L&T PxV Measurement invariance

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Contents

Creating factor-item mapping

As part of this process, outputting the alpha coefficients.

```
## **Wave 1**
```

```
##          aspfin    bfa_mt   bfas_ac   bfas_ap   bfas_ci   bfas_co
## alpha 0.7998668 0.7940664 0.8824893 0.7797439 0.8545544 0.7725705
##         bfas_ea   bfas_ee  bfas_nv  bfas_nv9   bfas_nw   bfas_oi   bfas_oo
## alpha 0.8870118 0.8534764 0.910106 0.8997879 0.8767214 0.8268913 0.7880777
##           bfi_a    bfi_a6     bfi_c bfi_d_scale     bfi_e   bfi_hp8
## alpha 0.7993139 0.7890365 0.8186571   0.7942425 0.8729018 0.6737578
##           bfi_n     bfi_o bfi_s_scale hrz_col   hrz_ind       mvi
## alpha 0.8561822 0.7878788   0.7954728 0.71104 0.5489294 0.6048862
##             usi   vrt_col   vrt_ind
## alpha 0.6706219 0.6719594 0.6508247
```

```
## **Wave 2**
```

```
##          aspfin   bfa_mt   bfas_ac   bfas_ap   bfas_ci   bfas_co   bfas_ea
## alpha 0.8281351 0.780895 0.8768574 0.8025806 0.8452354 0.8001713 0.8761414
##         bfas_ee   bfas_nv bfas_nv9   bfas_nw   bfas_oi   bfas_oo    bfi_a
## alpha 0.8587505 0.8944813 0.881748 0.8669656 0.8123296 0.7959007 0.791396
##          bfi_a6     bfi_c bfi_d_scale    bfi_e   bfi_hp8     bfi_n
## alpha 0.7843713 0.7988338   0.7813448 0.850435 0.7262371 0.8470545
##           bfi_o bfi_s_scale   hrz_col   hrz_ind       mvi       usi
## alpha 0.7912195   0.7779401 0.6927973 0.5789569 0.6348847 0.6757283
##         vrt_col  vrt_ind
## alpha 0.7047015 0.632918
```

```
## **Wave 3**
```

```
##          aspfin    bfa_mt  bfas_ac  bfas_ap   bfas_ci   bfas_co   bfas_ea
## alpha 0.8394445 0.7968984 0.880958 0.778155 0.8464886 0.7981412 0.8764604
##         bfas_ee   bfas_nv  bfas_nv9   bfas_nw   bfas_oi   bfas_oo    bfi_a
## alpha 0.8590187 0.8917669 0.8796346 0.8788573 0.8358084 0.8030536 0.792851
##          bfi_a6    bfi_c bfi_d_scale     bfi_e   bfi_hp8     bfi_n
## alpha 0.7894659 0.814697   0.7822754 0.8542851 0.7222933 0.8472325
```

```
##          bfi_o bfi_s_scale   hrz_col   hrz_ind      mvi       usi
## alpha 0.809368   0.7845088 0.7048981 0.5254994 0.662813 0.6714507
##         vrt_col   vrt_ind
## alpha 0.6961429 0.6658047
```

```
## **Wave 4**
```

```
##          aspfin    bfa_mt   bfas_ac   bfas_ap   bfas_ci  bfas_co   bfas_ea
## alpha 0.8370609 0.8080326 0.8816963 0.7959744 0.8475942 0.810329 0.8781754
##        bfas_ee   bfas_nv  bfas_nv9   bfas_nw   bfas_oi  bfas_oo     bfi_a
## alpha 0.867998 0.9034178 0.8936647 0.8764767 0.8305875 0.803291 0.8016667
##          bfi_a6     bfi_c bfi_d_scale    bfi_e   bfi_hp8     bfi_n
## alpha 0.7936111 0.8039574   0.8004715 0.855144 0.6921843 0.8590039
##           bfi_o bfi_s_scale   hrz_col   hrz_ind       mvi       usi
## alpha 0.8067764   0.7890908 0.7004189 0.5446953 0.6082213 0.6670748
##         vrt_col  vrt_ind
## alpha 0.7193429 0.645252
```

