

*Online Supplements for:*

**Improved Representation of the Self-Perception Profile for Children through Bifactor  
Exploratory Structural Equation Modeling**

Table S1

*Standardized Factor Loading for the First-Order CFA and Bifactor-CFA Models*

Item	Label	CFA		Bifactor-CFA		
		Loading	Residual	G-factor	S-factor	Residual
Global Self-Concept						
5	Some kids are often unhappy with themselves. But other kids are pretty pleased with themselves.	0.668**	0.554**	0.688**	0.281**	0.448**
10	Some kids don't like the way they are leading their life. But other kids do like the way they are leading their life.	0.574**	0.670**	0.579**	0.198*	0.625**
15	Some kids are usually happy with themselves as a person. But other kids are often not happy with themselves.	0.745**	0.445**	0.733**	0.001	0.463**
20	Some kids like the kind of person they are. But other kids often wish they were someone else.	0.661**	0.564**	0.651**	-0.190**	0.540**
25	Some kids are very happy being the way they are. But other kids wish they were different.	0.755**	0.430**	0.763**	-0.289**	0.334**
30	Some kids are not happy with the way they do a lot of things. But other kids think the way they do things is fine.	0.590**	0.652**	0.589**	0.048	0.651**
Scholastic Competence						
1	Some kids feel that they are very good at their schoolwork. But other kids worry about whether they can do the schoolwork assigned to them.	0.558**	0.689**	0.343**	0.435**	0.693**
6	Some kids feel like they are just as smart as other kids their age. But other kids aren't so sure and wonder if they are as smart.	0.647**	0.581**	0.402**	0.497**	0.592**
11	Some kids are pretty slow in finishing their schoolwork. But other kids can do their schoolwork quickly.	0.604**	0.635**	0.279**	0.553**	0.617**
16	Some kids often forget what they learn. But other kids remember things easily.	0.604**	0.635**	0.345**	0.495**	0.635**
21	Some kids do very well at their classwork. But other kids don't do well at their classwork.	0.681**	0.536**	0.353**	0.592**	0.525**
26	Some kids have trouble figuring out the answers in school. But other kids can almost always figure out the answers.	0.685**	0.531**	0.379**	0.571**	0.530**
Peer Acceptance						
2	Some kids find it hard to make friends. But other kids find it pretty easy to make friends.	0.637**	0.594**	0.345**	0.543**	0.587**
7	Some kids have a lot of friends. But other kids don't have very many friends.	0.732**	0.464**	0.371**	0.652**	0.437**
12	Some kids would like to have a lot more friends. But other kids have as many friends as they want.	0.689**	0.525**	0.389**	0.574**	0.520**
17	Some kids are always doing things with a lot of kids. But other kids usually do things by themselves.	0.536**	0.713**	0.318**	0.426**	0.717**
22	Some kids wish that more people their age liked them. But other kids feel that most people their age do like them.	0.660**	0.564**	0.418**	0.505**	0.570**
27	Some kids are popular with others their age. But other kids are not very popular.	0.696**	0.515**	0.439**	0.525**	0.532**

Table S1 (Continued)

Item	Label	CFA		Bifactor-CFA		
		Loading	Residual	G-Factor	S-Factor	Residual
Athletic Competence						
3	Some kids do very well at all kinds of sports. But other kids don't feel that they are very good when it comes to sports.	0.768**	0.411**	0.315**	0.726**	0.374**
8	Some kids wish they could be a lot better at sports. But other kids feel they are good enough at sports.	0.647**	0.581**	0.357**	0.530**	0.592**
13	Some kids think they could do well at just about any new sports activities they haven't tried before. But other kids are afraid they might not do well at sports they haven't ever tried.	0.741**	0.450**	0.367**	0.643**	0.452**
18	Some kids feel that they are better than others their age at sports. But other kids don't feel they can play at well.	0.675**	0.544**	0.290**	0.624**	0.526**
23	In games and sports some kids usually watch instead of play. But other kids usually play rather than watch.	0.352**	0.876**	0.269**	0.228**	0.876**
28	Some kids don't do well at new outdoor games. But other kids are good at new games right away.	0.564**	0.682**	0.356**	0.425**	0.693**
Physical Appearance						
4	Some kids are happy with the way they look. But other kids are not happy with the way they look.	0.706**	0.502**	0.617**	0.285**	0.538**
9	Some kids are happy with their height and weight. But other kids wish their height or weight were different.	0.544**	0.705**	0.431**	0.355**	0.688**
14	Some kids wish their body was different. But other kids like their body the way it is.	0.702**	0.506**	0.551**	0.494**	0.453**
19	Some kids wish their physical appearance (how they look) was different. But other kids like their physical appearance the way it is.	0.802**	0.357**	0.639**	0.545**	0.294**
24	Some kids wish that something about their face or hair looked different. But other kids like their face and hair the way it is.	0.633**	0.599**	0.560**	0.290**	0.602**
29	Some kids think they are good looking. But other kids think that they are not good looking.	0.698**	0.512**	0.635**	0.235**	0.541**

Note. \*  $p < .05$ . \*\*  $p < .01$ .

Table S2

*Standardized Factor Loading for the First-Order ESEM Model*

Item	GSC	Scholastic	Appearance	Athletic	Peer	Residual
5	<b>0.368**</b>	0.125**	0.185*	-0.004	0.166**	0.574**
10	<b>0.309*</b>	0.152**	0.133	-0.051*	0.158**	0.694**
15	<b>0.594**</b>	0.075	0.150*	0.040*	0.034	0.430**
20	<b>0.441**</b>	0.073	0.197**	-0.006	0.081*	0.579**
25	<b>0.527**</b>	0.016	0.279**	0.031	0.041	0.422**
30	<b>0.358**</b>	0.224**	0.102	-0.015	0.068	0.659**
1	0.121**	<b>0.515**</b>	-0.027	0.088**	-0.093**	0.689**
6	0.208**	<b>0.583**</b>	-0.091*	0.045	-0.057*	0.584**
11	-0.100**	<b>0.633**</b>	-0.038	0.022	0.076**	0.603**
16	-0.046*	<b>0.600**</b>	0.048	0.012	0.020	0.623**
21	0.128**	<b>0.675**</b>	-0.101*	-0.004	-0.048*	0.542**
26	-0.082*	<b>0.708**</b>	0.059*	-0.024	0.040	0.494**
2	-0.055	-0.020	0.027	0.021	<b>0.653**</b>	0.583**
7	0.096**	-0.056**	-0.164**	0.066**	<b>0.754**</b>	0.442**
12	-0.132**	0.022	0.117**	-0.057**	<b>0.731**</b>	0.479**
17	0.169**	-0.051	-0.175**	0.107**	<b>0.503**</b>	0.689**
22	-0.028	0.030	0.092**	-0.063**	<b>0.656**</b>	0.549**
27	0.125**	0.029	-0.079	0.072**	<b>0.612**</b>	0.530**
3	-0.032	-0.047**	-0.029	<b>0.819**</b>	0.021	0.367**
8	-0.154**	-0.002	0.203**	<b>0.569**</b>	0.076*	0.577**
13	0.062*	0.031	-0.064**	<b>0.737**</b>	-0.002	0.441**
18	0.011*	-0.006	-0.034	<b>0.722**</b>	-0.035	0.513**
23	-0.156*	0.103**	0.172**	<b>0.198**</b>	0.155**	0.842**
28	-0.065	0.132**	0.071	<b>0.445**</b>	0.089*	0.686**
4	0.356**	-0.066**	<b>0.370**</b>	0.094**	0.067**	0.524**
9	0.082	0.027	<b>0.440**</b>	0.157**	-0.062*	0.697**
14	0.025*	0.029	<b>0.703**</b>	0.075*	-0.059**	0.460**
19	0.037*	-0.029	<b>0.828**</b>	0.008	0.023	0.275**
24	0.133**	0.051*	<b>0.538**</b>	-0.034	0.030	0.583**
29	0.368**	-0.040	<b>0.314**</b>	0.133**	0.088**	0.518**

Note. GSC = Global Self-Concept; \*  $p < .05$ . \*\*  $p < .01$ .

Table S3

*Standardized Factor Correlations of the First-Order Models (CFA below the diagonal, ESEM above the diagonal)*

	Global Self-Concept	Scholastic Competence	Peer Acceptance	Physical Appearance	Athletic Competence
Global self-concept		0.380**	0.379**	0.564**	0.328**
Scholastic competence	0.552**		0.406**	0.360**	0.313**
Social acceptance	0.541**	0.410**		0.397**	0.451**
Physical appearance	0.837**	0.416**	0.469**		0.343**
Athletic competence	0.438**	0.356**	0.507**	0.458**	

*Note.* \*  $p < .05$ . \*\*  $p < .01$ .

