

INTERNATIONAL SURVEY OF CHILDREN'S WELL-BEING (ISCWeB)

## Using psychometric scales as children's Subjective Well-Being indicators in cross-cultural analysis

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# Why to use multi-item psychometric scales?

- Up to now most cross-cultural studies on child well-being have used single-item scales.
- It has been pointed-out that using only one single item scale for comparative purpose is a too weak solution.
- Multiple-item scales are much more robust measures.
- In this project we have used 4 multiple-item scales and one single item scale.





# Why to use Confirmatory Factor Analysis (CFA) with Structural Equation Modelling (SEM)?

- CFA is used to assess the construct validity of a measurement model (i.e.: a psychometric scale).
- SEM is a multivariate technique that seeks to explain the relationship between multiple variables (even unobservable or "latent"), including the measurement errors in the model. It takes advantage of psychometric and econometric knowledge, and its foundation lies in factor analysis and multiple regression analysis.





# Why to use Multi-group CFA?

- When using the same model with different groups (i.e.: samples from different countries) we need to examine the degree to which the models are equivalent across groups (i.e.: its comparability).
- In order to meaningfully compare statistics across groups (i.e.: the mean of a latent variable) measurement invariance is required. Three steps are required to check for measurement invariance: (a) configural invariance (unconstrained variables); (b) metric invariance (constrained factor loadings); (c) scalar invariance (constrained loadings and intercepts).
- Metric invariance allows meaningful comparison of correlations and regressions.
- Scalar invariance allows meaningful comparison of the latent means.





# Our data is non-normal and we have used emoticon scales with 8yo

- Emoticons are categorical variables of an ordinal scale. However, in some occasions categorical variables in psychometric scales are treated by psychometricians as continuous variables, because it has been shown that results of the analysis are very similar. That frequently happens in traditional statistical techniques (i.e.: ANOVA, MANOVA) as well as SEM analysis. AMOS20 program allows analyzing whether results of a categorical variable are very different from results of a continuous variable through Bayesian estimation (Arbuckle, 2010; Byrne, 2010).
- No item of our scales shows a normal distribution. Values present positive asymmetric skewness and positive kurtosis and, therefore, high multivariate kurtosis. For that reason all results will be presented using bootstrap corrections.





### SLSS. 12-year-olds 15 countries pooled sample

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Model		χ2	df	p- value	CFI	RMSEA (confidenc e interval)	SRMR		
1	Initial model. Pooled data	909.42	5	.000	.981	.103 (.097- .108)	.024		
2	SLSS 2 error cov	1-2 4-5	3	.000	.998	.042 (.035- .049)	.007		
3	SLSS multigroup 2errCov	284.47	45	.000	.996	.018 (.016020)	.013		
4	SLSS multigroup 2errCov Constrained loadings	620.88	101	.000	.991	.017 (.016019)	.015		
5	SLSS multigroup 2errCov Constr load. & intercepts	1571.99	157	.000	.975	.023 (.022024)	.016		
6	SLSS multigroup 2errCov Semipartial constr interc: without item 2	1207.98	143	.000	.981	.021 (.020022)	.016		
CHILDREN'S JACOBS WORLDS INTERNATIONAL SURVEY OF CHILDREN'S WELL-BEING (ISCWGB)									

#### SLSS. 10-year-olds 15 countries pooled sample

#### SLSS. 8-year-olds 15 countries pooled sample

	Model	χ2	df	p- value	ĊFI	RMSEA (confidence interval)	SRMR				
1	Initial model. Pooled data	468.33	5	.000	.987	.078 (.072084)	.021				
2	SLSS 2 error cov	44.03	3	.000	.999	.030 (.023038)	.006				
3	SLSS multi-group 2errCov	180.86	45	.000	<mark>.996</mark>	.014 (.012016)	.006				
4	SLSS multi-group 2errCov Constrained loadings	377.27	101	.000	<mark>.993</mark>	.013 (.012015)	.021				
5	SLSS multi-group 2errCov Constr load. & intercepts	1110.53	157	.000	.974	.020 (.019021)	.021				
6	SLSS multi-group 2errCov Constr load. & partial interc: item 2 excluded	765.42	143	.000	<mark>.983</mark>	.017 (.016018)	.020				
CHILDREN'S JACOBS											

