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Reliability generalization of the Emotional Quotient Inventory Youth Version (EQ-i:YV):A meta-analitic structural equation modelling approach

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THE BEGGINING AND THE END...
α
ω

Justification

- Problems in univariate MA-GR using Cronbach Alfa as effect size: lack of equivalence between total reliability and subscales reliability.
- Principles of Alfa Cronbach difficult to address:
  - Equivalence of the contribution of each item to the scale (Tau-equivalence).
  - Independence of errors.
  - Unidimensionality.

Dunn, T. J., Baguley, T., & Brunsden, V. (2013). From Alpha to omega: a practical solution to the pervasive problem of internal consistency estimation. *British Journal of Psychology, 105*(3), 399-412. https://doi.org/10.1111/bjop.12046

Basic principles of MASEM

1

Estimation of Random Effects Model

2

Combination of correlation matrices from different primary studies

3

Estimation and check of Structural Equation Model fit, based on the pooled correlation matrices

INTRODUCTION

- Antecedent of MASEM: Invariance analysis of SEM across primary studies (Raykov & Marcoulides, 2013).
- Different MASEM procedures have been proposed:
    - Correlation-based MASEM:
        - Two-stage MASEM (TSMASEM).
        - One-stage MASEM (OSMASEM).
    - Parameter-based MASEM.

Jak, S., & Cheung, M. W. L. (2020). Meta-analytic structural equation modeling with moderating effects on SEM parameters. *Psychological methods*, *25*(4), 430.

Raykov, T., & Marcoulides, G. A. (2013). Meta-analysis of scale reliability using latent variable modelling. *Structural Equation Modeling: A multidisciplinary Approach, 20*(2),338-353.

MASEM

	Correlation-based		Parameter-based
	Two-stage	**One-stage**	
Common effect size	inter-items correlation matrix.	inter-items correlation matrix	Reliability coefficients
Factor structure	Stage 1: Combine the matrices. Stage 2: Run the CFA.	Unic stage: estimate the pooled matrices and run the CFA.	Unic stage: Run a separate CFA per primary study.
Reliability Generalization	1. Estimate the average reliability 2. Evaluate heterogeneity of correlations. 3. Only quantitative moderators.	1. Estimate the average reliability. 2. Evaluate the heterogeneity of correlations. 3. Analysis of moderators influencing factor loadings.	1. Combine the reliability coefficients. 2. Evaluate the heterogeneity of reliability coefficients. 3. Analysis of moderators.

Objective of the study

To Implement MASEM on the Emotional Quotient Inventory Youth Version (EQ-i:YV; Bar-On & Parker, 2003)

Characteristics of the scale

60-item self-report measure.

4 dimensions: *Intrapersonal scale, interpersonal scale, stress management scale, adaptability scale.*

**There is a popular short version of 35 items with the same factors.*

Example of items

- Intrapersonal:
  - *It is easy to tell people how I feel.*
- Interpersonal
  - *I care what happens to other people.*
- Stress management
  - *I can stay calm when I am upset.*
- Adaptability
  - *It is easy for me to understand new things*

Search of studies

- Initial identification: 320 potential studies.
- Screening: 100 studies.
- Studies assessed: 84
- Final studies included: 17
  - Reasons for exclusión: qualitative study, lack of correlation matrices.
  - Matrices of correlations included: 19.

