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Data Sources on the Older Population in Europe: Comparison of the Generations and Gender Survey (GGS) and the Survey of Health, Ageing and Retirement in Europe (SHARE)

Two European surveys – the Survey of Health, Ageing and Retirement in Europe (SHARE) and the Generations and Gender Survey (GGS) – are widely used in demography, notably to study ageing populations. While they cover different respondent age groups and have different objectives, they share many points in common: both surveys are longitudinal, contain equivalent questions and topics, and include large samples of respondents aged 50-80 in seven European countries. So it should be possible to use them for joint analyses – on condition that they are comparable. In this article, Katherine KEENAN, Else FOVERSKOV *and* Emily GRUNDY *test GGS and SHARE for comparability by looking at the consistency of responses across the two surveys. Using as examples two commonly used health indicators, self-rated health and long-standing illness, and their association with level of education and marital status, the authors highlight the importance of weighting, question wording and the placement of questions in the questionnaire to explain the discrepancies between the two surveys.*

Understanding age associated changes in socio-demographic circumstances, health, resources and activity patterns is a key priority in Europe given substantial past and projected future increases in the representation of older people in the population (United Nations, 2013). High quality, representative longitudinal data are required as a basis for developing this understanding. To this end, considerable resources have been devoted to establishing comparable large scale cross-national longitudinal data sets, notably the Survey of Health, Ageing and Retirement in Europe (SHARE) (Börsch-Supan et al., 2013), and the Generations and Gender Survey (GGS) (Vikat et al., 2007), both of which are freely available and widely used. While they both collect data on older

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people, the surveys have different objectives. The GGS was primarily developed to underpin the study of family and intergenerational processes from young adulthood to old age, while the focus of SHARE is on ageing. Both studies were initiated in the early 2000s and while the quality of the data collected in each has been investigated through comparison with other sources, including national population data and European population surveys such as European Union Statistics on Income and Living Conditions (EU-SILC) (Börsch-Supan et al. 2005; Croezen et al., 2013; Fokkema et al., 2014; Vergauwen et al. 2015), they have not, to date, been systematically compared with each other. We compare data from SHARE and GGS where they cover the same countries and age ranges.

The aims of this paper are to present sources of differences in the SHARE and GGS surveys and to investigate whether common health measures drawn from the two surveys provide comparable information, either in terms of prevalence or their patterning by socio-demographic characteristics. We start by examining the GGS and SHARE survey methodologies, then compare data on common indicators including age, gender, education, fertility, marriage and health. We go on to assess the comparability of results from multivariate regression modelling of associations between two socio-demographic indicators, education and marital status, with measures of health.

I. Methodology: comparison of SHARE and GGS surveys

Survey design

Baseline SHARE and GGS surveys have been carried out in ten common countries: Austria, Belgium, Estonia, France, Germany, Hungary, Italy, the Netherlands, Poland and Sweden. We compared measures from seven of these countries for the population aged 50-80 years. We excluded Italy and Austria because their GGS data did not include respondents aged 65 and over. At the time of writing the Swedish GGS data was not available so was initially excluded. We also note that the GGS and SHARE surveys were generally not conducted in the same year, so the time separating any two surveys may vary (by up to eight years).[1] This could limit their comparability.

Table 1 shows the main characteristics of the sampling procedures and fieldwork for the surveys included in this study: GGS surveys from wave 1, and SHARE surveys from the baseline wave (Estonia, Hungary and Poland joined the SHARE survey at wave 2 or later). All countries except Estonia and the Netherlands (GGS) used sampling strategies based on an external source, with the most common sampling frames being the census or population register. In most countries the sampling frame was designed to provide coverage of the

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(1) The Swedish SHARE wave 1 was conducted in 2004; the Swedish GGS wave 1 was conducted in 2012-2013.

population living in private households, although some countries and surveys also included those living in institutions.[2]

Reflecting the different objectives of the surveys, a major difference between SHARE and GGS is the target population. In SHARE it was defined as all households with at least one member aged 50 years or older, and within these households, all individuals aged 50 years or older. Respondents' spouses/partners were also included, regardless of age (Börsch-Supan and Jürges 2005). By contrast, in the GGS the target population was individuals aged 18-79[3] years and only one individual from each household was interviewed. Response rates for both the GGS and SHARE surveys were lowest in Belgium (43.8% and 39.2%, respectively). The Netherlands GGS survey also had a rather low response rate of 44.7%. However in most other countries response rates for both surveys were over 60%.

