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The Challenge of Keeping Assessments Standardized

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Learning Outcomes

After this course, participants will be able to:

- Discuss at least two possible negative consequences of using alterations when performing a standardized motor assessment.
- List the three most common alterations used by physical therapists when administering standardized motor skill assessments.
- Identify at least three incorrect alterations used during the administration of a standardized assessment of motor skills through video examples or case presentations.
- Provide at least three examples from the literature of how alterations used during test administration can change motor scores in children who are typically developing.
- Accurately report standardized scores from a case presentation of assessment with the use of alterations.

2

Standardization

The process of making something conform to a standard.

Standard: a level of quality or attainment

Standardization in Administration of Assessment Tools

Standardization establishes uniform *procedures* for using the assessment tool:

- Items are administered in a structured and similar way to each child
- Structured procedures for interpretation of item scores and overall test performance

Standardization in Administration of Assessment Tools

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Importance of Standardization

Example:

- Touch the back of head, your forehead and your nose going back and forth as fast as you can.
  - How many used a flat hand touching with your palm, used several fingers, or just your index finger?
  - Where did you touch for the back of your head – down by the base of your skull or up toward the top?
  - Did you do Head, Forehead, Nose in that order over and over or Head, Forehead, Nose, Forehead, Head, etc.
- Standardized instructions help ensure that everyone is doing the SAME task

Standardization is Important

- Let's talk specifically about motor assessments:

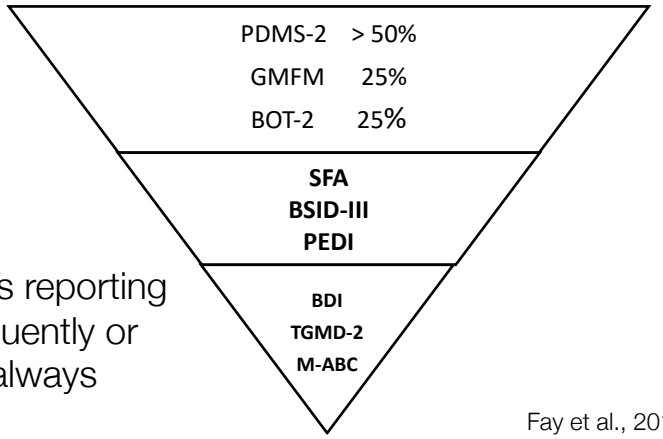
Survey on Use of Pediatric Assessment Tools in Children Ages 2-10

- A total of **93%** of respondents reported using standardized tests for this age range at least occasionally, and **62%** used them frequently or always.
- Respondents reported that they administered on average **5** assessment tools per month.

Fay et al., 2018

Which motor assessments do you do you use most often for children between the ages of 2-10?
POLL #2

Commonly Used Motor Assessment for Ages 2 to 10 Years



% of PTs reporting use frequently or almost always

Fay et al., 2018

Factors Influencing Choice of Tool

The most important factors in making this decision were

- The child's ability to complete (72%)
- The ease of administering (61%)
- The psychometric properties (59%)
- Amount of time required, the availability or cost of the test, and the conclusions from results (50-51%)

Why are standardized assessments used?

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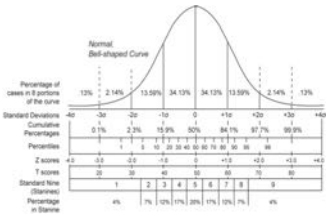
Reporting of Normative Scores

When reporting scores, 84% of respondents frequently or almost always reported scores compared with normative values.

Review of Test Types:

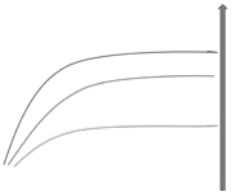
- Norm-referenced

  Performance is interpreted in relation to the performance of a group of peers who have previously taken the same test.



- Criterion-referenced

  Performance (i.e., score) is interpreted by comparing it with a pre-specified standard or specific content and/or skills.



Standardization is essential for reporting normative scores

The only way to ensure that the percentile values and z-scores obtained for a given child are accurate is to ensure that the test was administered the SAME way to that child as it was for the children on which it was normed.

