Using the BOT-2 to Identify and Support Students with Fine and Gross Motor Difficulties

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September 21, 2015

Bruininks-Oseretsky Test of Motor Proficiency, 2nd Edition

Nationally Standardized test:

Examines behaviors or foundations that are highly predictive in motor performance

Motor Control of hands/feet that requires precision

Dexterity Skills involved in reaching, grasping, object manipulation

Movement Skills in outdoor recreational activities and sports

Balance

Strength
Major Areas of Emphasis

- **Maintenance of Body Position** is essential in acts of movement and skilled performance (e.g., running, jumping, and striking objects).
- **Coordination of Visual Tracking with Movement of arms and hands** is needed for catching and throwing.
- **Speed of Response** is an important psychomotor ability.
- **Integration of Visual-Perceptual responses with highly controlled motor responses** is required for successful reading and writing.
- **Precision and Speed of Fine Motor Movements** are essential components of skilled motor performance in vocational activities, play, and sports.

The BOT-2

- Provides practitioners:
  - Reliable and Valid
  - Affordable
  - Efficient measure of fine and gross motor control skills in children and young adults

Professionals

- OT's
- PT's
- Physical Rehabilitation
- Nurses
- Adaptive & Physical Educators
- Neurologists
A. Purpose & Application

Assessing Motor Development
Making Placement Decisions
Developing & Evaluating Motor Training Programs
Support Diagnosis of Motor Impairment
Screening
Research

B. Features of the BOT-2

Portability
Supportive Evidence
Administration Easel
Scoring
BOT-2 & Supportive Evidence

**Scores obtained across items within each subtest and composite:**
- Total Motor Composite = Mid-Upper 80’s
- High 90’s
- Mean Subtest: Compulsive N 80’s to low 90’s
- TMC = mid 90’s
- Short Form = mid 80’s

**Statistically significant in supporting diagnoses that involve motor performance deficits (DCD, ASD):**

**Validity:**
- Has the statistical support for evidence-based assessment.
- Has the evidence-based support that educational settings and agencies for accommodation are requiring.

**Mean Subtest Comp.= hi 80’s to low 90’s**

**TMC = mid 90’s**

**Short Form = mid 80’s**

**Administration Easel**

- Large (8.5 x 11) Content
- Full Color Photos
- Includes:

**Set-Up Instructions**

[Instructions text will be included here]
Scoring Prompts

Total motor composite: 4 motor area composites, 8 subtests
Gender-based norms/combined norms
Scale scores, standard scores, percentile rank, descriptive levels
Graphical profiles
Pairwise comparisons
Q-Global

Web-based
Allows you to quickly and easily score and report results.
Single Reports, Short Form Reports, 1, 3, 5-year subscriptions

The Q-Global includes:
- Unlimited Scoring
- Entry of either Item Raw Scores (IRS) or Subtests Total Point Scores (TPS)
- Generation of derived scores and score profiles
- Identification of examinees’ motor skill strengths and weaknesses
- Gross Motor Composite (Q-Global Only)
- Fine Motor Composite (Q-Global Only)

Generates Reports

The Complete Test Kit

Manual
- Examinee Booklets (25)
- Scoring Transparency
- Blocks (15) and String (1)
- Pegboard (1) and Pegs (20)
- Red Pencils (2)
- Target
- Knee Pad
- Tennis Ball

Administration Easel
- Record Forms (25)
- Balance Beam
- Sorting Cards (50)
- Pennies (20) and Pad
- Shuttle Block
- Box
- Scissors
- Carrying Case

Note: you will need to provide: Stopwatch, tape measure and tape

C. Testing Options

Gross Motor & Fine Motor
- Complete Form
- Short Form
- BOT-2 Brief

Individual Subtests
(1) Total Motor Composite

A Four-Composite Structure
All 8 Subtests (53 Items)
Preferred option
  - Most comprehensive and reliable measure of overall motor proficiency
  - Qualifying an individual for services
  - Supporting clinical diagnosis

Items: 53
Subtests: 8
Testing Time: 40-60* minutes (10-15 min set-up)

- Fine Manual Control
  - Fine Motor Precision (7 Items)
  - Fine Motor Integration (8 Items)

- Gross Manual Control
  - Manual Dexterity (5 Items)
  - Upper-Limb Coordination (7 Items)

- Body Control
  - Bilateral Coordination (7 Items)
  - Balance (9 Items)

- Strength & Agility
  - Running Speed & Agility (5 Items)
  - Strength (5 Items)

-Subtest 1-
Fine Motor Precision

Consists of activities that require precise control of finger and hand movement
  - 5 drawing items
  - 1 paper-folding item
  - 1 cutting item

Total # of Errors
-Subtest 2-
Fine Motor Integration

Reproduce drawings of various geometric shapes that range in complexity.