Analysis sample

We selected men and women aged 50-80 years at the time of survey, based on their reported dates of birth (50-79 in the Hungarian GGS data). Partners outside the SHARE age range (less than 50 years) were excluded because they are not a representative sample. This resulted in samples of between 2,255 and 10,447 individuals for each of the surveys and countries included (Table 2). The proportion of respondents with missing values on the variables considered ranged between 0.1% and 4.1%. The different timings of the GGS and SHARE surveys, especially for Belgium, Estonia, Hungary, and Poland, mean that the surveys include survivors of different birth cohorts (see Table 2), who could be subject to different time trends in some variables. To try to assess whether these different timings affected comparability we made additional comparisons using a subset including only the exact equivalent birth cohorts. However we acknowledge that this means we are comparing cohorts who have survived to different ages, and this selection issue may bias the comparability of health indicators, especially when the period between two surveys is long.

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(2) The Estonian GGS, and the German, Hungarian, Netherlands SHARE stated that institutionalized people were included in the sampling frame. However, the proportion of such individuals aged 50-80 years in our analysis was negligible: in the Estonia GGS there were 7 (<0.1%), and in SHARE they were not identifiable.

(3) In the GGS countries which sampled to age 79, the data includes some people aged 80, who had a birthday between sampling and fieldwork. The exceptions to this were GGS Estonia which deliberately sampled 80 year-olds, and GGS Hungary which sampled only to age 78.

Table 1. Main characteristics of sampling and fieldwork for GGS Wave 1 and SHARE baseline data (common countries except Austria, Italy and Sweden)

Country	Survey	Fieldwork period	Number of sample stages	Sampling method[a]	Sampling frame	Geographic coverage	Sampling unit	Institution-alized people included	Age range sampled	Overall response rate
Belgium	GGS W1	Feb 08-May 10[b]	2	PPS+SRS	Population register	Full coverage	Individuals	No	18-79	43.8[c]
	SHARE W1	Jan 05-Jul 05	2/3	PPS+SRS	Telephone number list	Not German-speaking areas (>99% population)	Individuals	No	50+[d]	39.2
Estonia	GGS W1	Sep 04-Dec 05	1	SRS	Census and update new dwellings	Full coverage	Individuals	Yes	21-80	70.2[c]
	SHARE W4	Feb-Oct 11	1	SRS	Population register	Full coverage	Individuals	No	50+[d]	61.0
France	GGS W1	Sep 05-Dec 05	2	PPS+SRS	Census and update new dwellings	Full coverage	Dwellings/ addresses	No	18-79	71.7[c]
	SHARE W1	Oct-Nov 04	2 (3 in urban)	PPS+SysRS	Census and update new dwellings	6 regions (covering approx.50% of population)[e]	Dwellings/ addresses	No	50+[d]	73.6
Germany	GGS W1	Feb 05- May 05	2	PPS+ SRS	List of households (ADM-Master-Sample)	Full coverage	Addresses	No	18-79	55.4[c]
	SHARE W1	May 04-Oct 04	2	SysRS+SRS	Population register	Full coverage	Individuals	Yes	50+[d]	63.4

Table 1 (cont'd). Main characteristics of sampling and fieldwork for GGS Wave 1 and SHARE baseline data (common countries except Austria, Italy and Sweden)

Country	Survey	Fieldwork period	Number of sample stages	Sampling method[a]	Sampling frame	Geographic coverage	Sampling unit	Institution-alized people included	Age range sampled	Overall response rate
Hungary	GGS W1[f]	Oct 04-May 05	2	PPS+SRS	Population register	Full coverage	Individuals	na	21-78	83.2[c]
	SHARE W4	Mar-Oct 11	2	PPS+SRS	Population register	Full coverage	Individuals	Yes	50+[d]	63.0
Netherlands	GGS W1	Sep 02- Mar 04	1	SRS	Address list from mail company	Full coverage	Addresses	No	18-79	44.7[c]
	SHARE W1	May-Oct 04	2	SysRS+SRS	Population register	Full coverage	Households	Yes	50+[d]	61.6
Poland	GGS W1	Nov 10-Feb 11	2	SRS+SRS	Address list	Full coverage	Addresses	No	18-79	na
	SHARE W2	Nov 06-Aug 07	na	na	na	na	na	na	50+[d]	na

