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

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Objectives

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

Methods

A design-thinking approach to development was used, involving:

1. Problem definition
2. Needs assessment
3. Building a prototype

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.

Hints from Needs-Assessment Interviews

- Interviews were analyzed using conventional content analysis
- A change table was constructed, in which the themes from user feedback were mapped to potential changes to the R2Play prototype

Examples of Implemented Changes

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility</td>
<td>Adapting R2Play for wheelchair users</td>
<td>Moved tablets onto elevated stands</td>
</tr>
<tr>
<td>Task</td>
<td>Navigating self in relation to moving/changing stimuli</td>
<td>Implemented scramble condition in which nodes change places during the trial</td>
</tr>
<tr>
<td>Interface</td>
<td>Ability to display results and use them to communicate with athletes</td>
<td>A graphical summary of results was developed with young athletes in mind</td>
</tr>
</tbody>
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Usability Testing Results

- The interface achieved a System Usability Scale score of 81% (SD=8.02), indicating "good" to "excellent" usability\textsuperscript{4}
- Participants were comfortable navigating the interface and found the "flow" easy to follow

Conclusion

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


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 here: