

Subjective well-being between 9 and 14 years of age: Gender differences in a 5-year longitudinal study



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Sample characteristics (I)

- During 5 consecutive years, data from an overall sample of 2180 children has been collected.
- All cohorts include slightly more girls than boys, excepting 2001 cohort. There are also more girls than boys that answered 3 or 5 consecutive years, but not that answered 4 consecutive years.
- In the first year of data collection most children were between 10 and 14 years of age, with a few 9, 16 and one 17-years-old. The following years new cohorts of 10-11 were added. Three different versions of a questionnaire were used - with more questions the older the children are (9-11; 12-13; 14 or more years of age).

Sample characteristics (II)

		Number of years the child answered the questionnaire					Total
		1	2	3	4	5	
Cohort (year of birth)	1998	16	134	40	39	0	229
	1999	25	82	69	22	13	211
	2000	28	86	51	86	39	290
	2001	18	88	27	31	69	233
	2002	11	76	61	35	68	251
	2003	77	112	136	0	0	325
	2004	29	46	132	0	0	207
	2005	57	131	23	0	0	211
	2006	223	0	0	0	0	223
Total		484	755	539	213	189	2180

Subjective well-being psychometric scales used

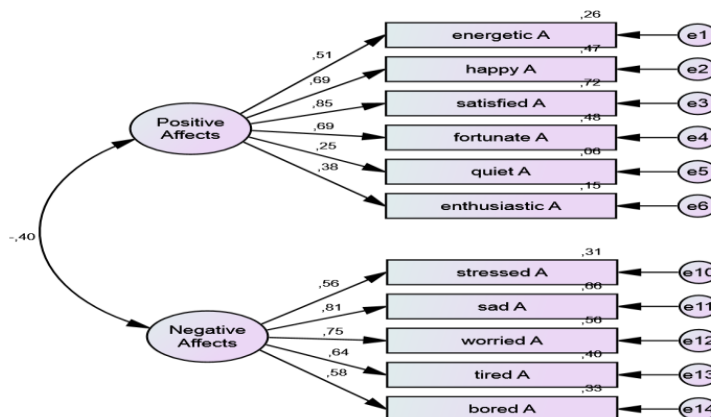
- * **OLS** - Overall Life Satisfaction single-item scale
- * **HOL** - Happiness with Overall Life single-item scale
- * **SWLS** - Satisfaction with Life Scale. Context-free multi-item scale by Diener, Emmons, Larsen & Smith (1985)
- * **PWI-SC** - Personal Well-Being Index-School Children. Cummins and Lau's (2005) multi-item domain-based scale
- * **BMSLSS** - Brief Multidimensional Student Life Satisfaction Scale. Domain-based multi-item scale by Seligson, Huebner & Valois (2003)
- * **Positive and Negative Affects** based on Russell's Core Affects scale (2003)

Data analyses

- We have first analysed the fit statistics for each psychometric scale we are using as SWB indicator using CFA. We have accordingly deleted some items in a few scales to obtain the best fitting options (some examples presented).
- Next we have analysed paired means for every psychometric scale here used, between all different years of data collections (some examples presented).
- Next we present a summary of score mean differences for each instrument, by gender.
- Next we present a few graphics to show some of the results more visually.
- Next some SEM results.
- Finally: some conclusions.

Example of CFA: Affect scales

Graph 1. Initial Model with 6 positive affect items and 5 negative affect items



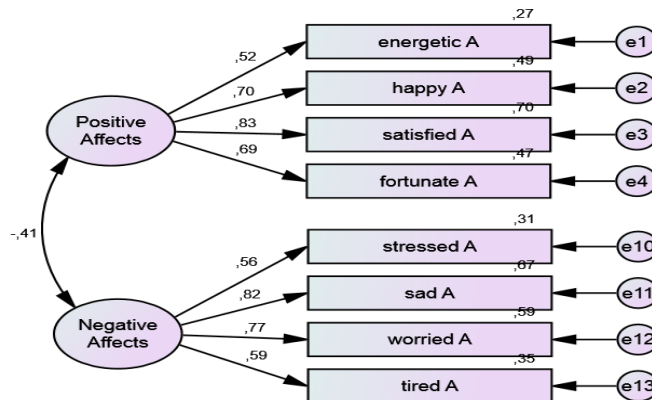
CHI=218,483;CFI=,937;RMSEA=,043;

