

R2Play is a return-to-play assessment designed with stakeholders to better reflect the multi-domain demands of sport.

Learn more about the *R2Play* assessment :



R2Play Development: Fostering User Driven Technology that Supports Return-to-Play Decision-Making Following Pediatric Concussion

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Objective

- Post-concussion, return-to-play protocols rely on single-domain assessments and symptom self-reporting¹
- These methods may fail to detect changes elicited by the cognitive, physical, and emotional demands of sport^{2,3}
- To address this, *R2Play* was designed to facilitate the implementation of a multi-domain return-to-play assessment

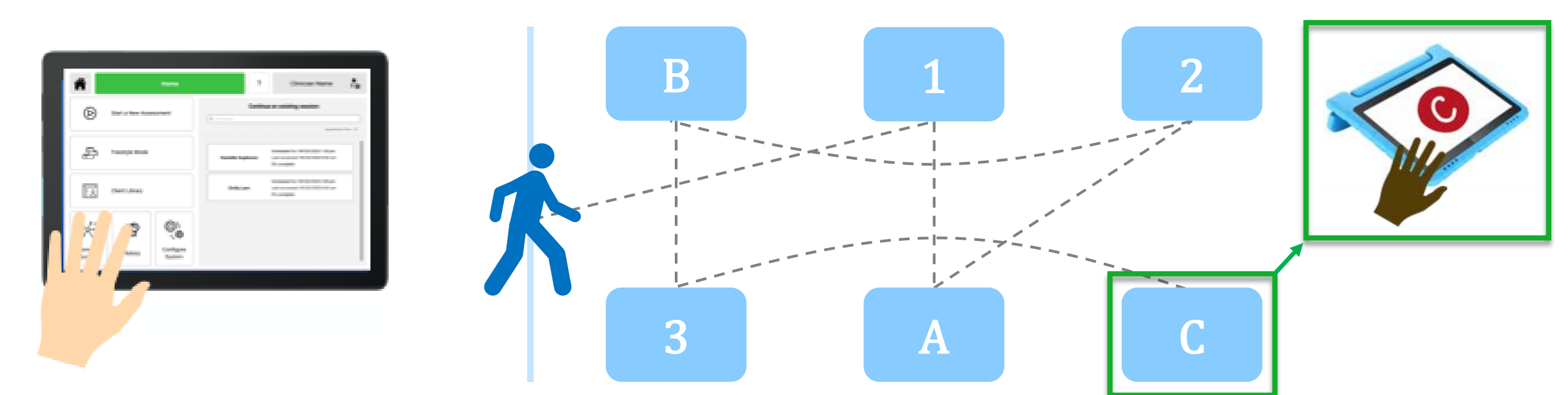
Methods

A design-thinking approach was used, in which we carried out:

1. Problem definition and early ideation via a scoping review and structured brainstorming
2. Needs-assessment interviews with stakeholders (6 clinicians and 4 youth sports coaches)
3. Building a *R2Play* prototype and conducting usability testing via cognitive walkthroughs with 5 clinicians

The R2Play Prototype

After problem definition and ideation, the prototype consisted of a tablet-button system that displays numbers and letters, and a clinician tablet that controls the assessment.



During the task, athletes run in a zig-zag pattern in an embodied Trail Making Task by pressing tablets in alphanumeric order.

Insights from Needs-Assessment Interviews

- Interviews were analyzed using a conventional content analysis
- A change table was constructed, in which the themes from user feedback were mapped to potential changes to the prototype

Examples of Implemented Changes		
Category	Description	Change
Accessibility	Adapting <i>R2Play</i> for wheelchair users	Moved tablets onto elevated stands
Task	Navigating self in relation to moving/changing stimuli	Implemented a condition where nodes change places during the trail
Interface	Ability to display results and use them to communicate with athletes	A graphical summary of results was developed with young athletes in mind

Usability Testing Results

- The interface achieved a System Usability Scale score of 81% (SD=8.02), indicating “good” to “excellent” usability⁴
- Participants seemed comfortable navigating the interface and found the “flow” easy to follow

Conclusion

- *R2Play* aligns with best practice guidelines for return-to-play by simultaneously integrating multi-domain neuropsychological and physiological measures
- With further testing and refinement, *R2Play* may provide clinicians with richer clinical data for making return-to-play decisions

1. McCrory, P. *et al.* Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016. *Br J Sports Med* bjsports-2017-097699 (2017) doi:10.1136/bjsports-2017-097699.
 2. Fino, P. C. *et al.* Detecting gait abnormalities after concussion or mild traumatic brain injury: A systematic review of single-task, dual-task, and complex gait. *Gait & Posture* **62**, 157–166 (2018).
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 4. Sauro, J. & Lewis, J. R. *Quantifying the User Experience: Practical Statistics for User Research*. (Morgan Kaufmann, 2016).