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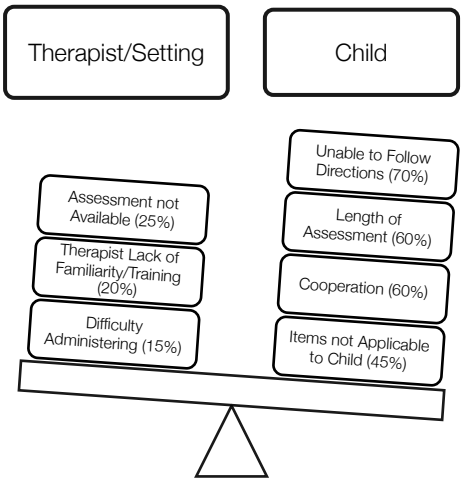
Problems Encountered in Using Pediatric Standardized Assessments



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Do therapists struggle administering clinical measures in a standardized manner?

- Experience: **YES!**
- Literature:

  Stuhec & Gisel, (2003)
  - 59 therapists in Quebec who assess children with PDD
  - All stated they modify the instructions, with over 80% indicating frequently or always
  - Majority also indicated adding gestures, demonstrations, or materials

  Hanna SE, Russell DJ, Bartlett DJ, Kertoy M, et al (2007)
  - 209 therapists in Ontario (PT, OT, SPL)
  - More than half of the respondents reported sometimes doing the following:
    - administered only specific items or subscales,
    - modified the instructions or materials
    - used the test with a clinical population or age range other than recommended
  - Respondents noted the frequent need to accommodate test administration because of cognitive, sensory, or behavioral limitations of clients

CONTINUED

In the US, a total of 94% of respondents reported modifying administration of a standardized test at least occasionally, and 70% reported using modifications frequently or always.

Fay et al., 2018

CONTINUED

Overwhelmingly, the reasons modifications were needed were related to the child (80%), with ease of administration related to time constraints (16%) being the only common response that was non-child related.

Attention

Cognitive ability

Language ability

Behavior

The results show us…

- Therapists are needing norm-referenced tests for evaluation and placement of children.
- Therapists are trying to select tools that the children can complete.
- The greatest percentage of problems all have to do with the child's ability to complete the test (ability to follow directions, attention, motivation, etc.)

⇩

Therapists modify tests to meet need in presence of problems

Which of the following alterations or modifications do you use most often when administering a motor assessment tool? (Select one)

Poll Question #2

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Modifications Used by Physical Therapist in the U.S.

Provide Demonstration (85%)

Provide Feedback (75%)
Modify Instructions (75%)
Alter/Add Gestures (70%)

Alter/Add Number of Trials (65%)
Use Parental Report (60%)
Alter/Add Materials (45%)

Fay et al., 2018

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Examples of Modifications

- Modify Instructions: Verbal Prompts, Pretend Play, Competition
  - Alter/Add Gestures
  - Provide Demonstration
- Alter/Add Materials: Concrete Tasks
- Provide Feedback
- Alter/Add Number of Trials
- Assess with Peers/Group Setting

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Modifying the instructions: Changing the Verbal Prompts

Word Choice:

- Hands on your hips vs hands on your belly
- "underhand" to "down and toss"

Specificity of Directions:

- Bounce hit or bounce catch
- Hop 5 times on one leg and then switch and hop 5 times on the other

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Video #1

Throwing ball underhand: Demonstrate throwing the tennis ball underhand as least 7 ft forward. Give ball to child and say "Throw me the ball"

25

Video #2

Hop forward on 1 foot for 5 hops, then on the other foot for 5 hops. Say, "Hop like I did"

26

CONTINUED

Modifying the Instructions: Adding Pretend Play

- Jumping forward, down, or over a hurdle like a frog, kangaroo, bunny
- Bringing an egg back to the nest for shuttle run
- Truck "beeping" as it backs up for walking backwards
- Walking on a bridge across the water for walking on a line

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CONTINUED

Video #3

Place can on one line. Say, "When I say go, run as fast as you can, pick up the can, and bring it back across the starting line."

28

CONTINUED

Video #4

Using a normal stride walk forward on line. Say, “Keep your hands on your hips and walk on the line like I did. Try not to step off the line.”

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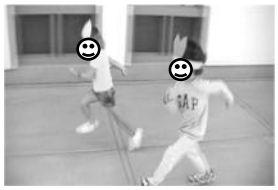
CONTINUED

Modifying the Instructions: Adding Competition

- Running alongside the child during timed running tasks
- Verbal cue of “Jump as far as I did” given after demonstration for jumping distance
- Hopping alongside the child for hopping speed
- Facing child performing pushups while encouraging them to do more than examiner
- Encouraging the child to stand on one foot longer than the examiner



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Video #5

Stand on 1 foot, hands on hips with free leg bent back at knee for 5 seconds. Say, “Put your hands on your hips and stand on 1 foot like I did.”

