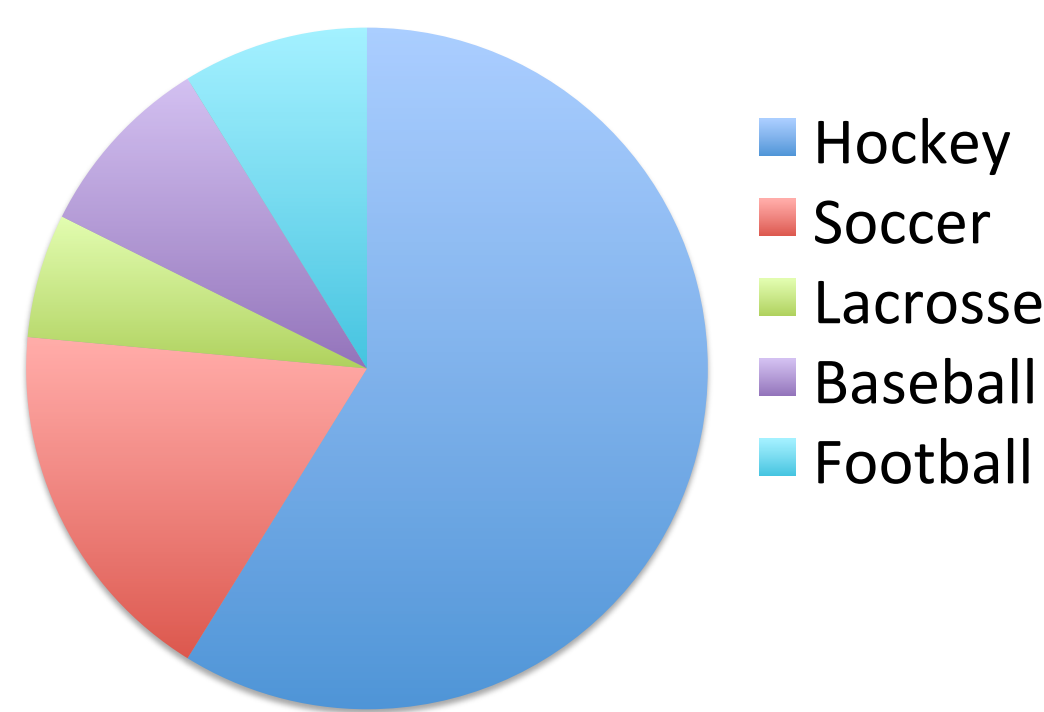
Introduction

- Baseline neurocognitive assessments are highly recommended for tracking concussions in athletes who play high-risk sports (McCrory et al., 2013), but there are currently no measures available specifically for use with children.
- The most widely used assessment tool, the Immediate Post-concussion Assessment and Cognitive Testing (ImPACT®; Lovell & Collins, 2002), was developed for adults but can be used with children as young as 11 years old.
- In spite of this, there is no published study that examines the psychometric properties of this measure in children younger than high school age.
- The purpose of the present study was to determine the two-week test-retest reliability of the ImPACT® neurocognitive test in a healthy sample of children who play extra-curricular sports.