Generate lavaan syntax

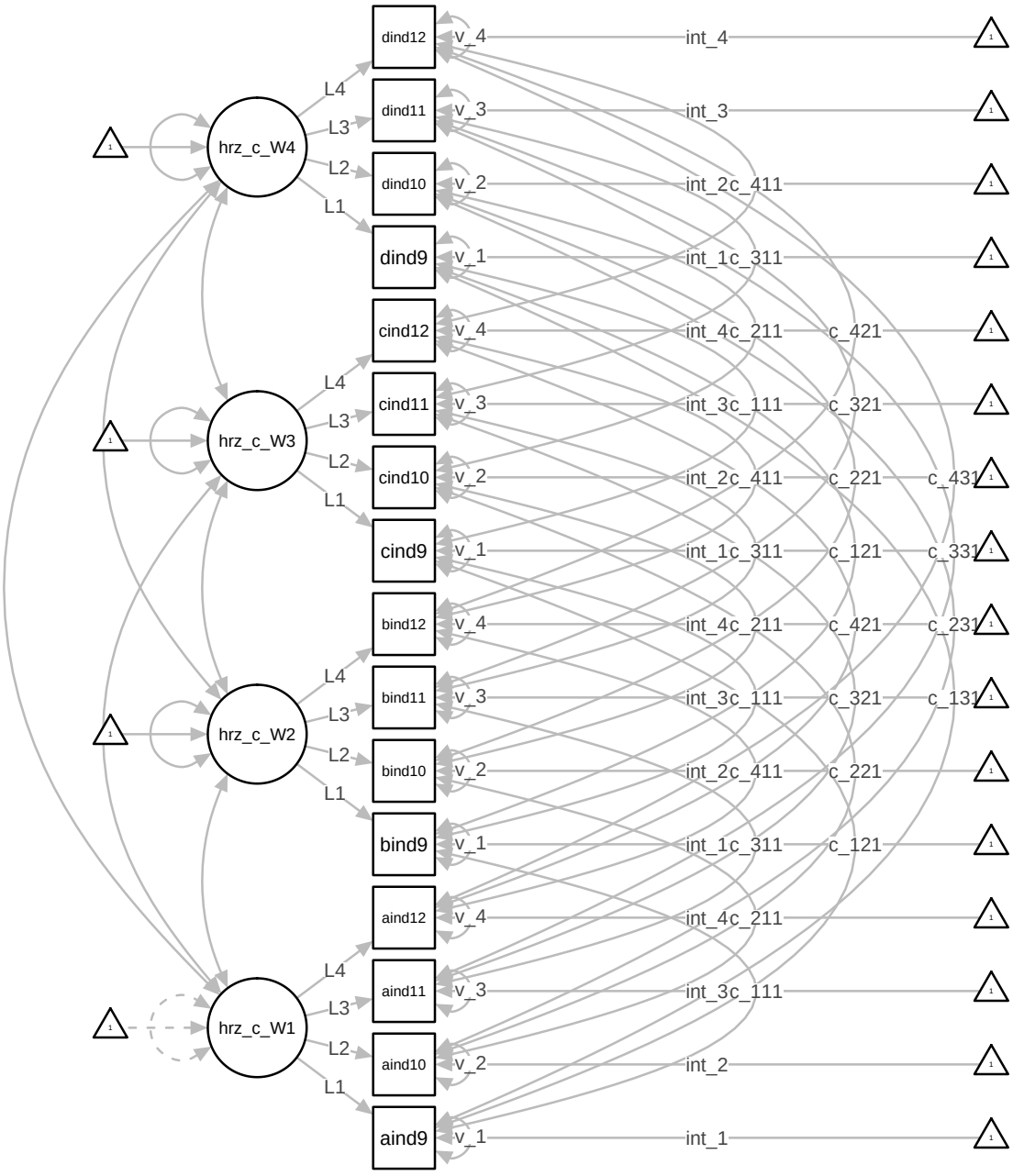
This is an example of the measurement model diagram, using Horizontal Collectivism, for one group demonstrating constraints for the strict measurement invariance model. Paths with the same label are constrained to have the same path weight, and in the strict invariance model, all labeled path weights must be the same for each decade group. The residual covariances are an exception: the constraint imposed is that residual covariance is the same across the same time-lag, for the same indicator (so e.g., `cov(aind9, bind9) = cov(bind9, cind9)`, and `cov(aind9, cind9) = cov(bind9, dind9)`), but these are not constrained to be the same across group. Since this constraint is imposed in every factorial invariance model tested, it does not affect the fit comparisons.

```
## hrz_col_W1 ~ 0*1
## hrz_col_W1 ~~ 1*hrz_col_W1
##
## #---
##
## hrz_col_W1 =~ c(L1, L1, L1, L1)*aind9 + c(L2, L2, L2, L2)*aind10 + c(L3, L3, L3, L3)*aind11 + c(L4, L
## hrz_col_W2 =~ c(L1, L1, L1, L1)*bind9 + c(L2, L2, L2, L2)*bind10 + c(L3, L3, L3, L3)*bind11 + c(L4, L
## hrz_col_W3 =~ c(L1, L1, L1, L1)*cind9 + c(L2, L2, L2, L2)*cind10 + c(L3, L3, L3, L3)*cind11 + c(L4, L
## hrz_col_W4 =~ c(L1, L1, L1, L1)*dind9 + c(L2, L2, L2, L2)*dind10 + c(L3, L3, L3, L3)*dind11 + c(L4, L
##
## #---
##
## aind9 ~ c(int_1, int_1, int_1, int_1)*1
## bind9 ~ c(int_1, int_1, int_1, int_1)*1
## cind9 ~ c(int_1, int_1, int_1, int_1)*1
## dind9 ~ c(int_1, int_1, int_1, int_1)*1
##
## aind10 ~ c(int_2, int_2, int_2, int_2)*1
## bind10 ~ c(int_2, int_2, int_2, int_2)*1
## cind10 ~ c(int_2, int_2, int_2, int_2)*1
## dind10 ~ c(int_2, int_2, int_2, int_2)*1
##
## aind11 ~ c(int_3, int_3, int_3, int_3)*1
## bind11 ~ c(int_3, int_3, int_3, int_3)*1
## cind11 ~ c(int_3, int_3, int_3, int_3)*1
```

```