31

Video #6

Place the child within 6 in behind a taped line and then stand 3 ft behind the finish line. Say, “Run to me as fast as you can without stopping.”

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Adding Materials: Making it a Concrete Task

- Reaching up on tiptoes to hold hands on cutout handprints
- Using a stuffed toy as a target for kicking the ball
- Jumping up to touch a toy or balloon
- Keeping a toy at the top of the stairs for all stair climbing items
- Jumping back and forth on spots
- Turning to look at a mirror for turning jump task
- Touching a balloon with head during sit-ups

33

Video #7

Kick a stationary ball so that it travels at least 6 ft. forward. Place ball 6 in in front of child and say, “Kick the ball hard like I did.”

34

Video #8a/8b

Demonstrate sit-ups on a mat. Place child in starting position on mat. Hold child's feet and say, "Do as many sit-ups as you can." Stop child after 30 seconds.

35

Assess with Peers/Group Setting

Can assess all as one group or have students take turns

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CONTINUED

Adding Additional Trials

Video # 9:

Walks forward 10 consecutive steps on a straight line
2 cm wide: 3 trials allowed

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CONTINUED

When asked the reasoning for modifications, almost a third responded that they wanted to get the child's

"true motor ability"

CONTINUED

- *"My interest is only in whether the child has the physical motor skills to complete a task. I am not concerned with whether he understands the demonstration, is shy about performing, or just needs a few more trials to perform what I am asking her to do."*
- *"Am more concerned about whether the child can do the task rather than if they can follow instructions"*
- *"To get the "true or as close to true motor abilities of the child"*
- *"I typically add number of trials, provide demonstration, and modify instruction so the child understands the task and to get a true assessment of their actual motor performance versus their ability to comprehend the instructions or attend to the task."*

What is "true motor ability" and do the modifications really help us determine this?

Measures of motor ability:

- Capacity: What a person can do in a standardized, controlled, environment.
- Capability: What a person can do in his/her daily environment.
- Performance: What a person actually does do in his/her daily environment.

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Capacity

When we are using standardized tests of motor ability in a clinic or school testing situation, we are obtaining information about the child's capacity.

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CONTINUED

If modifications help us deal with challenges and get a better measure of the child's capacity, than why shouldn't we use them??

Let's review some of the research finding on the impact these modification have on scores…

CONTINUED

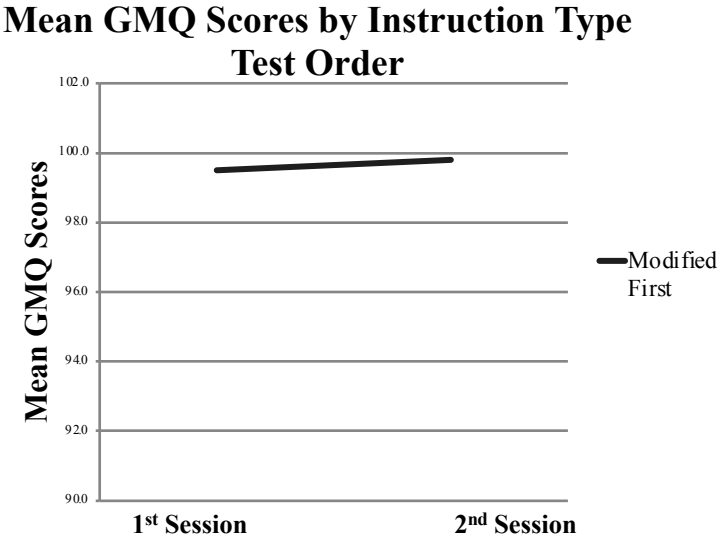
Several researchers have reported improved performance or altered scores related to factors other than ability:

