# MI RMarkdown

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Executive Summary

• Grade 3 Child Self Regulation (csr) Child Self Regulated Learning (csrl) Child Internalizing - Caregiver Report (aint)

 Child Emotional Processes - Caregiver Report (aemo) Caregiver Relationship - Caregiver Report (arel) Caregiver Anxiety and Depression (aanxdep)

 Grade 7 Child Self Regulation (csr) Child Self Regulated Learning (csrl) Child Internalizing - Child Report (cyips)

Child Externalizing - Child Report (cyeps)

Child Emotional Processes - Caregiver Report (aemo)

 Caregiver Relationship - Caregiver Report (arel) Caregiver Anxiety and Depression (aanxdep)

### In an attempt to examine the presence of any group differences between Peruvian nationals and Venezuelan refugees with regards to Social Emotional Learning, we conduct measurement invariance on a range of different SEL measures for a sample of 823 Grade 3 students and 744 Grade 7 students and their caregivers. Using Confirmatory Factor Analysis, we conduct measurement invariance to ensure that any differences

**Executive Summary** 

observed are a reflection of true differences between groups and are not a result of biased measurements, which would produce unreliable results. A measurement is invariant if the items measure the factor consistently across groups. To confirm that a measurement is invariant we verify both threshold and loading invariances. We first test our measurement model separately on each of the groups 'Peruvian' and 'Venezuelan' to ensure that the model fits our data. We rely on the following indices to determine adequate fit (p>0.05, CFI>0.90, RMSEA<0.10, SRMR<0.08). If model fit is confirmed, then we proceed to test for invariance. To do so, we conduct a multigroup CFA firstly without any constraints to produce the configural model, then we impose an equality constraint on the thresholds in the two

model. Threshold invariance is established if the threshold model fits the data and the differences in fit indices between the configural and threshold models are non-significant. Similarly, loading invariance is satisfied if the loading model fits the data and the differences in fit indices between the threshold and loading models are non-significant. A change in model fit between the configural and threshold models is considered to be significant if  $\Delta p < 0.05$ ,  $\Delta CFI= 0.02$ ,  $\Delta RMSEA= 0.03$ , or  $\Delta SRMP= 0.03$ . When comparing the threshold and loading models, the change in fit is significant if  $\Delta p < 0.05$ ,  $\Delta CFI = 0.01$ ,  $\Delta RMSEA = 0.01$ , or  $\Delta SRMP = 0.01$ . If both threshold and loading invariances are satisfied, we can safely compare the mean and variance of the two groups on the particular construct. If threshold or loading invariances cannot be confirmed, we proceed to investigate partial invariance and we provide a table identifying the restricted parameters with a significant modification index (>4). To achieve partial invariance, we should consider freeing those constrained

parameters. Our findings suggest that for Grade 3, the only measure that was found to be invariant was Child Self Regulation. The Caregiver Relationship measure was found to be threshold non-invariant, while for the following measures - Child Self Regulated Learning, Child Internalizing-Caregiver Report, Child Emotional Processes, the fit of the measurement model did not fit either one or both groups. For the Caregiver Anxiety and Depression model the fit on the Venezuelan group was ambiguous. For Grade 7, all measures but one were found to be threshold non-invariant -Child Self Regulation, Child Self Regulated Learning, Child Internalizing-Child Report, Child Externalizing-Child Report, Caregiver Relationship and

(Refer to the MI Analysis.R script to access a more extensive analysis on each of the measures than what is provided below) Grade 3 Child Self Regulation (csr)

Model fit for each model and model comparison statistics

## Peruvian Only

### Only Configural 713

2 329.14 180 0.00 0.97 0.05 [0.04, 0.06]0.05 713 Threshold 2 383.75 224 0.00 0.96 0.04 [0.04, 0.05]0.05

THICSHOIL	110	_	303.73	227	0.00	0.50	0.04	[0.0-	, 0.00]	.00	30.303	77.000	0.032	0.001	0.001	0.000	
Loading	713	2	371.85	239	0.00	0.97	0.04	[0.03	, 0.05]	0.05	16.944	15.000	0.322	-0.004	0.006	0.004	
Conclus  Both Thresho		g inv	ariances	were	satisfie	d, this	meası	ıre is invari	ant for Vend	ezue	lan and Peru	vian grou	ıps.				
Standar	dized m	eai	ns an	id va	ariar	nces	of	groups	8								
			-	group		mea	n.est	mean.se	variance.	est	variance.se	<del>-</del>					
			_	Peruv	rian		0	0	1.0000	00	0.00000000	)					
					_		_										

Model

Only

Configural

Conclusions

Only

Configural

Threshold

Loading

Depression Measure.