## dind11 ~ c(int_3, int_3, int_3, int_3)*1
##
## aind12 ~ c(int_4, int_4, int_4, int_4)*1
## bind12 ~ c(int_4, int_4, int_4, int_4)*1
## cind12 ~ c(int_4, int_4, int_4, int_4)*1
## dind12 ~ c(int_4, int_4, int_4, int_4)*1
##
## #---
##
## aind9 ~~ c(v_1, v_1, v_1, v_1)*aind9
## bind9 ~~ c(v_1, v_1, v_1, v_1)*bind9
## cind9 ~~ c(v_1, v_1, v_1, v_1)*cind9
## dind9 ~~ c(v_1, v_1, v_1, v_1)*dind9
##
## aind10 ~~ c(v_2, v_2, v_2, v_2)*aind10
## bind10 ~~ c(v_2, v_2, v_2, v_2)*bind10
## cind10 ~~ c(v_2, v_2, v_2, v_2)*cind10
## dind10 ~~ c(v_2, v_2, v_2, v_2)*dind10
##
## aind11 ~~ c(v_3, v_3, v_3, v_3)*aind11
## bind11 ~~ c(v_3, v_3, v_3, v_3)*bind11
## cind11 ~~ c(v_3, v_3, v_3, v_3)*cind11
## dind11 ~~ c(v_3, v_3, v_3, v_3)*dind11
##
## aind12 ~~ c(v_4, v_4, v_4, v_4)*aind12
## bind12 ~~ c(v_4, v_4, v_4, v_4)*bind12
## cind12 ~~ c(v_4, v_4, v_4, v_4)*cind12
## dind12 ~~ c(v_4, v_4, v_4, v_4)*dind12
##
## #---
##
## aind9 ~~ c(cv_11g1, cv_11g2, cv_11g3, cv_11g4)*bind9
## aind9 ~~ c(cv_12g1, cv_12g2, cv_12g3, cv_12g4)*cind9
## aind9 ~~ c(cv_13g1, cv_13g2, cv_13g3, cv_13g4)*dind9
## bind9 ~~ c(cv_11g1, cv_11g2, cv_11g3, cv_11g4)*cind9
## bind9 ~~ c(cv_12g1, cv_12g2, cv_12g3, cv_12g4)*dind9
## cind9 ~~ c(cv_11g1, cv_11g2, cv_11g3, cv_11g4)*dind9
##
## aind10 ~~ c(cv_21g1, cv_21g2, cv_21g3, cv_21g4)*bind10
## aind10 ~~ c(cv_22g1, cv_22g2, cv_22g3, cv_22g4)*cind10
## aind10 ~~ c(cv_23g1, cv_23g2, cv_23g3, cv_23g4)*dind10
## bind10 ~~ c(cv_21g1, cv_21g2, cv_21g3, cv_21g4)*cind10
## bind10 ~~ c(cv_22g1, cv_22g2, cv_22g3, cv_22g4)*dind10
## cind10 ~~ c(cv_21g1, cv_21g2, cv_21g3, cv_21g4)*dind10
##
## aind11 ~~ c(cv_31g1, cv_31g2, cv_31g3, cv_31g4)*bind11
## aind11 ~~ c(cv_32g1, cv_32g2, cv_32g3, cv_32g4)*cind11
## aind11 ~~ c(cv_33g1, cv_33g2, cv_33g3, cv_33g4)*dind11
## bind11 ~~ c(cv_31g1, cv_31g2, cv_31g3, cv_31g4)*cind11
## bind11 ~~ c(cv_32g1, cv_32g2, cv_32g3, cv_32g4)*dind11
## cind11 ~~ c(cv_31g1, cv_31g2, cv_31g3, cv_31g4)*dind11
##
## aind12 ~~ c(cv_41g1, cv_41g2, cv_41g3, cv_41g4)*bind12
## aind12 ~~ c(cv_42g1, cv_42g2, cv_42g3, cv_42g4)*cind12
```

```
## aind12 ~~ c(cv_43g1, cv_43g2, cv_43g3, cv_43g4)*dind12
## bind12 ~~ c(cv_41g1, cv_41g2, cv_41g3, cv_41g4)*cind12
## bind12 ~~ c(cv_42g1, cv_42g2, cv_42g3, cv_42g4)*dind12
## cind12 ~~ c(cv_41g1, cv_41g2, cv_41g3, cv_41g4)*dind12
```

