ABSTRACT

Objective: Most neuropsychological tests are not accessible to children with significant motor and/or communicative impairments. This study examined the psychometric properties of modified test procedures that were accessible with use of assistive technology. Data from a sample of typically developing children were derived from the initial phase of a study of the psychometrics of adapted procedures in children with and without cerebral palsy (CP) including a subset of children who are not oral communicators.

Participants and Methods: The sample included 54 typically developing children, ages 6-12, 43.6% male. Children were administered standardized and adapted versions of the Raven's CPMI, PPVT-III, CTOPP Elision and PIAT-R Reading Comprehension in randomized order. In the adapted administration, test items were presented on a computer monitor and children responded either through use of a HeadMouse® or a simple dichotomous switch device.

Results: Findings indicate that modified procedures yield comparable scores, with the exception of CTOPP Elision in which significantly higher scores were obtained with the modified version. There are no significant differences in effect of type of device (HeadMouse® or switch) on modified test scores. Correlation matrices of standard and adapted test scores provide preliminary evidence that the nomological nets are comparable across procedures, again with the exception of CTOPP Elision.

Conclusions: Preliminary data support the potential use of assistive technology and accessible procedures for some test instruments. Challenges remain in creating accessible procedures for aspects of phonological processing, in particular. Future directions include examining psychometrics in samples of children with CP.

METHODS

Participants
- Children, age 6-12 years old (mean 9.1±1.8)
- 43.6% Male
- Currently in elementary school
- Informed consent and/or assent within IRB guidelines

Instruments and Procedures

- PPVT-III and Raven's Coloured Progressive Matrices tests provide estimations of overall intellectual ability.
- CTOPP Elision provides information on phonemic awareness, an important predictor of reading acquisition.
- PIAT-R/NU Reading Comprehension provides an estimation of current reading ability.

For modified administrations, stimuli were computerized using BoardMakerTM software, allowing responses to be made using a switch interface system (HeadMouse® or switch).

Modified CTOPP Elision: The test is presented on a computer screen using BoardmakerTM software. A screen with three pictures, each on a virtual button, is presented for each item. The examiner points to and verbally labels each picture e.g., "This is tall, this is pale, this is train." Then, the examiner provides the prompt: "Listen carefully. Show me 'trail,' without /r/." The examinee then uses A17 to select the picture of the target word ("trail") from among three choices. Foils were created to systematically alter the beginning, middle, or end of the target word.

RESULTS

Standard and Modified Test Scores

- No significant differences in scores obtained with Standard and Modified (HeadMouse® or Switch) administrations of PPVT-III, Ravens CPMI and PIAT-R Reading Comprehension

Bivariate Correlations for Standard and Modified Tests

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PPVT-III</td>
<td></td>
<td>-.28</td>
<td>-.28</td>
<td>-.33</td>
</tr>
<tr>
<td>2. Ravens</td>
<td>.19</td>
<td></td>
<td>-.29</td>
<td>-.33</td>
</tr>
<tr>
<td>3. Elision</td>
<td>.49</td>
<td>.34</td>
<td></td>
<td>.55</td>
</tr>
<tr>
<td>4. PIATRC</td>
<td>.64</td>
<td>.33</td>
<td>.54</td>
<td></td>
</tr>
</tbody>
</table>

Note. Standard above the diagonal and Modified below the diagonal.

- Bivariate correlation matrices for Standard and Modified administrations were compared by computing Fisher’s r to z transformations.

- Differences in matrices were not significant, with the exception of CTOPP Elision correlations

CONCLUSIONS

- Findings provide preliminary evidence that modified accessible test administration with use of assistive technology appears to yield comparable scores and nomological nets for specific neuropsychological instruments;

- Challenges remain in creating accessible procedures for aspects of phonological processing;

- Future work focuses on the psychometrics of modified test administration in children with cerebral palsy.

ACKNOWLEDGMENTS

This work was supported by a U.S. Department of Education, Office of Special Education Programs (OSEP) Model Demonstration Project award H234M020077, NIH R21 HD052592-01A, and NIDRR FI H133G070044.