

University of Dayton

eCommons

University of Dayton Doctor of Physical Therapy
Annual Research Symposium

Department of Physical Therapy

2014

Test Items in the Complete and Short Forms of the BOT-2 that Correlate to Subtest Score in Typically Developing Children 6-10 Years of Age

Betsy Donahoe-Fillmore

C. Jayne Brahler

Kadi Carmosino

Ashley Grzeszczak

Kaylie McMurray

See next page for additional authors

Follow this and additional works at: https://ecommons.udayton.edu/dpt_symposium

Authors

Betsy Donahoe-Fillmore, C. Jayne Brahler, Kadi Carmosino, Ashley Grzeszczak, Kaylie McMurray, Bo Slutz, Brittany Zoll, Susan Aebker, and Megan Kreill

Test Items in the Complete and Short Forms of the BOT-2 that Correlate to Subtest Score in Typically Developing Children 6-10 Years of Age

Betsy Donahoe-Fillmore, PT, PhD, PCS;¹ C. Jayne Brahler, PhD;¹ Ali Olivo, SPT;^{1*} Kadi Carmosino, SPT;^{1*} Ashley Grzeszczak, SPT;^{1*} Kaylie McMurray, SPT;^{1*} Bo Slutz, SPT;^{1*} Brittany Zoll, SPT;^{1*} Susan Aebker, DHS, OTR/L;² Megan Kreill, MS, OTR/L²

¹Doctor of Physical Therapy Program, School of Education and Health Sciences, University of Dayton, Dayton, OH

²Miami Valley Regional Center, Dayton, OH

Introduction

The Bruininks-Oseretsky Test of Motor Proficiency, second edition (BOT-2), is used to measure fine and gross motor proficiency in children ages 4-21 years.¹ The BOT-2 consists of both a Complete and Short Form and is comprised of 4 composites with 8 subtests. The Short Form consists of 14 items proportionally selected from the subtests of the Complete Form. Despite requiring less time to administer and score, a group of researchers found that the BOT-2 Short Form is not a valid measure for assessing motor proficiency in 4-6 year olds, suggesting that a revision of the Short Form may be advised.² Brahler et al³ investigated 4 subtests (Strength, Balance, Precision and Integration) with children 6-10 years of age. They found that several items were poorly associated with their subtest total scores and the Short Form contained low yield items in 3 of these subtests.

Purpose

The purpose of this study was to determine the magnitude of association between individual subtest items of the BOT-2 and the respective total subtest scores on the 4 subtests of manual dexterity, bilateral coordination, running speed and agility, and upper limb coordination. A secondary objective was to determine if the items on the BOT-2 Short Form demonstrate the greatest correlation with their respective subtest total score.

Hypothesis

We hypothesized that all of the individual subtest items would be at least moderately correlated to the respective total subtest scores for all 4 of the administered subtests.

Participants

Subjects were a convenience sample of 44 children in first and third grades (21 male, 23 Female; 6-10 years) at a Midwestern elementary school with no known conditions.

Methods

The BOT-2 subtests of Manual Dexterity, Bilateral Coordination, Running Speed and Agility, and Upper Limb Coordination were administered to subjects per the examiner's manual. Subjects progressed through the subtests in random order and each subtest was graded and administered by a consistent person. Means and standard deviations were calculated for the scores on the individual subtest items. Pearson correlation tests were run to determine the magnitude of the association between the individual subtest items and the respective subtest total score; the magnitude of association was assessed to see if the items that comprise the Short Form were strongly associated with their subtest total score.

Items in order from strongest to weakest association with subscale total score	Mean	Std. Deviation	r	p
*Transferring Pennies	5.30	1.357	.784	.000
*Sorting Cards	5.11	1.166	.752	.000
*Making Dots in Circles	4.50	1.338	.730	.000
*Placing Pegs Into a Pegboard	5.23	1.075	.710	.000
*Stringing Blocks	3.89	0.993	.573	.000
Manual Dexterity Total	23.93	4.438		

Note: Transferring Pennies is also on the Short Form; * = $p \leq 0.05$, statistically significant correlations

Items in order from strongest to weakest association with subscale total score	Mean	Std. Deviation	r	p
*Jumping in Place Opposite Sides Synchronized	1.73	1.283	.771	.000
*Tapping Feet and Fingers Opposite Sides Synchronized	2.16	1.119	.724	.000
*Pivoting Thumbs and Index Fingers	2.20	.930	.675	.000
*Jumping Jacks	2.77	.677	.586	.000
*Jumping in Place Same Sides Synchronized	2.91	.291	.510	.000
Touching Nose with Index Fingers Eyes Closed	3.91	.421	.191	.215
Tapping Feet and Fingers Same Sides Synchronized	3.95	.302	.033	.832
Bilateral Coordination Total	19.66	3.080		