na: Not available.
(a) PPS = Probability Proportional to Size; SRS = Simple random sampling; RR = random route; SysR = Systematic sampling with a random start.
(b) Statistics Belgium conducted fieldwork from Feb 08-Apr 09, and TNS Dimarso from Nov 09-May 10.
(c) "Average rate" calculated by Fokkema, Kveder, and Liefbroer (2014).
(d) and their partners/spouses of any age.
(e) Aquitaine, Île-de-France, Languedoc-Roussillon, Nord-Pas-de-Calais, Pays de la Loire, Rhône-Alpes.
(f) Refers to the sampling characteristic of wave 1 of "Turning points of the Life-Course Program".
Sources: Börsch-Supan et al. (2013); Börsch-Supan and Jürges (2005); Malter and Börsch-Supan (2013); Fokkema, Kveder, and Liefbroer (2014); Kapitány (2003); GGS webpage http: //www.ggp-i.org/data, and SHARE webpage : http://www.share-project.org/data-access-documentation/sample.html

Table 2. Timing of surveys, sample size and birth cohorts

	GGS			SHARE			Common birth cohorts
	Survey year	Birth cohorts	Sample 50-80 years	Survey year	Birth cohorts	Sample 50-80 years	
Belgium	2008-2010	1928-1960	3,151	2005	1924-1955	3,383	1928-1955
Estonia	2004-2005	1924-1956	3,696	2011	1930-1961	6,087	1930-1956
France	2005	1926-1956	4,542	2004	1923-1955	2,742	1926-1955
Germany	2005	1925-1955	4,373	2004	1923-1954	2,758	1925-1954
Hungary	2004-2005	1926-1955	6,251	2011	1931-1961	2,744	1931-1955
Netherlands	2002-2004	1923-1954	3,460	2004	1923-1954	2,651	1923-1954
Poland	2010-2011	1930-1961	10,447	2006-2007	1926-1957	2,255	1930-1957

Sources: http: //www.ggp-i.org/data/data-documentation.html and http://www.share-project.org/data-access-documentation/sample.html; authors calculations.

Socio-demographic measures

We compared distributions by gender, age, education, marital status, and number of children. Age was categorized into 5-year groups. Both SHARE and GGS used the International Standard Classification of Education (ISCED) 1997 framework[4] to classify educational level and we distinguish between a low level of education (ISCED 0-2, including no education, primary and lower secondary) versus medium and higher level of education (ISCED 3-6, including upper secondary and non-tertiary post-secondary, and tertiary education).

We used a *de jure* measure of marital status which was grouped into four categories: never-married, married, divorced, and widowed. For the main summary and regression analyses this was dichotomized into married versus non-married. In the GGS, marital status was commonly derived from answers to a series of questions on marriage and partnership history, and the resulting variable had the four categories as above. In SHARE we used a single question which asked the respondents if they were 1) married and living together with their spouse, 2) in a registered partnership, 3) married and living separated from their spouse, 4) never-married, 5) divorced or 6) widowed. We grouped together the first three of these categories in SHARE as "married". In SHARE and GGS, if respondents reported (in other questions) that they were unmarried but living with their partner we coded according to their reported marital status (never married, divorced or widowed).

As a summary indicator of fertility, we grouped number of children into five categories: 0, 1, 2, 3 and 4+, and for the main summary dichotomized it into childless versus non-childless. Number of children in SHARE was measured

(4) In GGS, many questionnaires used their own country-specific classifications and these were post-coded into ISCED.

by asking "How many children do you have that are still alive? Please count all natural children, fostered, adopted and stepchildren, including those of your husband/your wife/your partner". The SHARE wave 1 questionnaire also asked specifically whether children were biological or non-biological, but only for the first four children reported. A similar count of number of biological, adopted, foster and stepchildren still alive was obtained in GGS by combining information from the household roster and questions on non-resident children. However, lack of information on non-resident stepchildren in the Polish and Estonian surveys and on deaths of stepchildren in the French survey may result in slight estimation differences for those countries.

Health measures

We concentrate on two health measures: self-rated health (SRH) and presence of long-standing illness or chronic conditions.

