

Appendices

Additional analyses

The appendices include:

Appendix A Associations of baseline age with SA: results based on restructured data

Appendix B Resilience and functional limitations: Comparison between LASA and NSHD

Appendix A. Associations of baseline age with SA: results based on restructured data

The original dataset included six measurements of the same variable that expressed functioning at subsequent waves (called waves B to G). For example, cognitive functioning measured by the MMSE across 1992-2008 consisted of six measurements: Bmmse, Cmmse, Dmmse, Emmse, Fmmse, and Gmmse. We restructured the data contained in these six measurements to seventeen new measurements. These new measurements expressed functioning at the *age* (rather than the measurement wave) at which functioning was observed. In effect, a series of 17 measurements was produced that expressed individual functioning at three-year age intervals, i.e., functioning at age 55-57 (for example, mmse55), at age 58-60 (mmse58), at age 61-63 (mmse61), etcetera (see Table A1). Each individual had data for up to six of these measurements.

An example from Table A1: a female respondent started participating in LASA when she was 64 years old. She participated in all waves from B to G. Her scores on the MMSE were: Bmmse = 30; Cmmse = 30; Dmmse = 27; Emmse = 24; Fmmse = 22; Gmmse = 21, respectively. During these measurement waves her age was 64, 67, 70, 74, 77, and 80 years respectively (between waves E and F we have counted 4 years; 2001-2005). Because she participated in six waves, this participant has valid scores for six out of the seventeen new measurements, namely those expressing functioning at age 64-66 (score 30); at age 67-69 (score 30); at age 70-72 (score 27); at age 73-75 (score 24); at age 76-78 (score 22); and at age 79-81 (score 21). The rest of the seventeen measurements is set to missing for this participant.

Subsequently, instead of using the six original measurements (Bmmse – Gmmse), the series of 17 variables was used as input for the LCGA. Because missing data was handled by the Maximum Likelihood procedure in *Mplus*, a full trajectory was estimated for all participants. But instead of being based on six measurement waves (B – G), the trajectories were based on 17 measurement points, expressing functioning from age 55 up to age 103. However, we found that the estimated trajectories diverged strongly from the observed values from age 90 onwards, largely because of the small *n* and the large proportions of missing data at these ages. Therefore, the final models were based on 12 measurements. Example trajectories are shown in Figure A1. After exporting LCGA results to SPSS, we used logistic regression models with 'having a successful trajectory in functional limitations' and 'having a successful trajectory in cognitive functioning' as outcomes, predicted by baseline age, gender, and SEP (Table A2).

Table A1. Examples of restructuring measurement waves to measurements based on observed age

Respondent 1: 64 years at baseline, participating in all six included measurement waves

Respondent 2: 77 years at baseline, participating in waves B-E

Original measurements: Functional Limitations score at wave...						
	B	C	D	E	F	G
(R1)	30	30	27	24	22	21
(R2)	24	22	21	18	-	-

Restructured measurements: Functional Limitations at age...																	
	55-57	58-60	61-63	64-66	67-69	70-72	71-73	74-76	77-79	80-82	83-85	86-88	89-91	92-94	95-97	98-100	101-103
R1	-	-	30	30	27	24	22	21	-	-	-	-	-	-	-	-	-
R2	-	-	-	-	-	-	-	24	22	21	18	-	-	-	-	-	-

Table A2. Associations between baseline age, SEP, and successful trajectories of functional limitations and cognitive functioning based on two different Latent Class Growth Analyses

Observed	Functional Limitations ORIGINAL	Functional limitations ALTERNATIVE	Cognitive Functioning ORIGINAL	Cognitive Functioning ALTERNATIVE
	% successful	64.3 m:69.4;w:56.2	73.0 m:84.3;w:63.1	67.0 m:68.8;w:60.2
Predictors	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age	0.89 0.88, 0.90	0.98 0.97, 0.99	0.90 0.89, 0.91	1.02 1.01, 1.03
Gender	0.60 0.47, 0.75	0.42 0.33, 0.53	1.11 0.87, 1.42	2.12 1.68, 2.67
Education in years	1.05 1.01, 1.09	1.04 1.00, 1.09	1.16 1.11, 1.21	1.16 1.11, 1.22
Occupational skill level	Reference = elementary			
Low	1.55 1.04, 2.31	1.34 0.93, 1.94	1.23 0.82, 1.83	1.33 0.92, 1.92
Medium	1.67 1.10, 2.54	1.52 1.02, 2.26	1.77 1.16, 2.71	1.61 1.09, 2.39
High	1.41 0.82, 2.40	1.36 0.80, 2.30	1.77 1.01, 3.09	2.20 1.28, 3.81
Never had a job	1.20 0.76, 1.87	1.21 0.80, 1.83	0.84 0.54, 1.32	0.77 0.51, 1.17
Income (per 100 euro)	1.04 1.01, 1.07	1.06 1.03, 1.09	1.07 1.03, 1.10	1.08 1.05, 1.12