Table S4

*Standardized Factor Loadings of the Bifactor-ESEM Model Excluding the Global Self-**Concept S-Factor (Model 8)*

Item	G-factor	Scholastic Competence	Peer Acceptance	Physical Appearance	Athletic Competence	Residual
5	0.644**	0.050	0.060*	0.050	-0.057**	0.574**
10	0.536**	0.083*	0.063	0.028	-0.085**	0.694**
15	0.746**	-0.029	-0.088**	-0.017	-0.071**	0.430**
20	0.641**	-0.008	-0.026	0.046	-0.080**	0.579**
25	0.745**	-0.073**	-0.077**	0.084**	-0.070**	0.422**
30	0.564**	0.133**	-0.003	-0.003	-0.068**	0.659**
1	0.367**	<b>0.409**</b>	-0.065**	-0.047	0.056**	0.689**
6	0.439**	<b>0.457**</b>	-0.051*	-0.107*	0.010	0.584**
11	0.285**	<b>0.547**</b>	0.115**	-0.012	0.055**	0.603**
16	0.340**	<b>0.506**</b>	0.054*	0.037	0.030	0.623**
21	0.387**	<b>0.546**</b>	-0.028	-0.097*	-0.015	0.542**
26	0.368**	<b>0.601**</b>	0.079**	0.052	0.009	0.494**
2	0.357**	0.020	<b>0.532**</b>	0.019	0.079**	0.583**
7	0.422**	-0.020	<b>0.591**</b>	-0.143**	0.102**	0.442**
12	0.380**	0.065**	<b>0.602**</b>	0.097**	0.032	0.479**
17	0.358**	-0.036	<b>0.380**</b>	-0.162**	0.104**	0.689**
22	0.414**	0.054*	<b>0.522**</b>	0.060	0.003	0.549**
27	0.477**	0.037	<b>0.474**</b>	-0.089	0.090**	0.530**
3	0.365**	-0.029	0.093**	-0.036	<b>0.699**</b>	0.367**
8	0.349**	0.018	0.135**	0.152**	<b>0.510**</b>	0.577**
13	0.415**	0.023	0.055**	-0.076*	<b>0.614**</b>	0.441**
18	0.341**	-0.004	0.034	-0.045	<b>0.606**</b>	0.513**
23	0.234**	0.109**	0.172**	0.140*	<b>0.206**</b>	0.842**
28	0.352**	0.122**	0.127**	0.047	<b>0.396**</b>	0.686**
4	0.655**	-0.119**	-0.024	<b>0.178*</b>	0.012	0.524**
9	0.458**	-0.011	-0.064*	<b>0.279**</b>	0.104**	0.697**
14	0.558**	-0.012	-0.066**	<b>0.472**</b>	0.039*	0.460**
19	0.642**	-0.064*	-0.015	<b>0.555**</b>	-0.018	0.275**
24	0.545**	0.001	-0.019	<b>0.340**</b>	-0.061**	0.583**
29	0.673**	-0.096**	-0.010	<b>0.136</b>	0.046	0.518**

Note. \*  $p < .05$ . \*\*  $p < .01$ .

Table S5

*Goodness-of-fit Indices of Models Excluding Global Self-Concept Items*

<b>Model</b>	$\chi^2$	<b>df</b>	<b>CFI</b>	<b>TLI</b>	<b>RMSEA</b>	<b>RMSEA 90% CI</b>	<b>Model Description</b>
<b>CFA</b>							
Model 1	1272.438	246	.926	.917	.042	[.040, .044]	First-order CFA
Model 2	1278.810	248	.926	.918	.042	[.040, .044]	Higher-order CFA
Model 3	1073.598	228	.939	.927	.040	[.037, .042]	Bifactor-CFA
<b>ESEM</b>							
Model 4	873.737	186	.951	.927	.040	[.037, .042]	First-order ESEM
Model 5	877.685	188	.950	.927	.039	[.037, .042]	Higher-order ESEM
Model 6	460.788	166	.979	.965	.027	[.025, .030]	Bifactor-ESEM
<b>Invariance across gender and grade level</b>							
Model 9	1073.488	664	.971	.952	0.032	[.031, .036]	Configural invariance
Model 10	1398.140	949	.968	.963	0.028	[.026, .031]	Weak invariance (loadings)
Model 11	1601.979	1006	.958	.954	0.032	[.028, .033]	Strong invariance (loadings, intercepts)
Model 12	1822.270	1078	.948	.946	0.034	[.030, .034]	Strict invariance (loadings, intercepts, uniq.)
Model 13	1967.458	1123	.940	.941	0.036	[.031, .035]	Full invariance (loadings, intercepts, uniq., var./covar.)
Model 14	2216.761	1138	.924	.926	0.040	[.034, .039]	Latent mean invariance (loadings, intercepts, uniq., var./covar., means)

*Note.* CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval; GSC: Global self-concept; uniq. = uniquenesses; var./covar. = latent variances and covariances. ESEM models were conducted with target oblique rotation. All models were conducted with the MLR estimator. All  $\chi^2$  values are all significant ( $p < .01$ ).

Table S6

*Standardized Factor Loading of the First-Order ESEM, First-order CFA, and Bifactor-CFA Models Excluding Global Self-Concept Items*

Item	ESEM					CFA		Bifactor-CFA		
	Scholastic	Appearance	Athletic	Peer	Residual	Loading	Residual	G-Factor	S-Factor	Residual
1	<b>0.538**</b>	0.052*	0.071**	-0.080**	0.688**	0.555**	0.692**	0.334**	0.440**	0.695**
6	<b>0.622**</b>	0.042	0.027	-0.033	0.595**	0.641**	0.590**	0.379**	0.513**	0.593**
11	<b>0.621**</b>	-0.092**	0.006	0.074**	0.613**	0.612**	0.626**	0.347**	0.504**	0.626**
16	<b>0.589**</b>	0.024	-0.004	0.018	0.635**	0.606**	0.633**	0.369**	0.477**	0.636**
21	<b>0.718**</b>	-0.022	-0.027	-0.029	0.523**	0.680**	0.538**	0.339**	0.607**	0.517**
26	<b>0.681**</b>	0.011	-0.040	0.039	0.526**	0.686**	0.529**	0.402**	0.553**	0.532**
2	-0.025	0.017	0.007	<b>0.641**</b>	0.588**	0.639**	0.591**	0.448**	0.462**	0.587**
7	-0.024	-0.082**	0.056**	<b>0.761**</b>	0.443**	0.733**	0.463**	0.482**	0.578**	0.434**
12	0.002	0.055**	-0.066**	<b>0.699**</b>	0.515**	0.690**	0.523**	0.473**	0.508**	0.519**
17	-0.016	-0.068**	0.110**	<b>0.517**</b>	0.706**	0.531**	0.718**	0.392**	0.359**	0.717**
22	0.025*	0.090**	-0.079**	<b>0.646**</b>	0.557**	0.659**	0.566**	0.503**	0.417**	0.573**
27	0.065**	0.020	0.050*	<b>0.626**</b>	0.524**	0.696**	0.516**	0.568**	0.396**	0.521**
3	-0.051**	-0.034*	<b>0.818**</b>	0.010	0.369**	0.768**	0.410**	0.459**	0.645**	0.373**
8	-0.040	0.113**	<b>0.564**</b>	0.048	0.602**	0.647**	0.581**	0.455**	0.445**	0.595**
13	0.040*	-0.018	<b>0.740**</b>	-0.003	0.444**	0.741**	0.451**	0.490**	0.554**	0.453**
18	-0.005	-0.010	<b>0.720**</b>	-0.041*	0.515**	0.675**	0.544**	0.403**	0.564**	0.520**
23	0.064*	0.077*	<b>0.195**</b>	0.132**	0.869**	0.352**	0.876**	0.363**	0.120**	0.854**
28	0.105**	0.035	<b>0.449**</b>	0.076**	0.693**	0.563**	0.683**	0.474**	0.308**	0.680**
4	-0.015	<b>0.620**</b>	0.045	0.079**	0.546**	0.696**	0.515**	0.526**	0.435**	0.534**
9	0.032	<b>0.519**</b>	0.110**	-0.071**	0.689**	0.552**	0.695**	0.361**	0.416**	0.697**
14	0.009	<b>0.751**</b>	0.016	-0.082**	0.468**	0.712**	0.492**	0.424**	0.595**	0.467**
19	-0.047**	<b>0.890**</b>	-0.063**	-0.002	0.283**	0.813**	0.339**	0.495**	0.683**	0.288**
24	0.050*	<b>0.630**</b>	-0.075**	0.023	0.599**	0.623**	0.612**	0.431**	0.452**	0.610**
29	0.016	<b>0.569**</b>	0.084**	0.106**	0.547**	0.687**	0.528**	0.583**	0.370**	0.524**

Note. \*  $p < .05$ . \*\*  $p < .01$ .