1


dind12
dind11
dind10
dind9
cind12
cind11
cind10
cind9
bind12
bind11
bind10
bind9
aind12
aind11
aind10
aind9
hrz_c_W4
hrz_c_W3
hrz_c_W2
hrz_c_W1
L4
L3
L2
L1
v_4
v_3
v_2
v_1
int_4
int_3
int_2c_411
int_1c_311
int_4c_211
int_3c_111
int_2c_411
int_1c_311
int_4c_211
int_3c_111
int_2c_411
int_1c_311
int_4c_211
int_3c_111
int_2
int_1
c_421
c_321
c_221
c_121
c_431
c_331
c_231
c_131

Results

CFI & *IC

To determine the invariance of measurement over groups, we can examine the χ^2 test. But this is often an overly strict test with a large sample size. Relative change in AIC and BIC (with lower values, and negative changes, being better) help guide interpretation by incorporating information about the number of parameters (AIC, BIC) and sample size (BIC). Cheung & Rensvold (2002) recomend using ΔCFI because it is not influenced by complexity or sample size, and does not correlate with overall fit measures. In this paper, they write, "A value of ΔCFI smaller than or equal to –0.01 indicates that the null hypothesis of invariance should not be rejected" (p 251). Below, I generally ignore the χ^2 tests in interpretation but present them for completeness.

Table 1: Financial Aspirations

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					752.00		0.959			0.049 [0.043, 0.055]
2	metric	-6.2		-77.7		767.00	15	0.958	-0.001		0.049 [0.043, 0.055]
3	strong	8.7		-62.8		782.00	15	0.956	-0.002		0.050 [0.044, 0.056]
4	strict	-0.8	1.7	-72.2	-212.7	797.00	15	0.954	-0.001	-0.005	0.050 [0.045, 0.056]

Invariant.

Table 2: Materialism

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					6224.00		0.722			0.066 [0.064, 0.068]
2	metric	-44.7		-244.9		6266.00	42	0.722	0.000		0.066 [0.064, 0.068]
3	strong	19.9		-180.2		6308.00	42	0.719	-0.003		0.066 [0.064, 0.068]
4	strict	-27.8	-52.6	-228.0	-653.0	6350.00	42	0.719	-0.001	-0.003	0.066 [0.064, 0.068]

Invariant.

Table 3: Horizontal Collectivism

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					464.00		0.951			0.048 [0.041, 0.056]
2	metric	8.4		-48.8		476.00	12	0.947	-0.004		0.050 [0.043, 0.057]
3	strong	47.1		-10.0		488.00	12	0.935	-0.012		0.055 [0.048, 0.061]
4	strict	21.2	76.7	-36.0	-94.8	500.00	12	0.928	-0.007	-0.023	0.057 [0.050, 0.063]

Problematic: Neither CFI nor AIC support strict invariance. Constraints from metric to strong invariance (intercepts) may be an issue.

Table 4: Horizontal Individualism

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					464.00		0.924			0.048 [0.041, 0.056]
2	metric	-7.0		-64.2		476.00	12	0.922	-0.002		0.048 [0.041, 0.055]
3	strong	3.5		-53.6		488.00	12	0.917	-0.005		0.049 [0.042, 0.056]
4	strict	-9.3	-12.8	-66.5	-184.3	500.00	12	0.916	-0.001	-0.008	0.049 [0.042, 0.056]

Invariant.

Table 5: Mature Values Index

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					9200.00		0.588			0.087 [0.085, 0.088]
2	metric	-29.0		-271.9		9251.00	51	0.587	-0.001		0.087 [0.085, 0.088]
3	strong	117.2		-125.7		9302.00	51	0.582	-0.005		0.087 [0.086, 0.088]
4	strict	63.7	152.0	-179.3	-576.9	9353.00	51	0.579	-0.003	-0.008	0.087 [0.086, 0.088]

Likely invariant: Change in CFI and BIC suggest invariance, though AIC does not favor constraints beyond metric invariance.

