Obtaining a single score from multiple reporters: An item analysis that combines parent and teacher reports

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The Constructs

- Social / Behavioral Competence:
  - How outgoing is a child?, Does the child follow directions?, Does the child get in trouble?
- Academic Competence
  - Does the child know basic personal information?, Does the child have a basic grasp of reading / math?
- Adaptive Competence / Independent Functioning
  - Can the child use a toothbrush, wash hands, has use of arms & legs?

Multiple Reporters & Measures

- Two reporters:
  - KFI - Parent Report (N = 2,298)
  - KTS - Teacher Report (N = 1,581)
- Different scales
  - Different items on each scale
- Not all children were assessed by both reporters
- Not all items were completed by all reporters on any single measure
- We want a common score that can be used for all children
- So what do we do?

Measurement Theory

- Classical test theory (CTT)
  - Get a sum or mean score for each kid on each completed assessment (per construct)
  - May not want two scores per kid (when available)
  - There are other problems....
    - All items are equally reliable
    - Scores are item / test dependent

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- Modern measurement theory (MMT)
  - Calculate a single score from multiple reporters
  - Can score all kids with at least one response from at least one reporter
  - While this is possible, it is more difficult....

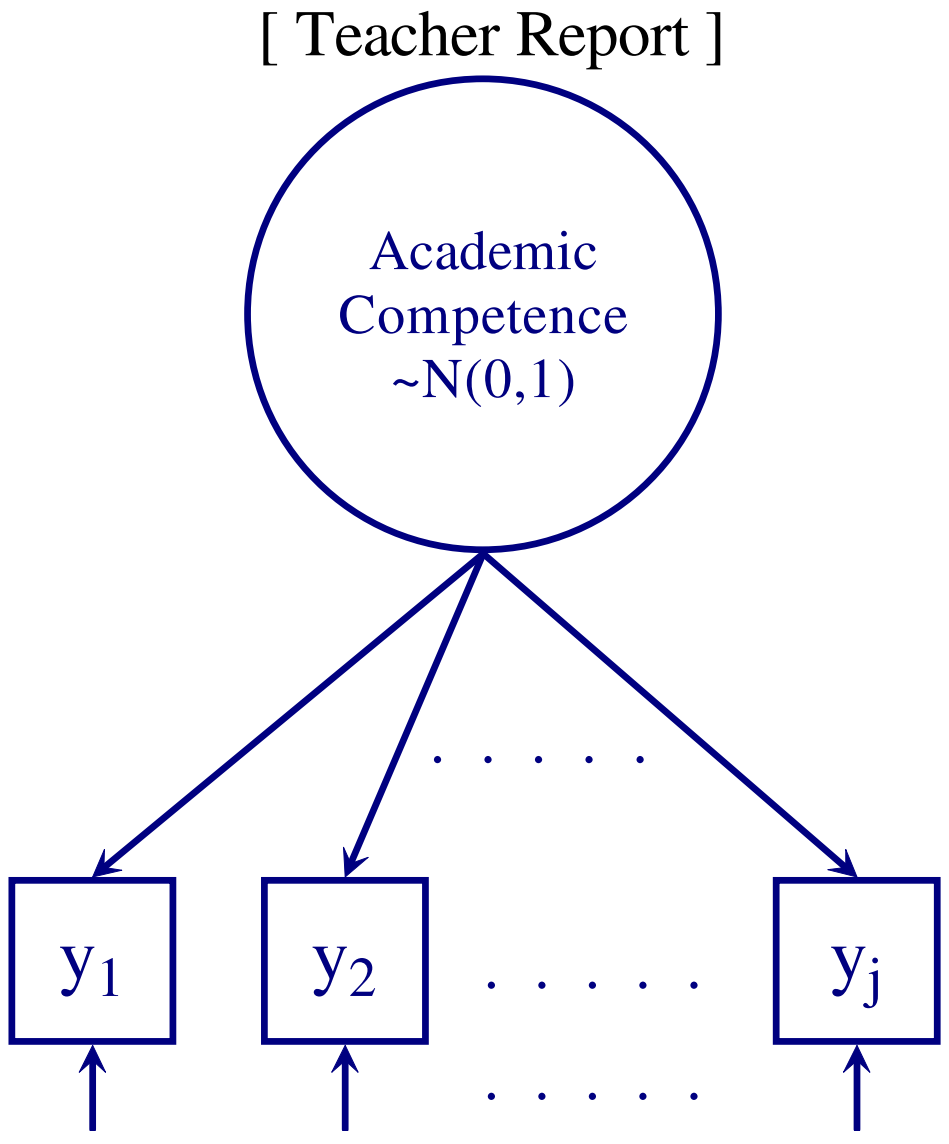
Some of the steps

- Select items you believe operationally define your constructs of interest
- Item Factor Analysis (IFA):
  - Initial exploratory factor analysis
    - Sense of possible dimensionality issues
    - Local dependence
  - Evaluate unidimensional IFA models within reporter
  - Combine reports to evaluate a joint IFA model
    - Use of “Method” factors, also called a “Bi-factor” model
  - Estimate individual scores

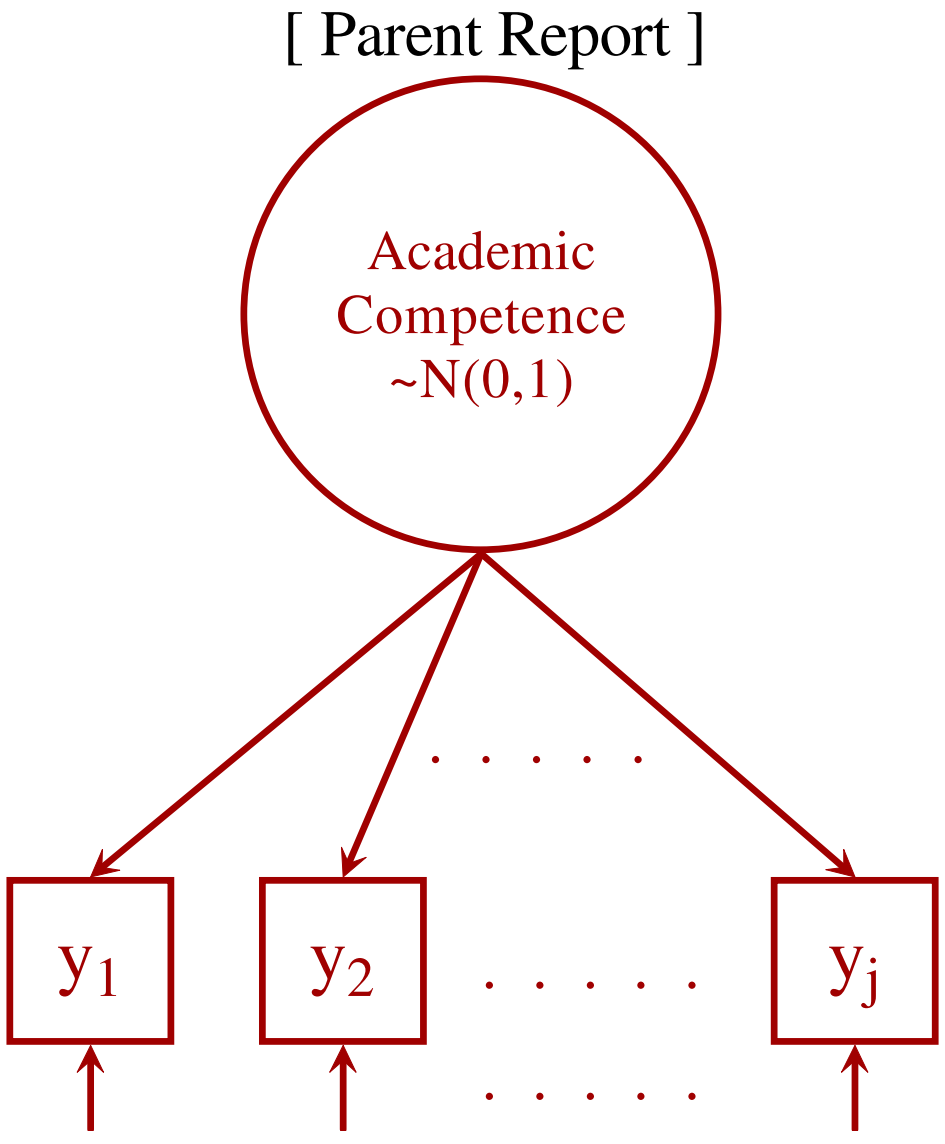
Item Factor Analysis

- Item Factor Anlaysis
  - Categorical Exploratory Factor Analysis
  - Categorical Confirmatory Factor Analysis
  - Item Response Theory
- Item independent
- Allows for item specific weights
- Provides continuous, interpretable, and comparable scores