Codification

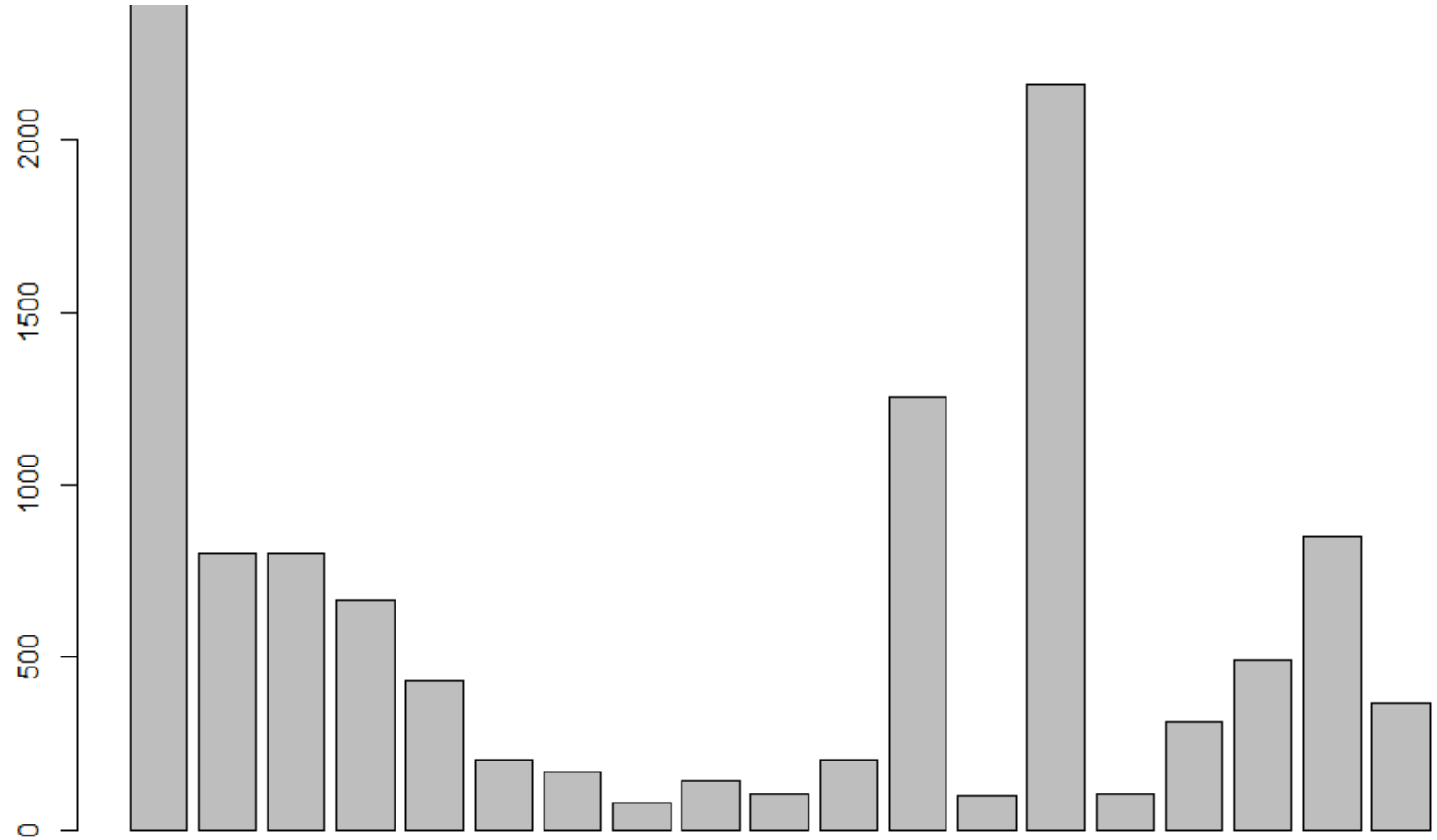
- Only correlations between factors included. None of the studies reported the inter-item correlation matrices.
- Two studies reported two correlation matrices as they used different types of simples.
- Subsamples (not included in the MASEM):
  - Adolescents.
  - Gifted students.
  - Children.
  - Students with disabilities.

Method

- Scherer, R., & Teo, T. (2020). A tutorial on the Meta-analytic structural equation modeling of reliability coefficients. *Psychological Methods, 25*(6), 747-775. https://doi.org/10.1037/met0000261

Procedures	R packages
Univariate	Metafor
Parameter-based MASEM	Metafor, Psych
One-Stage MASEM	Lavaan, MetaSEM
Two-stage MASEM	Lavaan, MetaSEM

SAMPLE DISTRIBUTION ACROSS PRIMARY STUDIES



Results: Two-Stage MASEM

	Intra	Inter	SM	AD
Intra	1			
Inter	0,30	1		
SM	0,22	0,20	1	
AD	0,32	0,48	0,20	1

Results: Two-stage MASEM. Fixed-effects Model

CORRELATION MATRIX FIXED EFFECTS MODEL

Modelo	χ^2 (gl)	RMSEA (IC)	CFI	AIC
FEM	1771,62 (108)*	0,12 (0,118-0,128)	0,84	1555.62

The fixed-effect model is not a suitable representation of the correlation matrix, given its poor fit indices. This may already be interpretaed as evidence for the existence of the between-sample variation of correlations. Therefore, a random-effects model should be estimated.

