### Supplement 7: Results for three age groups



**Measurement invariance** 

*Figure S7.1.* A path diagram of Confirmatory Factor Analysis (CFA). Residual variances are fixed to 1.0. Numbers indicate the standardized parameter estimates as weighted edges.

Table S7.1											
Results measurement invariance tests over all age groups											
	X2	df	p-value	CFI	ΔCFI	TLI	RMSEA	BIC	AIC		
Model 1 –	573.01	72	<.001	.986		.978	.043	169436	168775		
Conf. invar.											
Model 2ª –	616.52	84	<.001	.985	.001	.980	.041	169367	168795		
Metric invar.											
Model 3 <sup>b</sup> –	882.96	96	<.001	.977	.007	.975	.046	169522	169037		
Scalar invar.											
Model 4 <sup>c</sup> –	1168.04	102	<.001	.969	.008	.968	.052	169751	169310		
Strict invar.											

<sup>a</sup>Equal loadings; <sup>b</sup>Equal loadings, equal intercepts; <sup>c</sup>Equal loadings, equal intercepts, equal means

### **Descriptive statistics**

# Table S7.2Distribution of the social needs per age category

			0					
Age	Ν	М	М	М	М	М	Percentage	Percentage
category		age	affection	confirmation	status	happiness	men	higher educated
Young adult	4245	28.51	5.99 <sup>a</sup>	5.71ª	3.67ª	6.81ª	26%	77%
Middle adult	6327	52.30	5.74 <sup>b</sup>	5.88 <sup>b</sup>	3.93 <sup>b</sup>	6.90 <sup>a,b</sup>	35%	76%
Late adult	915	68.70	5.62 <sup>b</sup>	5.89 <sup>a,b</sup>	4.08 <sup>b</sup>	7.11 <sup>b</sup>	53%	72%
Total	11487	44.82	5.82	5.82	3.85	6.88	33%	76%

Categories indicated with the same letter do not differ significantly with p-value < .00008

(Bonferroni correction = p-value / amount of tests = .001 / 12)

Table S7.3 Distribution of the social needs per age category (weighted)

		,	0 0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
Age	Ν	М	М	М	М	М	Percentage	Percentage
category		age	affection	confirmation	status	happiness	men	higher educated
Young adult	4216	28.04	5.70 <sup>a</sup>	5.52ª	3.54 <sup>a</sup>	6.50 <sup>a</sup>	48%	31%
Middle adult	6267	51.89	5.47 <sup>b</sup>	5.68 <sup>b</sup>	3.67 <sup>a</sup>	6.68 <sup>b</sup>	50%	25%
Late adult	903	70.06	5.42 <sup>b</sup>	5.71 <sup>a,b</sup>	3.68ª	6.96°	51%	50%
Total	11386	46.48	5.54	5.63	3.63	6.66	50%	32%

Categories indicated with the same letter do not differ significantly with p-value < .00008

(Bonferroni correction = p-value / amount of tests = .001 / 12)



*Figure 5.* Boxplots of the social needs per age group. The black dots in the middle indicate the means.

#### **ANOVA** results

To examine age group differences in the average levels of social need fulfilment, ANOVA analyses were performed. Our models showed small but significant age group differences in affection ( $F_{(2, 11408)} = 33.13$ , p < .001), behavioral confirmation ( $F_{(2, 11409)} = 18.05$ , p < .001), and status ( $F_{(2, 11408)} = 38.42$ , p < .001; see Supplement 2 for details). These differences were marginal as the maximum difference comprised 0.48 on a 9-point scale. Young adults reported slightly higher fulfilment of affection than middle (d = 0.13,  $M_y = 5.99$ ,  $M_m = 5.74$ ) and late adults (d = 0.20,  $M_l = 5.62$ ), lower levels of behavioral confirmation than middle adults (d = -0.10,  $M_y = 5.71$ ,  $M_m = 5.88$ ) and lower levels of status than middle (d= -0.14,  $M_y = 3.67$ ,  $M_m = 3.93$ ) and late adults (d = -0.22,  $M_l = 4.08$ ).

The weighted ANOVA analyses showed comparable age group differences in social need fulfilment for affection ( $F_{(2,11312)} = 23.63$ , p < .001), behavioral confirmation ( $F_{(2,11308)} = 17.05$ , p < .001), and status ( $F_{(2,11307)} = 7.50$ , p = .001; see Supplement 2 for details). After weighting differences in status fulfilment lost their significance.