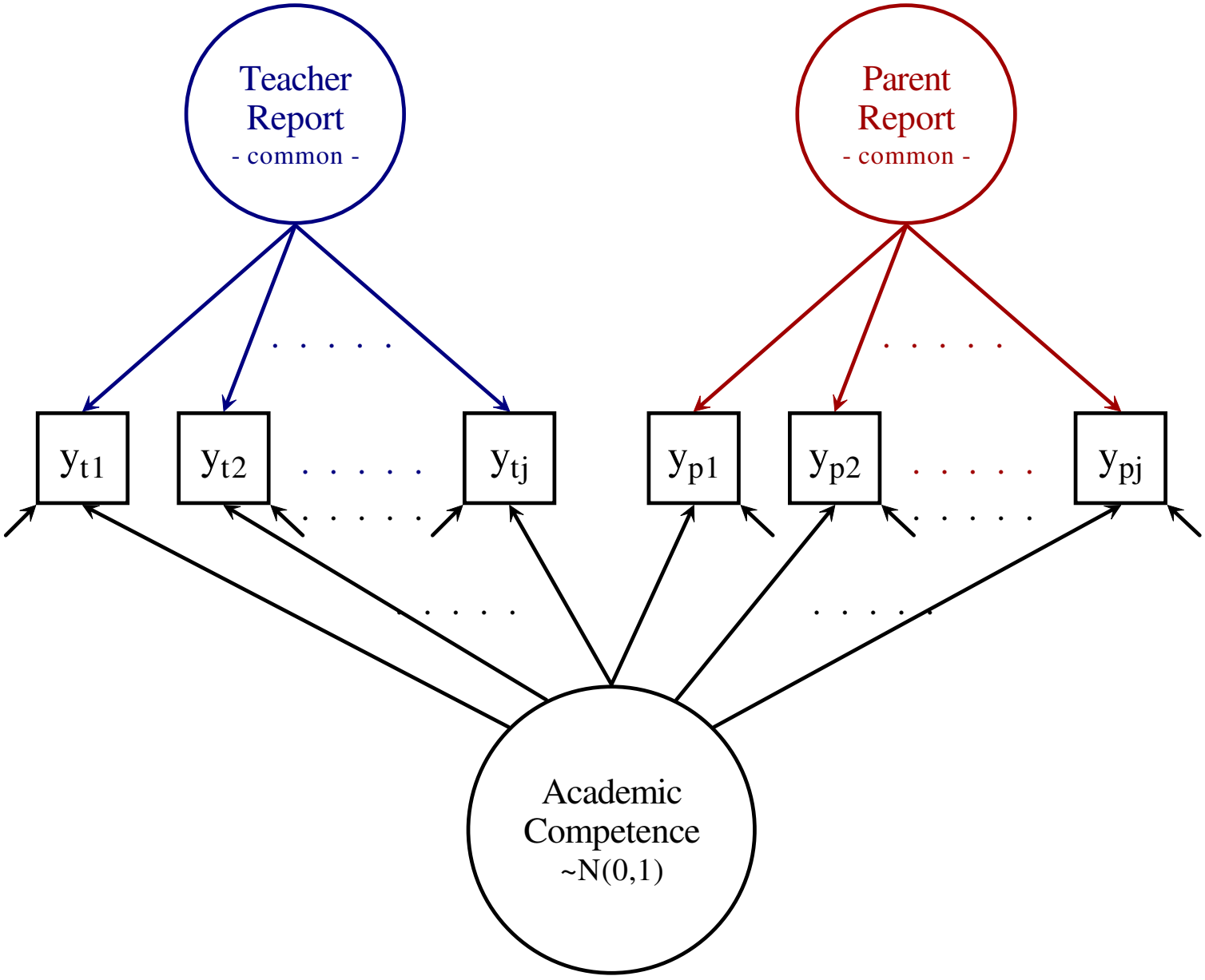
Teacher Report



Parent Report



Bi-factor Model

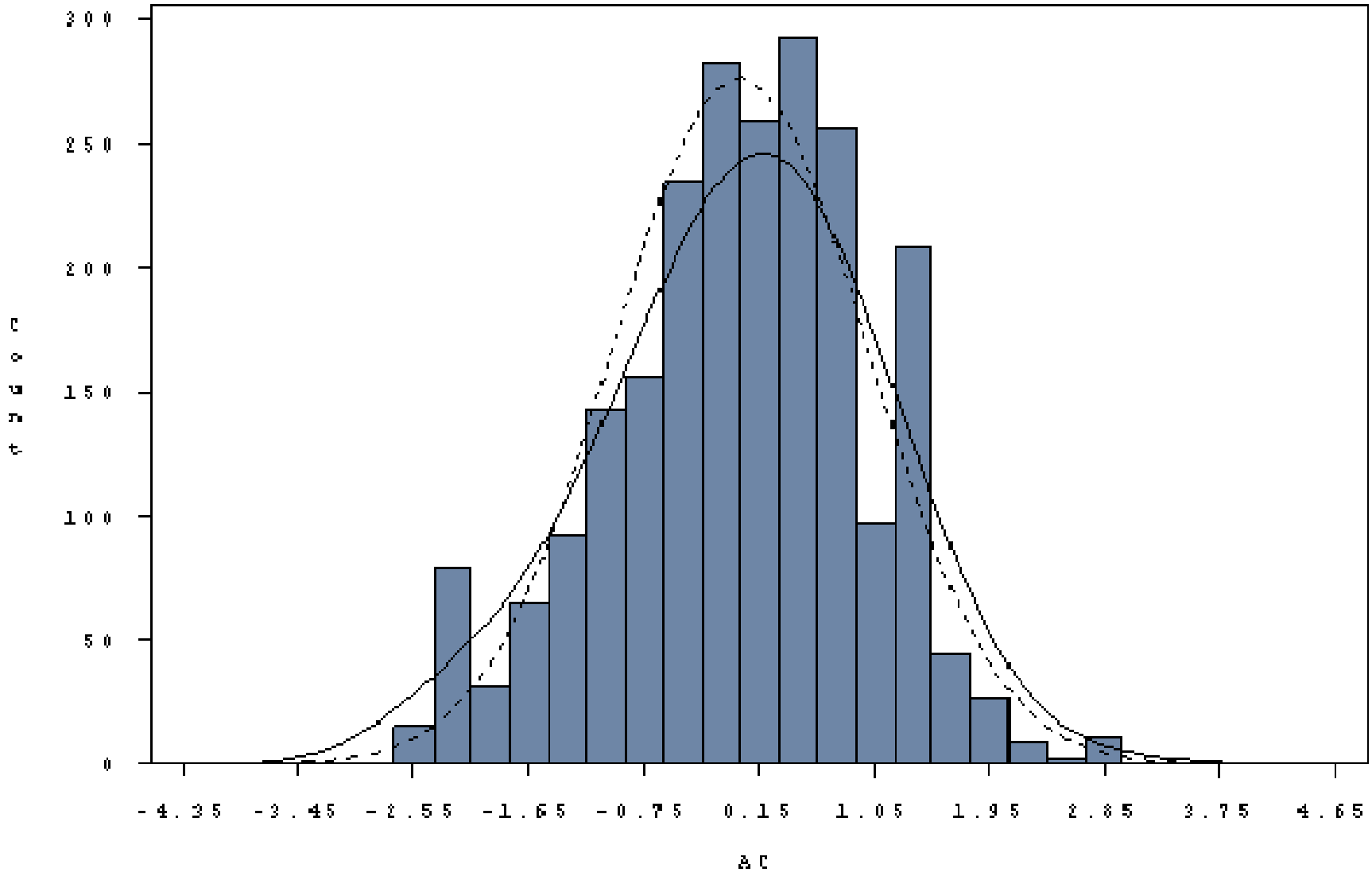


Model Fit

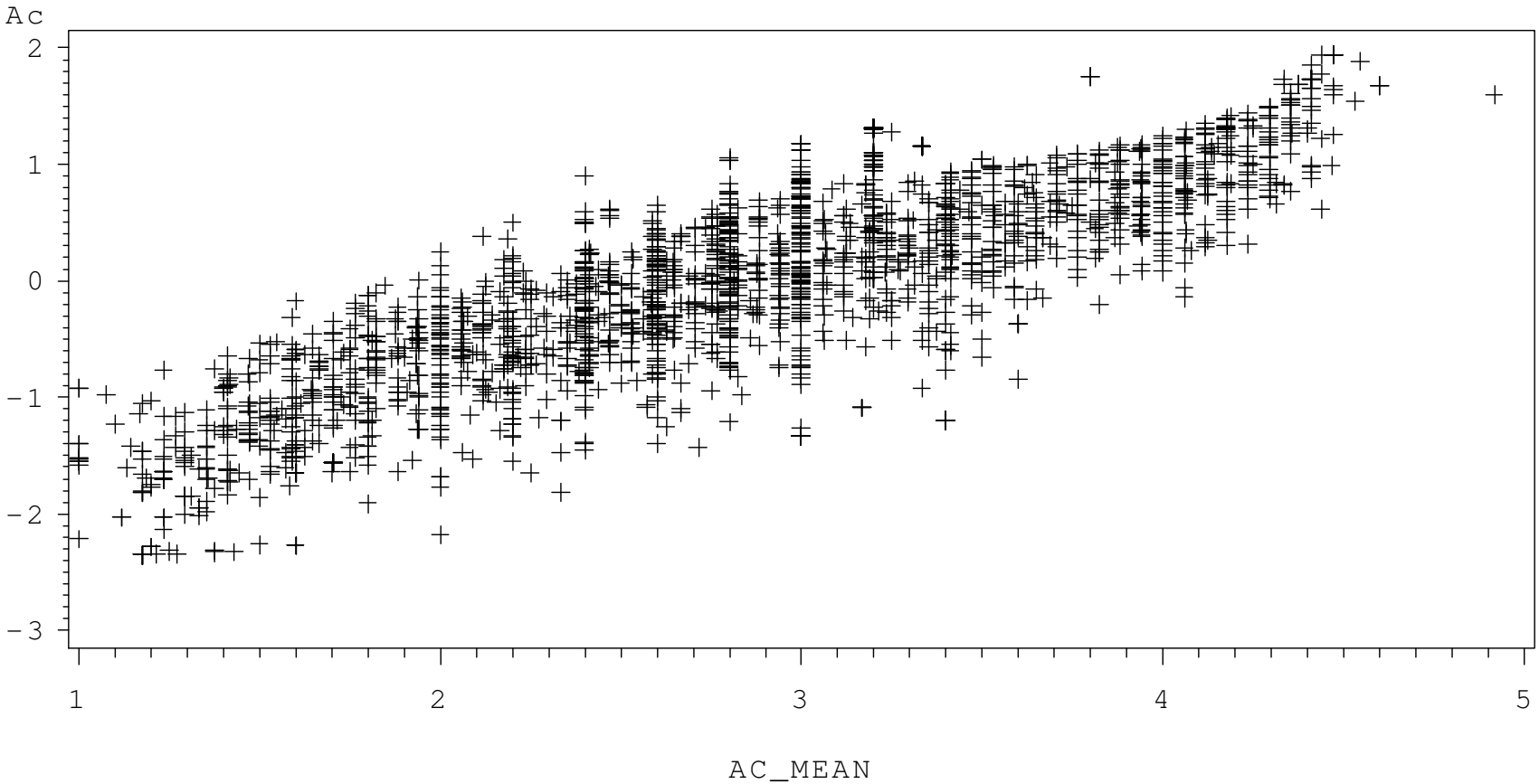
	Outcome		
	Social / Behavioral	Academic	Adaptive / Independence
χ^2	316.90	654.11	755.23
df	71	48	117
p-value	$< .0001$	$< .0001$	$< .0001$
CFI	0.98	0.98	0.97
TLI	0.99	1.00	1.00
RMSEA	0.04	0.07	0.05
N	2320	2307	2307

Estimation and evaluation was conducted using Robust WLS as implemented in Mplus v.5

Academic Scores (N = 2307)



Academic Factor vs. Mean Scores



Mean Outcome Scores by Kindergarten IEP Status

Domain	IEP	Disability but No IEP	No IEP
Social / Behavioral	-.38	.28	.49
Academic	-.35	.26	.46
Adaptive Functioning	-.43	.16	.68

Mean Academic Score by Provider Rating's of Delay

Domain	No	Mild	Moderate / severe	N/A
Gross motor	.33	-.06	-.78	-.00
Fine motor	.39	-.00	-.72	-.01
Social development	.38	-.09	-.60	.00
Receptive language	.43	.04	-.56	-.01
Expressive language	.50	.23	-.30	.00
Cognitive development	.42	-.04	-.69	.00
Self-help/independence	.34	.05	-.72	.01
Vision	.17	-.56	-.97	-.05
Hearing	.12	-.18	-.61	-.06

Summary

- Introduction
- Measurement
  - thinking about scores
- Item Factor Analysis
- Obtain a single, easily interpretable score from multiple reporters
- Initial Validation

Thank You.

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