Online supplement

Figure S1. Sample flow diagram for the analytic sample of SHARE and ELSA work exit respondents

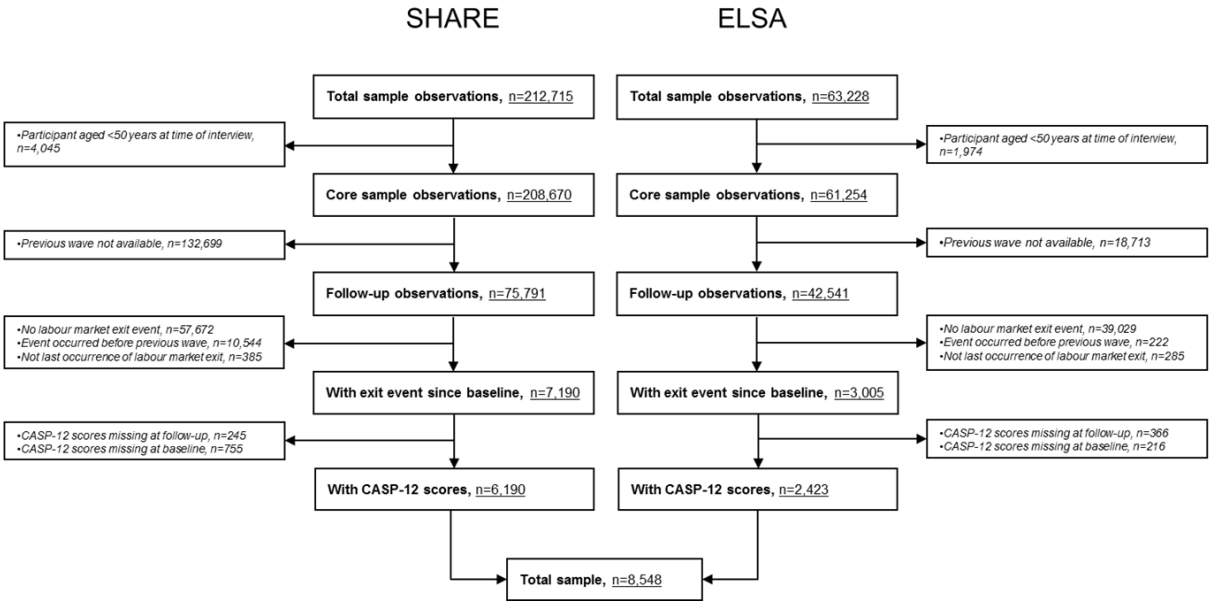


Table S1. Overview of statistical terms and definitions relating to social protection benefits*

Term	Definition
Social expenditure	The provision by public (and private) institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances which adversely affect their welfare, provided that the provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an individual contract or transfer. Such benefits are 'unrequited': it does not include 'market transactions', i.e. payments in return for the simultaneous provision of services of equivalent value cash transfers, and can take the form of cash transfers or direct ("in-kind") provision of goods and services.
Social benefits	Current transfers received by households intended to provide for the needs that arise from certain events or circumstances, for example, sickness, unemployment, retirement, housing, education or family circumstances.
Social benefits in kind	These consist of (a) social security benefits, reimbursements, (b) other social security benefits in kind, (c) social assistance benefits in kind; in other words they are equal to social transfers in kind excluding transfers of individual non-market goods and services.
Social security benefits in cash	Social insurance benefits payable in cash to households by social security funds; they may take the form of sickness and invalidity benefits, maternity allowances, children's or family allowances, other dependants' allowances, unemployment benefits, retirement and survivors' pensions, death benefits or other allowances or benefits.