CFA. Fit statistics for the factor structure of models relating positive affect items to negative affect items

		year	χ^2	df	p-value	CFI	RMSEA (confidence interval)
1	Initial model: 6 positive + 5 negative affects	1	218.48	43	.000	.937	.043 (.038-.049)
2	Modified model: 4 posit + 4 negative affects	1	67.87	19	.000	.978	.034 (.026-.043)
3	Modified model: 4 posit + 4 negative affects	2	66.34	19	.000	.984	.034 (.025-.043)
4	Modified model: 4 posit + 4 negative affects	3	165.53	19	.000	.963	.059 (.051-.068)
5	Modified model: 4 posit + 4 negative affects	4	129.22	19	.000	.969	.052 (.043-.060)
6	Modified model: 4 posit + 4 negative affects	5	121.87	19	.000	.973	.050 (.042-.058)

CFA of the modified affect scales

Graph 2. Modified model with 4 positive affect items and 4 negative affect items



CHI=67,866;CFI=,978;RMSEA=,034;

Improving the model

- A CFA of the initial model using 6 positive affect items and 5 negative affect items (first year of data collection) displays moderate fit indexes (Model 1 in Table, and Graph 1). Accurate analyses has shown that a modified model deleting 2 positive items (enthusiastic and quiet) that displayed very low loadings on the latent variable, and 1 negative affect (bored) that displayed too high error covariance with another item (tired), the model shows excellent fit statistics (Model 2 in Table, and Graph 2). The equivalent model using data from the second to the fifth data collection also displayed good to excellent fit statistics (Models 3 to 6 in Table).
- The item with highest regression weights on the Positive Affects latent variable is "Satisfied" for the first 3 years of data collection and "Happy" for the 4th and 5th. "Sad" displays the highest regression weights on the Negative Affects latent variable in year 1st, 4th and 5th, while it is "Worried" in years 2nd and 3rd. SMC (Squared Multiple Correlations) follow a similar pattern. Correlation between the two latent variables fluctuate from -.412 to -.583 depending on the year of the data collection.
- The overall scores of Positive and Negative Affects have been calculated accordingly to the best fitting model in the CFA, that is to say, with 4 positive and 4 negative items.

Standardized regression weights, SMC and correlations of every year's Model

Standardized Regression Weights Estimates			Year 1 (A)	Year 2 (B)	Year 3 (C)	Year 4 (D)	Year 5 (E)
Energetic	<---	Positive Affects	.520	.475	.612	.627	.641
Happy	<---	Positive Affects	.698	.848	.842	.869	.909
Satisfied	<---	Positive Affects	.835	.885	.858	.837	.815
Fortunate	<---	Positive Affects	.688	.781	.669	.727	.702
Stressed	<---	Negative Affects	.559	.586	.602	.669	.567
Sad	<---	Negative Affects	.822	.761	.796	.802	.830
Worried	<---	Negative Affects	.771	.815	.799	.783	.777
Tired	<---	Negative Affects	.592	.599	.586	.572	.610
Squared Multiple Correlations Estimates							
Tired			.350	.358	.636	.327	.372
Worried			.594	.664	.577	.614	.603
Sad			.675	.580	.634	.643	.689
Stressed			.312	.343	.362	.448	.321
Fortunate			.474	.610	.448	.529	.493
Satisfied			.696	.782	.736	.701	.665
Happy			.487	.719	.709	.755	.826
Energetic			.270	.225	.375	.393	.411
Correlations: Estimates							
Negative Affect	<->	Positive Affects	-.412	-.480	-.562	-.546	-.583