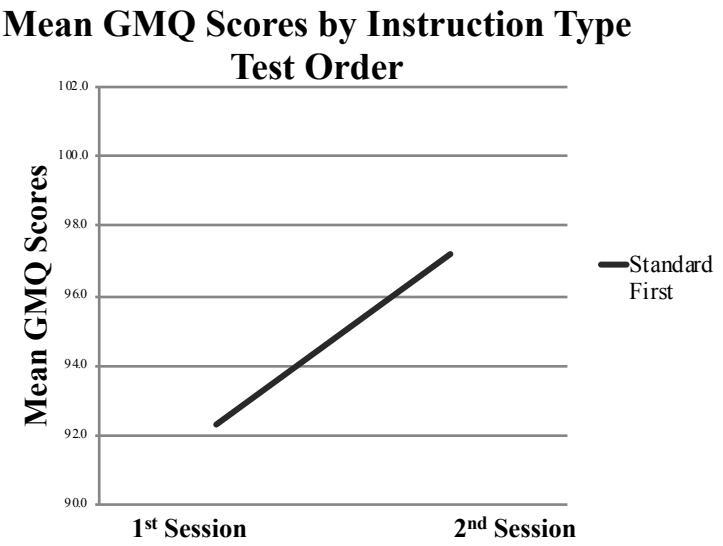
- Vocabulary used (Koegel et al., 1997)
- Attention time required (Koegel et al., 1997)
- Tester's demeanor (Fraysse & Desprels-Fraysse, 1990
- Number of trials (Pederson & Loras, 2017)
- Environmental variations (Onate et al., 2007)
- Motivation by pretend play (De Oliveira et al., 2019)

Standardization is an attempt to limit the effects of these outside factors….

Studies Specific to Scores on Motor Assessments:

Authors	Modification	Results
Fay et al. 2019	Demonstration, altered verbal cues, and concreate tasks	Overall gross motor quotient showed a significant effect for instruction type (p=0.026), and significant interaction between instruction type and order (p=0.018).
Wiepert and Mercer, 2002; Halliday & Fay, 2003	Number of Trials	Gross motor quotient and percentile rank both showed significant differences with 3 vs 6 trials offered per item (p<.05). Increased trials resulted in score change on 27% of items.
Doty et al., 1999; Fay et al., 2017	Peer Group Present	Performance of motor skills in the individual and group settings were statistically different (p=.025), with the children demonstrating improved performance in the group environment.





What do these results mean?

- 20 children (53%) had changes in scores greater than the SEM for their age
- 34 children (94%) had a change in overall percentile rank, often as much as10-20%
- 5 children were greater than one standard deviation below the mean with standard testing but above the cut-off when modifications were offered
- Overall, the response to alteration varied by the *type of task* and *type of modification* used, suggesting further research is warranted.

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Increased # of Trials

Weipert et al.,2002 (PDMS), Halliday & Fay, 2003 (PDMS-2)

- Halliday & Fay: Use of 3 vs 6 trials per item with typically-developing children
  - Statistically different scores for GMQ and Percentile Rank
  - The difference in scores between the two testing procedures ranged from no change to a maximum of 8 points for individual scores.
  - The mean overall gross motor percentile rank using standard testing procedures was 56 percent. When three extra trials were allowed, however, the overall percentile rank increased to 64 percent. The difference in percentile ranks between the two testing procedures ranged from no change to an increase of 20 percentage points for individual scores.
- Consistent with findings of different scores on motor skills assessment (soccer skills) in adolescent female soccer players (Pedersen and Loras, 2017)

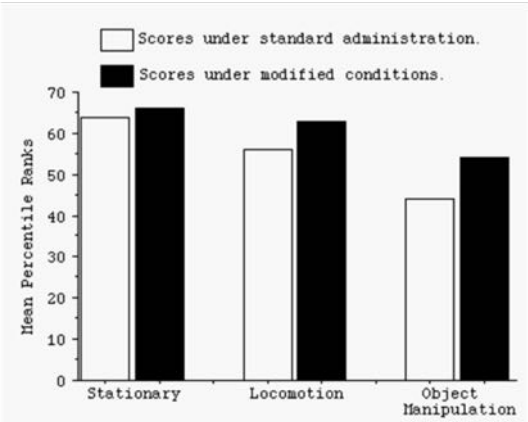

Figure 2. Mean percentile ranks for the three subtests under standard administration versus with extra trials.

Halliday & Fay, 2003

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CONTINUED

Presence of Peers

Doty et al. 1999, Fay et al., 2017

- Fay et al: Testing of 10 items from PDMS-2
- Overall, there was a statistically significant difference in the individual versus group setting (p = .03, d = 0.23).
- Total of 20 kids: 14 better in group setting, 5 better in individual, and only 1 no change.
- Peers had the greatest influence on scores in the area of *locomotion* skills with the least influence on stationary items.
- If a similar proportional difference occurred when the PDMS-2 is administered following the standardized procedure, the point difference would likely be greater that could be explained by the standard error of measurement.