## **Regression analyses**

	Mo	del 1	Mode	el 2	Mod	el 3	Mod	el 4
Pred. variable	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Intercept	6.83***	(0.01)	6.79***	(0.05)	6.66***	(0.02)	6.51***	(0.05)
Affection	0.35***	(0.01)	0.32***	(0.01)	0.36***	(0.02)	0.33***	(0.02)
Confirmation	0.23***	(0.01)	0.21***	(0.01)	0.25***	(0.02)	0.22***	(0.02)
Status	0.13***	(0.01)	0.11***	(0.01)	0.12***	(0.02)	0.11***	(0.02)
Gender (women)			0.03	(0.03)			0.02	(0.03)
Education level			0.12***	(0.02)			0.16***	(0.02)
Affection <sup>2</sup>			-0.03***	(0.00)			-0.03***	(0.00)
Confirmation <sup>2</sup>			-0.03***	(0.00)			-0.03***	(0.00)
Status <sup>2</sup>			-0.02***	(0.00)			-0.02***	(0.00)
Middle adult <sup>1</sup> (n=626	67)				0.19***	(0.03)	0.20**	(0.03)
Late adult (n=903)					0.51***	(0.04)	0.55***	(0.04)
Affection * Middle ac	dult				-0.01	(0.02)	-0.01	(0.02)
Affection * Late adul	t				0.03	(0.03)	0.03	(0.03)
Confirmation * Middl	le adult				-0.02	(0.03)	-0.01	(0.03)
Confirmation * Late	adult				-0.14***	(0.04)	-0.12***	(0.04)
Status * Middle adul	t				-0.01	(0.02)	-0.02	(0.02)
Status * Late adult					0.05	(0.03)	0.03	(0.03)
R <sup>2</sup> a		.30***	.32	***	.31	***	.33	***

Table S7.4 Regression analyses on happiness. Weighted by age, gender and education level (N = 11.386).

<sup>1</sup>Reference group is emerging adults (n = 4216); \*\*\*p < .001, \*\*p < .01, \*p < .05

<sup>2</sup>Quadratic term

aAdjusted R-squared statistic

	Model 1		Mode	el 2	Mode	el 3	Mode	el 4
Pred. variable	b	(SE)	b	(SE)	b	(SE)	b	(SE)
Intercept	6.88***	(.01)	6.81***	(.07)	6.80***	(.02)	6.72***	(.07)
Affection	.32***	(.01)	.31***	(.01)	.33***	(.01)	.32***	(.01)
Confirmation	.24***	(.01)	.23***	(.01)	.23***	(.02)	.21***	(.02)
Status	.11***	(.01)	.10***	(.01)	.11***	(.01)	.11***	(.01)
Gender (wome	n)		.08**	(.03)			.05	(.03)
Education level			.10***	(.02)			.11***	(.02)
Affection <sup>2</sup>			04***	(.00)			04***	(.00)
Confirmation <sup>2</sup>			03***	(.00)			03***	(.00)
Status <sup>2</sup>			02***	(.00)			02***	(.00)
Middle adult <sup>1</sup> (n	=6327)				.10***	(.03)	.09**	(.03)
Late adult (n=9	15)				.33***	(.05)	.31***	(.05)
Affection * Mide	dle adult				.00	(.02)	00	(.02)
Affection * Late	adult				00	(.04)	01	(.04)
Confirmation *	Middle ad	ult			.01	(.02)	.02	(.02)
Confirmation *	Late adult	t			04	(.05)	03	(.04)
Status * Middle	adult				01	(.02)	01	(.02)
Status * Late a	dult				.01	(.04)	.01	(.04)
R <sup>2</sup> a	.31*	**	.32*	**	.31*	**	.33*	**

Table S7.5Regression analyses on happiness (unweighted)

<sup>1</sup>Reference group is young adults (n=4245); \*\*\*p<.001, \*\*p<.01, \*p<.05

### **Cluster analyses**



Figure 7.2. Results of cluster analysis in young adults.

Figure 7.3. Results of weighted cluster analysis in young adults.

