Standardized Root Mean Square Residual (SRMR)

The SRMR is a popular absolute fit index, which is not derived from the χ^2-statistic. It is the standardized difference between the observed and model-implied covariances in the covariance matrices. The sample estimate of the global SRMR can be computed from the model-implied and observed (co)variance matrices $\hat{\Sigma}$ and S with the formula (Bentler, 1995; Heene et al., 2011)

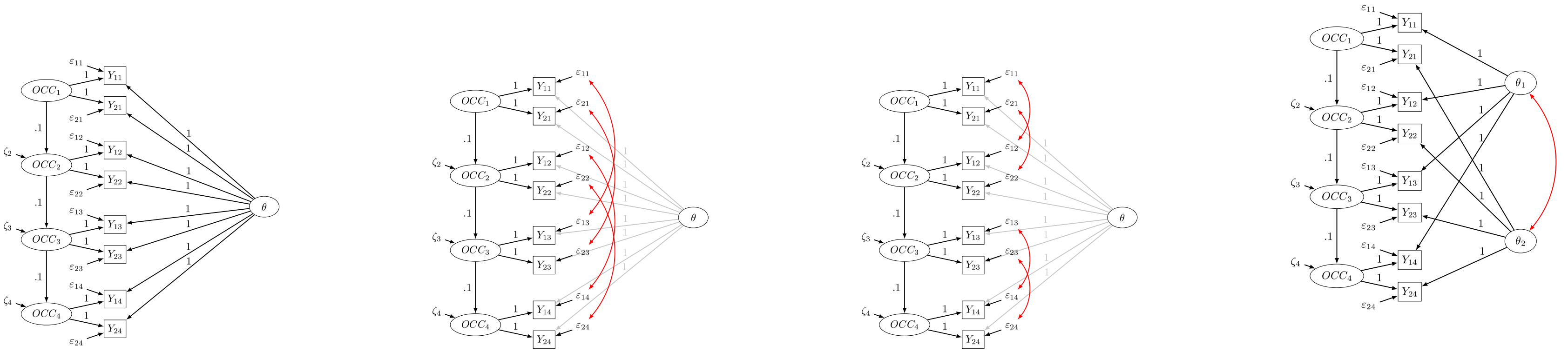
$$\text{SRMR} = \sqrt{2\sum_{i=1}^{p}\sum_{j=1}^{i}\frac{\left(\frac{s_{ij}-\hat{\sigma}_{ij}}{\sqrt{s_{ii}s_{jj}}}\right)^2}{p(p+1)}} \tag{1}$$

where p stands for the number of observed variables; s_{ij} are the observed covariances; $\hat{\sigma}_{ij}$ are the model-implied covariances; s_{ii} and s_{jj} are observed standard deviations. That means, that is, $\hat{\sigma}_{ij}$ are the entries of $\hat{\Sigma}$, while s_{ij}, s_{ii}, and s_{jj} are entries of S.

Block-wise versions of the SRMR can be computed from the block-wise model-implied variance-covariance matrix $\hat{\Sigma}_k$ and observed variance-covariance matrix S_k, which both include only the (co)variances of the manifest variables uniquely associated with each block. That means, to compute SRMR_k, we apply the formula above, but $\hat{\sigma}_{ij}$ are entries of $\hat{\Sigma}_k$, and likewise s_{ij}, s_{ii}, and s_{jj} are entries of S_k. An SRMR $\leq .08$ indicates good model fit (Hu & Bentler, 1999).

Figure E1

This figure visualizes the design of study 1 (pathmodels a and e) and study 2. Data is generated based on the models a-h. For misspecified models, the misspecification introduced through the correlations represented in red are either small (residual correlations: r = .15, structural error: r = .90) or large (residual correlations: r = .40, structural error: r = .60). Data is analysed with the respective model on the left (a and e). In study 1, data is generated and analysed based on models a and e, meaning that all models are correctly specified.