Table 6: Unmitigated Self-Interest

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					1104.00		0.862			0.062 [0.058, 0.066]
2	metric	-4.1		-89.9		1122.00	18	0.860	-0.002		0.062 [0.058, 0.066]
3	strong	32.3		-53.5		1140.00	18	0.853	-0.008		0.063 [0.059, 0.067]
4	strict	29.3	57.5	-56.4	-199.8	1158.00	18	0.846	-0.007	-0.017	0.064 [0.060, 0.068]

Possibly invariant: At each step, change in CFI suggests invariance, but baseline to strict change is greater than the recommended cutoff. Change in BIC suggests invariance, though AIC does not favor constraints beyond metric invariance.

Table 7: Vertical Collectivism

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					464.00		0.978			0.032 [0.022, 0.041]
2	metric	9.5		-47.6		476.00	12	0.973	-0.005		0.035 [0.025, 0.043]
3	strong	34.8		-22.3		488.00	12	0.963	-0.010		0.040 [0.032, 0.048]
4	strict	-1.0	43.3	-58.2	-128.2	500.00	12	0.961	-0.002	-0.017	0.041 [0.033, 0.049]

Possibly invariant: At each step, change in CFI suggests invariance, but baseline to strict change is greater than the recommended cutoff. Change in BIC suggests invariance, though AIC does not favor constraints except from strong to strict.

Table 8: Vertical Individualism

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					464.00		0.978			0.031 [0.020, 0.040]
2	metric	-5.0		-62.2		476.00	12	0.977	-0.002		0.032 [0.021, 0.041]
3	strong	38.1		-19.1		488.00	12	0.965	-0.011		0.038 [0.030, 0.046]
4	strict	-10.8	22.2	-68.0	-149.3	500.00	12	0.965	-0.000	-0.013	0.038 [0.029, 0.046]

Possibly problematic: change in CFI rejects invariance between metric and strong, and between baseline and strict, which agrees with change in AIC. Change in BIC suggests invariance.

Table 9: Social Self-Regulation

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					4560.00		0.848			0.050 [0.047, 0.052]
2	metric	-16.5		-188.1		4596.00	36	0.846	-0.001		0.050 [0.047, 0.052]
3	strong	1.7		-169.9		4632.00	36	0.844	-0.002		0.050 [0.047, 0.052]
4	strict	8.8	-6.1	-162.8	-520.7	4668.00	36	0.841	-0.003	-0.006	0.050 [0.048, 0.052]

Invariant.

Table 10: .Conscientiousness

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					2544.00		0.888			0.051 [0.048, 0.054]
2	metric	-24.8		-153.4		2571.00	27	0.888	-0.000		0.051 [0.048, 0.054]
3	strong	28.6		-100.1		2598.00	27	0.884	-0.004		0.052 [0.049, 0.055]
4	strict	41.4	45.3	-87.2	-340.7	2625.00	27	0.878	-0.005	-0.010	0.053 [0.050, 0.056]

Invariant, with the caveat that AIC favors only the metric constraints.

Table 11: ..Industriousness

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.889			0.048 [0.045, 0.051]
2	metric	-17.6		-160.6		3182.00	30	0.888	-0.001		0.048 [0.045, 0.051]
3	strong	1.4		-141.5		3212.00	30	0.886	-0.002		0.048 [0.045, 0.051]
4	strict	10.8	-5.4	-132.1	-434.2	3242.00	30	0.883	-0.003	-0.006	0.048 [0.046, 0.051]

Invariant.

Table 12: ..Orderliness

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.845			0.056 [0.053, 0.058]
2	metric	7.5		-135.4		3182.00	30	0.842	-0.003		0.056 [0.053, 0.059]
3	strong	28.0		-114.9		3212.00	30	0.838	-0.004		0.056 [0.054, 0.059]
4	strict	-29.4	6.1	-172.4	-422.8	3242.00	30	0.838	-0.000	-0.007	0.056 [0.054, 0.059]

Invariant.

Table 13: .Honesty/Propriety

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					2000.00		0.890			0.047 [0.043, 0.050]
2	metric	-18.8		-133.2		2024.00	24	0.889	-0.001		0.047 [0.043, 0.050]
3	strong	29.9		-84.5		2048.00	24	0.883	-0.006		0.048 [0.044, 0.051]
4	strict	-12.3	-1.2	-126.6	-344.3	2072.00	24	0.882	-0.001	-0.008	0.048 [0.044, 0.051]

Invariant.

