Measurement of Holistic Skills in RCTs: Review and Guidelines

Jessica Williams, J-PAL
with Karen Macours (Paris School of Economics) and Samuel Wolf (MIT)

CEGA Psychology and Economics of Poverty Convening
April 26, 2024
Roadmap

1. Motivation and Data
2. Results
3. Discussion & Action
J-PAL’s mission is to **reduce poverty** by ensuring that **policy** is informed by **evidence**, and **research** is translated into **action**.
Global knowledge: 2,200+ completed randomized evaluations in more than 96 countries
Motivation

• Which *interventions* are most effective at *improving* holistic skills in children?
Motivation

- Which *interventions* are most effective at *improving* **holistic skills** in children?
Holistic Skills
To accurately assess whether an intervention can improve a certain skill, that evaluation must be able to measure the skill validly and reliably.
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Without establishing validity, one can claim effects on an outcome, when in reality, this is not the actual outcome that is being affected.
Holistic Skill Challenges

- More “fuzzy” than literacy/numeracy
- More closely dependent on local social/cultural contexts
- Smaller evidence base
- Concentrated in high-income countries
Motivation

• Which *interventions* are most effective at *improving* holistic skills in children?
Motivation

- Which **interventions** are most effective at **improving** holistic skills in children?

- How are researchers **measuring** holistic skills in children?
Motivation

- Which interventions are most effective at improving holistic skills in children?
- How are researchers measuring holistic skills in children?
  - What kinds of skills are researchers measuring?
Motivation

Which interventions are most effective at improving holistic skills in children?

• How are researchers measuring holistic skills in children?
  – What kinds of skills are researchers measuring?
  – What kinds of measures are researchers using?
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• Which interventions are most effective at improving holistic skills in children?

• How are researchers measuring holistic skills in children?
  – What kinds of skills are researchers measuring?
  – What kinds of measures are researchers using?
  – How are they establishing the validity and reliability of those measures in the contexts they are working in?
Motivation

• Which interventions are most effective at improving holistic skills in children?

• How are researchers measuring holistic skills in children?
  – What kinds of skills are researchers measuring?
  – What kinds of measures are researchers using?
  – How are they establishing the validity and reliability of those measures in the contexts they are working in?
  – What should future researchers continue doing or do differently?
Data and Inclusion Criteria

- **American Economic Assn. (AEA) RCT registry**
  - Almost all projects had at least 1 economist PI
  - 98 projects (41%) had interdisciplinary PI teams

[Image of AEA RCT Registry interface]
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• Age range (3-18 years old)

• Outcomes measured in children
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- **Age range (3-18 years old)**

- **Outcomes measured in children**

- **Search term: “skills” in the abstract, intervention, outcomes sections**
  - Added search term “preschool” to better capture studies in ECE age group

- **= 237 RCT registry entries, 122 papers**

- **20 peer reviews → qualitative insights**
Results
Results: What kinds of measures are researchers using?
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<table>
<thead>
<tr>
<th>Self-report measures</th>
<th>Observed / direct assessment</th>
<th>Reported by others</th>
</tr>
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<tr>
<td>(49%)</td>
<td>(38%)</td>
<td>(11%)</td>
</tr>
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* These are broad categories and not exclusive (one study can use more than one type of measure)

Photo credits: (self report) Photo: shutterstock; (observed) Young1ove, Botswana; (reported by others) Kyle Murphy, J-PAL, Haryana, India
Results: What kinds of measures are researchers using?

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- **Self-report measures**:
  - Observed / direct assessment: 45.58%
  - Reported by others: 11%

- **Observed / direct assessment**: 30.91%

- **Reported by others**: 43.10%

**Age make-up of each type of measure**

- **Measurement: Self-reported**
  - Unspecified: 8.16%
  - Post-secondary: 33.33%
  - Primary and secondary: 4.08%
  - Secondary: 45.58%

- **Measurement: Observational**
  - Unspecified: 4.55%
  - Post-secondary: 24.55%
  - Primary and secondary: 29.09%
  - Secondary: 29.09%

- **Measurement: Reported by others**
  - Unspecified: 5.17%
  - Post-secondary: 17.24%
  - Primary and secondary: 27.59%
  - Secondary: 27.59%
  - Primary: 43.10%
Results: What checks are researchers using to assess the validity and reliability of their measures?
Definitions

- **Reliability** - the degree to which an instrument produces the same results under unchanged conditions
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Photo: Lundberg (2006)
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Example: Measuring *Openness* in a New Context

“Do you often daydream? // ¿Sueña durante el día a menudo?”
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### Validity of *Openness* Items

<table>
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<tr>
<th>openness to ideas</th>
<th>I am quick to understand things.</th>
</tr>
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<tbody>
<tr>
<td>openness to ideas</td>
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<td>openness to experiences</td>
<td>I enjoy trying new things and exploring new ideas.</td>
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<td>I am open to new experiences.</td>
</tr>
<tr>
<td>openness to experiences</td>
<td>I value curiosity and exploration.</td>
</tr>
<tr>
<td>openness to people</td>
<td>I enjoy discussing philosophical ideas.</td>
</tr>
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<td>openness to people</td>
<td>I am interested in learning about different cultures.</td>
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### I enjoy discussing philosophical ideas.