Table S7

*Standardized Factor Correlations of the First-Order Models (CFA below the diagonal, ESEM above the diagonal) Excluding Global Self-*

*Concept Items*

	Scholastic competence	Peer Acceptance	Physical Appearance	Athletic Competence
Scholastic Competence		0.397**	0.408**	0.337**
Peer Acceptance	0.410**		0.437**	0.466**
Physical Appearance	0.413**	0.465**		0.424**
Athletic Competence	0.355**	0.507**	0.455**	

*Note.* \*  $p < .05$ . \*\*  $p < .01$ .

Table S8

*Standardized Factor Loadings of the Bifactor-ESEM Model Excluding Global Self-Concept Items*

Item	G-factor	Scholastic Competence	Peer Acceptance	Physical Appearance	Athletic Competence	Residual
1	0.291**	<b>0.465**</b>	-0.018	0.069**	0.091**	0.686**
6	0.301**	<b>0.566**</b>	0.049*	0.056**	0.124**	0.568**
11	0.371**	<b>0.491**</b>	0.039	-0.014	-0.086**	0.612**
16	0.399**	<b>0.458**</b>	-0.019	-0.032	-0.018	0.629**
21	0.300**	<b>0.629**</b>	0.037	0.003	0.058**	0.509**
26	0.472**	<b>0.522**</b>	-0.036	-0.082**	-0.066**	0.492**
2	0.453**	-0.027	<b>0.449**</b>	0.016	-0.006	0.592**
7	0.423**	0.021	<b>0.620**</b>	0.102**	0.007	0.425**
12	0.581**	-0.065**	<b>0.427**</b>	-0.098**	-0.080**	0.460**
17	0.317**	0.019	<b>0.425**</b>	0.131**	0.006	0.701**
22	0.525**	-0.013	<b>0.416**</b>	-0.079**	-0.001	0.545**
27	0.437**	0.102**	<b>0.527**</b>	0.098**	0.097**	0.502**
3	0.427**	-0.025	0.063**	<b>0.663**</b>	0.024	0.373**
8	0.542**	-0.104**	-0.047	<b>0.395**</b>	-0.025	0.537**
13	0.425**	0.054**	0.059**	<b>0.605**</b>	0.045*	0.445**
18	0.356**	0.023	0.038	<b>0.597**</b>	0.059**	0.512**
23	0.418**	-0.022	-0.007	<b>0.089**</b>	-0.070**	0.812**
28	0.474**	0.045	0.011	<b>0.320**</b>	-0.035	0.670**
4	0.370**	0.074**	0.154**	0.103**	<b>0.623**</b>	0.435**
9	0.401**	0.026	-0.074*	0.070*	<b>0.365**</b>	0.695**
14	0.546**	-0.032	-0.154**	-0.045*	<b>0.462**</b>	0.462**
19	0.611**	-0.074**	-0.102**	-0.104**	<b>0.569**</b>	0.277**
24	0.486**	0.011	-0.061**	-0.102**	<b>0.396**</b>	0.593**
29	0.390**	0.103**	0.181**	0.140**	<b>0.590**</b>	0.437**

Note. \*  $p < .05$ . \*\*  $p < .01$ .

### Complementary Tests of Measurement Invariance across Single Grouping Variables

Before conducting the invariance models across four groups of students (i.e., based on students' grade level (elementary school vs. secondary school x gender), we tested for invariance across grade level and gender separately. In short, these results supported the measurement invariance (i.e., weak, strong, and strict measurement invariance) as well as the invariance of factor variances and covariances across grade levels (Models S1 to S5 in Table S9) and gender (Models S7 to S11 in Table S9). The observed changes in the fit indices also suggested that the latent means may also be invariant across grade levels and gender. However, in both cases, these changes remained well over the changes observed at other steps of the sequence of invariance testing and the changes in chi-square values also proved to be quite elevated (for grade level:  $\Delta MLR\chi^2 = 89.636$ ,  $\Delta df = 6$ ; for gender:  $\Delta MLR\chi^2 = 157.793$ ,  $\Delta df = 6$ ). We thus considered Models S5 and S11 where the mean levels for one group serving as the reference group (Model S5: elementary school students; Model S11: boys) were fixed to zero for identification purposes. Thus, the latent means in the other group (secondary school students in Model S5; boys in Model S11), are expressed as deviations from the latent means of the first (reference group) in SD units. According to the results from Model S5, the secondary students displayed significantly lower latent means on the G-factor ( $-0.283$ ,  $p < .01$ ) and on the S-factors representing scholastic competence ( $-0.218$ ,  $p < .01$ ), peer acceptance ( $0.371$ ,  $p < .01$ ), and physical appearance ( $-0.193$ ,  $p < .01$ ). Elementary and secondary school students did not differ in their latent mean levels on the athletic competence S-factor, and on the GSC S-factor. Model S11 showed that girls' latent means are lower than boys' on the G-factor ( $-0.374$ ,  $p < .01$ ) and on the S-factor for athletic competence ( $-0.377$ ,  $p < .01$ ). Conversely, girls' latent means on the S-factors for peer acceptance ( $0.306$ ,  $p < .01$ ) and GSC ( $0.359$ ,  $p < .01$ ) are significantly higher than boys'. No gender differences were apparent on the physical appearance and scholastic competence S-factors.

Table S9

*Goodness-of-fit Indices of the Invariance Models across Grade Level and Gender Separately (B-ESEM, Model 7)*

Model	$\chi^2$	df	CFI	TLI	RMSEA	RMSEA 90% CI	Model Description
<b>Invariance across Grade Levels</b>							
Model S1	1032.718	540	.974	.958	.028	[.025, .030]	Configural invariance
Model S2	1190.314	684	.973	.966	.025	[.023, .027]	Weak invariance (loadings)
Model S3	1276.764	708	.970	.963	.026	[.024, .028]	Strong invariance (loadings, intercepts)
Model S4	1399.383	738	.965	.959	.028	[.025, .030]	Strict invariance (loadings, intercepts, uniquenesses)
Model S5	1443.306	759	.964	.959	.028	[.026, .030]	Full invariance (loadings, intercepts, uniquenesses, var./covar.)
Model S6	1532.942	765	.960	.954	.029	[.027, .031]	Latent mean invariance (loadings, intercepts, uniquenesses, var./covar., latent means)
<b>Invariance across Gender</b>							
Model S7	1052.696	540	.973	.956	.028	[.026, .031]	Configural invariance
Model S8	1230.685	684	.971	.963	.026	[.024, .028]	Weak invariance (loadings)
Model S9	1319.595	708	.968	.960	.027	[.025, .029]	Strong invariance (loadings, intercepts)
Model S10	1388.556	738	.966	.959	.027	[.025, .030]	Strict invariance (loadings, intercepts, uniq.)
Model S11	1502.462	759	.961	.955	.029	[.027, .031]	Full invariance (loadings, intercepts, uniq., var./covar.)
Model S12	1660.255	765	.953	.946	.032	[.029, .034]	Latent mean invariance (loadings, intercepts, uniq., var./covar., latent means)

*Note.* CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval; uniq. = uniquenesses; var./covar. = latent variances and covariances. ESEM models were conducted with target oblique rotation. All models were conducted with the MLR estimator. All  $\chi^2$  values are all significant ( $p < .01$ ).

