Does Unique Factor Invariance Matter? Valid Group Mean Comparisons with Ordered-Categorical Indicators

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We provide the simulation results of the observed mean comparison and factor mean comparison for the paper. Table S1 summarizes the raw bias in the observed mean difference, and Table S2 summarizes the raw bias and standard error of the factor mean difference in the scalar model and strict/partial strict models.

Table S1

Raw Bias in the Observed Mean Difference

n_k	C	p_{ni}	d_{ni}	$\alpha_f = 0$	$\alpha_f = 0.2$	$\alpha_f = 0.5$
2	100	0		-0.01	-0.01	0.00
		1	Small	-0.02	-0.02	-0.02
			Large	-0.03	-0.03	-0.03
		3	Small	-0.04	-0.04	-0.04
			Large	-0.07	-0.07	-0.07
	200	0		0.00	0.00	0.00
		1	Small	-0.01	-0.01	-0.01
			Large	-0.02	-0.03	-0.02
		3	Small	-0.04	-0.04	-0.03
			Large	-0.07	-0.07	-0.06
	500	0		0.00	0.00	0.00
		1	Small	-0.01	-0.01	-0.01
			Large	-0.02	-0.03	-0.02
		3	Small	-0.03	-0.03	-0.03
			Large	-0.07	-0.07	-0.06
5	100	0		0.00	-0.01	-0.03
		1	Small	-0.01	-0.02	-0.03
			Large	-0.02	-0.03	-0.04
		3	Small	-0.01	-0.03	-0.05
			Large	-0.03	-0.05	-0.07
	200	0		0.00	0.00	-0.01
		1	Small	-0.01	-0.01	-0.02
			Large	-0.01	-0.02	-0.03
		3	Small	-0.02	-0.02	-0.03
			Large	-0.03	-0.04	-0.06
	500	0		0.00	0.00	0.00
		1	Small	-0.01	-0.01	-0.01
			Large	-0.01	-0.02	-0.02
		3	Small	-0.02	-0.02	-0.03
			Large	-0.04	-0.04	-0.05

Note. n_k = group size. C = number of response categories. p_{ni} = number of unique factor noninvariant items. d_{ni} = degree of unique factor noninvariance. α_f = population factor mean difference.

Table S2

Raw Bias in the Factor Mean Difference in the Scalar and Partial Strict Models

				$\alpha_f = 0$				$\alpha_f = 0.2$				$\alpha_f = 0.5$			
				Scalar		Str./P. Str.		Scalar		Str./P. Str.		Scalar		Str./P. Str.	
C	n_k	p_{ni}	d_{ni}	Bias	SE	Bias	SE	Bias	SE	Bias	SE	Bias	SE	Bias	SE
2	100	0		0.45	1.19	0.04	0.26	0.76	1.78	0.07	0.32	1.55	3.31	0.12	0.42
		1	Small	0.55	1.42	0.06	0.29	0.83	1.86	0.1	0.36	0.98	2.68	0.14	0.46
			Large	0.54	1.35	0.06	0.29	0.8	1.88	0.1	0.36	0.99	2.78	0.14	0.47
		3	Small	0.57	1.55	0.1	0.39	1.23	2.26	0.13	0.44	1.13	3.30	0.27	0.69
			Large	0.65	1.73	0.09	0.38	0.93	2.70	0.13	0.44	1.15	3.84	0.23	0.65
	200	0		0.16	0.56	0.02	0.18	0.24	0.77	0.04	0.21	0.53	1.70	0.11	0.28
		1	Small	0.13	0.54	0.02	0.19	0.29	0.94	0.04	0.23	0.55	1.45	0.11	0.32
			Large	0.13	0.54	0.02	0.19	0.24	0.86	0.04	0.23	0.49	1.41	0.11	0.32
		3	Small	0.15	0.65	0.02	0.23	0.27	0.96	0.05	0.28	0.74	1.91	0.14	0.39
			Large	0.19	0.71	0.02	0.23	0.45	1.21	0.05	0.28	0.73	2.39	0.14	0.39
	500	0		0.04	0.31	0	0.11	0.07	0.40	0.01	0.13	0.11	0.61	0.03	0.17
		1	Small	0.04	0.31	0.01	0.12	0.06	0.40	0.02	0.14	0.13	0.62	0.04	0.19
			Large	0.04	0.31	0.01	0.12	0.06	0.40	0.02	0.14	0.13	0.63	0.04	0.19
		3	Small	0.04	0.33	0.01	0.14	0.07	0.44	0.02	0.16	0.31	0.73	0.04	0.22
			Large	0.05	0.35	0.01	0.14	0.08	0.48	0.02	0.17	0.19	0.82	0.04	0.22
5	100	0		0	0.15	0	0.15	0	0.15	0	0.15	-0.01	0.16	-0.02	0.16
		1	Small	0	0.15	0	0.15	-0.01	0.15	-0.01	0.15	-0.01	0.16	-0.01	0.16
			Large	0	0.15	0	0.15	-0.01	0.15	-0.01	0.15	-0.01	0.16	-0.01	0.16
		3	Small	0.01	0.15	0.01	0.15	0	0.15	0	0.15	-0.01	0.16	-0.01	0.16
			Large	0	0.15	0.01	0.15	0	0.15	0	0.15	-0.01	0.16	-0.01	0.16
	200	0		0	0.11	0	0.11	0	0.11	0	0.11	0	0.11	0	0.11
		1	Small	0	0.11	0	0.11	0	0.11	0	0.11	0	0.11	0	0.11
			Large	0	0.11	0	0.11	0	0.11	0	0.11	0	0.11	0	0.11
		3	Small	0	0.11	0	0.11	0	0.11	0	0.11	0	0.11	0	0.11
			Large	0	0.11	0.01	0.11	0	0.11	0	0.11	0	0.11	0	0.11
	500	0		0	0.07	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07
		1	Small	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07
			Large	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07
		3	Small	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07
			Large	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07	0	0.07

Note. n_k = group size. C = number of response categories. p_{ni} = number of unique factor noninvariant items. d_{ni} = degree of unique factor noninvariance. α_f = population factor mean difference. Scalar = scalar invariance model. Str./P. Str. = strict invariance model when $p_{ni} = 0$ or partial strict invariance model otherwise.