Special considerations of implementing PerfO Assessments for Pediatric Populations

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Disclosures

There are no conflicts of interest related to this presentation

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1. **Developmental Level of the Child**

- Developmental change over time in kids
- Regression vs Development vs Stabilization
### Developmental Change over Time - Cognition

<table>
<thead>
<tr>
<th>Test Description</th>
<th>0-12 mos</th>
<th>12-24 mos</th>
<th>2-3 yrs</th>
<th>3-4 yrs</th>
<th>4-6 yrs</th>
<th>6-12 yrs</th>
<th>16-17 yrs</th>
<th>18+ yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayley –3 Screen</td>
<td>1-42 mos</td>
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<tr>
<td>Bayley-3</td>
<td>1-42 mos</td>
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<tr>
<td>BINS</td>
<td>3-24 mos</td>
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<tr>
<td>Battelle-II-NU</td>
<td>0 – 7:11 yrs</td>
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<tr>
<td>DAYC-2</td>
<td>0 – 5:11</td>
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<tr>
<td>Developmental Profile-3</td>
<td>0 – 12 yrs</td>
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### Developmental Change over Time - Cognition

<table>
<thead>
<tr>
<th>General Intellectual Ability (IQ)</th>
<th>0-12</th>
<th>12-24</th>
<th>2-3</th>
<th>3-4</th>
<th>4-6</th>
<th>6-12</th>
<th>16-17</th>
<th>18+</th>
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<tbody>
<tr>
<td>Mullen</td>
<td>0-68 mos</td>
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<td>WPPSI-IV</td>
<td>2:6-7:7</td>
<td>6:0-16:11</td>
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<td>WISC-V</td>
<td>2:85+</td>
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<tr>
<td>SB-5</td>
<td>2:6-17:11</td>
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<td>DAS-II</td>
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<td>KABC</td>
<td>3 - 18</td>
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<td>KBIT-2</td>
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<td>4 - 90</td>
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</table>
PerfO measures (cognitive, and to some degree, motor) are designed with an assumption of Development, not Regression.


Regression v. Development v. Stabilization?

Means with SE Bars for Voc SS
ICC = 0.83

Wechsler IQ test
Vocabulary subtest

CLN3 Disease (“juvenile Batten disease”)

N = 77 (42 females)
1-13 assessments

Vocabulary test, a proxy for Verbal IQ, appears to decline steadily over time, suggesting a loss of cognitive skills.

Unpublished data
Regression v. Development v. Stabilization?

In fact, raw scores (not adjusted for age) show that children do continue to acquire skills first, before experiencing a decline.

2. Examiner qualifications & experience

- Must understand child development & behavior

- Can elicit best performance from a wide range of developmental levels and abilities

- Must be familiar with the disease and its impacts on child behavior and cognition

- Must be able to manage challenging behaviors
  - Inattention
  - Defiance / noncompliance
  - Anxiety / shyness
  - Impulsivity and hyperactivity

- “Children do well if they can”
3. **Concept of Interest targeted by the PerfO**

Need to understand developmental considerations in measuring Concept of interest
(e.g., measuring “executive function” in a 4 year old can be quite different than measuring in a 14 year old…)

Different PerfO measures may need to be considered, depending on age and developmental level of child…

*And...*

The CoI itself may have a different operational definition, depending on age / developmental level
Developmental Differences in the Structure of Executive Function in Middle Childhood and Adolescence

Fen Xu1,2, Yan Han2, Mark A. Sabbagh3, Tengfei Wang4, Xuezhu Ren5, Chunhua Li5

**COMPONENTS OF EXECUTIVE FUNCTION**

- Updating Working Memory
- Inhibition
- Shifting

*A single factor best explains performance in 7-9 year olds, and in 10-12 year olds*

A three-factor model provided best fit for 13-15 year olds
4. PerfO Test Development & Measurement

PerfO Development / Selection

- Consider parent / child input regarding PerfO development (if possible)
- “Off-the-shelf” vs. de novo measures vs. adapted measures
- Tests must be: engaging, as easy as possible to administer, score & audit, and should be completed as quickly as possible to accomplish the goal

PerfO Measurement

- Are the age-standardized scores the most sensitive to change in the population of interest?
- Must capture full range of potential ability with adequate floor & adequate ceiling

Environment (operational considerations)

- Environmental distractors
- Medical / sensory limitations of the child
- Fatigue, jet lag, hunger, baseline temperament
- Prepare caregiver & child for what to expect at the visit
- Assessment needs to be scheduled in the proper sequence with other study activities
- Consider travel fatigue / burden
- Need for food or naps
- Need for scheduled meals or medications / treatments
- Ask parent if child’s behavior / mood / energy etc. on day of testing is representative
Example

6. Vocabulary

Wechsler Intelligence Scale for Children
– Fourth edition

Start
Ages 6–8: Item 5
Ages 9–11: Item 7
Ages 12–16: Item 9

Reverse
Ages 6–16: Score of 0 or 1 on either of the first two items given, administer preceding items in reverse order until two consecutive perfect scores are obtained.

Discontinue
After 5 consecutive scores of 0

Wechsler Intelligence Scale for Children
– Fifth edition

Start
Ages 6–7: Item 1
Ages 8–11: Item 5
Ages 12–16: Item 9

Reverse
Ages 8–16
Imperfect score on either of the first two items given, administer preceding items in reverse order until two consecutive perfect scores are obtained.

Discontinue
After 3 consecutive scores of 0