Mc	del	χ2	df	p- value	CFI	RMSEA (confidence	SRMR	
			_			interval)		Satisfaction with:
1	Initial model. Pooled data	159.00	5	.000	.988	.042 (.037048)	.017	Your family life
2	1 error covariance	77.39	4	.000	.994	.032 (.026039)	.012	
3	Multigroup (1 err cov)	326.11	60	.000	.979	.016 (.014018)	.018	52 Satisfaction with: Your friends
4	Multigroup (1 err cov) Constrained loadings	666.42	116	.000	.957	.016 (.015018)	.060	
5	Multigroup (1 err cov) Constr. load. & interc	3472.57	172	.000	.739	.033 (.032034)	.064	BMSLSS
6	Multigroup (1 err cov) EXCLUDING: Algeria, Ethiopia, Germany and . Romania, Uconstrained	285.55	44	.000	.977	0.021 (.018023)	.019	51 Satisfaction with:
7	Multigroup (1 err cov) EXCLUDING: Algeria, Ethiopia, Germany and Romania. Constr. load.	428.32	84	.000	.967	.018 (.016019)	.044	50 Satisfaction with:
8	Multigroup (1 err cov) EXCLUDING: Algeria, Ethiopia, Germany and	2230.00	124	.000	.796	.036 (.03538)	.053	The area you live
C	Romania. C L & interc. HILDREN'S					0		<b>JACOBS</b> FOUNDATIO
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#### BMSLSS. 12-year-olds 15 countries pooled sample

#### BMSLSS. 10-year-olds 15 countries pooled sample

Model		X <sup>2</sup>	df	p- value	CFI	RMSEA (confidence interval)	SRMR		
1	Initial model. Pooled data	91.85	5	.000	.993	.032 (.026038)	.010		
2	Multigroup	336.43	75	.000	.980	.014 (.013016)	.017		
3	Multigroup Constrained loadings	716.41	131	.000	.955	.016 (.015017)	.053		
4	Multigroup (1 err cov) EXCLUDING: Algeria, Colombia, Germany and Turkey. Uconstrained	251.53	55	.000	.982	0.021 (.018023)	.023		
5	Multigroup (1 err cov) EXCLUDING: Algeria, Colombia, Germany and Turkey. Constr. loadings	395.65	95	.000	.972	.018 (.016019)	.032		
6	Multigroup (1 err cov) EXCLUDING: Algeria, Colombia, Germany and Turkey. C load & interc	1218.84	135	.000	.898	.025 (.024026)	.030		
7	Multigroup (1 err cov) EXCLUDING: Algeria, Colombia, Germany and Turkey. C load & partial constr interc: items 3, 4 & 5 excluded	494.99	105	.000	.963	.017 (.015018)	.032		
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#### BMSLSS. 8-year-olds 15 countries pooled sample

#### PWI-SC7. 12-year-olds 15 countries pooled sample

Model		<b>x</b> <sup>2</sup>	df	p- value	CFI	RMSEA (confidence interval)	SRMR				
1	Initial model. Pooled data	737.37	14	.000	.978	.054 (.051058)	.024				
2	3 error covariances	190.81	11	.000	.995	.031 (.027034)	.012				
3	Multigroup (3 err cov)	803.86	165	.000	.984	.015 (.014016)	.014				
4	Multigroup (3 err cov) Constrained loadings	1460.19	249	.000	.970	.017 (.016018)	.042				
5	Multigroup (3 err cov) Constr. load. & interc	4639.36	333	.000	.893	.027 (.027028)	.046				
6	Multigroup (3 err cov) EXCLUDING: Algeria, Colombia, Nepal and Romania Uconstrained	644.07	121	.000	.985	.018 (.017020)	.018				
7	Multigroup (3 err cov) EXCLUDING: Algeria, Colombia, Nepal and Romania Constrained loadings	1060.47	181	.000	.975	.019 (.018021)	.030				
8	Multigroup (3 err cov) EXCLUDING: Algeria, Colombia, Nepal and Romania Constr loadings & interc.	2799.89	241	.000	.926	.029 (.028030)	.031				
9	Multigroup (3 err cov) EXCLUDING: Algeria, Colombia, Nepal and Romania Constr L & part constr interc: Items 1, 2, 3, 6 excluded	1299.36	201	.000	.968	.021 (.020022)	.030				
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#### PWI-SC7. 10-year-olds 15 countries pooled sample