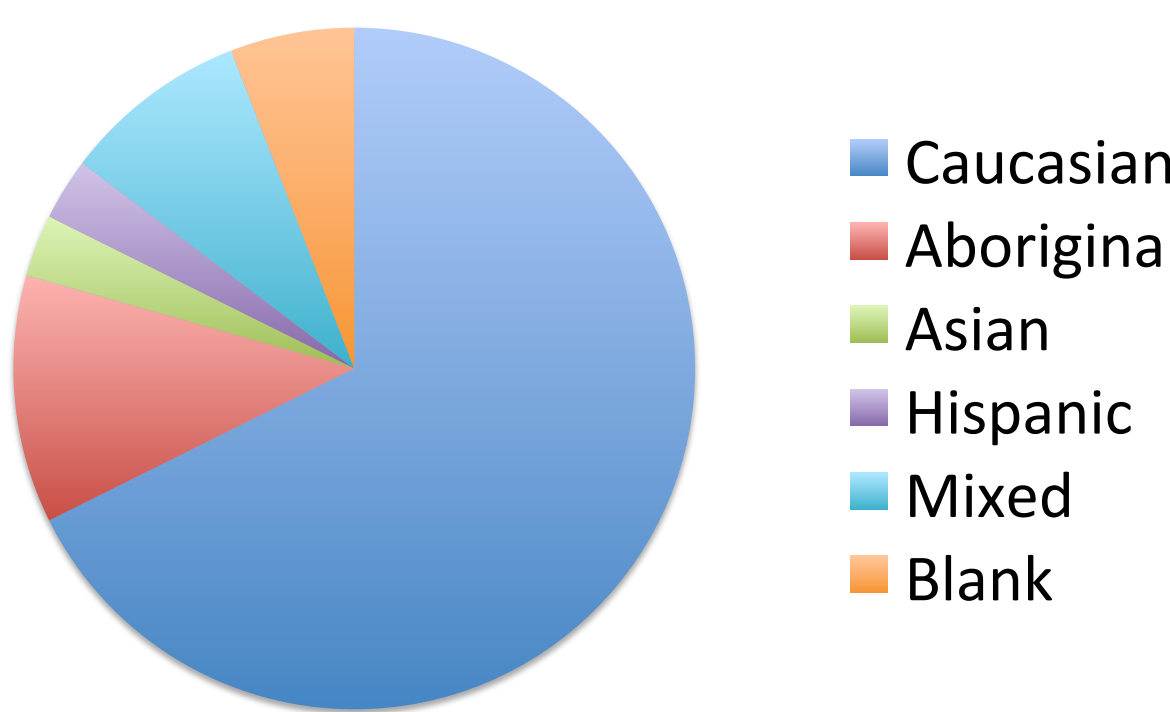
Participants & Methods

- Participants were 34 healthy Canadian children participating in extra-curricular sports (29 male, 5 female) between the ages of 11 and 14 who had not sustained a concussion within the previous 3 months.
- Participants completed the baseline neurocognitive test of the ImPACT® in a computer lab at the University of Windsor and returned for a retest approximately 14 days later ($M=14.3$ days, $SD= 1.6$).
- The mean age of participants was 12.4 years ($SD=1.0$) and 32% ($n=11$) had a history of concussion.
- Participants’ scores on each composite score were compared at Time 1 and 2 using paired-sample t-tests. Test-retest reliability was calculated using intra-class correlation coefficients for absolute agreement and standard error of measurement. Effect size was determined using eta-squared.

Sport Played (%)



Ethnicity (%)



Results

ImPACT Composites	M (SD)		Paired t-test		Intra-class correlation		
	Time 1	Time 2	t	p	R	η^2	SEM
Verbal Memory	84.48 (9.92)	87.79 (10.12)	-2.74	0.010	0.70	0.84	5.14
Visual Memory	71.41 (12.87)	77.79 (12.50)	-2.82	0.008	0.41	0.68	9.33
Reaction Time	0.665 (0.08)	0.664 (0.11)	0.05	0.961	0.45	0.72	0.07
Visual-Motor Speed	30.65 (5.50)	33.27 (6.76)	-4.01	0.001	0.75	0.86	2.69
Cognitive Efficiency Index	0.299 (0.14)	0.306 (0.23)	-0.18	0.861	0.37	0.68	0.15

- Participants’ scores at Time 1 and 2 were significantly different on Verbal and Visual Memory and Visual-Motor Speed.
- Each of the ImPACT® composite scores have at least fair agreement among participants, with ICCs ranging from .37 to .75
- Visual-Motor Speed and Verbal Memory were the most stable composites with strong agreement and a large effect (i.e. over 80% of accounted variance). Reaction Time, Visual Memory, and Cognitive Efficiency Index scores all had fair agreement, with 72%, 68% and 68% of accounted variance, respectively.

Discussion & Conclusion

- According to the suggested reliability standards for clinical measures, a coefficient should be at least 0.7 to be considered acceptably reliable and a value of less than 0.5 signifies poor reliability (Barker et al., 2015). Visual-Motor Speed and Verbal Memory Composites were the only scores to demonstrate good reliability after a two-week retest period.
- The ImPACT® Composites in children are not equally reliable after two weeks with only two stable scores, findings that are consistent with previous research with high school students and adults (Elbin et al., 2011; Iverson et al., 2003; Schatz & Ferris, 2013).
- When used clinically the Composites should not be given equal weighting in the interpretation of the findings. More emphasis should be given to Visual-Motor Speed and Verbal Memory Composites during post-injury evaluations.