Table 14: .Agreeableness

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					2544.00		0.914			0.044 [0.040, 0.047]
2	metric	-20.7		-149.4		2571.00	27	0.913	-0.001		0.044 [0.040, 0.047]
3	strong	1.0		-127.7		2598.00	27	0.911	-0.002		0.044 [0.041, 0.047]
4	strict	-4.3	-24.1	-133.0	-410.0	2625.00	27	0.909	-0.002	-0.005	0.044 [0.041, 0.047]

Invariant.

Table 15: .Agreeableness-Six

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					2000.00		0.878			0.058 [0.054, 0.061]
2	metric	-9.9		-124.2		2024.00	24	0.876	-0.001		0.058 [0.054, 0.061]
3	strong	-3.2		-117.5		2048.00	24	0.875	-0.002		0.058 [0.054, 0.061]
4	strict	-7.6	-20.6	-121.9	-363.7	2072.00	24	0.873	-0.001	-0.004	0.058 [0.054, 0.061]

Invariant

Table 16: ..Compassion

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.839			0.063 [0.060, 0.065]
2	metric	12.7		-130.3		3182.00	30	0.837	-0.003		0.063 [0.060, 0.065]
3	strong	-2.4		-145.3		3212.00	30	0.835	-0.002		0.063 [0.060, 0.065]
4	strict	74.8	85.2	-68.1	-343.7	3242.00	30	0.829	-0.006	-0.011	0.064 [0.061, 0.066]

Possibly invariant: At each step, change in CFI suggests invariance, but baseline to strict change is greater than the recommended cutoff. Change in BIC suggests invariance. AIC suggests constrained models fit worse, or at least no better, at each step.

Table 17: ..Politeness

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.873			0.048 [0.046, 0.051]
2	metric	-20.6		-163.6		3182.00	30	0.872	-0.001		0.048 [0.046, 0.051]
3	strong	98.1		-44.8		3212.00	30	0.862	-0.010		0.050 [0.047, 0.053]
4	strict	39.3	116.8	-103.7	-312.1	3242.00	30	0.857	-0.005	-0.016	0.051 [0.048, 0.053]

Possibly invariant: At each step, change in CFI suggests invariance, but baseline to strict change is greater than the recommended cutoff. Change in BIC suggests invariance. AIC suggests constrained models fit worse, at each step except when adding metric constraints.

Table 18: .Neuroticism

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					2000.00		0.925			0.049 [0.045, 0.052]
2	metric	-26.7		-141.1		2024.00	24	0.926	0.000		0.048 [0.045, 0.052]
3	strong	13.8		-100.6		2048.00	24	0.923	-0.003		0.049 [0.045, 0.052]
4	strict	-9.5	-22.5	-123.9	-365.5	2072.00	24	0.922	-0.001	-0.004	0.049 [0.045, 0.052]

Invariant

Table 19: .Neuroticism-Nine

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					2544.00		0.882			0.060 [0.057, 0.063]
2	metric	-2.8		-131.5		2571.00	27	0.880	-0.001		0.060 [0.057, 0.063]
3	strong	56.4		-72.3		2598.00	27	0.875	-0.005		0.061 [0.058, 0.063]
4	strict	-7.2	46.4	-135.8	-339.5	2625.00	27	0.874	-0.001	-0.008	0.061 [0.058, 0.063]

Lilely Invariant.

Table 20: ..Volatility

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.875			0.059 [0.056, 0.061]
2	metric	-9.1		-152.0		3182.00	30	0.874	-0.001		0.059 [0.056, 0.061]
3	strong	54.0		-88.9		3212.00	30	0.870	-0.004		0.060 [0.057, 0.062]
4	strict	-12.1	32.8	-155.0	-396.0	3242.00	30	0.869	-0.001	-0.006	0.060 [0.057, 0.062]

Likely invariant: Change in CFI and BIC suggest invariance, though AIC does not favor constraints from metric to strong, or baseline to strict invariance.

Table 21: ..Withdrawal

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.882			0.054 [0.052, 0.057]
2	metric	-12.9		-155.8		3182.00	30	0.881	-0.001		0.054 [0.051, 0.057]
3	strong	45.4		-97.5		3212.00	30	0.876	-0.004		0.055 [0.052, 0.058]
4	strict	-15.3	17.3	-158.2	-411.6	3242.00	30	0.875	-0.001	-0.006	0.055 [0.052, 0.057]

Likely invariant (AIC rejects metric to strong, and baseline to strict).