Cluster1

Cluster2

(28%)

Cluster3

(14%)

(58%)

Table S7.6

Goodness-of-fit measures	of the 10 invest	igated cluster	r models with	the three s	social needs for
young adults (unweighte	d sample, n = 4	1,245)			

	Npar	L <sup>2</sup>	df	<i>p</i> -value	LL	BIC (LL)	Class.Err
One-cluster model	27	3499	972	<.001	-23552	47329	0
Two-cluster model	31	1515	968	<.001	-22560	45378	.09
Three-cluster model	35	936	964	.74	-22270	44833	.12
Four-cluster model	39	767	960	1	-22186	44697	.14
Five-cluster model	43	710	956	1	-22157	44673	.21
Six-cluster model	47	679	952	1	-22142	44676	.21
Seven-cluster model	51	658	948	1	-22131	44688	.26
Eight-cluster model	55	646	944	1	-22125	44709	.27
Nine-cluster model	59	634	940	1	-22119	44731	.32
Ten-cluster model	63	624	936	1	-22114	44754	.33

Table S7.7

Goodness-of-fit measures of the 10 investigated cluster models with the three social needs for young adults (weighted sample, n = 4,216)

	Npar	L <sup>2</sup>	df	<i>p</i> -value	LL	BIC (LL)	Class.Err
One-cluster model	27	3464	972	<.001	-23361	46947	0
Two-cluster model	31	1491	968	<.001	-22375	45008	.09
Three-cluster model	35	918	964	.85	-22088	44468	.12
Four-cluster model	39	758	960	1	-22008	44341	.14
Five-cluster model	43	701	956	1	-21980	44318	.21
Six-cluster model	47	670	952	1	-21964	44321	.21
Seven-cluster model	51	650	948	1	-21954	44334	.27
Eight-cluster model	55	640	944	1	-21949	44358	.27
Nine-cluster model	59	625	940	1	-21942	44375	.32
Ten-cluster model	63	616	936	1	-21937	44400	.32



*Figure 7.4.* Results of cluster analysis in middle adults.

*Figure 7.5.* Results of weighted cluster analysis in middle adults.

Table S7.8

Goodness-of-fit measures of the 10 investigated cluster models with the **three social needs for middle adults (unweighted** sample, n = 6,327)

	Npar	L <sup>2</sup>	df	<i>p</i> -value	LL	BIC (LL)	Class.Err
One-cluster model	27	5421	972	<.001	-34465	69167	0
Two-cluster model	31	1995	968	<.001	-32752	65776	.07
Three-cluster model	35	1087	964	.00	-32298	64902	.12
Four-cluster model	39	799	960	1	-32155	64650	.14
Five-cluster model	43	733	956	1	-32121	64619	.15
Six-cluster model	47	697	952	1	-32103	64618	.18
Seven-cluster model	51	666	948	1	-32088	64621	.19
Eight-cluster model	55	655	944	1	-32082	64646	.21
Nine-cluster model	59	662	940	1	-32086	64688	.35
Ten-cluster model	63	613	936	1	-32061	64674	.31

Table S7.9

Goodness-of-fit measures of the 10 investigated cluster models with the **three social needs for middle adults (weighted** sample, n = 6,267)

, -	Npar	L <sup>2</sup>	df	<i>p</i> -value	LL	BIC (LL)	Class.Err
One-cluster model	27	5371	972	<.001	-34138	68511	0
Two-cluster model	31	1983	968	<.001	-32443	65158	.07
Three-cluster model	35	1076	964	.01	-31990	64286	.12
Four-cluster model	39	791	960	1	-31847	64035	.14
Five-cluster model	43	755	956	1	-31829	64035	.18
Six-cluster model	47	690	952	1	-31797	64005	.18
Seven-cluster model	51	672	948	1	-31788	64022	.17
Eight-cluster model	55	644	944	1	-31774	64029	.21
Nine-cluster model	59	635	940	1	-31769	64054	.24
Ten-cluster model	63	621	936	1	-31763	64076	.26



*Figure 7.7.* Results of cluster analysis in late adults.

*Figure 7.7.* Results of weighted cluster analysis in late adults.