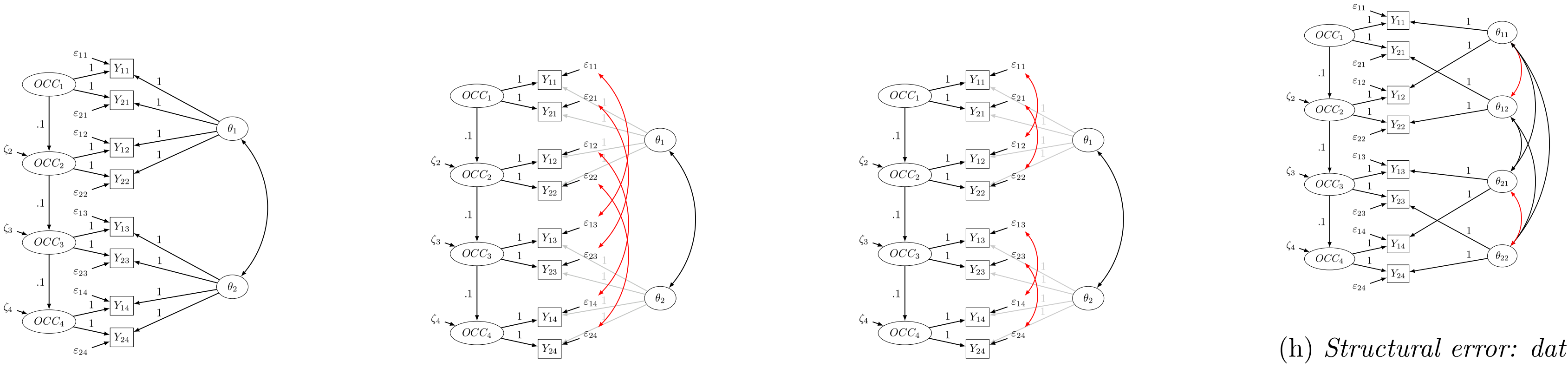


(a) *Single-trait model without misspecification*

(b) *Model with correlated residuals between days.*

(c) *Model with correlated residuals within days.*

(d) *Structural error: data is generated with correlated indicatorspecific traits*



(e) *Day-specific model without misspecification.*

(f) *Model with correlated residuals between days*

(g) *Model with correlated residuals within days*

(h) *Structural error: data is generated with correlated indicatorspecific traits for each day.*

Figure E2

Results of study 1 for the single-trait model. Yuan et al. (2015) corrected estimates are given for the χ^2 *rejection rates and Kolmogorov–Smirnov (KS) distances.*