**Annotated Mplus Input Files for the Main Models Estimated in this Study****Title: CFA (Model 1 in Table 1 of the main manuscript)**

```

! The following statement is used to identify the data file. Here, the data file is
! labelled SPPC.dat.
data: file = SPPC.dat;
! The variables names function identifies all variables in the data set, in order of appearance.
! The usevar command identifies the variables used in the analysis.
VARIABLE:
names = schooltype grade age gender
        SPPC_1 SPPC_2 SPPC_3 SPPC_4 SPPC_5
        SPPC_6 SPPC_7 SPPC_8 SPPC_9 SPPC_10
        SPPC_11 SPPC_12 SPPC_13 SPPC_14 SPPC_15
        SPPC_16 SPPC_17 SPPC_18 SPPC_19 SPPC_20
        SPPC_21 SPPC_22 SPPC_23 SPPC_24 SPPC_25
        SPPC_26 SPPC_27 SPPC_28 SPPC_29 SPPC_30;
usevar = SPPC_1 SPPC_2 SPPC_3 SPPC_4 SPPC_5
        SPPC_6 SPPC_7 SPPC_8 SPPC_9 SPPC_10
        SPPC_11 SPPC_12 SPPC_13 SPPC_14 SPPC_15
        SPPC_16 SPPC_17 SPPC_18 SPPC_19 SPPC_20
        SPPC_21 SPPC_22 SPPC_23 SPPC_24 SPPC_25
        SPPC_26 SPPC_27 SPPC_28 SPPC_29 SPPC_30;
! The next section defines the analysis. Here, the Robust Maximum Likelihood (MLR)
! estimation is used.
ANALYSIS:
ESTIMATOR = MLR;
! The next section defines the model itself. Preceding sections will not be repeated for next
! models.
MODEL:
! CFA factor for scholastic competence defined by the 6 items of the corresponding scale. The
! command BY defines factor loadings.
cogcomp by SPPC_1 SPPC_6 SPPC_11 SPPC_16 SPPC_21 SPPC_26;
! CFA factor for peer acceptance defined by the 6 items of the corresponding scale
peeracc by SPPC_2 SPPC_7 SPPC_12 SPPC_17 SPPC_22 SPPC_27;
! CFA factor for athletic competence defined by the 6 items of the corresponding scale
athleticcom by SPPC_3 SPPC_8 SPPC_13 SPPC_18 SPPC_23 SPPC_28;
! CFA factor for physical appearance defined by the 6 items of the corresponding scale
appear by SPPC_4 SPPC_9 SPPC_14 SPPC_19 SPPC_24 SPPC_29;
! CFA factor for global self-concept /GSC defined by the 6 items of the corresponding scale
gsc by SPPC_5 SPPC_10 SPPC_15 SPPC_20 SPPC_25 SPPC_30;
OUTPUT: sampstat standardized stdyx tech4 svalues;

```

**Title: Hierarchical-CFA (Model 2 in Table 1 of the main manuscript)**

*! Model section only, the other sections are identical to the one for the CFA model*

**MODEL:**

*! The first-order factors are defined as in the previous model.*

*! The higher-order factor is defined from the first-order factors.*

cogcomp by SPPC\_1 SPPC\_6 SPPC\_11 SPPC\_16 SPPC\_21 SPPC\_26;

peeracc by SPPC\_2 SPPC\_7 SPPC\_12 SPPC\_17 SPPC\_22 SPPC\_27;

athleticcom by SPPC\_3 SPPC\_8 SPPC\_13 SPPC\_18 SPPC\_23 SPPC\_28;

appear by SPPC\_4 SPPC\_9 SPPC\_14 SPPC\_19 SPPC\_24 SPPC\_29;

gsc by SPPC\_5 SPPC\_10 SPPC\_15 SPPC\_20 SPPC\_25 SPPC\_30;

HOfactor by cogcomp peeracc athleticcom appear gsc;

**Title: Bifactor-CFA (including the GSC S-factor; Model 3 in Table 1 of the main manuscript)**

*! Model section only, the other sections are identical to the one for the CFA model*

**MODEL:**

*! The S-factors are defined as in the previous model.*

*! The G-factor is defined from all items.*

cogcomp by SPPC\_1 SPPC\_6 SPPC\_11 SPPC\_16 SPPC\_21 SPPC\_26;  
peeracc by SPPC\_2 SPPC\_7 SPPC\_12 SPPC\_17 SPPC\_22 SPPC\_27;  
athleticcom by SPPC\_3 SPPC\_8 SPPC\_13 SPPC\_18 SPPC\_23 SPPC\_28;  
appear by SPPC\_4 SPPC\_9 SPPC\_14 SPPC\_19 SPPC\_24 SPPC\_29;  
gsc by SPPC\_5 SPPC\_10 SPPC\_15 SPPC\_20 SPPC\_25 SPPC\_30;  
global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5  
SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10  
SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15  
SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20  
SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25  
SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30;

*! orthogonal bifactor representation: correlations (WITH) fixed (@) to zero*

cogcomp with peeracc @0 athleticcom @0 appear @0 gsc@0 global@0;  
peeracc with athleticcom@0 appear @0 gsc@0 global@0;  
athleticcom with appear @0 gsc@0 global@0;  
appear with gsc@0 global @0;  
gsc with global@0;

**Title: Bifactor-CFA (excluding the GSC S-factor; Model 4 in Table 1 of the main manuscript)**

*! Model section only, the other sections are identical to the one for the CFA model*

**MODEL:**

*! The S-factors are defined as in the previous model.*

*! The G-factor is defined from all items.*

cogcomp by SPPC\_1 SPPC\_6 SPPC\_11 SPPC\_16 SPPC\_21 SPPC\_26;  
peeracc by SPPC\_2 SPPC\_7 SPPC\_12 SPPC\_17 SPPC\_22 SPPC\_27;  
athleticcom by SPPC\_3 SPPC\_8 SPPC\_13 SPPC\_18 SPPC\_23 SPPC\_28;  
appear by SPPC\_4 SPPC\_9 SPPC\_14 SPPC\_19 SPPC\_24 SPPC\_29;  
global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5  
SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10  
SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15  
SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20  
SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25  
SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30;

*! orthogonal bifactor representation: correlations (WITH) fixed (@) to zero*

cogcomp with peeracc @0 athleticcom @0 appear @0 global@0;  
peeracc with athleticcom@0 appear @0 global@0;  
athleticcom with appear @0 global@0;  
appear with global @0;



**Title: ESEM (Model 5 in Table 1 of the main manuscript)**

*! Model and analysis sections only, the other sections are identical to previous models*

*! Specification of target rotation*

ANALYSIS:

ESTIMATOR = MLR;

ROTATION = TARGET;

MODEL:

*! Factors forming a single set of ESEM factors (with cross-loadings between factors) are*

*! indicated by using the same label in parenthesis after \* (\*1).*

*! ESEM factors are defined by their respective items. All main loadings are freely estimated.*

*! Cross-loadings are "targeted" (~) to be as close to 0 as possible (~0)*

cogcomp by SPPC\_1 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10~0

SPPC\_11 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*t1);

peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*t1);

athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*t1);

appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*t1);

gsc SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30 (\*t1);

**Title: Hierarchical-ESEM (Model 6 in Table 1 of the main manuscript)**

*! Model section only, the other sections are identical to the one for the CFA model*  
*! The previous ESEM model is re-expressed using CFA. No rotation is necessary.*  
*! The model section uses the exact values of the non-standardized loadings and cross-*  
*! loadings estimated from the previous model as starts values (using \*). For identification*  
*! purposes, factor variances are constrained to be 1 (f1-f3@1;) and one item per factor has*  
*! all cross- loadings on non-target factors constrained to be exactly equal to their ESEM*  
*! values (using @).*

*! These first-order factors define a higher-order factor.*

cogcomp BY sppc\_1\*0.45629;  
 cogcomp BY sppc\_2\*-0.01759;  
 cogcomp BY sppc\_3@-0.04271;  
 cogcomp BY sppc\_4\*-0.05741;  
 cogcomp BY sppc\_5\*0.10841;  
 cogcomp BY sppc\_6\*0.54852;  
 cogcomp BY sppc\_7\*-0.04864;  
 cogcomp BY sppc\_8\*-0.00173;  
 cogcomp BY sppc\_9\*0.03054;  
 cogcomp BY sppc\_10\*0.13790;  
 cogcomp BY sppc\_11\*0.55092;  
 cogcomp BY sppc\_12@0.02228;  
 cogcomp BY sppc\_13\*0.02786;  
 cogcomp BY sppc\_14\*0.03022;  
 cogcomp BY sppc\_15@0.06307;  
 cogcomp BY sppc\_16\*0.51652;  
 cogcomp BY sppc\_17\*-0.04420;  
 cogcomp BY sppc\_18\*-0.00573;  
 cogcomp BY sppc\_19@-0.02859;  
 cogcomp BY sppc\_20\*0.06481;  
 cogcomp BY sppc\_21\*0.55783;  
 cogcomp BY sppc\_22\*0.02820;  
 cogcomp BY sppc\_23\*0.08828;  
 cogcomp BY sppc\_24\*0.05186;  
 cogcomp BY sppc\_25\*0.01411;  
 cogcomp BY sppc\_26\*0.59280;  
 cogcomp BY sppc\_27\*0.02416;  
 cogcomp BY sppc\_28\*0.10885;  
 cogcomp BY sppc\_29\*-0.03346;  
 cogcomp BY sppc\_30\*0.19428;

peeracc BY sppc\_1\*-0.08254;  
 peeracc BY sppc\_2\*0.58840;  
 peeracc BY sppc\_3@0.01871;  
 peeracc BY sppc\_4\*0.05840;  
 peeracc BY sppc\_5\*0.14416;  
 peeracc BY sppc\_6\*-0.05325;  
 peeracc BY sppc\_7\*0.64961;  
 peeracc BY sppc\_8\*0.08501;  
 peeracc BY sppc\_9\*-0.06991;  
 peeracc BY sppc\_10\*0.14297;