Differences in question wording mean that SRH was directly comparable across both surveys only in Belgium, France, Germany, and the Netherlands. GGS wave 1 used the European variant of SRH (Robine et al., 2002) which has an ordered scale of 1-5 ranging from "very good" to "very poor". The SHARE baseline surveys in Belgium, France, Germany, and the Netherlands used both the European variant of SRH and the US variant, which has an ordered scale of 1-5 ranging from "excellent" to "poor". The SHARE surveys from Estonia, Hungary and Poland collected SRH using only the US version. For the European variant, we dichotomized responses into "good" (those reporting very good or good health) or "poor" (fair, bad, or very bad health). For the US scale, respondents reporting excellent, very good or good health were considered to have good SRH while respondents reporting fair or poor health were considered to have poor SRH. Previous studies have shown that the US and European versions of the SRH question are not exactly comparable (Jürges et al., 2008), and that responses to the US scale usually produce estimates of better health than responses to the European version. Where available, we show distributions of SRH using both European and US variants, which allowed us to see the effect of wording differences.

Long-standing illness (LSI) was measured in the GGS by asking "Do you have any long-standing illness or chronic conditions?" and in SHARE by asking "Do you have any long-term health problems, illness, disability or infirmity?" with response options yes or no. In addition the Estonian GGS specified an illness "lasting 3 months or more".

Analytical methods and post-stratification weights

First, to assess representativeness we compared the weighted age and gender distributions in the GGS and SHARE against each other and against national population data as reported in EUROSTAT for the year the survey

took place.[5] Next we undertook descriptive analyses to compare the weighted proportions with particular characteristics in SHARE and GGS by country and gender. Comparisons of the non-dichotomized versions of education, marital status, and number of children are presented in appendices A.1 to A.3. We used the post-stratification weights provided with the GGS and SHARE surveys for the comparisons. In the GGS the weighting factors vary between countries, and for some countries such as Hungary no information was available (Fokkema et al., 2014). We provide summary information on GGS weighting factors in Appendix Table A.1. For most countries, the weights aimed to adjust the sample so that it was nationally representative on important aspects such as age, gender, urbanization, region and household size. The GGS weights for Belgium, Estonia and Sweden did not take account of household size, so in those countries we recalculated the weight to include it, using population data on household size distributions from the year of sampling downloaded from EUROSTAT (EUROSTAT, 2015). This adjustment is important because only one person per household was interviewed in the GSS (resulting in higher sampling probabilities for people living alone) while in SHARE all individuals aged 50 and over were sampled. The Poland GGS did not include any weights, so we also weighted the data for household size (but not for other factors such as gender or age). For the SHARE surveys we used the "calibrated cross-sectional weights" which adjust for unequal sampling probabilities, and the known distributions by gender and age in the general population[6] (Mannheim Research Institute for the Economics of Aging, 2013).

Despite variations in the proportions of respondents with particular characteristics, we would expect the socio-demographic gradient in health to be consistent across the surveys. To assess whether this was the case we fitted multivariable logistic regression models for associations between two socio-demographic indicators (education and marital status) and two health indicators (SRH and long-standing illness). We did not use weights for the multivariable models, but adjusted them for age (continuous measure), marital status, and education. To test whether the multivariable estimates were significantly different in SHARE and the GGS, we combined the datasets, and performed pooled models with an interaction term for data source.

Representativeness

In previous studies, both surveys have been compared separately with national population estimates to assess their representativeness (Börsch-Supan and Jürges 2005; Fokkema et al., 2014). For the GGS, the use of post-stratification weights reduced (but did not eradicate) deviation from whole population sources for age, gender and region, but did not correct biases by marital status

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(5) Population data from EUROSTAT reports age distributions on 1 January, whereas in the survey data we calculated age at the time of survey using dates of birth.

(6) We chose the SHARE "calibrated weights" in preference to the "design weights" which adjust only for unequal sampling probabilities.