*Adapted from the OECD Glossary of Statistical Terms.
OECD. OECD Glossary of Statistical Terms [Internet]. Paris: OECD Publishing; 2017 [cited 2017 Sep 22].
Available from: https://stats.oecd.org/glossary/index.htm

Table S2. CASP-19 and CASP-12 scale items and domains

Item question	CASP Domain
How often do you think your age prevents you from doing the things you would like to do?[1]	Control
How often do you feel that what happens to you is out of your control?[1]	
*How often do you feel free to plan for the future?	
How often do you feel left out of things?[1]	
How often do you think that you can do the things that you want to do?	Autonomy
How often do you think that family responsibilities prevent you from doing what you want to do?[1]	
*How often do you feel you can please yourself?	
*How often do you feel that your health stops you doing the things you want to do?[1]	
How often do you think that shortage of money stops you from doing the things you want to do?[1]	
How often do you look forward to each day?	Self-realisation
How often do you feel that your life has meaning?	
*How often do you enjoy the things you do?	
*How often do you enjoy the company of others?	
How often, on balance, do you look back on your life with a sense of happiness?	
How often do you feel full of energy these days?	Pleasure
*How often do you choose to do things you have never done before?	
*How often do you feel satisfied with your life?	
How often do you feel that life is full of opportunities?	
How often do you feel that the future looks good for you?	

*Item not included in CASP-12 scale
[1]Items are reverse-coded to ensure that higher CASP-12 scores were indicative of a higher degree of wellbeing

Table S3. Comparison of public benefit types in SHARE and ELSA for the specification of a categorical variable representing institutionally-defined route of work exit

Benefit in ELSA	Benefit in SHARE	Category*
Incapacity benefit (previously invalidity benefit) Severe disablement allowance Disability living allowance Industrial injuries disablement benefit Any other benefit for people with disabilities	Disability insurance benefits	1
Job-seeker's allowance (formerly unemployment benefit)	Unemployment benefits	2
Statutory sick pay	Sickness benefits	3
Income support or minimum income guarantee	Social assistance benefits	4
N/A	Public early retirement pension	5
State pension	Public old age pension	6

*The categorical variable for route of work exit according to type of public benefits received at t_1 was generated using benefit categories in SHARE. ELSA responses were harmonised with these as shown. Respondents receiving multiple benefit types were categorised using the hierarchy proposed by Robroek et al., 2013 (39) and assigned to the lowest-numbered category shown above. For example, a respondent receiving both disability insurance benefits and a public early retirement pension would be placed in Category 1.

Table S4. Social protection effort, emphasis and expenditure by country and welfare regime (2011)

Welfare regime	Country	Total public (% GDP)	Total public* (EUR per capita)	Effort		Emphasis		Expenditure	
				In-kind benefits (% GDP)	Cash benefits (% GDP)	In-kind benefits (% public)	Cash benefits (% public)	In-kind benefits (EUR per capita)	Cash benefits (EUR per capita)
Bismarckian	Austria	26.1	7603	8.3	17.8	31.8	68.2	2415	5188
	Germany	23.9	6792	10.1	13.8	42.1	57.9	2858	3934
	Netherlands	20.9	6433	9.9	11.0	47.4	52.6	3048	3385
	France	29.6	7311	11.1	18.5	37.4	62.6	2735	4576
	Switzerland	17.7	6414	7.6	10.1	43.0	57.0	2760	3654
	Belgium	27.9	7596	10	17.9	35.8	64.2	2719	4877
	Mean	*24.4*	*7025*	*9.5*	*14.9*	*39.2*	*60.8*	*2756*	*4269*
Mediterranean	Spain	25.4	5477	8.8	16.6	34.7	65.3	1899	3578
	Italy	26.9	6322	7.8	19.1	29.0	71.0	1833	4488
	Greece	25.7	4525	8.0	17.7	31.2	68.8	1414	3111
	Mean	*26.0*	*5441*	*8.2*	*17.8*	*31.5*	*68.5*	*1715*	*3726*
Social democratic	Sweden	24.6	7126	13.3	11.3	54.2	45.8	3863	3264
	Denmark	26.9	7722	13.5	13.4	50.1	49.9	3865	3857
	Mean	*25.8*	*7424*	*13.4*	*12.4*	*52.0*	*48.0*	*3864*	*3560*
Post-communist	Czech Republic	19.5	3702	6.9	12.6	35.5	64.5	1314	2388
	Poland	19.1	2804	5.4	13.7	28.3	71.7	793	2012
	Slovenia	23.1	4371	7.3	15.8	31.7	68.3	1384	2987
	Estonia	16.1	2551	5.3	10.8	32.7	67.3	833	1717
	Mean	*19.5*	*3357*	*6.2*	*13.2*	*32.2*	*67.8*	*1081*	*2276*
Liberal	England	22.2	5413	11.2	11.0	50.3	49.7	2723	2690