Measures:
- Precise control of finger and hand movement
- Ability to integrate visual stimuli with motor control (copying)

Precision and Accuracy

Multi-Faceted Scoring

-Subtest 3-
Manual Dexterity

Goal directed activities that involve:
- Reaching
- Grasping
- Bi-manual coordination with small objects

Key:
- Timed
- Differentiates levels of dexterity

Accuracy Speed

Timed Total # Correct

-Subtest 4-
Bilateral Coordination

Skills involved in playing sports and many recreational activities.

Tasks require body control as well as sequential and simultaneous coordination of upper and lower limbs.

Precision & Accuracy of Movement

Repeat if Max isn't reached on first trial.
-Subtest 5- Balance
Evaluates motor skills that are integral for maintaining posture

Measures:
- Stability of the trunk
- Stasis and movement
- Proprioception or use of visual cues

Use Running Course
Max Time & Total # Correct
Repeat if Max isn’t reached on first trial

Subtest 6- Running Speed & Agility
Assesses running speed and agility using:
- Shuttle Run
- Hopping Tasks
- Lateral Movement

Key: Provides an opportunity to make clinical observations about gait. We sometimes forget that we can learn a lot about an individual... by observation. Take some notes.

Use Running Course
Time and Total # Correct
Emphasis on form and speed
Provides great opportunity to make clinical observations about gait.

Subtest 7- Upper-Limb Coordination
Designed to measure visual tracking with coordinated arm and hand movements

4 Items require use of one hand
3 Items require coordination of 2 hands

Eye-Hand Coordination
Use a portion of running course
Total number (consecutive)
-Subtest 8-
Strength

Measures core (trunk) and upper and lower body strength
- Standing long jump
- Push-ups
- Sit-ups
- Wall Sit
- V-up

Good Form
Time and Total

When to Use the Total Motor

A comprehensive and reliable measure of total motor proficiency is needed.
The assessment may have a role in determining whether an individual qualifies for special-education services.
Diagnostics are needed to confirm the presence of a clinical condition.

(2) Short Form

All four Motor Composites
14 total Items
Items from each of the 8 Subsets
15-20 minutes
### Components of the Short Form

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Item</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Motor Precision</td>
<td>Drawing Lines-Crooked (3)</td>
<td>Folding Paper (6)</td>
</tr>
<tr>
<td>Fine Motor Integration</td>
<td>Copying a Square (2)</td>
<td>Copying a Star (7)</td>
</tr>
<tr>
<td>Manual Dexterity</td>
<td>Transferring Pennies (2)</td>
<td></td>
</tr>
<tr>
<td>Bilateral Coordination</td>
<td>Jumping in Place-Same-Side</td>
<td>Tapping Feet and Fingers-Same</td>
</tr>
<tr>
<td></td>
<td>Synchronized (3)</td>
<td>Synchronized (6)</td>
</tr>
<tr>
<td>Balance</td>
<td>Walking Forward on Line (2)</td>
<td>Standing on One Leg-Balance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Body Eyes open (7)</td>
</tr>
<tr>
<td>Running Speed &amp; Agility</td>
<td>One-Leg Stationary Hop (5)</td>
<td></td>
</tr>
<tr>
<td>Upper Limb Coordination</td>
<td>Dropping and Catching a Ball-</td>
<td>Dribbling a Ball-Alternate</td>
</tr>
<tr>
<td>Strength</td>
<td>With Hands (6)</td>
<td>Hands (8)</td>
</tr>
</tbody>
</table>

### When to Use the Short Form

- Screen for further evaluation/assessment.
- A program re-evaluation is needed.
- Use to obtain pre-referral information, as appropriate.
- Only a single score of overall motor proficiency is necessary.