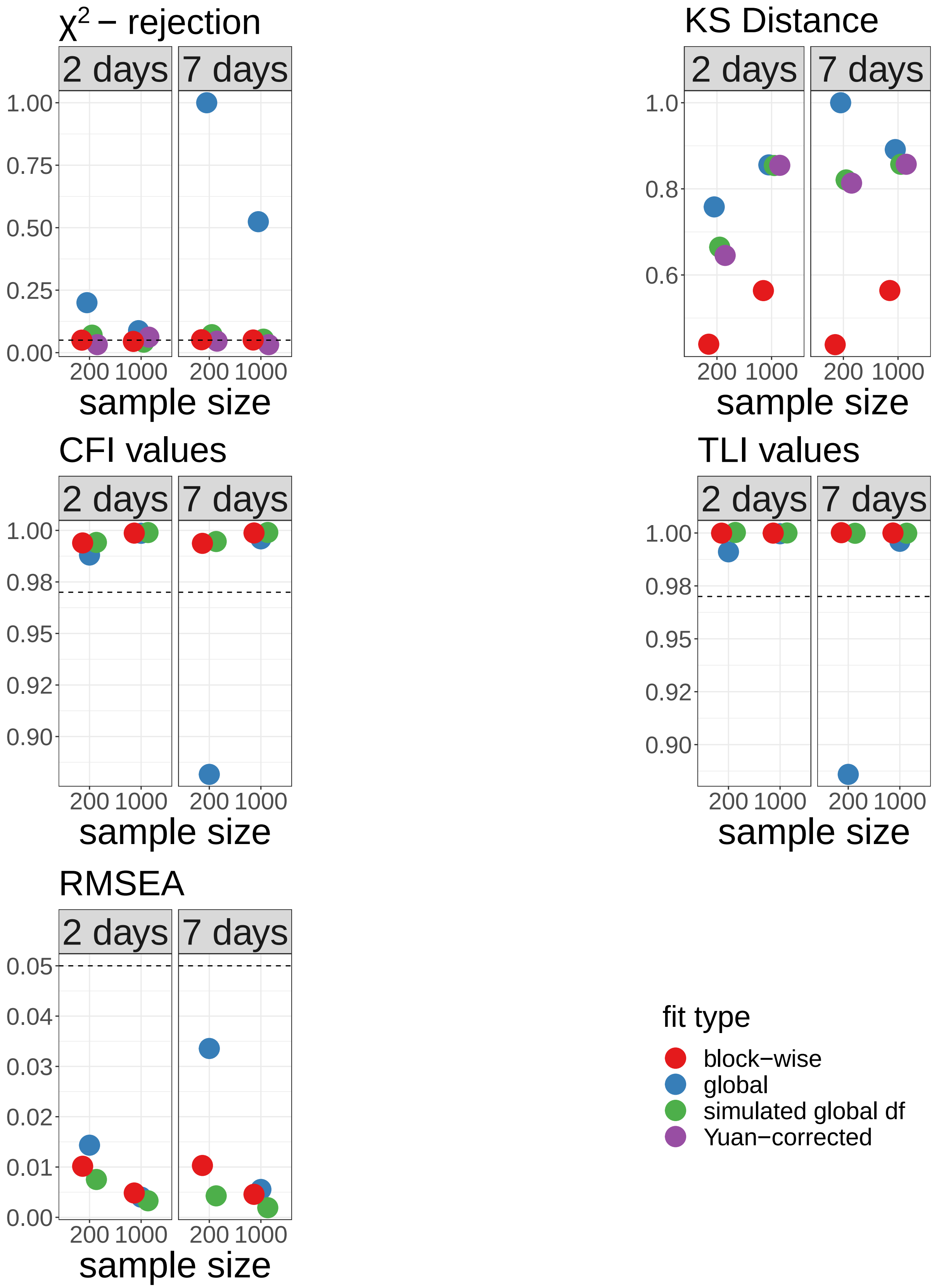


Figure E3

Results of study 1 for the model with day-specific traits. Yuan et al. (2015) corrected estimates are given for the χ^2 rejection rates and Kolmogorov–Smirnov (KS) distances.