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In ALL cases the Norms for these test would likely be higher if the children were tested with similar modifications.

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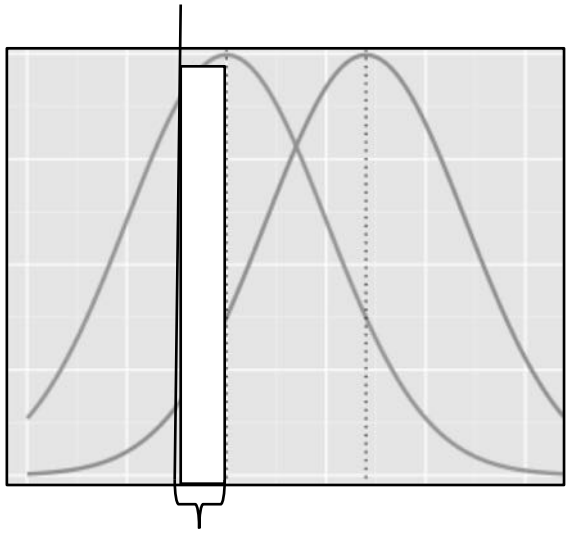
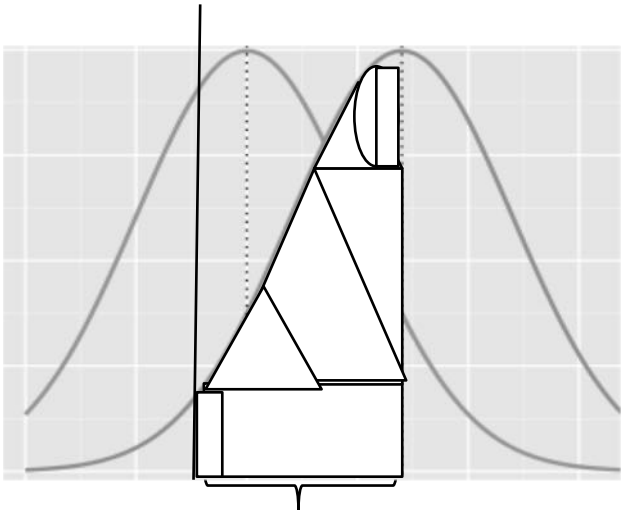


Below the Mean

53



Below the Mean

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So what does this mean for us as therapists?

How do we manage need for standardization and difficulties encountered in real clinical practice?

How do we toe the line… but still get the information we need?

Case Example: Rory

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Rory, a 5 year old boy (63 months) presenting with potential developmental delay, is being tested for qualification of services:

- While administering the PDMS-2, Rory has trouble following directions and routinely forgets to put his hands on his hips or only completes part of several tasks.
- While testing according to the standardized directions the therapist feels like the scores do not represent his motor ability. The therapist is tempted to start demonstrating more of the tasks and reminding Rory what do to mid-task in order to get successful completion of items.

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First Step: Know the *specific* directions of each different assessment tool.

Peabody Developmental Motor Scales -2 (PDMS-2)

- Quiet, comfortable, non-distracting environment
- Do not, through speech of gesture, comment on the accuracy of any item
- Items administered EXACTLY as specified in the Guide to Item Administration
- If purpose is both eligibility or placement and instructional or treatment programming, the examiner should first administer an item as directed and then adapt the directions

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Peabody Developmental Motor Scales -2 (PDMS-2) – Cont'd

- Three trials for each item: If after 3 trials the tester believes the performance was not optimal because of a non-motor disability, the examiner may readminister using adaptive instructions.
- When adaptions are used, the norms for the test are not accurate because adaptions were not sued when the test was standardized. Must be considered nonstandard scores.

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Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2)

- Space relatively free from noise or other distractions
- Important to adhere strictly to all scoring and administration rules
- # trials per item varies as instructed, most are 1-2

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Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2) – Cont'd

- Encouraged to be flexible when teaching the items to the examinee: use of photos, physical demonstration, and/or verbal instructions, providing physical support when necessary
- Encourage the examinee to maintain proper form through verbal reminders during the trial

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BOT-2
Are these actions allowed?