### (3) Fine and Gross Motor Test Kits

- Test Kit is split into two areas: Fine and Gross
- Designed to specifically look at one area
- Yields: Fine Motor Composite and Gross Motor Composite
- Supplemental manual
- Administration: 30-35 minutes
Gross and Fine Motor

<table>
<thead>
<tr>
<th>BOT-2 Fine Motor Form</th>
<th>BOT-2 Gross Motor Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Motor Precision</td>
<td>Bilateral Coordination</td>
</tr>
<tr>
<td>Fine Motor Integration</td>
<td>Balance</td>
</tr>
<tr>
<td>Manual Dexterity</td>
<td>Running Speed &amp; Agility</td>
</tr>
<tr>
<td>Upper-Limb Coordination</td>
<td>Strength</td>
</tr>
</tbody>
</table>

Developed to address the need for fewer manipulatives.
12 items consisting of at least one item from each BOT-2 subtest.
Quick and easy...yields an overall picture of motor proficiency.
Administration Time: 12-15 minutes

(4) BOT-2 Brief

The BOT-2 Brief

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Item</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Motor Precision</td>
<td>Filling a Star</td>
<td>Drawing a Line Through a Path</td>
</tr>
<tr>
<td>Fine Motor Integration</td>
<td>Copying Overlapping Circles</td>
<td>Copying a Diamond</td>
</tr>
<tr>
<td>Manual Dexterity</td>
<td>Stringing Block</td>
<td></td>
</tr>
<tr>
<td>Bilateral Coordination</td>
<td>Pivoting Thumb &amp; Index Fingers</td>
<td></td>
</tr>
<tr>
<td>Balance</td>
<td>Walking Forward Heel-to-Toe on a Line</td>
<td></td>
</tr>
<tr>
<td>Running Speed &amp; Agility</td>
<td>One-Legged Side-Hop</td>
<td></td>
</tr>
<tr>
<td>Upper Limb Coordination</td>
<td>Catching a Tossed Ball 1-Hand</td>
<td>Catching a Ball Alternate Hands</td>
</tr>
<tr>
<td>Strength</td>
<td>Push-ups (20 Reps)</td>
<td></td>
</tr>
</tbody>
</table>

Kit includes: Manual/Administration Easel, Record Forms (25), Red Pencil, Blocks and String, Knee Pad, Tennis Ball
When to Use the BOT-2 Brief

Used to determine the need for further assessment.
Note: Can be used as part of a comprehensive battery designed to complement cognitive and academic assessments.

(5) Individual Subtests
Select only those subtests/composites relevant to an individual’s needs.
When to use: Plan a motor training program and/or evaluate progress.
Important Note: Separate composites/subtests alone are not as statistically strong as the complete test. Should be limited to situations in which you have prior knowledge of the examinee’s abilities.

D. Purpose & Application

<table>
<thead>
<tr>
<th>Assessing Motor Development</th>
<th>Making Placement Decisions</th>
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<td>Support Diagnosis of Motor Impairment</td>
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<tr>
<td>Screening</td>
<td>Research</td>
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</tbody>
</table>
Motor-Related Disabilities

Disability Prevalence
- 2.8 million children

Motor Coordination Deficits
- Estimated: 6-10% of the population (WHO, 2008)

Coordination Deficits commonly found in individuals with:
- Autism Spectrum Disorders (~1 in 68)
- Cognitive Disabilities
- Physical Disabilities
- ADHD (5% of children)
- TBI (473,000+, children ages 0-14 treated)
- Obesity (17%, ages 2-19) [CDC, 2015]

Moderate Coordination Problems
- Associated with poor academic achievement and socialization issues
- Health issues

D. Supporting Needs: RTI

Before a child is deemed eligible for special education services under IDEA, the child must be evaluated to determine his or her disability status and educational needs.

Present: Overarching framework; overall integrated system of service delivery

Response to Intervention

Multi-tiered systems of support
Resource allocation model
Problem solving model
Data-based decision making
Early intervention
BOT-2 and RTI

Tier 1: Majority of students will not require assessment or additional intervention

Tier 2: Students need supplemental intervention

Tier 3: Students need supplemental and individualized intervention
Role of BOT-2 in Problem Solving

- **Problem Identification**: Use the BOT-2 to determine if there is/are motor skill deficit(s).
- **Problem Analysis**: Use the BOT-2 to identify specific motor skills needs and areas for intervention.
- **Plan Implementation**: Select and implement supplemental interventions based on identified student needs.
- **Plan Evaluation**: Use the BOT-2 to assess the impact of the implemented intervention(s) [Benchmarking].