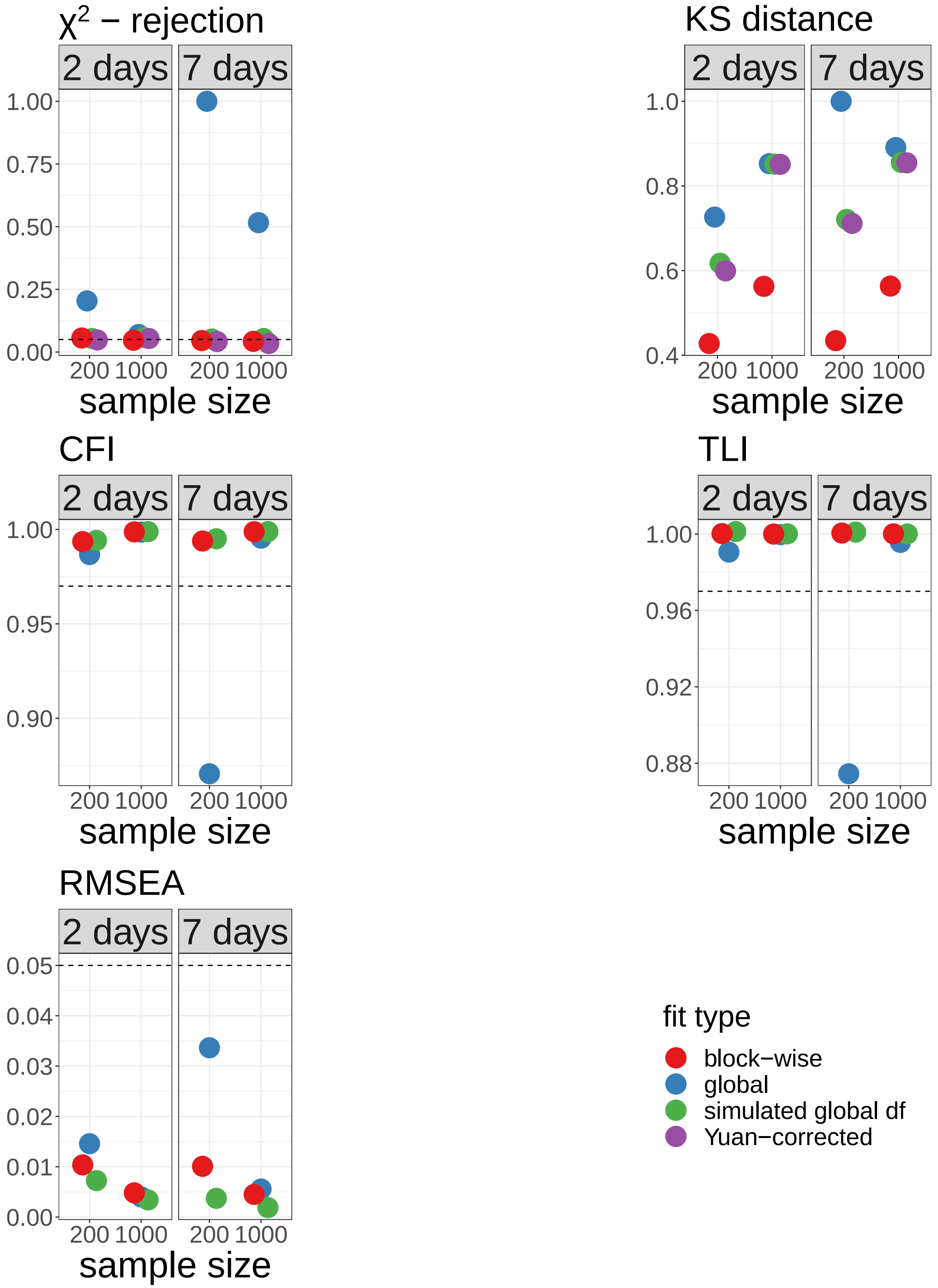


Table E1

Results of study 2: ANOVAs comparing χ^2/df ratios based on global evaluation, global with simulated degrees of freedom, block-wise fit evaluation, and Yuan et al. (2015) corrected χ^2 for misspecified models.

effects on χ^2/df ratio

	df	F	p	η^2
model	1	4636.0	$< .001$	0.001
days	1	107115.8	$< .001$	0.01
misspecification	5	412102.9	$< .001$	0.26
N	1	952053.4	$< .001$	0.12
fit type	3	119700.7	$< .001$	0.05
model:days	1	125.2	$< .001$	$< .001$
model:misspecification	5	1488.4	$< .001$	0.001
model:N	1	2330.4	$< .001$	$< .001$
model:fit type	3	350.7	$< .001$	$< .001$
days:misspecification	5	37401.0	$< .001$	0.02
days:N	1	54119.1	$< .001$	0.007
days:fit type	3	20434.2	$< .001$	0.008
misspecification:N	5	201819.0	$< .001$	0.13
misspecification:fit type	15	105156.1	$< .001$	0.20
N:fit type	3	57895.2	$< .001$	0.02
model:days:misspecification	5	21.6	$< .001$	$< .001$
model:days:N	1	22.2	$< .001$	$< .001$
model:days:fit type	3	49.7	$< .001$	$< .001$
model:misspecification:N	5	403.8	$< .001$	$< .001$
model:misspecification:fit type	15	288.5	$< .001$	0.001
model:N:fit type	3	155.8	$< .001$	$< .001$
days:misspecification:N	5	9342.8	$< .001$	0.006
days:misspecification:fit type	15	7127.0	$< .001$	0.01
days:N:fit type	3	10079.7	$< .001$	0.004
misspecification:N:fit type	15	58386.4	$< .001$	0.11
residuals	179876			

Table E2

Results of study 2: ANOVAs comparing CFI values based on global evaluation, global with simulated degrees of freedom, and block-wise fit evaluation for misspecified models.