Venezuelan

Configural

Threshold

Conclusions

Loading

Measure.

Venezuelan

Configural

Learning Measure.

Conclusions

Report Measure.

Model

Only

Peruvian

Loading

Conclusions

Report Measure.

Model

Only

Peruvian

Venezuelan

Conclusions

Peruvian

Venezuelan

Configural

Threshold

Loading

The measure is threshold non-invariant.

Only

Only

433

293

726

726

726

n ngroups x2

The fit of the model on the Venezuelan group is ambiguous.

1 47.19

1 50.40

1 182.43

424

The measure is threshold non-invariant.

Investigating threshold partial invariance

plabel

.p23.

.p38.

.p18.

.p13.

.p33.

Child Externalizing - Child Report (cyeps)

lhs

cyips5

cyips10

cyips3

cyips1

cyips8

CFI

35 0.00 0.98 0.05

RMSEA

op

Only

254

637

Only

259

637

637

CFI

Peruvian 397 1 340.19 90 0.00 0.82 0.08 [0.07, 0.09]Only Venezuelan 312 90 0.00 0.87 0.07 [0.06, 0.08]1 226.86

df p

2 568.31 180 0.00 0.84 0.08

n ngroups x2

709

•															
Threshold	709	2	696.61	224	0.00	0.80	80.0	[0.07, 0.08]	0.08	118.683	44.000	0.000	-0.022	0.000	0.000
Loading	709	2	661.64	239	0.00	0.82	0.07	[0.06, 0.08]	0.08	21.093	15.000	0.134	-0.011	0.001	0.004
Conclus The csrl mea		s po	orly both t	he Pe	ruvian	and Ve	enezuelan	groups.							
Child Internalizing - Caregiver Report (aint)															

[0.07, 0.09]

Venezuelan 1 263.42 77 0.00 0.81 0.09 Only

## Conclusions The model for the aint factor has a poor fit on both the Peruvian and Venezuelan groups.

Only Venezuelan

The model for the aemo measure fits the Venezuelan group poorly.

Caregiver Relationship - Caregiver Report (arel) Model fit for each model and model comparison statistics n ngroups x2 Model RMSEA RMSEA.CI95 SRMR diff.x2 diff.df diff.CFI diff.RMSEA diff.SRMR df p CFI diff.p Peruvian 20 0.00 0.97 0.05 473 1 45.56 [0.03, 0.07] 0.05 Only Venezuelan 338 [0.01, 0.07]0.06 1 32.67 20 0.04 0.96 0.04 Only Configural 811 40 0.00 0.97 0.05 [0.03, 0.06]0.05 2 77.59 Threshold 811 0.000 2 159.32 63 0.00 0.92 0.06 [0.05, 0.07]0.05 64.763 23.000 0.000 -0.029 0.016

Consider freeing the equality constraint on the following thresholds to obtain Threshold Partial Invariance on the Grade 3 Caregiver Relationship Measure. plabel lhs op rhs label X2 .p10. t2 arel1.thr2 11.175454 arel1 .p18. t1 arel4 arel4.thr1 8.540644 .p30. t1 arel8 arel8.thr1 6.385733 .p27. arel7 t1 arel7.thr1 5.621943 t2 .p13. arel2 arel2.thr2 5.513307 .p12. t1 arel2.thr1 arel2 5.064609

### 815 10 0.00 0.99 0.09 [0.07, 0.12]0.04 2 46.33 815 2 86.16 24 0.00 0.97 0.08 [0.06, 0.10]32.719 14.000 0.003 -0.004 0.04 815 2 105.95 29 0.00 0.97 0.08 [0.06, 0.10]18.406 5.000 0.002 -0.012 0.023 0.05 Conclusions The fit of the model on the Venezuelan group is ambiguous. However, if we choose to accept the fit of the model on the Venezuelan group, and proceed to determine and compare the goodness of fit of the Configural, Threshold and Loading models to test the measure's invariance, we conclude that the measure is threshold non-invariant.