BOT-2 Within the RTI Model

- The BOT-2 is primarily relevant for Tiers 2 & 3 assessment and intervention.
- Its primary uses are for:
  - Identification of motor deficits
  - Specific deficits needing intervention
  - Targeted intervention selection
  - Provide data for writing specific IEP goals
  - Evaluating individual response to intervention
  - BOT-2 Normative data will help set individual goals

Case Study

- **Name**: MK90045
- **Gender**: Male
- **Age**: 12-years, 10 months
- **Special notes**: Male has recognized attention, motor, and social difficulties.
- Examinee has been tested using the BOT-2 Full Motor Composite
- **NOTE**: Subtests were pulled out to show deficits
Professional Reports

Below average manual dexterity and ability to coordinate his body in a quick and controlled manner
Below average balance, especially eyes closed
"Toe Walking"
Overall poor motor skill resulting in avoidance of group sports
Decreased attention to task
Fidgeting and impulsivity which required medical management in order to participate in academic tasks
Decreased social skills, lack of participation in conversation
Decreased verbal expression of ideas and opinions

Motor Subtests Results

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Score(s)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Dexterity</td>
<td>Below Average</td>
<td>Examinee presented issues with grasping</td>
</tr>
<tr>
<td>(Age Equivalent: 8:3-8:5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Limb Coordination</td>
<td>Below Average</td>
<td>Examinee exhibited object tracking and grasping issues</td>
</tr>
<tr>
<td>(Age Equivalent: 8:3-8:5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilateral Coordination</td>
<td>Average</td>
<td>Examinee presented issues with synchronization</td>
</tr>
<tr>
<td>(Age Equivalent: 10:9-10:10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance</td>
<td>Below Average</td>
<td>Examinee presented issues with posture, toe walking and focus</td>
</tr>
<tr>
<td>(Age Equivalent: 5:10-5:11)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Examinee was given the TMC. Subtests were chosen to show deficits.

Motor Intervention Focus

Improve his physical activity
Improve overall body coordination
Address areas of weakness and develop precise and measurable IEP goals related to his skill deficits.
Increase in motor skills may positively impact social skills, confidence, participation, self-efficacy, and academic performance.
Set-up Instructions

Prepare testing area
- Room: 60 feet long/12 feet wide
- Table and 2 chairs (Feet must be able to touch the floor
- Tape off Running Course
- Affix Target
- Prepare Record Forms

E. Tips for Administration

Familiarize yourself with the test
Read and Follow all Directions and Rules within the Test Manual

Validity
- Reduction in subtest transition time
- Reduces overall testing time

Reliability
- =

Easel
Scoring

Room
Lighting
Temp
Furniture
= Examinee Comfort

Practice

Keep testing area free of all testing equipment not in use

Attention

Safety

Establish Rapport
- Open and Honest
- Respect
- Make it fun!

Make sure the examinee is wearing appropriate testing attire
- Athletic
- Comfortable clothing

Make sure your examinee understands the directions

Demonstrate Easel

Teaching Text

Proper Form

Meet the needs of your examinee

Hungry
Thirsty
Restroom

Assistive Devices

Flexibility
Maintain rapport throughout the testing.

Eye Contact

Smooth Transitions

Encourage

Properly schedule each examination and adjust testing time accordingly.

Administer every item in each subtest and score everything objectively.

F. Frequently Asked Questions

What Version of the Test is Preferred?

The Total Motor Composite option is preferred. It’s the most comprehensive and reliable measure of overall motor proficiency and should certainly be used when:

- Qualifying an individual for services
- Supporting clinical diagnosis
Can I Change Up the Order of the Subtests/Items?

No. It is for the benefit of the examinee and the results that you stay with the order designated by that subtest. Subtest items were ordered to allow maximum performance.

Can I Split Testing Sessions?

Certainly. Many factors go into testing performance and you can decide to administer the test by splitting into two sessions. Key: if you are administering a subtest and need to stop the test, complete that subtest.

How Much Time Between Testing Dates to Minimize the Testing Effect?

It's general practice to wait 90 days until the next administration (can be used for Benchmarking). This will ensure minimal (if any) testing effects and determine the impact of the intervention(s). However, depending on your child or young adult, you can administer the BOT-2 and its subtests somewhat more frequently (~60 days). Note: the latter is typically used for pre/postest scenarios.
How Do I Make Sure I have the Preferred Foot/Hand?

Although some children do like to stand/lean on their “preferred foot/leg”, for testing purposes, the BOT-2 designates the preferred foot as the one he/she uses to kick the ball.

The preferred hand is the one in which he or she reaches for the ball in the preliminary assessment.

When Should I Administer a Second Trial?

If the examinee doesn’t achieve a maximum score of the item, in some of the BOT-2 items, a second trial is allowable. Check the Administration Easel for the specifics. Note: when scoring, take the higher score of the two trials.

Can I Get a Discount on Products?

Some products offered by Pearson qualify for discounts:
- Research Assistance Plan
- Training Partner Program—training needs of college and university faculty and training directors
Special Thanks

- Sherry Lokken
- Shelley Hughes
- Michelle Samlaska
- Cynthia P. Conner

Thank You