Example 1: Paired-means, correlations and paired-mean differences of the OLS scores, according the year of the data collection (1st to 5th = A to E)

Pair	OLS on 100	Mean	N	SD	Std. Error Mean	Correlation	Sig.	Paired Differences				t	df	Sig. (2-tailed)	
								Mean Difference	Std. Deviation	Std. Error Mean	95% Conf. Interv. Diff Lower Upper				
1	OLSAs/100	87.52	940	13.91	.45	.453	.000	3.17	15.09	.49	2.20	4.14	6.44	939	.000
	OLSBs/100	84.35	940	14.89	.49										
2	OLSBs/100	85.12	551	14.67	.62	.380	.000	4.41	15.75	.67	3.09	5.73	6.57	550	.000
	OLSCs/100	80.71	551	13.57	.58										
3	OLSCs/100	85.22	811	15.24	.54	.512	.001	1.79	14.80	.52	.77	2.81	3.44	810	.001
	OLSDs/100	83.43	811	14.71	.52										
4	OLSDs/100	86.45	749	14.19	.52	.467	.000	2.47	14.89	.54	1.40	3.54	4.54	748	.000
	OLSEs/100	83.98	749	14.66	.54										
5	OLSAs/100	88.51	565	13.31	.56	.161	.000	7.72	17.44	.73	6.28	9.16	10.52	564	.000
	OLSCs/100	80.80	565	13.61	.57										
6	OLSAs/100	89.72	361	12.29	.65	.303	.000	10.36	15.12	.80	8.80	11.92	13.02	360	.000
	OLSDs/100	79.36	361	13.29	.70										
7	OLSAs/100	92.20	255	9.99	.63	.115	.000	12.78	15.26	.96	10.9	14.7	13.38	254	.000
	OLSEs/100	79.41	255	12.74	.80										
8	OLSBs/100	85.92	348	14.30	.77	.437	.000	6.67	14.70	.79	5.12	8.22	8.46	347	.000
	OLSDs/100	79.25	348	13.35	.72										
9	OLSBs/100	89.20	251	12.17	.77	.174	.000	9.56	15.98	1.01	7.58	11.55	9.48	250	.000
	OLSEs/100	79.64	251	12.69	.80										
10	OLSCs/100	86.81	700	13.90	.53	.364	.000	4.47	15.68	.59	3.31	5.64	7.54	699	.000
	OLSEs/100	82.34	700	13.92	.53										

Example 2: Paired-means, correlations and paired-mean differences of the Positive Affects overall scores, according the year of the data collection (1st to 5th = A to E)

Pair	Positive Affects 4 items on 100	Mean	N	SD	Std. Error Mean	Correlation	Sig.	Paired Differences				t	df	Sig. (2-tailed)
								Mean Difference	Std. Deviation	Std. Error Mean				
1	PosAffectsA	86.81	881	13.48	.45	.532	.000	2.77	13.38	.45	6.15	880	.000	
	PosAffectsB	84.04	881	14.15	.48									
2	PosAffectsB	84.83	524	13.03	.57	.414	.000	3.75	14.11	.62	6.09	523	.000	
	PosAffectsC	81.07	524	13.04	.57									
3	PosAffectsC	84.36	771	14.67	.53	.582	.000	1.34	13.45	.48	2.77	770	.006	
	PosAffectsD	83.02	771	14.76	.53									
4	PosAffectsD	85.54	722	14.03	.52	.588	.000	2.01	12.90	.48	4.18	721	.000	
	PosAffectsE	83.54	722	14.36	.53									
5	PosAffectsA	87.71	541	12.69	.55	.276	.000	6.85	15.76	.68	10.11	540	.000	
	PosAffectsC	80.86	541	13.48	.58									
6	PosAffectsA	89.07	349	11.53	.62	.373	.000	10.05	14.85	.79	12.64	348	.000	
	PosAffectsD	79.02	349	14.61	.78									
7	PosAffectsA	90.72	250	11.25	.71	.220	.000	11.67	15.30	.97	12.06	249	.000	
	PosAffectsE	79.05	250	13.14	.83									
8	PosAffectsB	85.79	335	13.08	.71	.377	.000	6.67	15.29	.84	7.99	334	.000	
	PosAffectsD	79.12	335	14.26	.78									
9	PosAffectsB	88.30	241	11.41	.73	.215	.001	9.13	15.37	.99	9.22	240	.000	
	PosAffectsE	79.17	241	13.04	.84									
10	PosAffectsC	85.66	671	13.72	.53	.461	.000	3.88	14.54	.56	6.91	670	.000	
	PosAffectsE	81.78	671	14.26	.55									