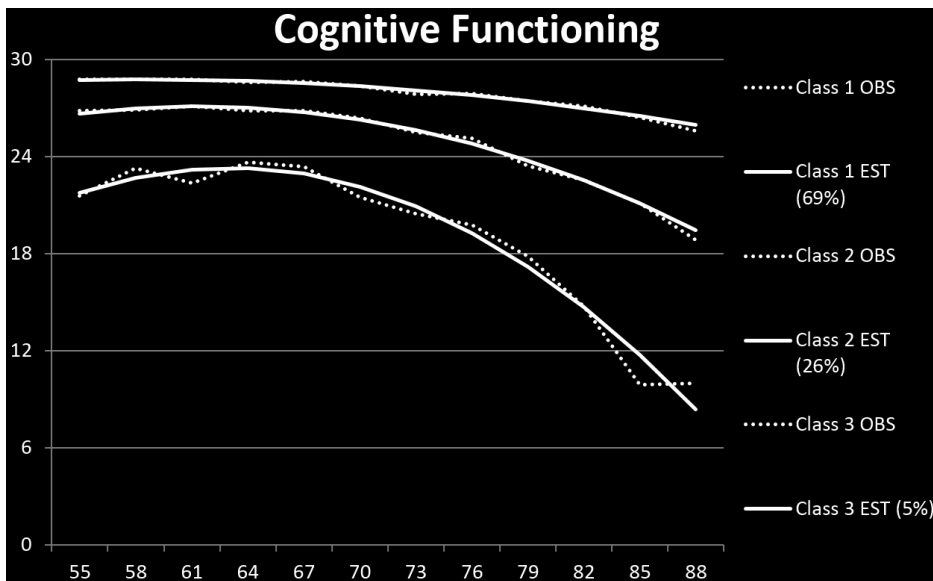
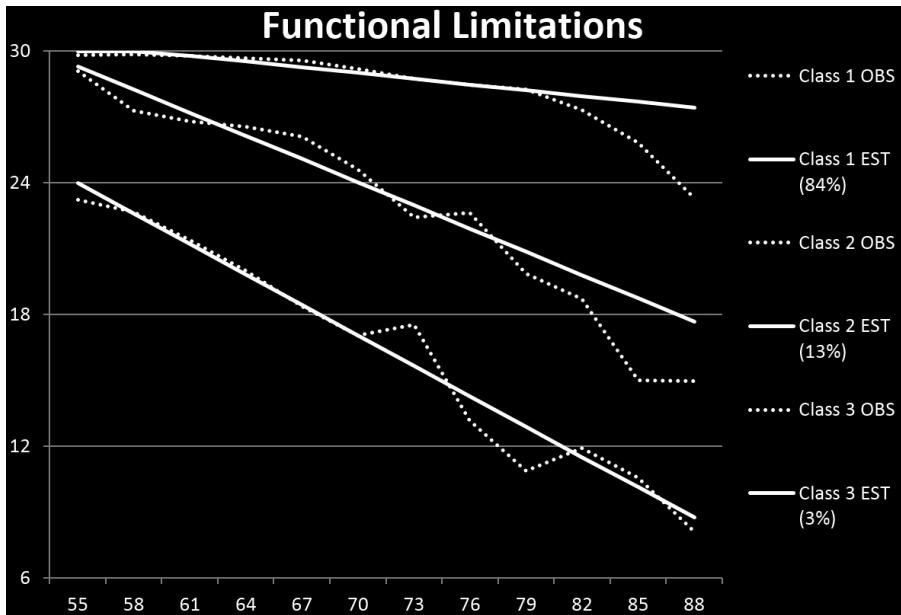


Figure A1. Example of results from LCGA analyses with restructured data, for men (n=1,030). Instead of measurement wave, the X-axis now represents the respondents' chronological age. Observations made above the age of 90 were omitted. OBS = Observed values; EST = Estimated values.

Appendix B. Resilience and functional limitations: Comparison between LASA and NSHD

For this replication of the NSHD study (Chapter 7), we similarly defined three levels of socioeconomic adversity (see **Table B1**) and a dichotomous measure of functional limitations. Socioeconomic adversity was based on the same indicators as used in Chapter 6. The outcome was based on the analysis of trajectories of functional limitations from Chapter 3, and was defined as “having a successful trajectory in functional limitations”.