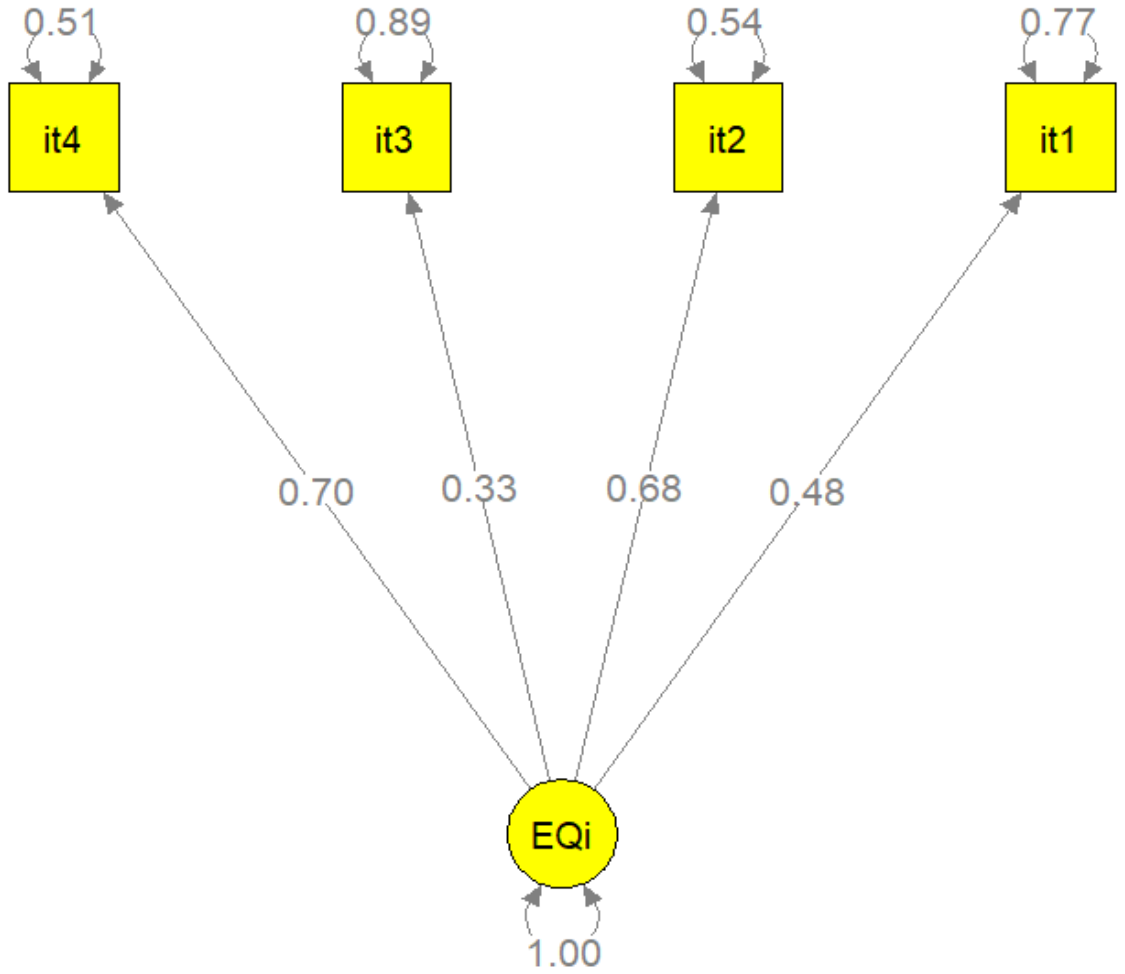
Results: Two-stage MASEM. Random effects model