Gross Motor Function Measure (GMFM)

** Criterion-referenced test – standardization required for repeat testing

- Comfortable and consistent testing area
- Acceptable to test in any order
- 3 attempts on each item

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Gross Motor Function Measure (GMFM) – Cont'd

- If necessary, child may be placed in the starting position
- Items may be scored based on spontaneous performance
- Any strategy that meets testing guidelines can be used (follow the leader, role playing, etc.)
- Toys may be used for incentives

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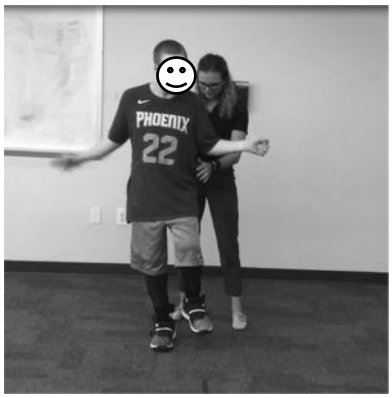
Video #10

Most common inappropriate modification is # of trials



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Second Step: Be aware and recognize the use of modifications during testing

Summary of Modifications to Be Aware of:

- Alter verbal prompts: use different wording than provided, count before throwing a ball for cueing, provide instructions during the task, etc.
- Competition: Run alongside, stand on one leg together, perform wall sit side-by-side, etc.
- Provide concrete target: Give something to reach for with tips toes, provide a spot to jump forward or down onto, hold something to touch during sit-ups, etc.
- Make activity part of “pretend play”
- Provide extra trials
- Use peers during testing unless specified

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Case Example: Rory

- PDMS-2
- Modifications: Demonstration of all tasks, verbal prompts, feedback during tasks, extra trials

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Case Example: Rory

- How should the therapist report Rory's scores??

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Third Step: Be diligent in how you record scores when reporting normative values

- First, follow standardized procedures!
- Next, if after allowed number of trials you believe the performance was not optimal because of a non-motor disability, you should re-administer the item using modifications or adaptive instructions.
  - Both scores should be recorded
  - Normative scores should only be reported for the scores achieved with standardized methods, but the other scores can be used to present the full picture of the child's abilities

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Case Example: Rory Assessment Summary

- When tested under standardized conditions, Rory received a Gross Motor Quotient of 70 (2nd percentile / 2 standard deviations below the norm).
  - His subtest standard scores were 4 for Stationary, 5 for Locomotion, and 7 for Object Manipulation.
- When Modifications were offered, including demonstration of all tasks, reminders and verbal cues during tasks, and a few extra trials when he seemed close to achieving the skill, his raw scores improved substantially.
  - His new standard scores were 8 for Stationary, 8 for locomotion, and 10 for Object Manipulation.
  - If these scores are used to compute his GMQ, it would give him an 91 (27th percentile / <1 standard deviation below the norm).

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- If the therapist used only the modified scores, Rory would NOT qualify for therapy.
- If, however, the standardized scores are used, Rory DOES qualify….
  - In this case – reporting modified scores may be doing Rory a disservice because if the children on which the test was norm were offered modifications, the mean would likely be higher and his “modified scores” would likely still qualify.

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So..

It is recommended that you first report the standard scores and percentile rankings.

Then, add in information as to your interpretation of his difficulties and if you feel it is completely non-motor related you can discuss this.

- For example, if Rory has a language delay and you believe the performance difference is completely related to this, then provide examples and documentation to support this, but don't just report the modified scores.
- More likely, you should state that Rory is able to perform some tasks better with additional cues and demonstration, indicating that he may have better motor capacity than his initial scores suggest, but his inability to perform the tasks in the standard way indicates that intervention is warranted to address his difficulty with these motor skills.

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Within the school setting, the use of standardized testing requires that you report scores. Reporting modified scores as if they are standardized, is violating requirements of testing under IDEA.

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In Summary

- Allowing modifications to standardized assessments, while still using the normative values for reporting the child's performance, mixes the concepts of capacity and performance and may be misrepresenting both

  (Holsbeeke et al., 2009; Reed et al., 2005; Smits et al., 2014; Tieman et al., 2005).

- Standardized tests MUST be administered according to specified directions if normative scores are going to be used.

CONTINUED

In Summary

- Providing a child with modifications and then using those score against the norms actually does them a disservice versus identifying their "true motor ability"
  - Recognizing and reporting any modifications to the directions of assessment tools used is absolutely necessary.
  - Reporting of scores should be differentiated between standardized and norm-based scores and those determined with modifications.

Questions?

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