Table S7.10

Goodness-of-fit measures of the 10 investigated cluster models with the **three social needs for late** adults (unweighted sample, n = 915)

	Npar	L <sup>2</sup>	df	<i>p</i> -value	LL	BIC (LL)	Class.Err
One-cluster model	27	1039	884	<.001	-4985	10154	0
Two-cluster model	31	556	880	1	-4743	9698	.10
Three-cluster model	35	423	876	1	-4677	9592	.14
Four-cluster model	39	377	872	1	-4654	9573	.15
Five-cluster model	43	367	868	1	-4649	9591	.27
Six-cluster model	47	354	864	1	-4643	9605	.23
Seven-cluster model	51	345	860	1	-4638	9623	.23
Eight-cluster model	55	340	856	1	-4635	9645	.23
Nine-cluster model	59	334	852	1	-4633	9667	.30
Ten-cluster model	63	329	848	1	-4630	9689	.27

### Table S7.11

Goodness-of-fit measures of the 10 investigated cluster models with the **three social needs for late adults (weighted** sample, n = 903)

	N <sub>par</sub>	L <sup>2</sup>	df	<i>p</i> -value	LL	BIC (LL)	Class.Err
One-cluster model	27	1025	872	<.001	-4916	10016	0
Two-cluster model	31	552	868	1	-4680	9571	.10
Three-cluster model	35	419	864	1	-4613	9465	.13
Four-cluster model	39	374	860	1	-4590	9446	.14
Five-cluster model	43	363	856	1	-4585	9463	.27
Six-cluster model	47	353	852	1	-4580	9480	.25
Seven-cluster model	51	344	848	1	-4576	9498	.24
Eight-cluster model	55	336	844	1	-4572	9517	.24
Nine-cluster model	59	337	840	1	-4572	9545	.35
Ten-cluster model	63	333	836	1	-4570	9569	.33



*Figure 7.8.* Results of cluster analysis with age categories in total sample.

*Figure 7.9.* Results of cluster analysis with age categories in total sample.

### Table S7.12

Goodness-of-fit measures of the 10 investigated cluster models with the **three social needs and the three age categories (unweighted** sample, n = 11,471)

	Npar	L <sup>2</sup>	df	<i>p</i> -value	LL	BIC (LL)	Class.Err
One-cluster model	29	10249	2970	<.001	-73394	147058	0
Two-cluster model	35	4456	2964	<.001	-70497	141320	.08
Three-cluster model	41	2881	2958	.84	-69709	139802	.12
Four-cluster model	47	2426	2952	1	-69482	139403	.15
Five-cluster model	53	2232	2946	1	-69385	139264	.24
Six-cluster model	59	2141	2940	1	-69339	139230	.27
Seven-cluster model	65	2023	2934	1	-69280	139168	.29
Eight-cluster model	71	1951	2928	1	-69244	139152	.31
Nine-cluster model	77	1877	2922	1	-69207	139134	.31
Ten-cluster model	83	1854	2916	1	-69196	139167	.34



*Figure 7.10.* Results of weighted cluster analysis with age categories in total sample.

*Figure 7.11.* Results of weighted cluster analysis with age categories in total sample.

### Table S7.13

Goodness-of-fit measures of the 10 investigated cluster models with the **three social needs and the three age categories (weighted** sample, n = 11,386)

	Npar	L <sup>2</sup>	df	<i>p</i> -value	LL	BIC (LL)	Class.Err
One-cluster model	29	10147	2970	<.001	-72710	145691	0
Two-cluster model	35	4413	2964	<.001	-69843	140013	.08
Three-cluster model	41	2845	2958	.93	-69059	138501	.12
Four-cluster model	47	2399	2952	1	-68836	138110	.16
Five-cluster model	53	2206	2946	1	-68740	137974	.25
Six-cluster model	59	2123	2940	1	-68698	137947	.28
Seven-cluster model	65	2004	2934	1	-68639	137884	.28
Eight-cluster model	71	1932	2928	1	-68603	137868	.31
Nine-cluster model	77	1880	2922	1	-68577	137872	.32
Ten-cluster model	83	1844	2916	1	-68558	137891	.34

Specification of the options in Latent GOLD.