#### PWI-SC7. 8-year-olds 15 countries pooled sample

	Model	X <sup>2</sup>		p- value		RMSEA (confidence interval)	SRMR
1	Initial model. Pooled data	309.39	14	.000	.982	.037 (.034041)	.020
2	1 error covariance	145.49	13	.000	.992	.026 (.022030)	.013
3	Multi-group (1 err cov) Unconstrained	626.60	195	.000	.974	.012 (.011013)	.023
4	Multi-group (1 err cov) Constrained loadings	1031.87	279	.000	.955	.013 (.012014)	.038
5	Multi-group (1 err cov) EXCLUDING: England, Ethiopia, Germany, Norway & South Africa	598.80	140	.000	<mark>.961</mark>	.018 (.016019)	.024
6	Multi-group (1 err cov) EXCLUDING: England, Ethiopia, Germany, Norway & South Africa. Constr loadings	766.37	194	.000	<mark>.951</mark>	.017 (.015018)	.034
7	Multi-group (1 err cov) EXCLUDING: England, Ethiopia, Germany, Norway & South Africa. Constr loadings & interc	1726.02	248	.000	.873	.024 (.023025)	.035
8	Multi-group (1 err cov) EXCLUDING: England, Ethiopia, Germany, Norway & South Africa. Constr load & partial intercepts: Items 1, 2, 3, 4 & 7 excluded	846.06	203	.000	<u>.945</u>	.017 (.016018)	.033
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# SEM with the 3 multi-item SWB psychometric scales

#### SEM with the 3 multi-item SWB psychometric scales

- Correlations between the two domain-based SWB scales (BMSLSS and PWI-SC) are extremely high in the 3 age groups, showing multi-colinearity and suggesting they overlap or they belong to a same supra-construct.
- · Correlations between the context-free and the domainbased SWB scales are high - higher the older children are.
- Both correlations and regression weights display diverse shape in their values depending on the country - therefore reflecting different influences from the language and the cultural context.





# SEM with the 5 SWB psychometric scales 12-year-olds 15 countries pooled sample

- The regression weight of the PWI-SC7 on the OLS is .528 for the pooled sample, and ranges from .387 in Nepal and .415 in Israel, to .576 in Spain and .601 in South Korea.
- The regression weight of the BMSLSS on the OLS is .549 for the pooled sample, and ranges from .353 in Nepal and .416 in Ethiopia, to .621 in United Kingdom and .635 in South Korea.
- The regression weight of the SLSS4 on the OLS is .462 for the pooled sample, and ranges from .302 in South Africa and .336 in Colombia, to .558 in the United Kingdom and .616 in Norway.
- The regression weight of the PWI-SC7 on the OHS is .365 for the pooled sample, and ranges from .223 in Colombia and .309 in South Korea, and .462 in Norway and .536 in Nepal.
- The regression weight of the BMSLSS on the OHS is. 398 for the pooled sample, and ranges from .297 in Colombia and .303 in South Korea, to .458 in Romania and .523 in Ethiopia.
- The regression weight of the SLSS4 on the OHS is .470 for the pooled sample, and ranges from .335 in Norway and .399 in the United Kingdom, to .556 in South Africa and .558 in Romania.
- The correlation between the OLS and the OHS is .538 for the pooled sample and ranges from .296 in South Africa and .323 in Nepal, to .673 in South Korea and .680 in Norway.
- The correlation between the BMSLSS and the SLSS4 is .637 for the pooled sample and ranges from .485 in South Korea and .501 in Norway, to .711 in Colombia and .790 in Nepal.
- The correlation between the PWI-SC7 and the BMSLSS is .919 for the pooled sample and ranges from .757 in Algeria and .826 in Israel.
- The correlation between the PWI-SC7 and the SLSS4 is .585 for the pooled sample and ranges from .441 in Colombia and .461 in Germany, to .622 in Poland and .908 in Nepal.





