The Reliability and Validity of the Pediatric Balance Scale
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PURPOSE
The purpose of this poster is to review the literature of the Pediatric Balance Scale (PBS) and to explore the evolution of the tool.

BACKGROUND
The PBS is a standardized outcome measure which examines functional balance in children ages 2 to 13 years. It was developed in 1994 and is based on modifications of the Berg Balance Scale. Modifications include shortened time requirements for static balance items, and the addition of child friendly instructions (See Table 1). The PBS takes less than 15 minutes to administer, requires minimal equipment, and is easy to score. The PBS is widely used and has been translated into 13 languages. The PBS has strong psychometric properties including excellent test-retest, intrarater and interrater reliability, as well as good to very good validity. In preschool age children the PBS can differentiate balance abilities in children with typical development (TD) from those with mild and moderate balance dysfunctions (BD). In school age children the PBS can differentiate balance abilities in children with TD from those with BD. By age 5, children with TD appear to reach the upper limits of the PBS (See table). A Rasch analysis was conducted to examine item performance. Results confirmed the presence of a ceiling effect. The modification of underperforming items and the addition of more challenging items was proposed in 2012 to measure and to assess a larger pediatric population.

FIGURE 1

<table>
<thead>
<tr>
<th>Berg Balance Scale</th>
<th>Pediatric Balance Scale</th>
<th>Pilot PBS Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling to sit</td>
<td>Rolling to sitting</td>
<td>Standing on one foot</td>
</tr>
<tr>
<td>Standing on feet</td>
<td>Standing on one foot</td>
<td>Standing on one foot</td>
</tr>
<tr>
<td>Standing unassisted</td>
<td>Standing unassisted</td>
<td>Standing on two feet</td>
</tr>
<tr>
<td>Standing on foam</td>
<td>Standing on foam</td>
<td>Standing on two feet</td>
</tr>
<tr>
<td>Standing on floor</td>
<td>Standing on floor</td>
<td>Standing on two feet</td>
</tr>
<tr>
<td>Standing on chair</td>
<td>Standing on chair</td>
<td>Standing on two feet</td>
</tr>
<tr>
<td>Sitting on floor</td>
<td>Sitting on floor</td>
<td>Sitting on two feet</td>
</tr>
<tr>
<td>Sitting on chair</td>
<td>Sitting on chair</td>
<td>Sitting on two feet</td>
</tr>
<tr>
<td>Sitting on one leg</td>
<td>Sitting on one leg</td>
<td>Sitting on one leg</td>
</tr>
<tr>
<td>Sitting on two legs</td>
<td>Sitting on two legs</td>
<td>Sitting on two legs</td>
</tr>
<tr>
<td>Sitting on three legs</td>
<td>Sitting on three legs</td>
<td>Sitting on three legs</td>
</tr>
<tr>
<td>Sitting on four legs</td>
<td>Sitting on four legs</td>
<td>Sitting on four legs</td>
</tr>
</tbody>
</table>

Figure 1 shows the components of the Pediatric Balance Scale as modified from the Berg Balance Scale.

ARTICLE

<table>
<thead>
<tr>
<th>Psychometric Properties of the Pediatric Balance Scale Using Rasch Analysis</th>
<th>Purpose</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>To analyze test-retest reliability, the PBS was administered to 20 children. A single therapist tested all individuals at both test sessions (within a 14 day time frame). Each session lasted approximately 15 minutes. A variety of test sites were included in this study including homes, schools, and physical therapy clinics. To analyze interrater reliability, videotapes were created during test and retest sessions. Ten pediatric therapists were asked to review/score the videotapes after completing a 45 minute training session regarding the scoring of the PBS. Rescoring of the 10 videotapes was completed no more than one week after their training.</td>
<td>A Rasch analysis was conducted on data collected from 13 previous PBS studies between 1994 - 2011. Thirty-three raters participated in data collection over the 14 year period</td>
<td>The PBS was administered, using standardized protocol, to each individual child. Subjects participated in one 10-20 minute session. Subjects were divided into 11 different groups based on age (6 month age increments). Each group was then divided into subgroups based on sex for a total of 22 groups. A 2-way analysis of variance was performed to determine effects of sex and age on PBS total scores. Five static items (numbers 4, 6, 7, 8, and 9) and 3 anticipatory items (numbers 11, 12, and 14) were used to further explore age and gender differences.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>823 children</td>
<td>A Rasch analysis was conducted on data collected from 13 previous PBS studies between 1994 - 2011. Thirty-three raters participated in data collection over the 14 year period</td>
</tr>
<tr>
<td>643 children with TD</td>
<td>The PBS was administered, using standardized protocol, to each individual child. Subjects participated in one 10-20 minute session. Subjects were divided into 11 different groups based on age (6 month age increments). Each group was then divided into subgroups based on sex for a total of 22 groups. A 2-way analysis of variance was performed to determine effects of sex and age on PBS total scores. Five static items (numbers 4, 6, 7, 8, and 9) and 3 anticipatory items (numbers 11, 12, and 14) were used to further explore age and gender differences.</td>
</tr>
</tbody>
</table>

| PBS scores of at least 53, 54, 55, or 56. |

RESULTS

In an attempt to address the identified ceiling effect modifications were made to 9 of the original items and 5 new items were added. This revision currently contains 20 items and is referred to as the PBS-2. The items within the PBS-2 remain common everyday functional balance activities. Item scoring remains criterion-based and continues to use a 0 to 4 scale. The PBS-2 requires 45 to 75 minutes to administer. The purpose of our research study is to examine test-retest, interrater and intrarater reliability of the PBS-2 and describe performance capabilities of children by age, sex and presence of BD. Data collection is currently in process.

CONCLUSION

We are currently recruiting children of all ability levels, ages 2 to 13 years to participate in our study. If you have children, or know any children, who would be interested in participating in our research study, please contact us or our faculty advisor Mary Rose Franjoine at mfranjoi@daemen.edu or 716-839-8521.

REFERENCES