Cluster	Model - HGN_f	inal.csv - Mod	el1	×
Variables Advanced Model	Residuals ClassPre	d Output Techn	ical	
id*         J           "gender"         "age"           "spf1"         "spf2"           "spf4"         "spf5"           "spf5"         "spf5"           "spf3"         "spf3"           "spf3"         "spf3"           "spf3"         "spf3"           "spf4"         "spf5"           "spf5"         "spf3"           "spf3"         "spf3"           "spf4"         "spf3"           "spf3"         "spf3"           "spf4"         "spf3"	Indicators> Covariates>	"affection" "confirmation" "status"	Ord-Fixed Ord-Fixed Ord-Fixed	10 10 10
"abs_age" . "weight" .	Clusters 1 - 10			
Lexical Order	Case Weight> Select>			
	Close	Cancel E	stimate	Help

*Figure 7.12.* Selecting variables.

Variables Advanced Model Residuals	ClassPred Output Technical				
Output Sections	Standard Errors and Wald				
✓ Parameters	<ul> <li>Standard (Hessian)</li> </ul>				
✓ Profile	Robust (Sandwich)				
✓ ProbMeans	Fast (Outer Product)     None				
Bivariate Residuals	UNDIE				
Frequencies / Residuals	Prediction Type				
Classification - Posterior	Posterior (EB)     HR like (ER)				
Classification - Model	Model (Marginal)				
<ul> <li>Estimated Values</li> </ul>					
Set Profile	Coding Nominal				
Set ProbMeans					
✓ Importance	O Dummy Last				
✓ Iteration Detail					
Default					
Scoring Syntax Typ	e Generic V				
	Browse				
Variance/Covariance Matrix	Browse				
Restore to Defaults Save as Defaul	t Cancel Changes				

Figure 7.14. Selecting output.

	Cluster Model - HGN_final.csv - Model1
	Variables Advanced Model Residuals ClassPred Output Technical
elp	□ Clusters       Induded Effects         □ Cluster 1       □ "affection"         □ Cluster 2       □ "onfrmation"         □ Cluster 3       □ "onfrmation"         □ Cluster 4       □ Cluster 5         □ Cluster 7       □ Cluster 7         □ Cluster 9       □ Cluster 10
	Add     Remove       Cluster Independent
orc	
	Close Cancel Estimate Help

Figure 7.13. Model specification.

/ariables Advanced	Model Residuals	ClassPred Output	Technical
Convergence Limits		Bayes Constants	
EM Tolerance	0.01	Latent Variables	1
Tolerance	1e-008	Categorical Variables	1
		Poisson Counts	1
Iteration Limits		Error Variances	1
EM	250		
Newton-Raphson	50	Missing Values Exc	lude Cases 🖲
		Include Indicators/	Dependent 🔿
Start Values			Include All 🔾
Random Sets	16		
Iterations	200	Bootstrap	
Seed	0	Replications	500
		Seed	0
Tolerance	1e-005		
Threads		Continuous Factors	
Maximum Threads	all 🗸	Number of Nodes	10 🗸
Restore to Defaults	Save as Defau	lt	Cancel Changes

Figure 7.15. Technical specifications.

Cluster Mode	el - HGN_weights_only.csv - Model1
Variables         Advanced         Model         R           "ld"         .	tesiduals (classPred Output Technical Survey Stratum> PSU> <-Sampling Wgt 'weight' <r> Continuous Factors CFactors None V</r>
"sof9" . "happiness" . "gender_num" . "dbs_educ" . "age_cat" . "dbs_age" .	Multilevel Model Group ID-> GClasses 0 GCFactors None
Lexical Order	
	Close Cancel Estimate Help

	Clust	er Moo	del - HGN_weigh	nts_only.csv - N	/lodel1	×
Variables	Advanced	Model	Residuals ClassPred	l Output Techni	ical	
"id" "gender" "spf1" "spf2" "spf3" "spf4" "spf5" "spf6" "spf6"		- - - - - - - - - - - - - - -	<indicators< td=""><td>"affection" "confirmation" "status" "age_cat"</td><td>Ord-Fixed Ord-Fixed Ord-Fixed Nominal</td><td>10 10 10 3</td></indicators<>	"affection" "confirmation" "status" "age_cat"	Ord-Fixed Ord-Fixed Ord-Fixed Nominal	10 10 10 3
"spf8" "spf9" "happiness "gender_n "cbs_educ "cbs_age" "weight"	s" um" "		Covariates> Clusters 1-10			
Lexical Scan	Order Re	set	Case Weight> Select>			
			Close	Cancel Es	stimate	Help

Figure 7.16. Selecting weights.

Figure 7.17. Adding age categories.