12-year-olds CHI=3218,742;CFI=,980;RMSEA=,038; SRMR=.023



# SEM with the 5 SWB psychometric scales 10-year-olds 15 countries pooled sample

- The regression weight of the PWI-SC7 on the OLS is .535 for the pooled sample, and ranges from .411 in Turkey and .416 in Israel, to .682 in Poland and .698 in Spain.
- The regression weight of the BMSLSS on the OLS is .530 for the pooled sample, and ranges from .434 in Ethiopia and .449 in Romania, to .680 in Poland and .687 in Spain
- The regression weight of the SLSS on the OLS is .452 for the pooled sample, and ranges from .286 in South Africa and .306 in Colombia, to .582 in Poland and .563 in Norway.
- The regression weight of the PWI-SC7 on the OHS is .354 for the pooled sample, and ranges from .202 in Spain and .216 in Poland, and .432 in Germany and .464 in Israel.
- The regression weight of the BMSLSS on the OHS is .370 for the pooled sample, and ranges from .203 in Spain and .275 in Poland, to .428 in Romania and .437 in Ethiopia.
- The regression weight of the SLSS on the OHS is .447 for the pooled sample, and ranges from .272 in Poland and .346 in Norway, to .524 in Algeria and .570 in Colombia.
- The correlation between the OLS and the OHS is .481 for the pooled sample and ranges from .274 in Nepal and .287 in Romania, to .630 in South Korea and .653 in Norway.
- The correlation between the BMSLSS and the SLSS is .644 for the pooled sample and ranges from .343 in Spain and .525 in the United Kingdom, to .842 in Israel and .951 in Algeria.
- The correlation between the PWI-SC7 and the BMSLSS is .953 for the pooled sample and ranges from .836 in South Africa and .854 in Estonia, to 1 in Algeria, Nepal, Ethiopia, England and Norway.
- The correlation between the PWI-SC7 and the SLSS is .631 for the pooled sample and ranges from .268 in Spain and .437 in Norway, to .869 in Nepal and 1 in Algeria.







#### SEM with the 5 SWB psychometric scales 8-year-olds 12 countries pooled sample

- The correlation between the HOLS and the Happy Life 11-point scales is .429 for the pooled sample, and ranges between .151 in Nepal and .199 in South Africa, to .594 in Norway and .625 in Germany, suggesting a very different understanding of and/or answering styles in front of the two different scales depending on the culture.
- The correlation between the PWI-SC5 and the BMSLSS is .907 for the pooled sample and ranges from .807 in Germany and .862 in Nepal, to .974 in Romania and .992 in United Kingdom. Results suggests these two scales are measuring the same construct in all the studied countries.
- The correlation between the BMSLSS and the SLSS is .478 for the pooled sample and ranges from .176 in South Africa and .319 in Nepal, to .618 in Germany and .692 in Algeria.
- The correlation between the PWI-SC5 and the SLSS is .436 for the pooled sample and ranges from .100 in South Africa and .278 in Nepal, to .607 in United Kingdom and .646 in Israel.
- The regression weight of the PWI-SC5 on the HOLS is .564 for the pooled sample, and ranges from .376 in Norway and .407 in Algeria, to .649 in Ethiopia and .716 in Turkey.
- The regression weight of the BMSLSS on the HOLS is .561 for the pooled sample, and ranges from .421 in Norway and .446 in Germany, to .592 in Israel and ..694 in Turkey.
- The regression weight of the SLSS on the HOLS is .399 for the pooled sample, and ranges from .284 in South Africa and .326 in Romania, to .454 in Israel and 504 in Norway.
- The regression weight of the PWI-SC7 on the HL10 is .276 for the pooled sample, and ranges from .079 in Turkey and .117 in Nepal, to .396 in Norway and .417 in Germany.
  The regression weight of the BMSLSS on the HL10 is .344 for the pooled sample, and
- ranges from .125 in Nepal and .133 in Turkey, to .396 in Germany and .405 in Norway. • The regression weight of the SLSS on the HL10 is .411 for the pooled sample, and
- Ine regression weight of the SLSS on the HLU is .411 for the pooled sample, and ranges from .157 in Nepal and .171 in Turkey, to .492 in South Korea and .524 in Germany.