effects on CFI				
	df	F	p	η^2
model	1	5865.1	< .001	0.002
days	1	89526.8	< .001	0.03
misspecification	5	337291.7	< .001	0.57
N	1	14926.6	< .001	0.005
fit type	2	133213.7	< .001	0.09
model:days	1	289.0	< .001	< .001
model:misspecification	5	4219.3	< .001	0.007
model:N	1	76.4	< .001	< .001
model:fit type	2	1367.4	< .001	0.001
days:misspecification	5	16704.9	< .001	0.03
days:N	1	9422.6	< .001	0.003
days:fit type	2	42835.7	< .001	0.03
misspecification:N	5	289.0	< .001	< .001
misspecification:fit type	10	36904.1	< .001	0.13
N:fit type	2	19282.2	< .001	0.01
model:days:misspecification	5	276.2	< .001	< .001
model:days:N	1	16.4	< .001	< .001
model:days:fit type	2	93.5	< .001	< .001
model:misspecification:N	5	15.7	< .001	< .001
model:misspecification:fit type	10	1959.3	< .001	0.007
model:N:fit type	2	85.6	< .001	< .001
days:misspecification:N	5	119.7	< .001	< .001
days:misspecification:fit type	10	6071.9	< .001	0.02
days:N:fit type	2	13693.5	< .001	0.009
misspecification:N:fit type	10	272.5	< .001	0.001
residuals	155903			

Table E3

Results of study 2: ANOVAs comparing TLI values based on global evaluation, global with simulated degrees of freedom, and block-wise fit evaluation for misspecified models.

effects on TLI				
	df	F	p	η^2
model	1	5820.8	< .001	0.002
days	1	136038.6	< .001	0.04
misspecification	5	360458.7	< .001	0.52
N	1	8669.4	< .001	< .001
fit type	2	253606.6	< .001	0.15
model:days	1	334.1	< .001	< .001
model:misspecification	5	4899.5	< .001	0.007
model:N	1	143.8	< .001	< .001
model:fit type	2	1445.6	< .001	0.001
days:misspecification	5	19839.7	< .001	0.03
days:N	1	8323.3	< .001	0.002
days:fit type	2	72257.6	< .001	0.04
misspecification:N	5	934.5	< .001	0.001
misspecification:fit type	10	38277.6	< .001	0.11
N:fit type	2	33428.6	< .001	0.02
model:days:misspecification	5	373.1	< .001	0.001
model:days:N	1	37.0	< .001	< .001
model:days:fit type	2	104.2	< .001	< .001
model:misspecification:N	5	26.8	< .001	< .001
model:misspecification:fit type	10	2303.8	< .001	0.007
model:N:fit type	2	137.4	< .001	< .001
days:misspecification:N	5	322.2	< .001	< .001
days:misspecification:fit type	10	7123.1	< .001	0.02
days:N:fit type	2	21879.2	< .001	0.01
misspecification:N:fit type	10	547.0	< .001	0.002
Residuals	155903			

Table E4

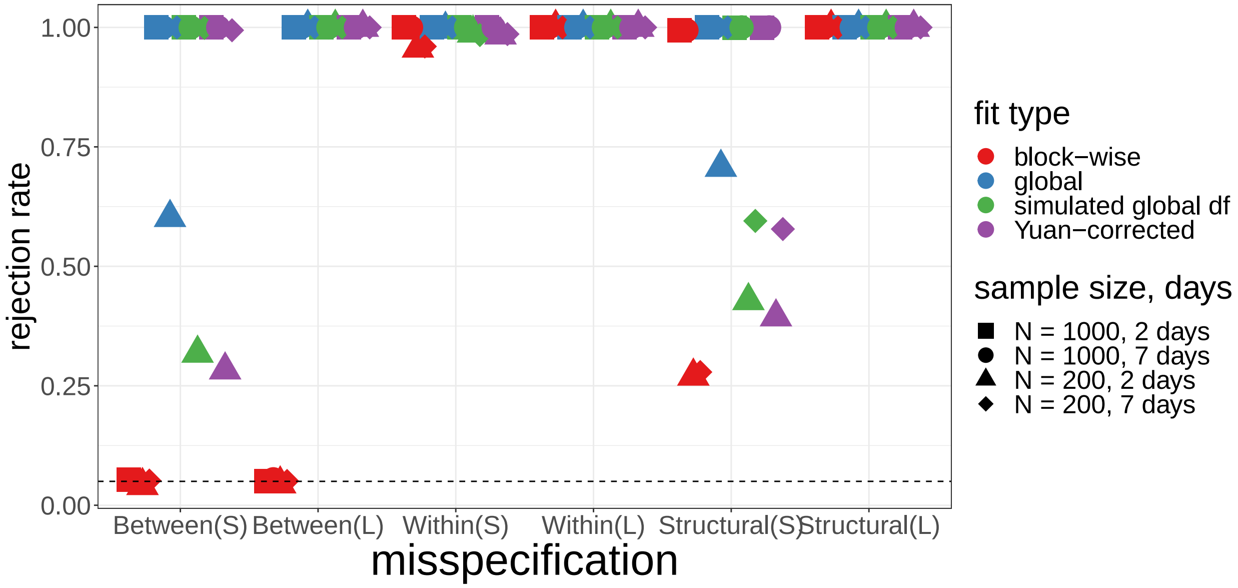
Results of study 2: ANOVAs comparing RMSEA values based on global evaluation, global with simulated degrees of freedom, and block-wise fit evaluation for misspecified models.