*All per capita expenditure measures are PPP-adjusted and benchmarked against the relative price level for actual individual consumption in Germany in 2011.

Table S5. Types of social protection programme by OECD policy area and expenditure type*

Policy area	Social protection benefit type: Benefits in kind	Social protection benefit type: Cash transfers
Old age	Residential care Home help services Other benefits in kind	Pension Early retirement pension Other old age cash benefits
Survivors	Funeral expenses Other benefits in kind	Pension Other cash benefits
Incapacity	Residential care Home help services Other benefits in kind	Disability pensions Paid sick leave Other cash benefits
Health	Healthcare services	N/A
Family	Day care Other benefits in kind Home help services	Family allowances Maternity and parental leave Other cash benefits
Unemployment	Other benefits in kind	Unemployment compensation Severance pay Early retirement pension (for labour market reasons)
Housing	Housing assistance Other benefits in kind	N/A
Other	Social assistance Other benefits in kind	Income maintenance Other cash benefits

*Adapted from The Social Expenditure database: An Interpretive Guide.
OECD. The Social Expenditure database: An Interpretive Guide. Paris: OECD Publishing; 2007 (63).
Available from: http://stats.oecd.org/oecdstatdownloadfiles/oecdsocx2007interpretativeguide_en.pdf

Supplementary notes

1) The physical frailty index was based on the deficit accumulation model, for which a standard method for determining degree of frailty in a clinical context has been proposed by Searle et al. (1). This has been implemented in a number of panel studies including SHARE (2,3,4,5) and ELSA (6).

Rockwood and Mitnitski (7) and Ferrucci et al. (8) have concluded that such frailty scales are strongly predictive of risk of mortality, institutionalisation and adverse health events when 30 or more variables are included, and that estimates become unstable particularly when 10 or fewer are included (1). In addition, items included should be representative of an individual's health status over as wide a range of functional domains as possible and not saturate at too early an age (i.e. deficits included in the scale must not be near-universal at too young an age) (3). This is particularly important when applying scales to data from the general population and across wider age ranges. One key assumption of the deficit accumulation model, with regards to its relationship with chronological age, is that deficits accumulate over time at a non-linear 'characteristic' rate for each individual (7).

Items were selected with the objective of including at least 30 items covering as wide a range of functional domains as possible (7). The index was operationalised using all self-reported items relating to medically-diagnosed conditions, medical symptoms, functional activities and activities of daily living previously included in studies of frailty indices in SHARE (3) and ELSA (6). The final scale included 36 items.

While the scale initially included 37 items, 27.7% of responses in ELSA had missing values for diagnosis of a hip or femoral fracture. This item was therefore removed from the scale as performed by others (7,9) in previous studies. Furthermore, grip strength measures were not considered for inclusion in the scale as these were not available in all waves of ELSA. This could potentially have