Example 3: Paired-means, correlations and paired-mean differences of the Negative Affects overall scores, according the year of the data collection (1st to 5th = A to E)

Pair	Positive Affects 4 items on 100	Mean	N	SD	Std. Error Mean	Corre- lation	Sig.	Paired Differences				t	df	Sig. (2- tailed)
								Mean Diffe- rence	Std. Devia- tion	Std. Error Mean				
1	Negative AffectsA	36.77	820	24.55	.86	.445	.000	-3.27	25.38	.89	-3.69	819	.000	
	Negative AffectsB	40.04	820	23.59	.82									
2	Negative AffectsB	37.50	506	22.96	1.02	.450	.000	-5.96	23.56	1.05	-5.69	505	.000	
	Negative AffectsC	43.47	506	21.94	.98									
3	Negative AffectsC	37.46	746	23.07	.84	.500	.000	-1.77	23.07	.84	-2.09	745	.037	
	Negative AffectsD	39.23	746	23.06	.84									
4	Negative AffectsD	36.51	687	23.17	.88	.479	.000	-1.81	23.35	.89	-2.03	686	.043	
	Negative AffectsE	38.32	687	22.58	.86									
5	Negative AffectsA	34.50	503	24.14	1.08	.357	.000	-8.98	26.14	1.17	-7.70	502	.000	
	Negative AffectsC	43.48	503	21.83	.97									
6	Negative AffectsA	32.85	325	23.32	1.29	.360	.000	-12.72	25.31	1.40	-9.06	324	.000	
	Negative AffectsD	45.57	325	21.31	1.18									
7	Negative AffectsA	29.80	225	23.53	1.57	.280	.000	-17.14	26.99	1.80	-9.53	224	.000	
	Negative AffectsE	46.94	225	21.35	1.42									
8	Negative AffectsB	35.95	322	23.31	1.30	.387	.000	-10.02	24.71	1.38	-7.28	321	.000	
	Negative AffectsD	45.98	322	21.20	1.18									
9	Negative AffectsB	32.44	226	22.00	1.46	.258	.000	-15.32	25.65	1.71	-8.98	225	.000	
	Negative AffectsE	47.77	226	20.05	1.33									
10	Negative AffectsC	34.87	633	22.43	.89	.359	.000	-6.11	24.86	.99	-6.18	632	.000	
	Negative AffectsE	40.98	633	21.45	.85									

Example 4: Paired-means, correlations and paired-mean differences of the BMSLSS scores, according the year of the data collection (1st to 5th = A to E)