peeracc BY sppc\_11\*0.06610;  
peeracc BY sppc\_12\*0.73654;  
peeracc BY sppc\_13\*-0.00158;  
peeracc BY sppc\_14\*-0.06167;  
peeracc BY sppc\_15@0.02875;  
peeracc BY sppc\_16\*0.01739;  
peeracc BY sppc\_17\*0.43723;  
peeracc BY sppc\_18\*-0.03179;  
peeracc BY sppc\_19@0.02345;  
peeracc BY sppc\_20\*0.07164;  
peeracc BY sppc\_21\*-0.03941;  
peeracc BY sppc\_22\*0.61994;  
peeracc BY sppc\_23\*0.13283;  
peeracc BY sppc\_24\*0.03091;  
peeracc BY sppc\_25\*0.03526;  
peeracc BY sppc\_26@0.03364;  
peeracc BY sppc\_27\*0.51255;  
peeracc BY sppc\_28\*0.07337;  
peeracc BY sppc\_29\*0.07384;  
peeracc BY sppc\_30\*0.05873;

athleticcom BY sppc\_1\*0.07802;  
athleticcom BY sppc\_2\*0.01853;  
athleticcom BY sppc\_3\*0.74393;  
athleticcom BY sppc\_4\*0.08229;  
athleticcom BY sppc\_5\*-0.00388;  
athleticcom BY sppc\_6\*0.04276;  
athleticcom BY sppc\_7\*0.05716;  
athleticcom BY sppc\_8\*0.63726;  
athleticcom BY sppc\_9\*0.17796;  
athleticcom BY sppc\_10\*-0.04596;  
athleticcom BY sppc\_11\*0.01929;  
athleticcom BY sppc\_12@-0.05730;  
athleticcom BY sppc\_13\*0.65967;  
athleticcom BY sppc\_14\*0.07838;  
athleticcom BY sppc\_15@0.03377;  
athleticcom BY sppc\_16\*0.01031;  
athleticcom BY sppc\_17\*0.09292;  
athleticcom BY sppc\_18\*0.65447;  
athleticcom BY sppc\_19@0.00783;  
athleticcom BY sppc\_20\*-0.00530;  
athleticcom BY sppc\_21\*-0.00318;  
athleticcom BY sppc\_22\*-0.05931;  
athleticcom BY sppc\_23\*0.16981;  
athleticcom BY sppc\_24\*-0.03423;  
athleticcom BY sppc\_25\*0.02623;  
athleticcom BY sppc\_26@-0.02020;  
athleticcom BY sppc\_27\*0.06029;  
athleticcom BY sppc\_28\*0.36553;  
athleticcom BY sppc\_29\*0.11163;  
athleticcom BY sppc\_30\*-0.01264;

appear BY sppc\_1\*-0.02398;  
appear BY sppc\_2\*0.02406;  
appear BY sppc\_3@-0.02666;  
appear BY sppc\_4\*0.32249;  
appear BY sppc\_5\*0.16052;  
appear BY sppc\_6\*-0.08592;  
appear BY sppc\_7\*-0.14144;  
appear BY sppc\_8\*0.22754;  
appear BY sppc\_9\*0.49958;  
appear BY sppc\_10\*0.12053;  
appear BY sppc\_11\*-0.03304;  
appear BY sppc\_12@0.11841;  
appear BY sppc\_13\*-0.05699;  
appear BY sppc\_14\*0.73456;  
appear BY sppc\_15@0.12614;  
appear BY sppc\_16\*0.04091;  
appear BY sppc\_17\*-0.15165;  
appear BY sppc\_18\*-0.03086;  
appear BY sppc\_19\*0.82745;  
appear BY sppc\_20\*0.17384;  
appear BY sppc\_21\*-0.08352;  
appear BY sppc\_22\*0.08658;  
appear BY sppc\_23\*0.14778;  
appear BY sppc\_24\*0.54658;  
appear BY sppc\_25\*0.23923;  
appear BY sppc\_26@0.04917;  
appear BY sppc\_27\*-0.06583;  
appear BY sppc\_28\*0.05874;  
appear BY sppc\_29\*0.26462;  
appear BY sppc\_30\*0.08831;

gscBY sppc\_1\*0.10699;  
gscBY sppc\_2\*-0.04977;  
gscBY sppc\_3@-0.02903;  
gscBY sppc\_4\*0.31021;  
gscBY sppc\_5\*0.31883;  
gscBY sppc\_6\*0.19587;  
gscBY sppc\_7\*0.08281;  
gscBY sppc\_8\*-0.17218;  
gscBY sppc\_9\*0.09274;  
gscBY sppc\_10\*0.27985;  
gscBY sppc\_11\*-0.08685;  
gscBY sppc\_12@-0.13267;  
gscBY sppc\_13\*0.05525;  
gscBY sppc\_14\*0.02613;  
gscBY sppc\_15\*0.50014;  
gscBY sppc\_16\*-0.03999;  
gscBY sppc\_17\*0.14714;  
gscBY sppc\_18\*0.01026;  
gscBY sppc\_19@0.03717;

gscBY sppc\_20\*0.38930;  
gscBY sppc\_21\*0.10576;  
gscBY sppc\_22\*-0.02658;  
gscBY sppc\_23\*-0.13362;  
gscBY sppc\_24\*0.13483;  
gscBY sppc\_25\*0.45266;  
gscBY sppc\_26@-0.06848;  
gscBY sppc\_27\*0.10425;  
gscBY sppc\_28\*-0.05305;  
gscBY sppc\_29\*0.30961;  
gscBY sppc\_30\*0.31025;  
HOfactor by cogcomp peeracc athleticcom appear gsc;

**Title: Bifactor-ESEM (including the GSC S-factor; Model 7 in Table 1 of the main manuscript)**

*! Model and analysis sections only, the other sections are identical to previous models*

*! Specification of orthogonal bifactor target rotation*

ANALYSIS:

ESTIMATOR = MLR;

ROTATION = TARGET (orthogonal);

MODEL:

*! S-factors are defined as in the ESEM model.*

*! G-factor is defined from all items, with all loadings freely estimated.*

*! All factors within a single set of ESEM factors (\*1).*

*! Cross-loadings are "targeted" (~) to be as close to 0 as possible (~0)*

global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5

SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10

SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15

SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20

SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25

SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30 (\*1);

cogcomp by SPPC\_1 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10~0

SPPC\_11 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*1);

appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*1);

gsc by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30 (\*1);

**Title: Bifactor-ESEM (excluding the GSC S-factor; Model 8 in Table 1 of the main manuscript)**

*! Model and analysis sections only, the other sections are identical to previous models*

*! Specification of orthogonal bifactor target rotation*

ANALYSIS:

ESTIMATOR = MLR;

ROTATION = TARGET (orthogonal);

MODEL:

*! S-factors are defined as in the ESEM model.*

*! G-factor is defined from all items, with all loadings freely estimated.*

*! All factors within a single set of ESEM factors (\*1).*

*! Cross-loadings are "targeted" (~) to be as close to 0 as possible (~0)*

global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5

SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10

SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15

SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20

SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25

SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30 (\*1);

cogcomp by SPPC\_1 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10~0

SPPC\_11 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*1);

appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*1);

**Title: Configural Invariance of the Bifactor-ESEM****VARIABLE:***! [...]**! the grouping function is added to the Variable section to define the groups based on grade level (elementary and secondary school students) and gender (boys and girls); the respective labels for the groups (1, 2, 3, ! 4) must appear in the data set.***grouping = group (1=1 2=2 3=3 4=4);***! 1 = elementary school boys; 2 = elementary school girls**! 3 = secondary school boys; 4 = secondary school girls***ANALYSIS:****ESTIMATOR = MLR;****ROTATION = TARGET (orthogonal);****MODEL:***! see model specification for the bifactor-ESEM model (including the GSC S-factor) for the total group this model is estimated separately in each group**! the first section of input refers to Group 1 (elementary school boys)**! Factor loadings and cross-loadings are freely estimated in all groups. In this context,**! Mplus fixes the factor variance to be 1 in all groups. Uniquenesses are freely estimated in**! all groups by default.***global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5****SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10****SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15****SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20****SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25****SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30 (\*1);****cogcomp by SPPC\_1 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0****SPPC\_6 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10~0****SPPC\_11 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0****SPPC\_16 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0****SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0****SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);****peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0****SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0****SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0****SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0****SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0****SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);****athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0****SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0****SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0****SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0****SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0****SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*1);****appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0****SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0****SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0****SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0****SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0****SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*1);****gsc by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5**



SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30 (\*1);

*! item intercepts are freely estimated in all groups*

[SPPC\_1-SPPC\_30\*];

*! for item intercepts to be freely estimated, the factor means are set to zero in all groups*

[global- gsc@0];

*! Model for Group 2 (elementary school girls). This model is the same as in previous section.*

Model 2:

global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5

SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10

SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15

SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20

SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25

SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30 (\*1);

cogcomp by SPPC\_1 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10~0

SPPC\_11 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*1);

appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*1);

gsc by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30 (\*1);

[SPPC\_1-SPPC\_30\*];

[global- gsc@0];

*! Model for Group 3 (secondary school boys). This model is the same as in previous sections.*

Model 3:

```

global by SPPC_1 SPPC_2 SPPC_3 SPPC_4 SPPC_5
        SPPC_6 SPPC_7 SPPC_8 SPPC_9 SPPC_10
        SPPC_11 SPPC_12 SPPC_13 SPPC_14 SPPC_15
        SPPC_16 SPPC_17 SPPC_18 SPPC_19 SPPC_20
        SPPC_21 SPPC_22 SPPC_23 SPPC_24 SPPC_25
        SPPC_26 SPPC_27 SPPC_28 SPPC_29 SPPC_30 (*1);
cogcomp by SPPC_1 SPPC_2~0 SPPC_3~0 SPPC_4~0 SPPC_5~0
        SPPC_6 SPPC_7~0 SPPC_8~0 SPPC_9~0 SPPC_10~0
        SPPC_11 SPPC_12~0 SPPC_13~0 SPPC_14~0 SPPC_15~0
        SPPC_16 SPPC_17~0 SPPC_18~0 SPPC_19~0 SPPC_20~0
        SPPC_21 SPPC_22~0 SPPC_23~0 SPPC_24~0 SPPC_25~0
        SPPC_26 SPPC_27~0 SPPC_28~0 SPPC_29~0 SPPC_30~0 (*1);
peeracc by SPPC_1~0 SPPC_2 SPPC_3~0 SPPC_4~0 SPPC_5~0
        SPPC_6~0 SPPC_7 SPPC_8 SPPC_9~0 SPPC_10~0
        SPPC_11~0 SPPC_12 SPPC_13~0 SPPC_14~0 SPPC_15~0
        SPPC_16~0 SPPC_17 SPPC_18~0 SPPC_19~0 SPPC_20~0
        SPPC_21~0 SPPC_22 SPPC_23~0 SPPC_24~0 SPPC_25~0
        SPPC_26~0 SPPC_27 SPPC_28~0 SPPC_29~0 SPPC_30~0 (*1);
athleticcom by SPPC_1~0 SPPC_2~0 SPPC_3 SPPC_4~0 SPPC_5~0
        SPPC_6~0 SPPC_7~0 SPPC_8 SPPC_9~0 SPPC_10~0
        SPPC_11~0 SPPC_12~0 SPPC_13 SPPC_14~0 SPPC_15~0
        SPPC_16~0 SPPC_17~0 SPPC_18 SPPC_19~0 SPPC_20~0
        SPPC_21~0 SPPC_22~0 SPPC_23 SPPC_24~0 SPPC_25~0
        SPPC_26~0 SPPC_27~0 SPPC_28 SPPC_29~0 SPPC_30~0 (*1);
appear by SPPC_1~0 SPPC_2~0 SPPC_3~0 SPPC_4 SPPC_5~0
        SPPC_6~0 SPPC_7~0 SPPC_8~0 SPPC_9 SPPC_10~0
        SPPC_11~0 SPPC_12~0 SPPC_13~0 SPPC_14 SPPC_15~0
        SPPC_16~0 SPPC_17~0 SPPC_18~0 SPPC_19 SPPC_20~0
        SPPC_21~0 SPPC_22~0 SPPC_23~0 SPPC_24 SPPC_25~0
        SPPC_26~0 SPPC_27~0 SPPC_28~0 SPPC_29 SPPC_30~0 (*1);
gsc by SPPC_1~0 SPPC_2~0 SPPC_3~0 SPPC_4~0 SPPC_5
        SPPC_6~0 SPPC_7~0 SPPC_8~0 SPPC_9~0 SPPC_10
        SPPC_11~0 SPPC_12~0 SPPC_13~0 SPPC_14~0 SPPC_15
        SPPC_16~0 SPPC_17~0 SPPC_18~0 SPPC_19~0 SPPC_20
        SPPC_21~0 SPPC_22~0 SPPC_23~0 SPPC_24~0 SPPC_25
        SPPC_26~0 SPPC_27~0 SPPC_28~0 SPPC_29~0 SPPC_30 (*1);
[SPPC_1-SPPC_30*];
[global-gsc@0];

```

*! Model for Group 4 (secondary school girls). This model is the same as in previous sections.*

Model 4:

```

global by SPPC_1 SPPC_2 SPPC_3 SPPC_4 SPPC_5
        SPPC_6 SPPC_7 SPPC_8 SPPC_9 SPPC_10
        SPPC_11 SPPC_12 SPPC_13 SPPC_14 SPPC_15
        SPPC_16 SPPC_17 SPPC_18 SPPC_19 SPPC_20
        SPPC_21 SPPC_22 SPPC_23 SPPC_24 SPPC_25
        SPPC_26 SPPC_27 SPPC_28 SPPC_29 SPPC_30 (*1);
cogcomp by SPPC_1 SPPC_2~0 SPPC_3~0 SPPC_4~0 SPPC_5~0
        SPPC_6 SPPC_7~0 SPPC_8~0 SPPC_9~0 SPPC_10~0
        SPPC_11 SPPC_12~0 SPPC_13~0 SPPC_14~0 SPPC_15~0
        SPPC_16 SPPC_17~0 SPPC_18~0 SPPC_19~0 SPPC_20~0

```

SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);  
 peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);  
 athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*1);  
 appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*1);  
 gsc by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30 (\*1);  
 [SPPC\_1-SPPC\_30\*];  
 [global-gsc@0];

**Title: Invariance of Factor Loadings of the Bifactor-ESEM**

*! Model and analysis sections only, other identical to the previous invariance model*

**MODEL:**

*! In Mplus, the factor loadings are set to be invariant across groups by default. To estimate  
! invariant factor loadings, one simply has to take out the statements related to factor  
! loadings from the group-specific sections of the input. With invariant factor loadings, Mplus  
! constrains the factor variances to be one in the first group, and freely estimated in the other  
! groups. The rest of the input remains unchanged.*

```

global by SPPC_1 SPPC_2 SPPC_3 SPPC_4 SPPC_5
      SPPC_6 SPPC_7 SPPC_8 SPPC_9 SPPC_10
      SPPC_11 SPPC_12 SPPC_13 SPPC_14 SPPC_15
      SPPC_16 SPPC_17 SPPC_18 SPPC_19 SPPC_20
      SPPC_21 SPPC_22 SPPC_23 SPPC_24 SPPC_25
      SPPC_26 SPPC_27 SPPC_28 SPPC_29 SPPC_30 (*1);
cogcomp by SPPC_1 SPPC_2~0 SPPC_3~0 SPPC_4~0 SPPC_5~0
      SPPC_6 SPPC_7~0 SPPC_8~0 SPPC_9~0 SPPC_10~0
      SPPC_11 SPPC_12~0 SPPC_13~0 SPPC_14~0 SPPC_15~0
      SPPC_16 SPPC_17~0 SPPC_18~0 SPPC_19~0 SPPC_20~0
      SPPC_21 SPPC_22~0 SPPC_23~0 SPPC_24~0 SPPC_25~0
      SPPC_26 SPPC_27~0 SPPC_28~0 SPPC_29~0 SPPC_30~0 (*1);
peeracc by SPPC_1~0 SPPC_2 SPPC_3~0 SPPC_4~0 SPPC_5~0
      SPPC_6~0 SPPC_7 SPPC_8 SPPC_9~0 SPPC_10~0
      SPPC_11~0 SPPC_12 SPPC_13~0 SPPC_14~0 SPPC_15~0
      SPPC_16~0 SPPC_17 SPPC_18~0 SPPC_19~0 SPPC_20~0
      SPPC_21~0 SPPC_22 SPPC_23~0 SPPC_24~0 SPPC_25~0
      SPPC_26~0 SPPC_27 SPPC_28~0 SPPC_29~0 SPPC_30~0 (*1);
athleticcom by SPPC_1~0 SPPC_2~0 SPPC_3 SPPC_4~0 SPPC_5~0
      SPPC_6~0 SPPC_7~0 SPPC_8 SPPC_9~0 SPPC_10~0
      SPPC_11~0 SPPC_12~0 SPPC_13 SPPC_14~0 SPPC_15~0
      SPPC_16~0 SPPC_17~0 SPPC_18 SPPC_19~0 SPPC_20~0
      SPPC_21~0 SPPC_22~0 SPPC_23 SPPC_24~0 SPPC_25~0
      SPPC_26~0 SPPC_27~0 SPPC_28 SPPC_29~0 SPPC_30~0 (*1);
appear by SPPC_1~0 SPPC_2~0 SPPC_3~0 SPPC_4 SPPC_5~0
      SPPC_6~0 SPPC_7~0 SPPC_8~0 SPPC_9 SPPC_10~0
      SPPC_11~0 SPPC_12~0 SPPC_13~0 SPPC_14 SPPC_15~0
      SPPC_16~0 SPPC_17~0 SPPC_18~0 SPPC_19 SPPC_20~0
      SPPC_21~0 SPPC_22~0 SPPC_23~0 SPPC_24 SPPC_25~0
      SPPC_26~0 SPPC_27~0 SPPC_28~0 SPPC_29 SPPC_30~0 (*1);
gsc by SPPC_1~0 SPPC_2~0 SPPC_3~0 SPPC_4~0 SPPC_5
      SPPC_6~0 SPPC_7~0 SPPC_8~0 SPPC_9~0 SPPC_10
      SPPC_11~0 SPPC_12~0 SPPC_13~0 SPPC_14~0 SPPC_15
      SPPC_16~0 SPPC_17~0 SPPC_18~0 SPPC_19~0 SPPC_20
      SPPC_21~0 SPPC_22~0 SPPC_23~0 SPPC_24~0 SPPC_25
      SPPC_26~0 SPPC_27~0 SPPC_28~0 SPPC_29~0 SPPC_30 (*1);
[SPPC_1-SPPC_30*]; [global-gsc@0];
Model 2:
[SPPC_1-SPPC_30*]; [global-gsc@0];
Model 3:
[SPPC_1-SPPC_30*]; [global-gsc@0];
Model 4:
[SPPC_1-SPPC_30*]; [global-gsc@0];