	Intra	Inter	SM	AD
Intra	1			
Inter	0,31	1		
SM	0,14	0,13	1	
AD	0,33	0,48	0,13	1

Results: Two-Stage MASEM Random-effects model

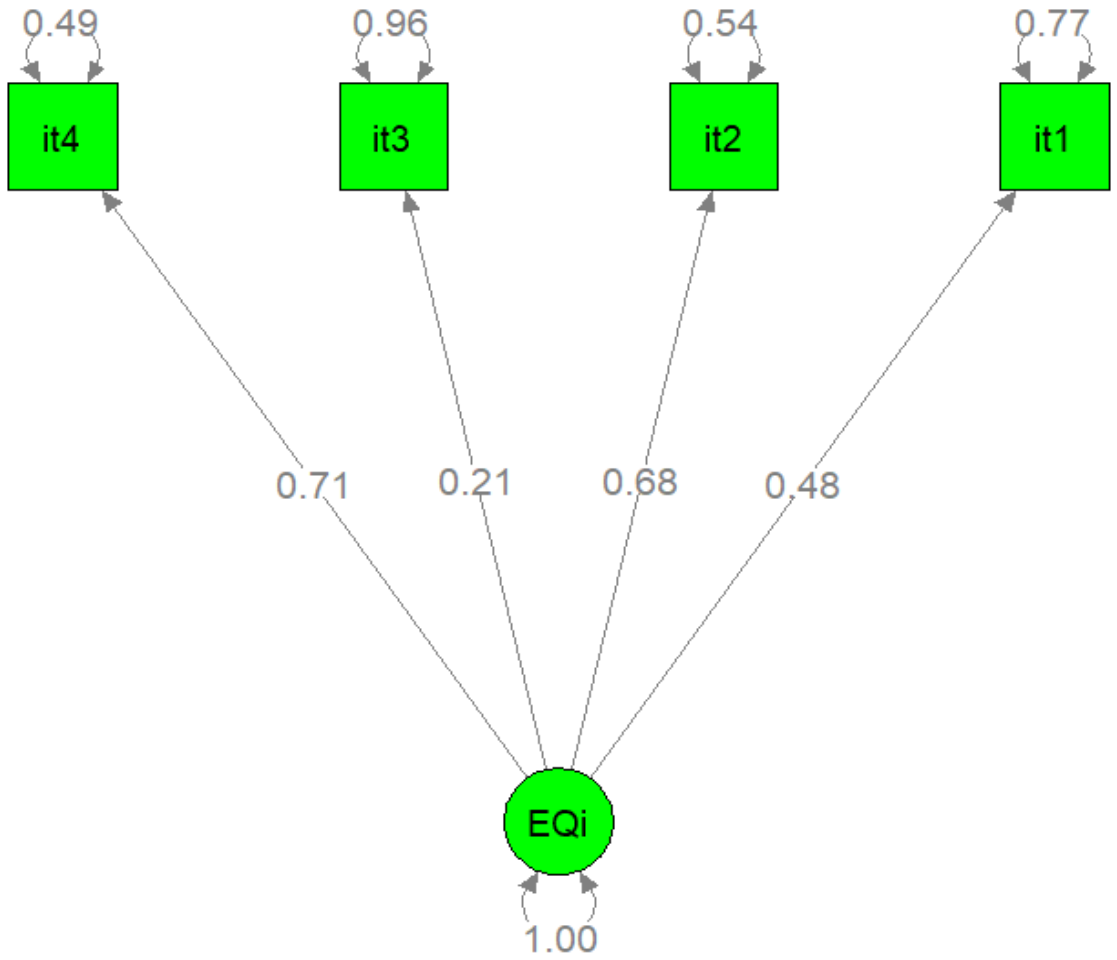
- Hetereogeneity indces (based on the estimated Tau2):
- Intercept 1. I2 = 0.93
- Intercept 2. I2 = 0.95
- Intercept 3. I2 = 0.93
- Intercept 4. I2 = 0.93
- Intercept 5. I2 = 0.89
- Intercept 6. I2 = 0.93

Results. Two-Stage. Model estimation FEM



CFI = 0.98
TLI = 0.94
RMSEA = 0.06
SRMR = 0.03
AIC = 174.31
BIC = 158.58
OMEGA = 0,638 [0,629-0,645]
Likelihood-Based CI

Results. Two-Stage. Model estimation REM



CFI = .99
TLI = .99
RMSEA = .002
AIC = -1.84
BIC = -17.56
OMEGA = 0.609 [0.578, 0.638). Likelihood-Based CI

Discussion and conclusions

Type of MASEMS applied to EQ-i: YV	Reliability values (Omega)
Two-stage MASEM FEM	0.638
Two-Stage MASEM REM	0.609

- Random effects models show a better representation of the data structure, as the inter-studies heterogeneity is considered.
- Low Omega values may confirm the multidimensionality nature of the scale.
- General limitations in MASEM: Normally, primary studies do not report inter-item correlation matrices.
- Recommendation that helps applied researchers: Expansion of Shiny App:

Jak et al. (2021). Meta-analytic structural equation modeling made easy: A tutorial and web application for one-stage MASEM. *Research Synthesis Methods, 12*(5), 590-606. https://doi.org/10.1002/jrsm.1498

Extra information… published MASEM with moderator analyses

Regular Article

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Reliability Generalization of the School Attitude Assessment Survey-Revised: A Meta-Analytic Structural Equation Modeling Approach

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THANK YOU VERY MUCH!!

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