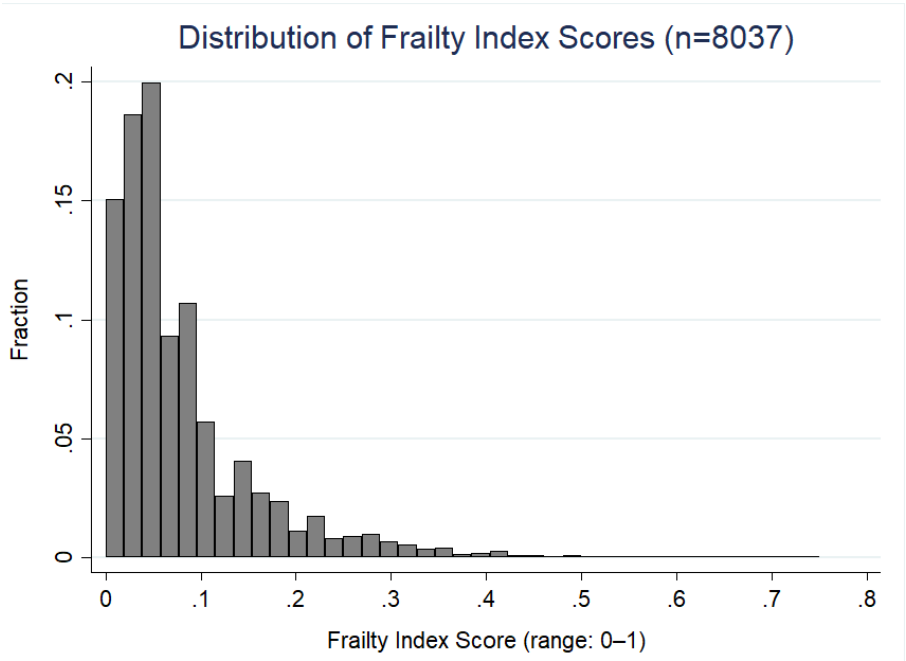
resulted in a large loss of sample size and statistical power if this measure were included. The table below lists the full range of items included in the scale.

A change in frailty score from 0 to 1 was associated with a difference in CASP-12 change scores from t_0 to t_1 of -6.13 (95% CI:-7.40, -4.86, p<0.001) when the fully-adjusted model was fitted for the combined analytic sample (n=8037) (see Table 3). When the same models were run for SHARE (n=6031) and ELSA data (n=2006) separately, the effect sizes were -7.40 (95% CI:-9.00, -5.79, p<0.001) and -4.02 (95% CI:-5.92, -2.12, p<0.001) respectively.

Items used to specify a physical frailty scale in SHARE and ELSA

Variable	Categories
Medically diagnosed conditions	
Myocardial infarction	1=yes, 0=no
Hypertension	1=yes, 0=no
Stroke	1=yes, 0=no
Diabetes or elevated blood sugar	1=yes, 0=no
Chronic Obstructive Pulmonary Disease	1=yes, 0=no
Arthritis	1=yes, 0=no
Osteoporosis	1=yes, 0=no
Cancer	1=yes, 0=no
Parkinson's Disease	1=yes, 0=no
Cataracts	1=yes, 0=no
Medical symptoms	
Problem sleeping or restlessness	1=yes, 0=no
Difficulty seeing objects at distance	1=yes, 0=no
Difficulty seeing objects at arm's length	1=yes, 0=no
Difficulties with functional activities	
Walking short distances (100 metres/100 yards)	1=yes, 0=no
Sitting for long periods (≥2 hours)	1=yes, 0=no
Standing up from sitting down	1=yes, 0=no
Climbing several flights of stairs	1=yes, 0=no
Climbing one flight of stairs without resting	1=yes, 0=no
Stooping, kneeling or crouching	1=yes, 0=no
Extending arms above shoulders	1=yes, 0=no
Pulling or pushing large objects	1=yes, 0=no
Carrying or lifting heavy objects (≥5kg/≥10lbs)	1=yes, 0=no
Picking up a small coin from a table	1=yes, 0=no
Difficulties with activities of daily living (ADLs)	
Dressing (including shoes and socks)	1=yes, 0=no
Walking across a room	1=yes, 0=no
Bathing or showering	1=yes, 0=no
Eating	1=yes, 0=no
Getting in or out of bed	1=yes, 0=no
Using the toilet (including getting up or down)	1=yes, 0=no
Using a map to navigate in a strange place	1=yes, 0=no
Preparing a hot meal	1=yes, 0=no
Shopping for groceries	1=yes, 0=no
Making telephone calls	1=yes, 0=no
Taking medication	1=yes, 0=no
Work in the home or garden	1=yes, 0=no
Managing money	1=yes, 0=no

The histogram below shows the distribution of frailty scores in the combined analytic sample.