```

**Title: Invariance of Factor Loadings and Item Intercepts of the Bifactor-ESEM**

*! Model and analysis sections only, other sections identical to previous invariance model*  
**MODEL:**

*! In Mplus, the item intercepts are set to be invariant across groups by default. To estimate  
! invariant item intercepts, one simply has to take out the statements related to item intercept  
! from all sections of the input. With invariant item intercepts, Mplus constrains the factor  
! means to be zero in the first group, and freely estimated in the other groups. The rest of the  
! input remains unchanged.*

```
global by SPPC_1 SPPC_2 SPPC_3 SPPC_4 SPPC_5
      SPPC_6 SPPC_7 SPPC_8 SPPC_9 SPPC_10
      SPPC_11 SPPC_12 SPPC_13 SPPC_14 SPPC_15
      SPPC_16 SPPC_17 SPPC_18 SPPC_19 SPPC_20
      SPPC_21 SPPC_22 SPPC_23 SPPC_24 SPPC_25
      SPPC_26 SPPC_27 SPPC_28 SPPC_29 SPPC_30 (*1);
cogcomp by SPPC_1 SPPC_2~0 SPPC_3~0 SPPC_4~0 SPPC_5~0
      SPPC_6 SPPC_7~0 SPPC_8~0 SPPC_9~0 SPPC_10~0
      SPPC_11 SPPC_12~0 SPPC_13~0 SPPC_14~0 SPPC_15~0
      SPPC_16 SPPC_17~0 SPPC_18~0 SPPC_19~0 SPPC_20~0
      SPPC_21 SPPC_22~0 SPPC_23~0 SPPC_24~0 SPPC_25~0
      SPPC_26 SPPC_27~0 SPPC_28~0 SPPC_29~0 SPPC_30~0 (*1);
peeracc by SPPC_1~0 SPPC_2 SPPC_3~0 SPPC_4~0 SPPC_5~0
      SPPC_6~0 SPPC_7 SPPC_8 SPPC_9~0 SPPC_10~0
      SPPC_11~0 SPPC_12 SPPC_13~0 SPPC_14~0 SPPC_15~0
      SPPC_16~0 SPPC_17 SPPC_18~0 SPPC_19~0 SPPC_20~0
      SPPC_21~0 SPPC_22 SPPC_23~0 SPPC_24~0 SPPC_25~0
      SPPC_26~0 SPPC_27 SPPC_28~0 SPPC_29~0 SPPC_30~0 (*1);
athleticcom by SPPC_1~0 SPPC_2~0 SPPC_3 SPPC_4~0 SPPC_5~0
      SPPC_6~0 SPPC_7~0 SPPC_8 SPPC_9~0 SPPC_10~0
      SPPC_11~0 SPPC_12~0 SPPC_13 SPPC_14~0 SPPC_15~0
      SPPC_16~0 SPPC_17~0 SPPC_18 SPPC_19~0 SPPC_20~0
      SPPC_21~0 SPPC_22~0 SPPC_23 SPPC_24~0 SPPC_25~0
      SPPC_26~0 SPPC_27~0 SPPC_28 SPPC_29~0 SPPC_30~0 (*1);
appear by SPPC_1~0 SPPC_2~0 SPPC_3~0 SPPC_4 SPPC_5~0
      SPPC_6~0 SPPC_7~0 SPPC_8~0 SPPC_9 SPPC_10~0
      SPPC_11~0 SPPC_12~0 SPPC_13~0 SPPC_14 SPPC_15~0
      SPPC_16~0 SPPC_17~0 SPPC_18~0 SPPC_19 SPPC_20~0
      SPPC_21~0 SPPC_22~0 SPPC_23~0 SPPC_24 SPPC_25~0
      SPPC_26~0 SPPC_27~0 SPPC_28~0 SPPC_29 SPPC_30~0 (*1);
gsc by SPPC_1~0 SPPC_2~0 SPPC_3~0 SPPC_4~0 SPPC_5
      SPPC_6~0 SPPC_7~0 SPPC_8~0 SPPC_9~0 SPPC_10
      SPPC_11~0 SPPC_12~0 SPPC_13~0 SPPC_14~0 SPPC_15
      SPPC_16~0 SPPC_17~0 SPPC_18~0 SPPC_19~0 SPPC_20
      SPPC_21~0 SPPC_22~0 SPPC_23~0 SPPC_24~0 SPPC_25
      SPPC_26~0 SPPC_27~0 SPPC_28~0 SPPC_29~0 SPPC_30 (*1);
```

**Title: Invariance of Factor Loadings, Item Intercepts, and Item Uniquenesses of the Bifactor-ESEM**

*! Model and analysis sections only, other sections identical to previous invariance model*

**MODEL:**

*! Item uniquenesses are specified in all sections of the inputs, and labels in parentheses are*

*! used to indicate their invariance across groups.*

global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5

SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10

SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15

SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20

SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25

SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30 (\*1);

cogcomp by SPPC\_1 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10~0

SPPC\_11 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*1);

appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*1);

gsc by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5

SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10

SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15

SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20

SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25

SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30 (\*1);

*! invariance of the item uniquenesses*

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);

SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);

SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);

SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);

SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);

SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);

Model 2:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);  
SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);

Model 3:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);  
SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);

Model 4:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);  
SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);

**Title: Invariance of Factor Loadings, Item Intercepts, Item Uniquenesses, and Factor Variances/Covariances of the Bifactor-ESEM**

*! Model and analysis sections only, other sections identical to previous invariance model*

MODEL:

*! In this model, the default which constraints the factor variances to be freely estimated in all ! groups save for the first one have to be turned off by fixing back the factor variances to be ! equal to 1 (@1) in all of the remaining groups. Factor correlations are also specified and ! constrained to equality using labels in parentheses. Even though the rotation used here is ! still orthogonal, equality constraints need to be imposed on the unrotated factor correlations ! to be able to test the complete invariance the latent variance-covariance matrix.*

global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5  
 SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10  
 SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15  
 SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20  
 SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25  
 SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30 (\*1);

cogcomp by SPPC\_1 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0  
 SPPC\_6 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10~0  
 SPPC\_11 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0  
 SPPC\_16 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0  
 SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*1);

appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*1);

gsc by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30 (\*1);

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
 SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
 SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
 SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);



SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
 SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);

*! invariance of factor variances: the factor variances are set to 1*

global@1; cogcomp@1; peeracc@1; athleticcom@1; appear@1; gsc@1;

*! invariance of the unrotated factor covariances*

global with cogcomp (100);

global with peeracc (101);

global with athleticcom (102);

global with appear (103);

global with gsc (104);

cogcomp with peeracc (105);

cogcomp with athleticcom (106);

cogcomp with appear (107);

cogcomp with gsc (108);

peeracc with athleticcom (109);

peeracc with appear (110);

peeracc with gsc (111);

athleticcom with appear (112);

athleticcom with gsc (113);

appear with gsc (114);