Table 22: Dynamism

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					2544.00		0.858			0.065 [0.062, 0.068]
2	metric	-0.0		-128.7		2571.00	27	0.856	-0.002		0.065 [0.062, 0.068]
3	strong	14.3		-114.4		2598.00	27	0.854	-0.003		0.065 [0.063, 0.068]
4	strict	-20.3	-6.0	-148.9	-391.9	2625.00	27	0.854	-0.000	-0.005	0.065 [0.062, 0.068]

Invariant (but see AIC).

Table 23: .Extraversion

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					2000.00		0.917			0.057 [0.053, 0.060]
2	metric	-15.9		-130.3		2024.00	24	0.917	-0.000		0.057 [0.053, 0.060]
3	strong	-2.7		-117.1		2048.00	24	0.915	-0.001		0.057 [0.053, 0.060]
4	strict	-9.0	-27.7	-123.4	-370.7	2072.00	24	0.915	-0.001	-0.003	0.057 [0.053, 0.060]

Invariant.

Table 24: ..Assertiveness

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.887			0.055 [0.053, 0.058]
2	metric	-34.0		-177.0		3182.00	30	0.887	0.000		0.055 [0.052, 0.058]
3	strong	-23.7		-166.7		3212.00	30	0.887	-0.000		0.055 [0.052, 0.057]
4	strict	-21.5	-79.3	-164.5	-508.1	3242.00	30	0.886	-0.000	-0.001	0.055 [0.052, 0.057]

Invariant.

Table 25: ..Enthusiasm

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.865			0.059 [0.057, 0.062]
2	metric	-28.3		-171.3		3182.00	30	0.864	-0.000		0.059 [0.057, 0.062]
3	strong	13.1		-129.8		3212.00	30	0.862	-0.002		0.059 [0.057, 0.062]
4	strict	26.1	10.9	-116.8	-417.9	3242.00	30	0.859	-0.003	-0.006	0.060 [0.057, 0.062]

Likely invariant: Change in CFI and BIC suggest invariance, though AIC does not favor constraints except from baseline to metric.

Table 26: .Openness

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.852			0.059 [0.056, 0.061]
2	metric	-14.0		-157.0		3182.00	30	0.851	-0.001		0.059 [0.056, 0.061]
3	strong	15.3		-127.6		3212.00	30	0.848	-0.003		0.059 [0.056, 0.061]
4	strict	-14.3	-13.0	-157.3	-441.9	3242.00	30	0.847	-0.001	-0.005	0.059 [0.056, 0.061]

Invariant (but see AIC).

Table 27: ..Intellect

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.866			0.056 [0.053, 0.059]
2	metric	-18.1		-161.1		3182.00	30	0.866	-0.001		0.056 [0.053, 0.058]
3	strong	-13.5		-156.5		3212.00	30	0.865	-0.001		0.056 [0.053, 0.058]
4	strict	44.4	12.7	-98.6	-416.2	3242.00	30	0.860	-0.005	-0.006	0.057 [0.054, 0.059]

Likely invariant: Change in CFI and BIC suggest invariance, though AIC does not favor constraints except from strong to strict, or baseline to strict.

Table 28: ..Openness

	Type	ΔAIC	$\Delta_{1,4}$AIC	ΔBIC	$\Delta_{1,4}$BIC	Df	ΔDf	CFI	ΔCFI	$\Delta_{1,4}$CFI	RMSEA
1	baseline					3152.00		0.858			0.057 [0.055, 0.060]
2	metric	-19.6		-162.6		3182.00	30	0.858	-0.001		0.057 [0.055, 0.060]
3	strong	31.7		-111.3		3212.00	30	0.854	-0.004		0.058 [0.055, 0.060]
4	strict	-16.4	-4.3	-159.3	-433.2	3242.00	30	0.853	-0.001	-0.005	0.058 [0.055, 0.060]

Invariant (but see AIC).

$\Delta\chi^2$ Tests

Below, just the $\Delta\chi^2$ tests.

Table 29: Financial Aspirations

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		752.00		
2	metric	23.8	767.00	15	0.069
3	strong	38.7	782.00	15	<.001
4	strict	29.2	797.00	15	0.015

Table 30: Materialism

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		6224.00		
2	metric	39.3	6266.00	42	0.591
3	strong	103.9	6308.00	42	<.001
4	strict	56.2	6350.00	42	0.071

Table 31: Horizontal Collectivism

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		464.00		
2	metric	32.4	476.00	12	0.001
3	strong	71.1	488.00	12	<.001
4	strict	45.2	500.00	12	<.001

Table 32: Horizontal Individualism

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		464.00		
2	metric	17.0	476.00	12	0.150
3	strong	27.5	488.00	12	0.006
4	strict	14.7	500.00	12	0.258