effects on RMSEA

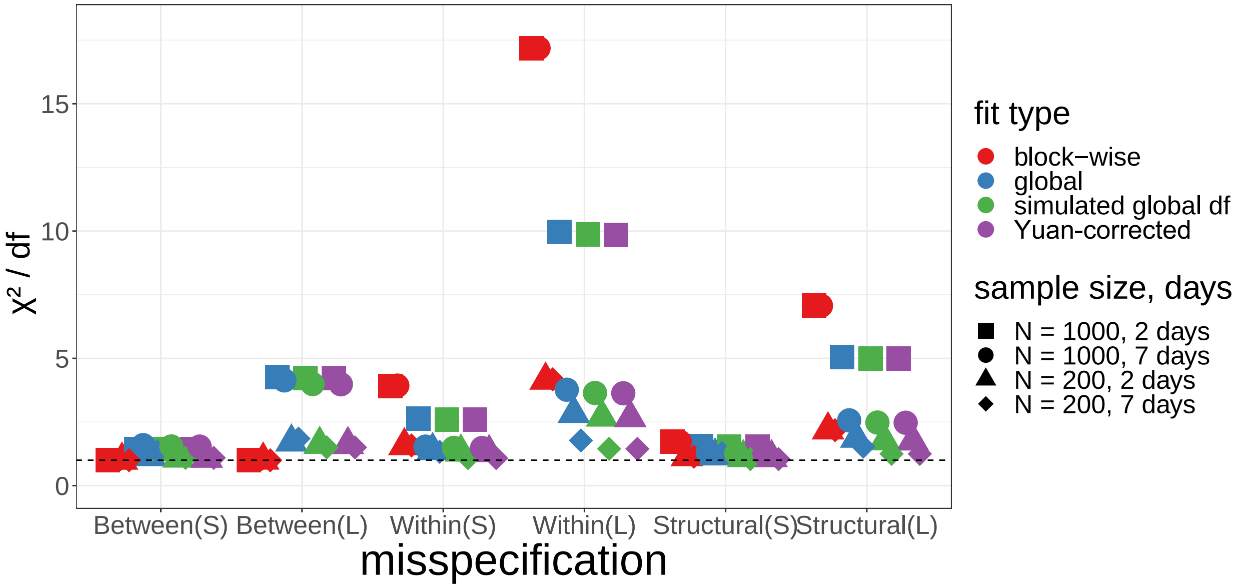
	df	F	p	η^2
model	1	2676.4	< .001	0.001
days	1	27321.8	< .001	0.01
misspecification	5	192939.9	< .001	0.53
N	1	1806.8	< .001	0.001
fit type	2	12138.8	< .001	0.01
model:days	1	10.9	< .001	< .001
model:misspecification	5	633.7	< .001	0.002
model:N	1	11.8	< .001	< .001
model:fit type	2	534.3	< .001	0.001
days:misspecification	5	8794.3	< .001	0.02
days:N	1	1301.3	< .001	0.001
days:fit type	2	11240.8	< .001	0.01
misspecification:N	5	150.3	< .001	< .001
misspecification:fit type	10	53426.9	< .001	0.29
N:fit type	2	3526.6	< .001	0.004
model:days:misspecification	5	4.2	< .001	< .001
model:days:N	1	1.0	0.306	< .001
model:days:fit type	2	3.9	0.021	< .001
model:misspecification:N	5	1.7	0.128	< .001
model:misspecification:fit type	10	271.2	< .001	0.001
model:N:fit type	2	11.4	< .001	< .001
days:misspecification:N	5	28.2	< .001	< .001
days:misspecification:fit type	10	3180.7	< .001	0.02
days:N:fit type	2	1475.9	< .001	0.002
misspecification:N:fit type	10	277.9	< .001	0.002
residuals	155903			