The table below shows the mean (95% CI) and median values of the index for the combined sample, for each dataset (SHARE and ELSA), and for each country in the analytic sample.

Mean and median values of the frailty index by dataset and by country

Dataset	Mean (95% CI)	Median
Combined	0.081 (0.079, 0.083)	0.054
SHARE	0.080 (0.078, 0.082)	0.054
ELSA	0.082 (0.078, 0.086)	0.054
Country		
Austria	0.080 (0.072, 0.087)	0.054
Germany	0.077 (0.070, 0.084)	0.061
Sweden	0.068 (0.062, 0.074)	0.054
Netherlands	0.071 (0.065, 0.077)	0.054
Spain	0.089 (0.080, 0.099)	0.054
Italy	0.073 (0.066, 0.081)	0.054
France	0.083 (0.076, 0.090)	0.054
Denmark	0.067 (0.061, 0.073)	0.047
Greece	0.088 (0.065, 0.110)	0.054
Switzerland	0.059 (0.054, 0.064)	0.047
Belgium	0.085 (0.079, 0.092)	0.061
Czech Republic	0.085 (0.078, 0.092)	0.061
Poland	0.117 (0.105, 0.129)	0.088
Slovenia	0.090 (0.078, 0.101)	0.074
Estonia	0.103 (0.096, 0.111)	0.081
England	0.082 (0.078, 0.086)	0.054

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2) A manual likelihood-ratio-test-based backward stepwise selection procedure, based on Collett's recommended method (1), was used to determine which independent variables would be included in the final model in addition to CASP-12 at t_0. The significance level for removal from the model was p=0.1. Below is a list of individual-level variables considered for inclusion in the final model. Asterisked (*) variables were dropped as part of the selection procedure.

- Year of work exit
- Route of exit from work (disability insurance benefits/unemployment benefits/sickness benefits/social assistance benefits/public early retirement pension/public old age pension/other)
- Age at exit from work (>1 year before pensionable age/pensionable age ±1 year/>1 year after pensionable age)
- Frailty index
- Participation in social activities in the previous month (yes/no)
- Birth outside country of residence (yes/no)
- Partnership status (partnered/non-partnered)
- Country-specific quartile of equivalised non-pension household net wealth
- Natural logarithm of equivalised gross household income
- Gender (male/female)*
- Highest last-known level of education (ISCED-97 category) at t_1 (primary (0 and 1)/secondary (2, 3 and 4)/tertiary (5 and 6)/other or still in education)* (2,3)
- Occupational level (ISCO-88 category) at t_0 (elementary manual (8 and 9)/skilled manual (6 and 7)/skilled non-manual (3, 4 and 5)/professional (1 and 2))* (4)
- Part-time employment at t_0 (<30 hours/week) (yes/no)* (5)
- Housing tenure (outright ownership/ownership with outstanding mortgage repayments/renting or other)*
- Effort-reward ratio* (6)

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3) All financial variables including country-level expenditure measures were expressed in PPP-adjusted Euros using the relative price level for actual individual consumption in Germany in 2011 as the baseline. Data were obtained from the Prices and Purchasing Power Parities database. For countries not part of the Euro currency area during the study period, adjusted financial variables were converted to Euros using year-average nominal exchange rates provided by EUROSTAT. Comparisons between years were made by extrapolating annual consumer price index (CPI) inflation terms for all consumer items (i.e. PPP(2009) = *[Relative price level for actual individual consumption relative to Germany in 2011]*[CPI inflation between 2009 & 2010]*[CPI inflation between 2010 & 2011]*[Nominal exchange rate in 2009]*).

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