X2 plabel lhs rhs label op t3 aanxdep2.thr3 6.315158 .p8. aanxdep2 | t2 aanxdep2.thr2 5.363162 .p7. aanxdep2 | Grade 7 Child Self Regulation (csr) Model fit for each model and model comparison statistics

# Threshold invariance is not satisfied. Investigating threshold partial invariance Consider freeing the equality constraint on the following thresholds to obtain Threshold Partial Invariance on the Grade 7 Child Self Regulation

### n ngroups x2 df p Model Peruvian 383 1 220.27 90 0.00 0.91 0.06 Only

1 177.47

Threshold 637 0.001 Loading 637 2 491.52 239 0.00 0.89 0.06 [0.05, 0.06]0.08 26.269 15.000 0.035 -0.016 0.006 Conclusions

rhs

t1

t2

t1

t1

t3

t3

			.p1	.6.	csrl	1	1	t1 cs	rl1.thr1	4.147	530			
Child I	nte	rnaliz	zing -	- C	hild	Re	eport	(cyips)						
Model fit	for	each	mode	l an	d m	odel	comp	arison sta	atistic	S				
Model	n	ngroups	x2	df	р	CFI	RMSEA	RMSEA.CI95	SRMR	diff.x2	diff.df	diff.p	diff.CFI	diff.RMSEA
Peruvian Only	386	1	62.43	35	0.00	0.98	0.05	[0.03, 0.06]	0.05					
Venezuelan Only	259	1	94.46	35	0.00	0.92	0.08	[0.06, 0.10]	0.07					
Configural	645	2	157.46	70	0.00	0.95	0.06	[0.05, 0.08]	0.06					
Threshold	645	2	249.87	99	0.00	0.92	0.07	[0.06, 0.08]	0.06	76.493	29.000	0.000	-0.017	0.010
Loading	645	2	260.67	109	0.00	0.92	0.07	[0.06, 0.08]	0.06	20.469	10.000	0.025	-0.014	800.0

Consider freeing the equality constraint on the following thresholds to obtain Threshold Partial Invariance on the Grade 7 Child Internalizing - Child

rhs

t1

t1

t2

t3

t2

label

cyips5.thr1

cyips3.thr2

cyips1.thr3

cyips8.thr2

0.05

0.07

label

RMSEA.CI95 SRMR

[0.03, 0.06]

[0.05, 0.07]

Consider freeing the equality constraint on the following thresholds to obtain Threshold Partial Invariance on the Grade 7 Child Externalizing - Child

rhs

cyips10.thr1 12.146233

### Venezuelan 261 35 0.00 0.91 0.09 1 112.80 Only Configural 647 2 177.43 70 0.00 0.95 0.07 Threshold 647 2 275.54 99 0.00 0.92 0.07

plabel

n ngroups x2

1 64.31

Investigating threshold partial invariance

386

647

Threshold invariance can not be established.

lhs

op

Venezuelan Only	287	1	172.82	35	0.00	0.93	0.12	[0.10, 0.14]	0.07				
Configural	711	2	355.40	70	0.00	0.93	0.11	[0.10, 0.12]	0.07				
Threshold	711	2	522.60	99	0.00	0.89	0.11	[0.10, 0.12]	0.07	131.665	29.000	0.000	-0.014
Loading	711	2	490.95	109	0.00	0.90	0.10	[0.09, 0.11]	0.08	32.895	10.000	0.000	-0.012

Model fit for each model and model comparison statistics

35 0.00 0.92 0.10

df p

Conclusions
Threshold invariance is not satisfied.
Investigating threshold partial invariance
Consider freeing the equality constraint on the following thresholds to obtain Threshold Partial Invariance on the Grade 7 Caregiver Relationship - Caregiver Report Measure.

lhs

arel6

plabel

.p25.

2 157.94 63 0.00 0.93 0.06

2 198.76 71 0.00 0.91 0.07

.p26. t3 arel6.thr3 4.054995 arel6 Caregiver Anxiety and Depression (aanxdep) Model fit for each model and model comparison statistics

rhs

t2

Model	n	ngroups	x2	df	p	CFI	RMSEA	RMSEA.CI95	SRMR	diff.x2	diff.df
Peruvian Only	428	1	19.79	5	0.00	0.99	0.08	[0.05, 0.12]	0.03		
Venezuelan Only	298	1	19.35	5	0.00	0.98	0.10	[0.05, 0.15]	0.05		
Configural	726	2	38.96	10	0.00	0.99	0.09	[0.06, 0.12]	0.04		
Threshold	726	2	73.27	24	0.00	0.98	0.08	[0.06, 0.10]	0.04	28.742	14.000
Loading	726	2	62.46	29	0.00	0.98	0.06	[0.04, 0.08]	0.04	5.667	5.000
Conclusi	ions	6									

Investigating threshold partial invariance plabel lhs rhs label X2 op

groups to generate the threshold model, then we constrain both thresholds and factor loadings to be equal across groups to obtain the loading

Caregiver Anxiety and Depression. The Child Emotional Processes model had an ambiguous fit on the Venezuelan group.