Model 2:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);

SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);

SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);

SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);

SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);

SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);

global@1; cogcomp@1; peeracc@1; athleticcom@1; appear@1; gsc@1;

global with cogcomp (100);

global with peeracc (101);

global with athleticcom (102);

global with appear (103);

global with gsc (104);

cogcomp with peeracc (105);

cogcomp with athleticcom (106);

cogcomp with appear (107);

cogcomp with gsc (108);

peeracc with athleticcom (109);

peeracc with appear (110);

peeracc with gsc (111);

athleticcom with appear (112);

athleticcom with gsc (113);

appear with gsc (114);

Model 3:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);

SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);

SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);

SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);

SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);

SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);

global@1; cogcomp@1; peeracc@1; athleticcom@1; appear@1; gsc@1;

global with cogcomp (100);  
 global with peeracc (101);  
 global with athleticcom (102);  
 global with appear (103);  
 global with gsc (104);  
 cogcomp with peeracc (105);  
 cogcomp with athleticcom (106);  
 cogcomp with appear (107);  
 cogcomp with gsc (108);  
 peeracc with athleticcom (109);  
 peeracc with appear (110);  
 peeracc with gsc (111);  
 athleticcom with appear (112);  
 athleticcom with gsc (113);  
 appear with gsc (114);

Model 4:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
 SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
 SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
 SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);  
 SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
 SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);  
 global@1; cogcomp@1; peeracc@1; athleticcom@1; appear@1; gsc@1;  
 global with cogcomp (100);  
 global with peeracc (101);  
 global with athleticcom (102);  
 global with appear (103);  
 global with gsc (104);  
 cogcomp with peeracc (105);  
 cogcomp with athleticcom (106);  
 cogcomp with appear (107);  
 cogcomp with gsc (108);  
 peeracc with athleticcom (109);  
 peeracc with appear (110);  
 peeracc with gsc (111);  
 athleticcom with appear (112);  
 athleticcom with gsc (113);  
 appear with gsc (114);

**Title: Invariance of Factor Loadings, Item Intercepts, Item Uniquenesses, Factor Variances/Covariances, and Factor Means of the Bifactor-ESEM**

*! Model and analysis sections only, other sections identical to the previous invariance model*  
MODEL:

*! In this model, the default which constraints the factor means to be freely estimated in all ! groups save for the first one have to be turned off by fixing back the factor means to be ! equal to 0 (@0) in all of the remaining groups.*

global by SPPC\_1 SPPC\_2 SPPC\_3 SPPC\_4 SPPC\_5  
 SPPC\_6 SPPC\_7 SPPC\_8 SPPC\_9 SPPC\_10  
 SPPC\_11 SPPC\_12 SPPC\_13 SPPC\_14 SPPC\_15  
 SPPC\_16 SPPC\_17 SPPC\_18 SPPC\_19 SPPC\_20  
 SPPC\_21 SPPC\_22 SPPC\_23 SPPC\_24 SPPC\_25  
 SPPC\_26 SPPC\_27 SPPC\_28 SPPC\_29 SPPC\_30 (\*1);

cogcomp by SPPC\_1 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0  
 SPPC\_6 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10~0  
 SPPC\_11 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0  
 SPPC\_16 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0  
 SPPC\_21 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

peeracc by SPPC\_1~0 SPPC\_2 SPPC\_3~0 SPPC\_4~0 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7 SPPC\_8 SPPC\_9~0 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12 SPPC\_13~0 SPPC\_14~0 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17 SPPC\_18~0 SPPC\_19~0 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22 SPPC\_23~0 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27 SPPC\_28~0 SPPC\_29~0 SPPC\_30~0 (\*1);

athleticcom by SPPC\_1~0 SPPC\_2~0 SPPC\_3 SPPC\_4~0 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8 SPPC\_9~0 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13 SPPC\_14~0 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18 SPPC\_19~0 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23 SPPC\_24~0 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28 SPPC\_29~0 SPPC\_30~0 (\*1);

appear by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4 SPPC\_5~0  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9 SPPC\_10~0  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14 SPPC\_15~0  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19 SPPC\_20~0  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24 SPPC\_25~0  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29 SPPC\_30~0 (\*1);

gsc by SPPC\_1~0 SPPC\_2~0 SPPC\_3~0 SPPC\_4~0 SPPC\_5  
 SPPC\_6~0 SPPC\_7~0 SPPC\_8~0 SPPC\_9~0 SPPC\_10  
 SPPC\_11~0 SPPC\_12~0 SPPC\_13~0 SPPC\_14~0 SPPC\_15  
 SPPC\_16~0 SPPC\_17~0 SPPC\_18~0 SPPC\_19~0 SPPC\_20  
 SPPC\_21~0 SPPC\_22~0 SPPC\_23~0 SPPC\_24~0 SPPC\_25  
 SPPC\_26~0 SPPC\_27~0 SPPC\_28~0 SPPC\_29~0 SPPC\_30 (\*1);

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
 SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
 SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
 SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);  
 SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
 SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);  
 global@1; cogcomp@1; peeracc@1; athleticcom@1; appear@1; gsc@1;

global with cogcomp (100);  
 global with peeracc (101);  
 global with athleticcom (102);  
 global with appear (103);  
 global with gsc (104);  
 cogcomp with peeracc (105);  
 cogcomp with athleticcom (106);  
 cogcomp with appear (107);  
 cogcomp with gsc (108);  
 peeracc with athleticcom (109);  
 peeracc with appear (110);  
 peeracc with gsc (111);  
 athleticcom with appear (112);  
 athleticcom with gsc (113);  
 appear with gsc (114);

*! invariance of factor means: the means of all factors are set to zero*

[global-gsc@0];

Model 2:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
 SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
 SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
 SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);  
 SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
 SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);  
 global@1; cogcomp@1; peeracc@1; athleticcom@1; appear@1; gsc@1;  
 global with cogcomp (100);  
 global with peeracc (101);  
 global with athleticcom (102);  
 global with appear (103);  
 global with gsc (104);  
 cogcomp with peeracc (105);  
 cogcomp with athleticcom (106);  
 cogcomp with appear (107);  
 cogcomp with gsc (108);  
 peeracc with athleticcom (109);  
 peeracc with appear (110);  
 peeracc with gsc (111);  
 athleticcom with appear (112);  
 athleticcom with gsc (113);  
 appear with gsc (114);

[global-gsc@0];

Model 3:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
 SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
 SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
 SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);  
 SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
 SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);  
 global@1; cogcomp@1; peeracc@1; athleticcom@1; appear@1; gsc@1;  
 global with cogcomp (100);  
 global with peeracc (101);

global with athleticcom (102);  
global with appear (103);  
global with gsc (104);  
cogcomp with peeracc (105);  
cogcomp with athleticcom (106);  
cogcomp with appear (107);  
cogcomp with gsc (108);  
peeracc with athleticcom (109);  
peeracc with appear (110);  
peeracc with gsc (111);  
athleticcom with appear (112);  
athleticcom with gsc (113);  
appear with gsc (114);  
[global-gsc@0];

Model 4:

SPPC\_1 (1); SPPC\_2 (2); SPPC\_3 (3); SPPC\_4 (4); SPPC\_5 (5);  
SPPC\_6 (6); SPPC\_7 (7); SPPC\_8 (8); SPPC\_9 (9); SPPC\_10 (10);  
SPPC\_11 (11); SPPC\_12 (12); SPPC\_13 (13); SPPC\_14 (14); SPPC\_15 (15);  
SPPC\_16 (16); SPPC\_17 (17); SPPC\_18 (18); SPPC\_19 (19); SPPC\_20 (20);  
SPPC\_21 (21); SPPC\_22 (22); SPPC\_23 (23); SPPC\_24 (24); SPPC\_25 (25);  
SPPC\_26 (26); SPPC\_27 (27); SPPC\_28 (28); SPPC\_29 (29); SPPC\_30 (30);  
global@1; cogcomp@1; peeracc@1; athleticcom@1; appear@1; gsc@1;  
global with cogcomp (100);  
global with peeracc (101);  
global with athleticcom (102);  
global with appear (103);  
global with gsc (104);  
cogcomp with peeracc (105);  
cogcomp with athleticcom (106);  
cogcomp with appear (107);  
cogcomp with gsc (108);  
peeracc with athleticcom (109);  
peeracc with appear (110);  
peeracc with gsc (111);  
athleticcom with appear (112);  
athleticcom with gsc (113);  
appear with gsc (114);  
[global-gsc@0];