The proportion of the sample (n=2,185) with a successful trajectory in functional limitations was 60.7%. As in the NSHD, a strong gradient in functional limitations was found between the three levels of socioeconomic adversity. The percentages with a successful trajectory in functional limitations was 71.6% in those with low adversity, 61.4% in those with intermediate adversity, and 47.4% in those with high adversity.

As in Chapter 7, we distinguished six groups based on level of adversity and functional limitations (**Table B2**). Although in LASA the measure of functional limitations is based on 16-year trajectories, for reasons of consistency, we use the same terms for functional limitations as in Chapter 7 (i.e., “without functional limitations” and “with functional limitations”).

Table B1. Operationalisation of three levels of lifetime socioeconomic adversity.

	Father's education	Own occupational skill level	Own education
High adversity satisfy all criteria N=404	m: <7 years f: <7 years	m: never, elementary or low f: never job or elementary	m: <10 years f: <7 years
Intermediate adversity N=1366	All other combinations of the three SEP measures (i.e., one or two indicators are low; all indicators have equal weight)		
Low adversity satisfy all criteria N=415	m: 7+ years f: 7+ years	m: intermediate or higher f: low or higher	m: 10+ years f: 7+ years

Table B2. Six groups based on socioeconomic adversity and having a successful trajectory of functional limitations (n=2,185)

	Without functional limitations	With functional limitation(s)
High adversity	<p>“Resilient”</p> <p>n=191 (8.7%)</p>	<p>“High Adversity/ Limitations”</p> <p>n=216 (9.9%)</p>
Intermediate adversity	<p>“Intermediate Adversity/ No Limitations”</p> <p>n=842 (38.5%)</p>	<p>“Intermediate Adversity/ Limitations”</p> <p>n=521 (23.9%)</p>
Low adversity	<p>“Low adversity/ No Limitations”</p> <p>n=292 (13.4%)</p>	<p>“Low Adversity /Limitations”</p> <p>n=123 (5.6%)</p>

I aimed to attain comparability of this additional analysis with both the study on resilience and SA from Chapter 6 and the NSHD study on resilience and functional limitations in Chapter 7. Therefore, I only used variables that were included in Chapter 6, and from these I selected only the ones that matched to a reasonable degree with those used in Chapter 7 (see **Table B3**).

After selecting 11 variables from LASA to be included in this additional analysis, I followed the same procedures as in Chapter 6 and 7. That is, I first compared each single protective factors between the six groups, adjusted for age and sex ('Bivariate comparison'; **Table B4**). Then, I selected factors in which the “Resilient” significantly differed from the “High Adversity/Limitations” group ($p < .05$) for a multiply adjusted analysis (**Table B5**), in which group comparisons were adjusted for all included protective factors.

Table B3. Matching of potential protective factors between NSHD and LASA study		
NSHD	Equivalent from LASA study on resilience/SA	Rationale for inclusion/exclusion
Childhood illness	None	No measure of childhood health available
Parental interest in education	None	No comparable measure available
Self-management	Mastery Self-efficacy	Both LASA measures partly capture self-control, which is assumed to be relatively stable across the life course
Neuroticism	Neuroticism	
Any education (any vocational course or higher versus none)	None	Group differences in 'any education' could not be accurately estimated in LASA due to large overlap of this measure with the definition of "low SEP" in this study.
Social contact frequency	Network size Instrumental support received Emotional support received	
Voluntary work	Successful trajectory in social activity	
Marital status	Partner status	
Smoking	Smoking	
Obesity	Obesity	
Vigorous physical activity	Engaged in sports activity (yes/no)	Used sports activity instead of total activity because NSHD items are on "vigorous physical activity". Dichotomized into yes/no because of skewness and because NSHD was also dichotomized.

Results

Based on the bivariate results, instrumental support, partner status, social activity, smoking, and sports activity were excluded from the multiply adjusted analysis. Additional analyses on physical activity showed that in contrast to the percentage engaging in any sports activity, the time spent (in minutes) on sports activities was significantly higher in the Resilient compared to the High Adversity/Limitations group. This relationship was thus obscured by the dichotomization of sports activity. However, it was no longer significant after adjustment for other protective factors.