Note: Jumping in Place Same Sides Synchronized and Tapping Feet and Fingers Same Sides Synchronized are also on the Short Form; * = $p \leq 0.05$, statistically significant correlations

Items in order from strongest to weakest association with subscale total score	Mean	Std. Deviation	r	p
*One-Legged Side Hop	3.84	1.539	.773	.000
*Two-Legged Side Hop	5.59	1.545	.722	.000
*One-Legged Stationary Hop	6.89	2.060	.613	.000
*Shuttle Run	5.41	1.386	.453	.002
*Stepping Sideways Over a Balance Beam	6.27	1.264	.420	.005
Running Speed & Agility Total	27.91	4.950		

Note: One-Legged Stationary Hop is also on the Short Form; * = $p \leq 0.05$, statistically significant correlations

Items in order from strongest to weakest association with subscale total score	Mean	Std. Deviation	r	p
*Dribbling a Ball One Hand	6.02	1.355	.847	.000
*Dropping and Catching a Ball One Hand	4.09	1.235	.788	.000
*Catching a Tossed Ball One Hand Synchronized	2.09	1.763	.787	.000
*Dribbling a Ball Alternating Hands	5.09	1.840	.780	.000
*Dropping and Catching a Ball Both Hands	4.16	1.180	.766	.000
*Catching a Tossed Ball Both Hands	3.86	1.322	.729	.000
*Throwing a Ball at a Target	2.95	1.257	.697	.000
Upper Limb Coordination Total	28.30	7.712		

Note: Dropping and Catching a Ball Both Hands and Dribbling a Ball Alternating Hands are also on the Short Form; * = $p \leq 0.05$, statistically significant correlations

Results

Tables 1-4 display the means, standard deviations, correlation coefficients (r), and p-values computed for the Manual Dexterity, Bilateral Coordination, Running Speed and Agility, and Upper Limb Coordination subtests of the BOT-2. Individual items are listed in the tables from highest to lowest correlation, and the items that comprise the Short Form are indicated.

All individual items in the Manual Dexterity, Running Speed and Agility, and Upper Limb Coordination subtest were significantly correlated ($p < 0.05$) with their overall subtest score. Two items in the Bilateral Coordination subtest, touching nose with index fingers eyes closed ($p=.215$) and tapping feet and fingers same sides synchronized ($p=.832$), were not significantly correlated with the overall subtest score. Tapping feet and fingers same sides synchronized is also included on the Short Form.

Discussion

All of the individual tests for the Upper Limb Coordination subtest had moderate-to-excellent correlations (average $r = 0.771$), which makes them valid assessments of the upper limb coordination when testing children 6 – 10. Manual Dexterity and Running Speed and Agility had similar scores to the Upper Limb Coordination subtest (average $r = 0.710$ and average $r = 0.596$, respectively) and are also valid assessments in children ages 6-10 years. However, the individual tests for the Bilateral Coordination subtest had the lowest average correlations (average $r = 0.499$), meaning they may not accurately assess bilateral coordination in children 6-10 years. Therefore, our hypothesis was proven wrong.

While some items included in the Short Form of the BOT-2 were significantly correlated with the overall subtest score, this study found that these items might not be the most highly correlated. Revisions to the short form may be needed in order to include more items that are all significantly correlated with their respective subtest scores.

References

- Bruininks R, Bruininks B. Bruininks-Oseretsky test of motor proficiency (2nd ed.). Minneapolis, MN: NCS Pearson; 2005.
- Venetsanou F, Kambas A, Aggeloussis N, Fatouros I, Taxildaris K. Motor assessment of preschool aged children: A preliminary investigation of the validity of the Bruininks-Oseretsky test of motor proficiency – Short form. *Human Movement Science*. 2009;28(4):543-550.
- Brahler C, Donahoe-Fillmore B, Mrowzinski S, Aebker S, Kreill M. Numerous Test Items in the Complete and Short Forms of the BOT-2 Do Not Contribute Substantially to Motor Performance Assessments in Typically Developing Children Six to Ten Years Old. *Journal Of Occupational Therapy, Schools & Early Intervention*. 2012;5(1):73-84.

*Project completed in partial fulfillment of requirements for Doctor of Physical Therapy Degree