Model n ngroups x2 df p CFI RMSEA RMSEA.CI95 SRMR diff.x2 diff.df diff.p diff.CFI diff.RMSEA diff.SRMR 397 90 0.00 0.96 0.05 [0.04, 0.06] 0.05 1 172.57 Venezuelan 316 [0.04, 0.06] 1 156.60 90 0.00 0.97 0.05 0.05 56.909 44.000 0.092 -0.001 0.000

Venezuelan 1.096366 0.08507385 Child Self Regulated Learning (csrl) Model fit for each model and model comparison statistics

RMSEA RMSEA.CI95 SRMR diff.x2

0.08

0.08

0.08

diff.df

diff.p diff.CFI diff.RMSEA diff.SRMR

Model fit for each model and model comparison statistics RMSEA RMSEA.CI95 SRMR diff.x2 diff.df diff.p diff.CFI diff.RMSEA diff.SRMR Model df p n ngroups x2 CFI Peruvian 464 77 0.00 0.87 0.08 1 332.88 [0.08, 0.09]0.08 Only [0.07, 0.10]0.10 2 588.48 154 0.00 0.86 0.08 Configural 796 [0.08, 0.09]0.08 Threshold 796 2 690.61 195 0.00 0.84 0.08 [0.07, 0.09]80.0 95.505 41.000 0.000 -0.014 -0.003 0.000 2 744.49 209 0.00 0.82 0.08 53.312 14.000 0.000 -0.029 Loading 796 [0.07, 0.09]0.09 0.008 0.006

Child Emotional Processes - Caregiver Report (aemo) Model fit for each model and model comparison statistics diff.df RMSEA RMSEA.CI95 SRMR diff.x2 Model diff.CFI diff.RMSEA diff.SRMR n ngroups x2 df p CFI diff.p Peruvian 473 35 0.00 0.95 0.09 1 167.98 [0.08, 0.10]0.06 333 35 0.00 0.89 0.14 1 256.24 [0.12, 0.15]0.09 Only [0.10, 0.12] Configural 806 2 425.71 70 0.00 0.92 0.11 0.07 93.947 29.000 0.000 0.000 Threshold 806 2 533.34 99 0.00 0.90 0.10 [0.10, 0.11]0.07 -0.008 -0.004 Loading 806 2 560.93 109 0.00 0.90 0.10 [0.09, 0.11] 0.08 49.581 10.000 0.000 -0.016 0.013 0.007

811 2 147.27 71 0.00 0.93 0.05 0.06 0.654 -0.001 -0.002 0.006 Loading [0.04, 0.06]5.939 8.000 Conclusions Threshold invariance can not be established. Investigating threshold partial invariance

.p26. arel6.thr3 4.208154 Caregiver Anxiety and Depression (aanxdep) Model fit for each model and model comparison statistics Model n ngroups x2 CFI RMSEA RMSEA.CI95 SRMR diff.x2 diff.df diff.p diff.CFI diff.RMSEA diff.SRMR Peruvian 476 0.03 1 15.87 5 0.01 0.99 0.07 [0.03, 0.11]Venezuelan 339 1 29.73 5 0.00 0.98 0.12 [0.08, 0.16]0.05

-0.008

0.000

0.006

0.000

0.006

0.001

54 0.00 0.91 0.07

2 254.96 108 0.00 0.94 0.07

2 329.27 143 0.00 0.92 0.06

2 375.44 155 0.00 0.91 0.07

.p20.

.p15.

.p35.

.p13.

.p39.

Child Self Regulated Learning (csrl)

csr5

csr1

csr15

csr1

csr16

CFI

0.00 0.90 0.06

lhs

csrl6r

csrl6r

csrl5r

csrl11

csrl4

csrl13r

op

plabel

.p31.

.p32.

.p28.

.p46.

.p27.

.p54.

Model fit for each model and model comparison statistics

90

Investigating threshold partial invariance

1 118.82

Model n ngroups x2 CFI RMSEA RMSEA.CI95 SRMR diff.x2 diff.df diff.p diff.CFI diff.RMSEA diff.SRMR Peruvian 54 0.00 0.95 0.06 378 1 138.19 [0.05, 0.08]0.06 Only

[0.05, 0.08]

[0.06, 0.08]

[0.05, 0.07]

[0.06, 0.08]