Pair	Positive Affects 4 items on 100	Mean	N	SD	Std. Error Mean	Corre- lation	Sig.	Paired Differences					t	df	Sig. (2- tailed)
								Mean Diffe- rence	Std. Devia- tion	Std. Error Mean	95% Conf. Interval of the Difference Lower	Upper			
1	BMSLSSAs/100	85.93	930	10.78	.35	.602	.000	3.23	9.95	.33	2.59	3.87	9.90	929	.000
	BMSLSSBs/100	82.70	930	11.48	.38										
2	BMSLSSBs/100	84.10	545	10.78	.46	.446	.000	5.06	11.06	.47	4.13	5.99	10.68	544	.000
	BMSLSSCs/100	79.03	545	10.22	.44										
3	BMSLSSCs/100	84.15	805	11.87	.42	.644	.000	2.27	9.92	.35	1.58	2.95	6.49	804	.000
	BMSLSSDs/100	81.88	805	11.64	.41										
4	BMSLSSDs/100	84.36	745	11.91	.44	.659	.000	1.83	9.92	.36	1.12	2.54	5.04	744	.000
	BMSLSEs/100	82.53	745	12.12	.44										
5	BMSLSSAs/100	87.16	559	9.91	.42	.367	.000	8.02	11.34	.48	7.08	8.96	16.72	558	.000
	BMSLSSCs/100	79.14	559	10.25	.43										
6	BMSLSSAs/100	88.32	356	9.36	.50	.380	.000	10.46	11.37	.60	9.28	11.65	17.36	355	.000
	BMSLSSDs/100	77.86	356	10.92	.58										
7	BMSLSSAs/100	90.30	254	8.94	.56	.264	.000	12.94	12.29	.77	11.4	14.46	16.77	253	.000
	BMSLSEs/100	77.36	254	11.12	.70										
8	BMSLSSBs/100	85.25	342	10.45	.57	.466	.000	7.44	11.10	.60	6.26	8.63	12.40	341	.000
	BMSLSSDs/100	77.81	342	11.00	.59										
9	BMSLSSBs/100	88.41	250	8.22	.52	.192	.002	11.02	12.54	.79	9.45	12.58	13.89	249	.000
	BMSLSEs/100	77.39	250	11.18	.71										
10	BMSLSSCs/100	85.64	698	11.41	.43	.534	.000	4.82	11.07	.42	4.00	5.64	11.51	697	.000
	BMSLSEs/100	80.82	698	11.51	.44										

Mean differences for scores of 7 SWB indicators in 5 consecutive longitudinal data collections. Pooled sample, boys' sample and girls' sample (I)

SWB indicators	Pooled sample					Only boys				Only girls					
	Diff Year 1-5	Diff Year 1-4	Diff Year 2-5	1-4 or 2-5?	Correl 1-5 (p>.001)	Diff Year 1-5	Diff Year 1-4	Diff Year 2-5	Correl 1-5 (p>.001)	Diff Year 1-5	Diff Year 1-4	Diff Year 2-5	Correl 1-5 (p>.001)		
OLS	12.78	10.36	9.56	↓	NS	10.80	8.94	7.48	↓	.007	14.34	11.49	11.21	↓	NS
HOL	13.96	11.31	11.08	↓	NS	12.86	10.82	9.91	↓	NS	14.83	11.70	12.00	↑	NS
Af+	11.67	10.05	9.13	↓	.000	10.07	9.58	6.81	↓	.027	12.91	10.42	11.02	↑	.007
Af-	-17.14	-12.72	-15.3	↑	.000	-13.43	-12.6	-11.6	↓	.009	-20.22	-12.9	-18.14	↑	.001
SWLS	12.35	9.90	9.63	↓	.007	12.64	11.12	7.56	↓	.016	12.21	9.11	11.37	↑	NS
BMSLSS	12.90	9.86	10.72	↑	NS	10.36	9.12	8.91	↓	NS	14.90	10.45	12.14	↑	NS
PWI-SC6	12.69	8.40	8.85	↑	NS	13.00	6.52	6.99	↑	NS	12.56	9.56	10.38	↑	NS

Mean differences for scores of 7 SWB indicators in 5 consecutive longitudinal data collections. Pooled sample