#### Comparable and non-strictly comparable mean scores of the items across-countries according to a multi-group SEM including the 3 multi-item SWB scales with constrained loadings and intercepts

		Comparable		Non-strictly comparable				
	12-y.o.	10-у.о.	8-y.o.	12-у.о.	10-у.о.	8-y.o.		
SLSS	My life is going well I have a good life	My life is going well I have a good life I have what I want in life The things in my life excell.	My life is going well I have a good life I have what I want in life The things in my life excell.	My life is just right I have what I want in life The things in my life are excellent	My life is just right	My life is just right		
BMSLSS	Sat with people I live with Sat with my friends	Sat with people I live with Sat with my friends	Sat with family Sat with my friends Sat with school experience	Sat with school experience Sat with myself Sat the area I live in	Sat with school experience Sat with own body Sat the area I live	Sat area live in Sat own body		
PWI-SC7 (PWI-SC5 for 8-yo)	Sat relationship people Sat how safe you feel Sat may happen later life	Satisfaction with health Sat relationship people Sat how safe you feel Sat may happen later life	Sat how safe you feel Sat with freedom I have	Sat all things you have Satisfaction with health Sat things want be good at Sat doing things away home	Sat all things you have Sat things want be good at Sat doing things away home	Satisfaction with health Sat relationship people Sat free time		

# Summarised results (I)

- Data in our databases display a very good quality for the 3 age groups.
- We have identified models using each of the 3 different multi-item psychometric scales which fit well with the pooled database from all countries.
- Therefore, the models here presented, in principle, can be used for incountry analysis and even cross-groups analysis in each country, although specific checking is advisable with each country data depending of the kind of analysis developed.
- Correlations and regressions of each single scale are comparable among countries excepting for a few countries in the case of BMSLSS and PWI-SC. When the 3 scales are used altogether in the same model, all country correlations and regressions are comparable.
- SLSS displays promising results, because is the only scale which correlations and regressions are comparable among ALL countries in our samples. However, not all its items display comparable mean scores.
- The non-comparability of some items suggests different answering styles, probably due to linguistic and cultural factors.





## Summarised results (II)

- Mean scores of the overall scale indexes are only comparable among countries in some cases, using partial intercept constrains (not all items constrained).
- SLSS mean scores are comparable: (a) for the 8 and 10-year-olds database, when item 2 is unconstrained, meaning that items 1, 3, 4 and 5 means are comparable; (b) for the 12-year-olds database, when item 4 is not included and items 2 and 5 are unconstrained.
- BMSLSS mean scores are comparable. (a) for the 10 and 12-yo databases when 3 items are unconstrained, meaning that only satisfaction with people I live in and Sat with family are comparable; (b) for the 8-yo when two items are unconstrained, meaning that only satisfaction with family, friends and school experience are strictly comparable.
- Mean scores of the PWI-SC7 are comparable with 4 unconstrained items for the 12-yo, and 3 for the 10 and 8-yo. Therefore, (a) sat with relationships, with safety and with what may happen later in life are strictly comparable for the 12-yo; (b) the same items, plus sat with health for the 10-yo; (c) and sat with safety and sat with freedom you have for the 8-yo.





## Summarised results (III)

- The overall number of items comparable seems to decrease with age: 7 on 17 are comparable at 12-yo; 10 on 17 at 10-yo; and 9 on 15 at 8-yo.
- Future challenge: more analysis must be done in order to identify which items should be modified and how in order to increase cross-country comparability of the scales.
- Future challenge: more countries should be included in the analysis and analysis of longitudinal data should be developed.