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<td>&quot;I sympathize with others' feelings.&quot;</td>
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<td>&quot;I enjoy being the center of attention.&quot;</td>
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<td>&quot;I make people feel at ease.&quot;</td>
<td>&quot;I am open to new experiences.&quot;</td>
<td>&quot;I am outgoing and sociable.&quot;</td>
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<td>&quot;I value curiosity and exploration.&quot;</td>
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<td>&quot;I am assertive and dominant in social situations.&quot;</td>
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### Wolf SEL Test
Openness Score: 100

### Macours Life Skills Test
Openness Score: 100

### Williams Holistic Skills Test
Openness Score: 30/100

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Standardized Test Scores and Academic Performance at Ivy-Plus Colleges

JOHN FRIEDMAN¹, BRUCE SACERDOTE², MICHELE TINE³
Results: What checks are researchers using to assess the validity and reliability of their measures?
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- Validation was relatively scarce
  - (21% of all entries, 45% of papers w/ appendix*)
- Cronbach’s alpha (17%*, 8% of total) - assessing reliability
- Factor analysis (16%*, 7% of total) - assessing content and construct validity
- Piloting - (11%*, 6% of total) assessing face validity
- Correlations (9%*, 4% of total) - assessing predictive validity

* out of all studies with a paper and appendix.
Borrowing measures from other contexts

- Are researchers developing their own measures or borrowing existing measures?
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- Are researchers developing their own measures or **borrowing** existing measures?
  - 60% of studies borrowed measures, 14% developed original measure, 26% both
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• If they are citing a validation paper, was the tool validated in the same context?
  – 18 papers cited a validation study which matched the age range in the current intervention
  – 11 papers had all their tools match the regional contexts of their cited validation papers
How are RCT researchers (*economists) measuring holistic skills in children?

- **What kinds of measures are researchers using?**
  - self-report

- **How are they establishing the validity and reliability of those measures in the contexts they are working in?**
  - By referencing past studies
  - lack of public information about the different validity/reliability checks performed for holistic skills measures
  - limited context-specific validity and reliability testing being done
Why?
Why is there a lack of validity and reliability reporting?

Execution challenges

• Lack of guidance
• Lack of examples from previous research in similar contexts
• Cost
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**Execution challenges**
- Lack of guidance
- Lack of examples from previous research in similar contexts
- Cost

**Dissemination challenges**
- Perception of journal editor and referee preferences
- Field norms
Main Takeaways

1. Opportunities for more citing, explaining, or conducting validation & reliability checks, relevant to the context

2. Making thinking public → helps the next researcher facing similar measurement decisions in that context

3. Conducting validity checks early + robustness checks after data collection, with flexibility to adjust proposed measures

4. Multidisciplinary teams well placed to come up with better measurements that draw from the strengths of different fields or to design new measures or adapt old tools to new contexts.
What is J-PAL doing about it?

Execution challenges

• Lack of guidance

• Lack of record or examples from previous research in similar contexts

• Cost

Dissemination challenges

• Perception of journal editor and referee preferences

• Field norms
Guiding questions at the RCT Design Stage
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1. **Which skills** do I want to measure, why those skills, and **which** measurement **tools** do I plan to use?
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   a. Are there existing tools that I could consider using to measure the skill of interest, or do I need to design a new tool or measurement instrument?

   b. What are the advantages of each of the different possible measures for capturing the trait of interest? Could I use multiple measures? If so, how will I combine them?

   c. Do I have the disciplinary expertise to use or design these measures? Should I collaborate with a co-author from a different discipline?
Guiding questions at the RCT Design Stage

1. Which skills do I want to measure, why those skills, and which measurement tools do I plan to use?

2. How will I determine that the proposed measures are predominantly capturing the latent trait of interest in the context of the proposed study?
Guiding questions at the RCT Design Stage

1. Which skills do I want to measure, why those skills, and which measurement tools do I plan to use?

2. How will I determine that the proposed measures are predominantly capturing the latent trait of interest in the context of the proposed study?
   a. What other outcomes should my measure be correlated with if it truly measures the trait I would like for it to measure, and how will I test this?
   b. What can I do to assure that the proposed measure will allow separating the measurement of the latent trait of interest from other factors (e.g. other related traits or some form of response bias)?
   c. If I am planning on using a measure someone else designed, has a validation paper been published? Does the context of the validation paper match the context of my evaluation? (Tested on a similar age group, in a similar language, in a similar geography?)
Guiding questions at the RCT Design Stage

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   a. What methods can I use to reduce measurement error?
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4. How and where will I report on the measurement adaptation, piloting, validity and reliability tests?
   a. Should I commit to this reporting in a pre-analysis plan?
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4. How and where will I report on the measurement adaptation, piloting, validity and reliability tests?

5. If my measure is failing some reliability and validity checks, how will I determine if there is an issue with the measure or with the experimental design?
   a. For example, may the measure fail to capture the same trait over time or may the experimental variations themselves affect the validity of a measure (e.g. by inducing changes in response patterns/biases)?
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6. How will I adjust my analysis and the write-up of the research results to reflect my findings on the validity and reliability of my measures?
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6. How will I **adjust my analysis and the write-up** of the research results to reflect my findings on the validity and reliability of my measures?
Appendix 2 - List of Measures Observed in Review

For each tool appearing >1 time:

- # of times it appears in the review
- which RCTs use this tool
- which skill the tool measures
- larger measurement category (self-report, observed, etc)
- original paper that developed/validated the tool
- age range of the original sample
- age range the tool was used among the observed RCTs
- official website (if open-access)
- which country the original paper was in
- additional countries the tool was validated in (from observed cited validation papers from evaluations in this review)
Thank you!

jwilliams@povertyactionlab.org