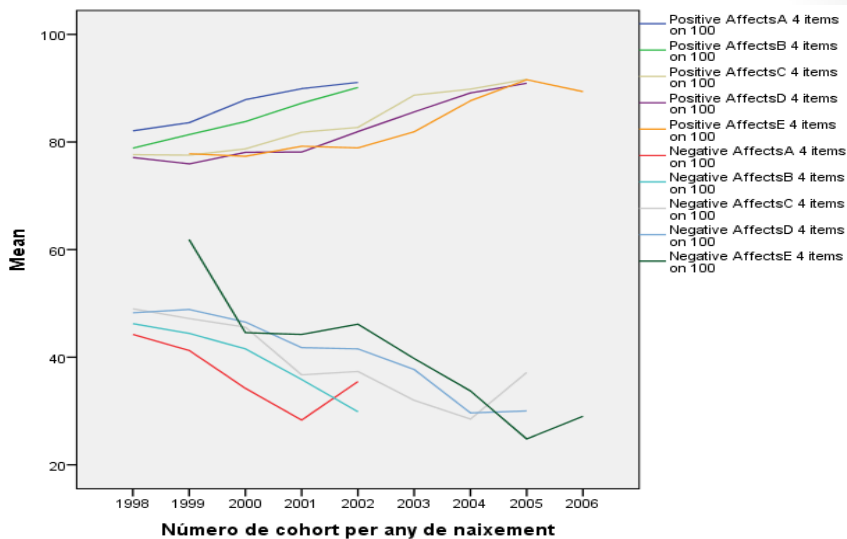
Using any of the SWB indicators (OLS, HOL, Positive Affects, Negative Affects, BMSLSS, PWI-SC6 and SWLS):

- With the pooled sample, the highest mean score differences are always observed between year 1 (A) and year 5 (E) data collection and they are significant in all cases. As expected, this group (the ones answering the questionnaire every year during 5 consecutive years) is the one with the smallest sample size (N=255) and therefore displaying the highest standard errors.
- Correlation between results for consecutive years is usually significant, with a few exceptions. However, it increasingly decreases the more years of difference in the data collections we consider, and between year 1 and year 5 correlation using the pooled sample is no more significant at p>.001 for most indicators - excepting for SWLS, Positive and Negative Affects.
- Differences comparing any pair of data collections are usually significant, but with some exceptions.

Mean differences for scores of 7 SWB indicators in 5 consecutive longitudinal data collections. Pooled sample, boys' sample and girls' sample

- The second highest mean score differences are observed between year 2 and year 5, and between year 1 and year 4. When using OLS, mean score differences between year 1 and 5 are always higher than between year 2 and 5, but when using PWI-SC6 it is the other way round in all cases. When using other psychometric scales, the highest mean scores difference depends on gender: Girls display higher differences between year 2 and 5, while boys display higher mean score differences between year 1 and 4.
- Girls display higher mean scores differences than boys when comparing different years of data collection, excepting with SWLS and PWI-SC6 when comparing year 1 and 5, and with SWLS when comparing year 1 and 4.
- Negative Affects display the highest mean differences for any comparison between data collections, differences displayed by girls being the most outstanding.

Tendencies of the Positive and Negative Affects according the different cohorts



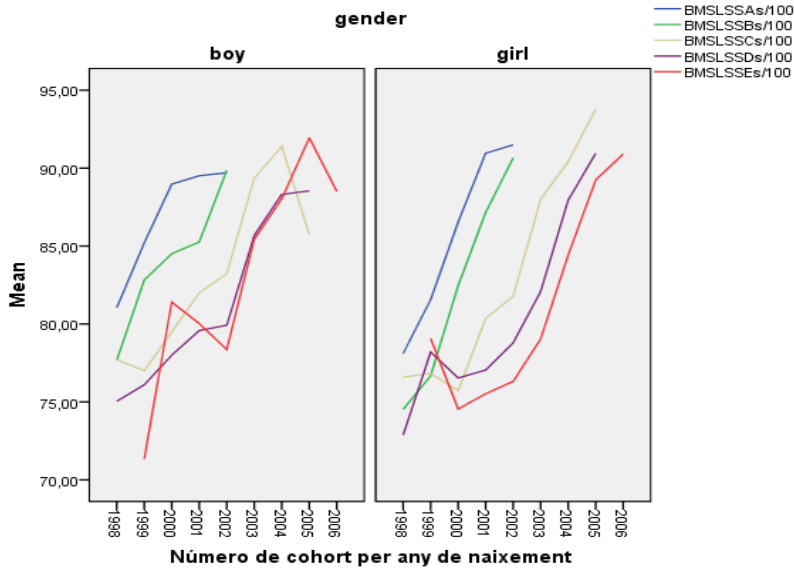
Tendencies of the Positive and Negative Affects according the different cohorts, by gender