Table 33: Mature Values Index

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		9200.00		
2	metric	73.0	9251.00	51	0.023
3	strong	219.2	9302.00	51	<.001
4	strict	165.7	9353.00	51	<.001

Table 34: Unmitigated Self-Interest

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		1104.00		
2	metric	31.9	1122.00	18	0.023
3	strong	68.3	1140.00	18	<.001
4	strict	65.3	1158.00	18	<.001

Table 35: Vertical Collectivism

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		464.00		
2	metric	33.5	476.00	12	<.001
3	strong	58.8	488.00	12	<.001
4	strict	23.0	500.00	12	0.028

Table 36: Vertical Individualism

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		464.00		
2	metric	19.0	476.00	12	0.090
3	strong	62.1	488.00	12	<.001
4	strict	13.2	500.00	12	0.357

Table 37: Social Self-Regulation

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		4560.00		
2	metric	55.5	4596.00	36	0.020
3	strong	73.7	4632.00	36	<.001
4	strict	80.8	4668.00	36	<.001

Table 38: .Conscientiousness

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		2544.00		
2	metric	29.2	2571.00	27	0.349
3	strong	82.6	2598.00	27	<.001
4	strict	95.4	2625.00	27	<.001

Table 39: ..Industriousness

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	42.4	3182.00	30	0.066
3	strong	61.4	3212.00	30	<.001
4	strict	70.8	3242.00	30	<.001

Table 40: ..Orderliness

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	67.5	3182.00	30	<.001
3	strong	88.0	3212.00	30	<.001
4	strict	30.6	3242.00	30	0.437

Table 41: .Honesty/Propriety

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		2000.00		
2	metric	29.2	2024.00	24	0.214
3	strong	77.9	2048.00	24	<.001
4	strict	35.7	2072.00	24	0.058

Table 42: .Agreeableness

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		2544.00		
2	metric	33.3	2571.00	27	0.188
3	strong	55.0	2598.00	27	0.001
4	strict	49.7	2625.00	27	0.005

Table 43: .Agreeableness-Six

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		2000.00		
2	metric	38.1	2024.00	24	0.034
3	strong	44.8	2048.00	24	0.006
4	strict	40.4	2072.00	24	0.019

Table 44: ..Compassion

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	72.7	3182.00	30	<.001
3	strong	57.6	3212.00	30	0.002
4	strict	134.8	3242.00	30	<.001

Table 45: ..Politeness

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	39.4	3182.00	30	0.118
3	strong	158.1	3212.00	30	<.001
4	strict	99.3	3242.00	30	<.001

Table 46: .Neuroticism

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		2000.00		
2	metric	21.3	2024.00	24	0.623
3	strong	61.8	2048.00	24	<.001
4	strict	38.5	2072.00	24	0.031

Table 47: .Neuroticism-Nine

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		2544.00		
2	metric	51.2	2571.00	27	0.003
3	strong	110.4	2598.00	27	<.001
4	strict	46.8	2625.00	27	0.010

Table 48: ..Volatility

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	50.9	3182.00	30	0.010
3	strong	114.0	3212.00	30	<.001
4	strict	47.9	3242.00	30	0.020

Table 49: ..Withdrawal

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	47.1	3182.00	30	0.024
3	strong	105.4	3212.00	30	<.001
4	strict	44.7	3242.00	30	0.041

Table 50: Dynamism

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		2544.00		
2	metric	54.0	2571.00	27	0.002
3	strong	68.3	2598.00	27	<.001
4	strict	33.7	2625.00	27	0.174

Table 51: .Extraversion

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		2000.00		
2	metric	32.1	2024.00	24	0.125
3	strong	45.3	2048.00	24	0.005
4	strict	39.0	2072.00	24	0.027

Table 52: ..Assertiveness

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	26.0	3182.00	30	0.676
3	strong	36.3	3212.00	30	0.199
4	strict	38.5	3242.00	30	0.138

Table 53: ..Enthusiasm

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	31.7	3182.00	30	0.382
3	strong	73.1	3212.00	30	<.001
4	strict	86.1	3242.00	30	<.001

Table 54: .Openness

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	46.0	3182.00	30	0.031
3	strong	75.3	3212.00	30	<.001
4	strict	45.7	3242.00	30	0.033

Table 55: ..Intellect

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	41.9	3182.00	30	0.074
3	strong	46.5	3212.00	30	0.028
4	strict	104.4	3242.00	30	<.001

Table 56: ..Openness

	Type	$\Delta\chi^2$	Df	ΔDf	$P(>\Delta\chi^2)$
1	baseline		3152.00		
2	metric	40.4	3182.00	30	0.098
3	strong	91.7	3212.00	30	<.001
4	strict	43.6	3242.00	30	0.052