In the multiply adjusted analysis we found that mastery, obesity and total physical activity distinguish the resilient from other individuals with high adversity (**Table B5**). Mastery is significantly higher in the resilient than in all other groups. The difference in mastery

Table B4. Bivariate comparison of psychosocial and health-related factors between Resilient and other groups (n=2,185), adjusted for sex and baseline age (FL=Functional Limitation)

Variable	Adjusted means/proportions for group:					
	Resilient (ref.)	High Adv / Lim	Med Adv / No Lim	Med Adv / Lim	Low Adv / No Lim	Low Adv / Lim
Mastery	18.0	16.3 ^{a)}	17.9	16.8 ^{a)}	17.6	16.9 ^{a)}
Self-efficacy	41.2	40.0 ^{a)}	42.6 ^{b)}	41.6	43.1 ^{b)}	42.6 ^{b)}
Neuroticism	6.3	8.2 ^{a)}	6.0	7.4 ^{a)}	5.4	6.7
Social Factors						
Network size	13.9	12.0 ^{a)}	14.3	13.4	15.6 ^{b)}	15.2
Instrumental support	14.3	15.3	13.5	14.8	13.6	15.2
Emotional support	21.5	19.8 ^{a)}	22.1	21.1	22.6	23.5 ^{b)}
% Partner in househ.	72.3	62.5	73.0	64.5	70.7	60.1 ^{a)}
% Socially active	24.6	17.2	22.5	20.6	18.3	13.3 ^{a)}
Health-related factors						
% Not curr. smoking	79.2	73.4	80.0	76.1	75.1	74.7
% Not obese	81.2	66.0 ^{a)}	88.2 ^{b)}	72.9	91.2 ^{b)}	79.1
% Any sports activity	50.6	42.0	57.6	51.3	65.6 ^{b)}	50.6

a) Difference with Resilient group $p < .05$, more favourable (meaning 'associated with less FL') in Resilient

b) Difference with Resilient group $p < .05$, less favourable in Resilient

between those with and without FL also seems particularly large at a high level of adversity. Formal tests of interaction (adversity*mastery) confirmed that the difference in levels of mastery between those with and without functional limitations was significantly larger in the low adversity versus the intermediate and high adversity groups.

Table B5. Multivariate comparison of psychosocial and health-related factors between Resilient and other groups (n=2,185), adjusted for sex and baseline age (FL=Functional Limitation)

Variable	Adjusted means/proportions for group:					
	Resilient (ref.)	High Adv / Lim	Med Adv / No Lim	Med Adv / Lim	Low Adv / No Lim	Low Adv / Lim
Psychological Factors						
Mastery	18.1	17.1 ^{a)}	17.7 ^{a)}	17.0 ^{a)}	17.1 ^{a)}	16.8 ^{a)}
Self-efficacy	40.8	40.9	42.3 ^{b)}	42.1 ^{b)}	42.8 ^{b)}	42.9 ^{b)}
Neuroticism	6.5	7.2	6.4	7.0	5.7	6.7
Social Factors						
Network size	13.9	13.3	14.0	13.8	15.1	14.4
Emotional support	21.6	20.8	21.9	21.5	21.8	23.0
Health-related factors						
% Not obese	80.6	65.4 ^{a)}	88.3 ^{b)}	73.1	91.6 ^{b)}	80.0

a) Difference with Resilient group $p < .05$, more favourable (meaning 'associated with less FL') in Resilient

b) Difference with Resilient group $p < .05$, less favourable in Resilient

ns = not significant at $p < .05$

Comparison with the NSHD results:

As in the NSHD, psychological factors related to self-control (i.e., mastery) and the absence of obesity were associated with resilience, and social factors appeared less important for resilience. Similar to the NSHD, neuroticism was only associated with resilience in the bivariate analysis and this difference disappeared in multiply adjusted analyses.

Absence of smoking and engaging in sports activity were not associated with resilience in LASA while they were in the NSHD. However, in the NSHD we found that the absence of smoking at age 43 (and not 53 and 60-64) were related to resilience, whereas at age 60-64 it was not. If we take the age at which smoking was measured into account (which was 55+ in LASA), the results regarding smoking may thus still be similar, and indicate that refraining from or stopping smoking earlier in life is more strongly related to later life resilience than the absence of smoking at higher ages.

Furthermore, in the NSHD, the Resilient were no more likely to be obese than those with less socioeconomic adversity, while in LASA, the Resilient were still more likely to be obese than the groups with an intermediate or high SEP who had a successful trajectory in functional limitations. The prevalence of obesity in the resilient thus appears to be somewhat more 'extraordinarily' low in the NSHD compared to LASA. On the other hand, it is striking that, in LASA, the level of mastery was statistically significantly higher in the resilient than in all other groups, even those with a substantially higher SEP.