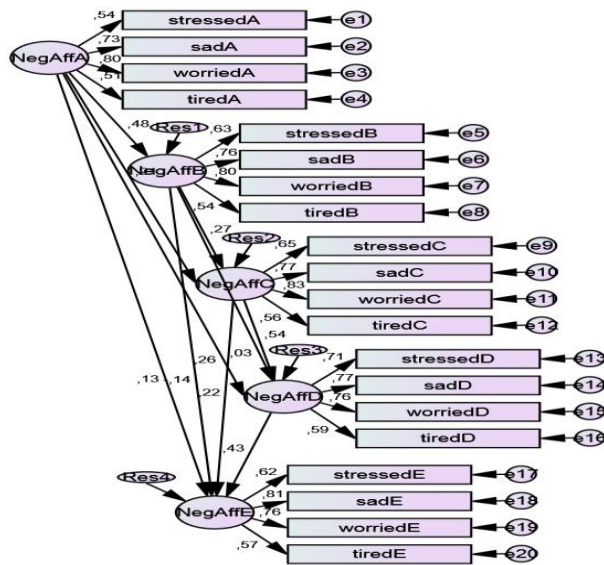
Tendencies of the OLS according the different cohorts, by gender



Tendencies of the BMSLSS according the different cohorts, by gender



SEM of the positive affect scale. 5 years



Standardized regression weights of different psychometric scales on the scores of different years of data collection, by gender

Standardized Regression Weights	OLS		HOL		Positive Affects		Negative Affects		BMSLSS	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
A → B	,446	,469	,412	,519	,518	,706	,478	,523	,856	,914
A → C	,170	-,069	,186	,082	,222	-,274	,210	,138	,239	-,037
A → D	,167	,131	,151	-,121	,620	,605	,544	,466	,910	,871
A → E	-,049	-,166	-,289	-,264	-,060	-,596	-,135	-,118	-,721	-,133
B → C	,369	,425	,458	,330	,419	,734	,267	,452	,392	,698
B → D	,131	,232	-,008	,111	,141	-,109	,026	,062	,257	-,331
B → E	-,119	-,191	,132	,094	,640	,510	,428	,503	2,219	,928
C → D	,453	,363	,590	,490	,126	,258	,257	,162	-,197	,310
C → E	,316	,194	,247	,182	-,283	,365	,128	-,096	,299	,743
D → E	,404	,463	,477	,500	,395	,344	,217	,211	-,1038	,190

Conclusions (I)

- All SWB instruments here used display similar trends, but not exactly the same results: SWB decreases with age - the younger children are, the more extreme are their overall mean scores -, however, some instruments seem to capture bigger differences than other. For example, after 5 years the correlation between the first and the fifth data collection is no more significant with most instruments, but it is still weakly significant with Positive and Negative Affects and with SWLS. However, after 5 years, all regression weights of the scores in the first year are negative on the fifth year, using any of the SWB instruments.
- Positive and negative affects display different evolution along time and their shape is not the opposite. All cohorts display a decreasing-with age trend of the positive affects and an increasing-with age trend of the negative affects, with significant changes from any year to the next. Negative affects seem to display larger variation in 5-years period than Positive Affects.

Conclusions (II)

- All results and the decreasing trend are clearly gender sensitive, displaying a different shape for boys and girls, but it is particularly outstanding how different is the evolution of negative affects for girls.
- Domain-based scales seem to display a more important prediction of SWB the following years than context-free SWB scales.
- Future research should focus in more detail in the different gender specific decreasing pathways of SWB.
- It is recommended to use more than one SWB psychometric scale -of different characteristics, i.e. context-free and domain-based- for any research with children and adolescents, because each scale seems to capture different aspects of the construct, which is probably differently influenced by each specific context.

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