0.07

0.06

0.06

0.07

csr5.thr2

csr1.thr3

csr1.thr1

0.07

0.07

68.856 35.000 0.001 -0.009

6.567323

6.369234

4.717451

diff.df

X2

13.953220

11.190971

5.827817

5.794246

5.637164

5.550479

X2

19.678829

8.923934

6.592148

4.176553

diff.df

81.955 29.000 0.000

X2

diff.df

diff.df

diff.p

49.566 23.000 0.001 -0.013

27.003 8.000 0.001 -0.028

X2

0.011 -0.003

0.340 -0.002

-0.007

0.002

0.000

0.005

10.778 10.000 0.375 -0.004

diff.p

diff.x2

diff.p

diff.CFI diff.RMSEA diff.SRMR

0.000

0.008

diff.SRMR

0.000

0.005

diff.CFI diff.RMSEA diff.SRMR

0.000

0.008

0.009

0.000

diff.p diff.CFI diff.RMSEA diff.SRMR

0.006

0.009

diff.CFI diff.RMSEA diff.SRMR

0.000

0.011

0.000

0.011

-0.016

csr15.thr2 5.121829

csr16.thr3 4.128304

34.812 12.000 0.001 -0.019 0.011

Consider freeing the equality constraint on the following thresholds to obtain Threshold Partial Invariance on the Grade 3 Caregiver Anxiety and

label X2 plabel lhs op rhs csr13.thr2 9.605377 t2 .p32. csr13 t3 7.978314 .p24. csr8 csr8.thr3 .p48. csr19 t3 csr19.thr3 7.780825

t2

t3

t2

t1

### 2 395.97 0.91 0.06 180 0.00 [0.05, 0.07]0.07 2 487.10 224 0.00 [0.05, 0.07] 0.89 0.06 0.07 86.194 44.000 0.000 -0.012 The fit of the threshold model is ambiguous. Therefore, we can not establish threshold invariance. Investigating threshold partial invariance Consider freeing the equality constraint on the following thresholds to obtain Threshold Partial Invariance on the Grade 7 Child Self Regulated

label

csrl6r.thr1

csrl6r.thr2

csrl5r.thr1

csrl11.thr1

csrl4.thr3

csrl13r.thr3

RMSEA RMSEA.CI95 SRMR diff.x2

[0.05, 0.07]

[0.05, 0.08]

# Mode Peru Only

[0.07, 0.11]0.08 [0.06, 0.08]0.06 [0.06, 0.08]0.06

2 252.74 109 0.00 0.93 0.06

Model fit for each model and model comparison statistics

df p

.p30.	cyeps7		t2	cyeps7.thr2	9.777454
.p31.	cyeps7		t3	cyeps7.thr3	9.292134
.p26.	cyeps6		t1	cyeps6.thr1	7.498053
.p14.	cyeps2		t1	cyeps2.thr1	7.417384
.p28.	cyeps6	1	t3	cyeps6.thr3	7.417250
.p20.	cyeps4		t1	cyeps4.thr1	7.267561
.p32.	cyeps8	1	t1	cyeps8.thr1	5.354378
.p23.	cyeps5	1	t1	cyeps5.thr1	5.030668
.p16.	cyeps2		t3	cyeps2.thr3	4.879155
.p34.	cyeps8		t3	cyeps8.thr3	4.749306

CFI RMSEA RMSEA.CI95 SRMR diff.x2

[0.09, 0.11]

[0.04, 0.08]

[0.05, 0.10]

[0.05, 0.08]

[0.05, 0.08]

[0.06, 0.08]

0.05

0.07

0.06

0.06

0.07

label

arel6.thr2 7.206273

0.07

### Caregiver Relationship - Caregiver Report (arel) Model fit for each model and model comparison statistics df p RMSEA RMSEA.CI95 SRMR diff.x2 Model n ngroups x2 CFI

20 0.00 0.97 0.06

20 0.00 0.94 0.07

40 0.00 0.96 0.06

.p12. arel2 t1 arel2.thr1 6.337725 .p18. t1 arel4.thr1 5.694345 arel4 .p21. arel5 t1 arel5.thr1 4.995987

op

								_							
Model	n	ngroups	x2	df	р	CFI	RMSEA	RMSEA.CI95	SRMR	diff.x2	diff.df	diff.p	diff.CFI	diff.RMSEA	diff.SRMR
Peruvian Only	428	1	19.79	5	0.00	0.99	0.08	[0.05, 0.12]	0.03						
Venezuelan Only	298	1	19.35	5	0.00	0.98	0.10	[0.05, 0.15]	0.05						
Configural	726	2	38.96	10	0.00	0.99	0.09	[0.06, 0.12]	0.04						

Consider freeing the equality constraint on the following thresholds to obtain Threshold Partial Invariance on the Grade 7 Caregiver Anxiety and Depression Measure. t3 .p8. aanxdep2 | aanxdep2.thr3 6.315158 .p7. t2 aanxdep2 aanxdep2.thr2 5.363162