Figure E4

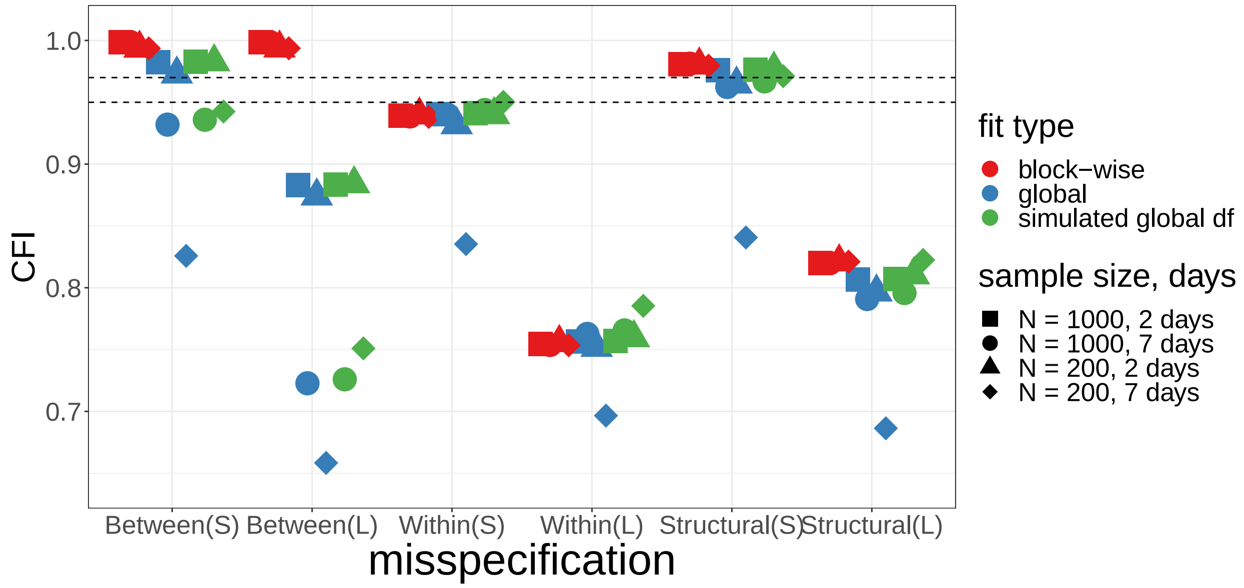
Overview of the results of study 2 for each fit index. The average fit values are provided as symbols for the different simulation conditions. Results are averaged across the two different LST models, because there were no main or interaction effects of the model. The six different misspecifications are provided on the x-axis. Between(S): omitted residuals correlations between days ($r = .15$); Between(L): likewise but with $r = .40$; Within(S): omitted residual correlations within days ($r = .15$); Within(L): likewise but with $r = .40$, Structural(S): data is generated with correlated indicatorspecific traits ($r = .90$); Structural(L): likewise but with $r = .60$.



