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USING RASCH ANALYSIS TO EXAMINE THE VALIDITY AND RELIABILITY OF THE PRAXIS TESTS OF THE EVALUATION IN AYRES SENSORY INTEGRATION (EASI)

INTRODUCTION

- In Sensory Integration (SI) theory, **praxis** refers to the process of conceptualizing and planning motor actions using sensory information gathered from objects, the environment, and the body's position in space[1]
  - For children – praxis is a critical component of learning, behavior, and engagement in occupations
  - Dyspraxia may be a symptom of many neurodevelopmental diagnosis (e.g., ASD, ADHD) but may also exist in isolation
- Measurement of praxis typically relies upon either the outdated normative data from the Sensory Integration and Praxis Tests (SIPT) or unstandardized, subjective clinical observations
- The **Evaluation in Ayres Sensory Integration (EASI)[2]** is a novel suite of tests including seven tests that examine praxis
  - Praxis: Positions (PrP)
  - Praxis: Sequences (PrS)
  - Ocular Praxis (OPr)
  - Praxis: Following Directions (PrFD)
  - Visual Praxis: Designs (VPrD)
  - Visual Praxis: Construction (VPrC)
  - Praxis: Ideation (PrI)

OBJECTIVE

To examine evidence for validity and reliability of the 7 EASI praxis tests using the Rasch Measurement Model

METHODS

Participants 2536 children ages 3-12, including data from 51 countries. Children had no known developmental or medical concerns.

Rasch Analyses
- One parameter Item Response Theory model that transforms ordinal level data into interval level data[3]

Construct Validity
- Item fit: empirical fit of item difficulty to Rasch model
- Person fit: empirical fit of child ability to Rasch model
- Principal components analysis (PCA): searches for alternative dimensions in data
- Differential Item Functioning (DIF) based on sex: detects potential item bias
- Correlation with age should be moderate to large

Reliability
- Person Reliability Index (PRI) evaluates reproducibility of measures
- Strata: evaluates levels of separation in data

RESULTS

Table 1. Construct validity and Reliability based on the Rasch Measurement Model

Test	Item fit	Person fit	PCA	DIF	Age Correlation	PRI	Strata
Criteria	> 95% of items fit the model (MnSq 0.7 – 1.3), # misfitting	> 90% of children fit the model, (MnSq 0.5 – 1.5), # misfitting	Largest Eigenvalue < 2.0, disattenuated correlation ≥ 0.57	0 items with DIF contrast > 0.43 logits	≥ .40	≥ 0.70 (0.80 is desirable)	≥ 2.0 (3.0 is desirable)
PrP	92%, 2	86%, 351	1.61, NA	0	0.64	0.84	3.4
PrS	100%, 0	89%, 277	1.92, NA	0	0.66	0.89	4.1
OPr	100%, 0	93%, 205	1.39, NA	0	0.61	0.70	2.4
PrFD	100%, 0	85%, 368	1.45, NA	0	0.54	0.74	2.6
VPrD	79%, 5	85%, 369	2.19, 0.92	0	0.74	0.95	5.9
VPrC	94%, 2	93%, 172	2.06, 0.93	0	0.54	0.82	3.2
PrI	100%, 0	86%, 254	2.94, 0.60	0	0.43	0.88	4.0

Figures 1 and 2. Sample Wright maps showing the items (right side of map) compared to people (#, left side of map). PrP shown on the left, VPrD shown on the right.

KEY FINDINGS

- Generally, praxis tests showed adequate to good evidence for reliability, moderate to high correlations with age, and negligible item bias based on DIF
- Three PCAs (VPrD, VPrC, and PrI) showed larger-than-expected Eigenvalues; however, high disattenuated correlations between item subsets provide encouraging evidence for unidimensionality
- Person fit was lower than our criteria for five of seven tests (PrP, PrS, PrFD, and PrI). Other factors, such as boredom or inattention, may have impacted scores on these tests.
- Item fit was inadequate for PrP, VPrD and VPrC. Closer inspection of items suggests that revisions are necessary for VPrD items.
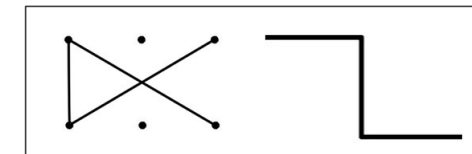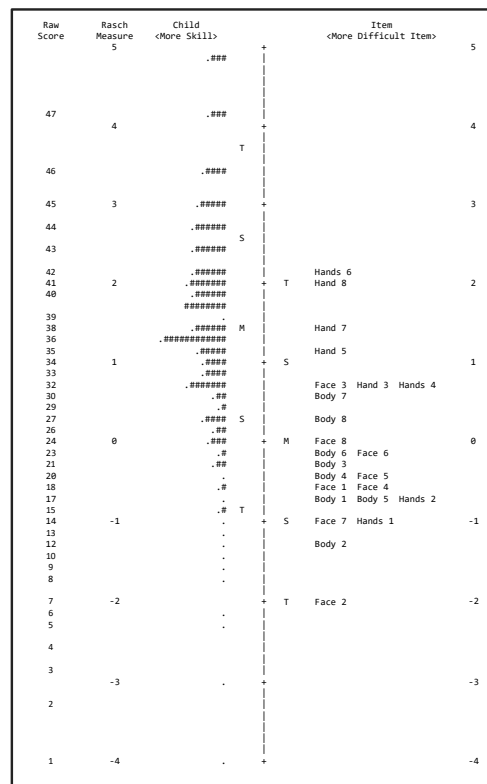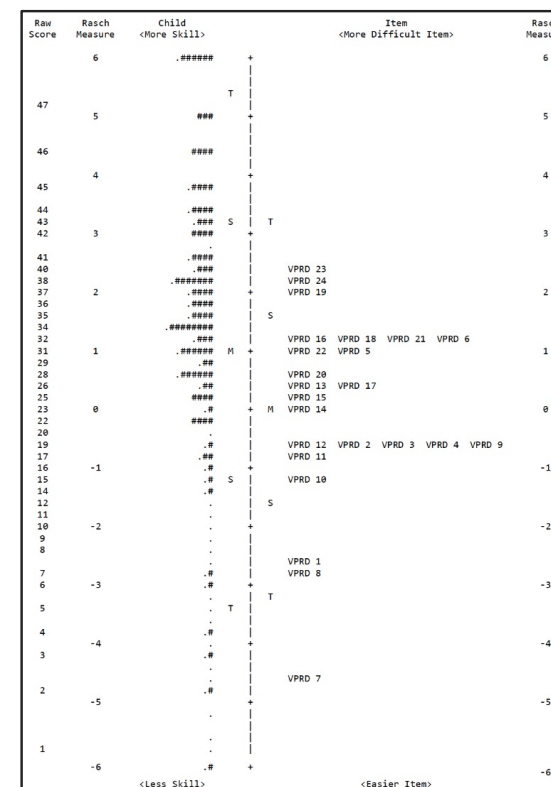

Figure 3. VPrD items; misfitting dot grid item (left), well-fitting freehand item (right)

CLINICAL IMPLICATIONS

Performance-based measurement for children with SI dysfunction is critical to providing evidence-based, data-driven services. The normative data collected using the EASI Praxis tests show generally strong evidence for validity and reliability; however, some tests require additional revision.

REFERENCES

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