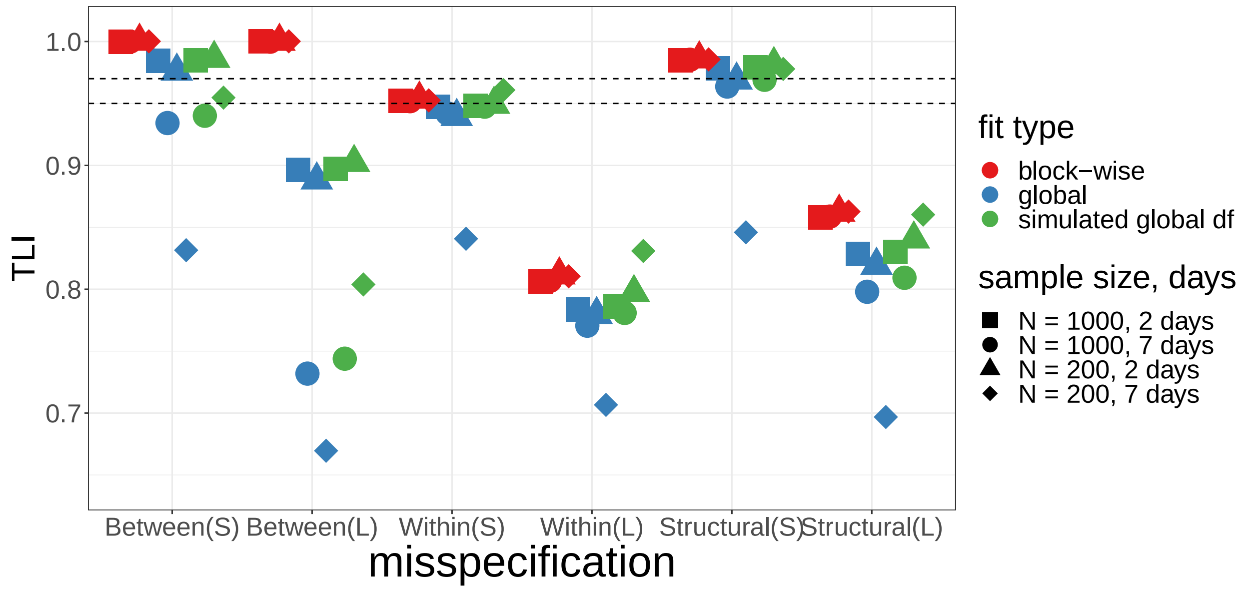
(a) χ^2 *rejection rates for all conditions, with* $\alpha = .05$ *included as a dotted line.*



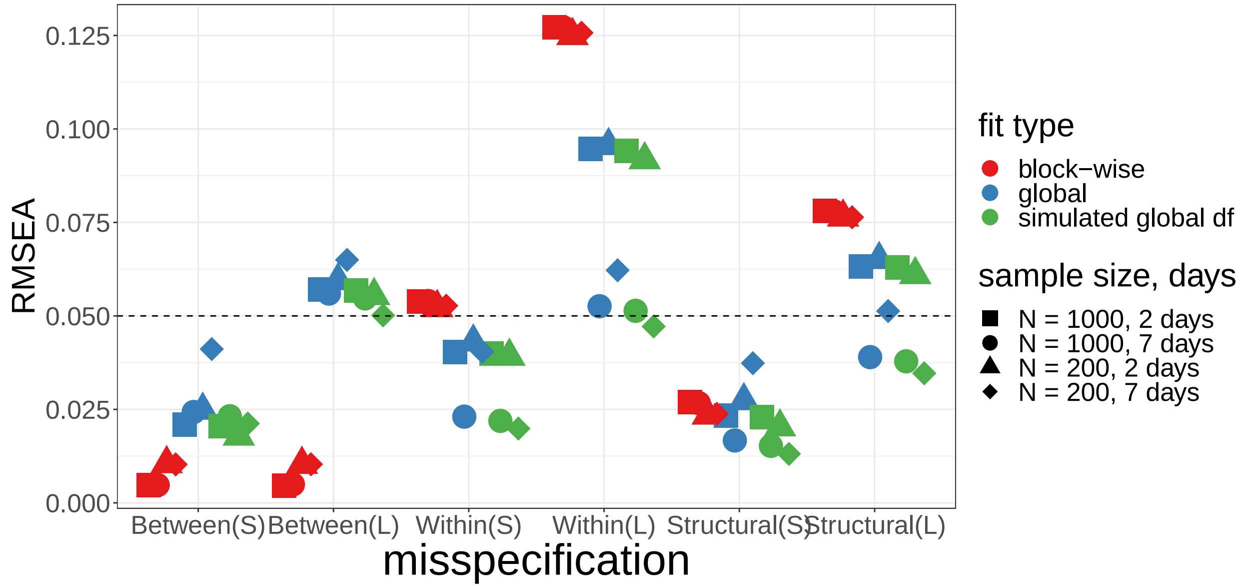
(b) *Average* $\chi^2/\,\mathrm{df}$ *ratios for all conditions. The dotted line at* $\chi^2/\,\mathrm{df} = 1$ *represents perfect fit.*



(c) *Average CFI values for all conditions. Lines are included at CFI* $= .95$ *and* $.97$.



(d) *Average TLI values for all conditions. Lines are included at TLI* $= .95$ *and* $.97$.



(e) *Average RMSEA values for all conditions. A dotted line is included at* $RMSEA = .05$.

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