Figure 1. Weighted age distributions of men and women aged 50-80 years in SHARE and GGS, compared with national population data for the respective survey years
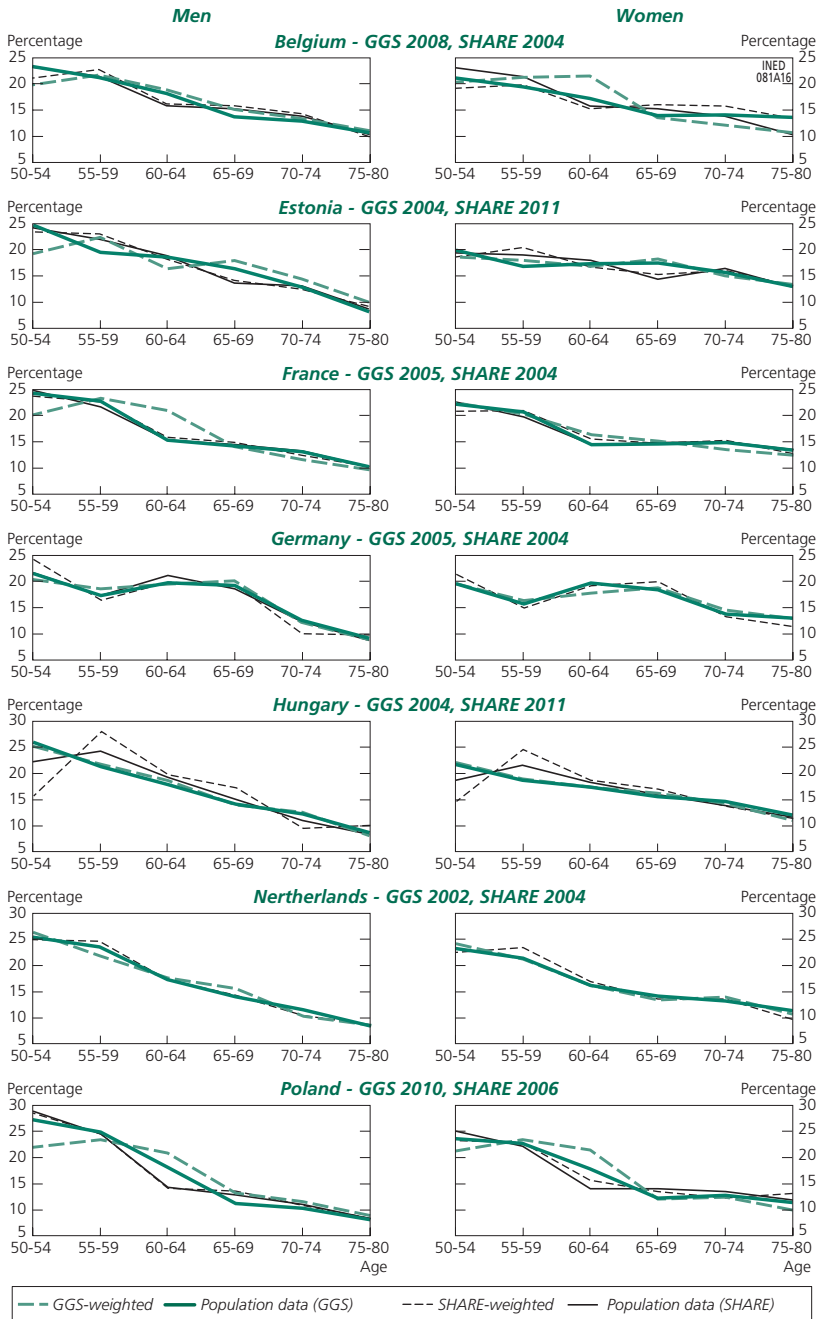
Sources: SHARE baseline surveys and GGS wave 1. Population data from EUROSTAT.

Figure 2. Proportion of women in the population aged 50-80 years according to SHARE and GGS, compared with national population data for the survey years
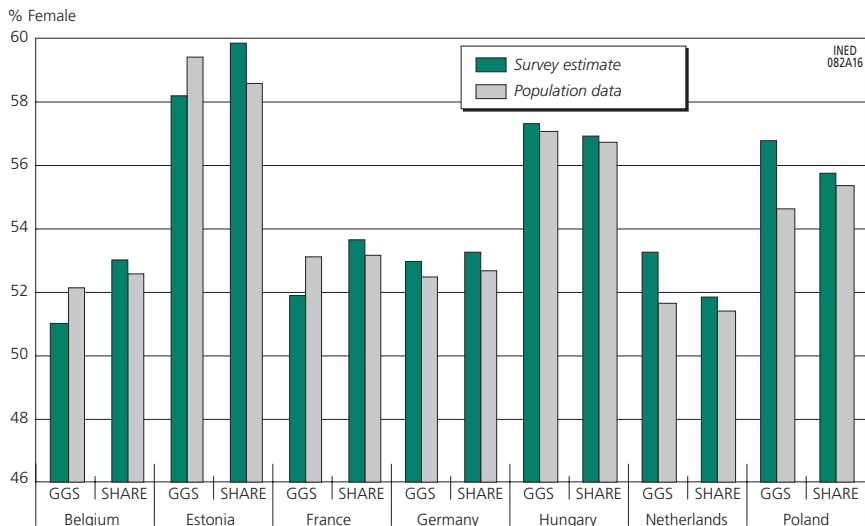
Sources: SHARE baseline surveys and GGS wave 1. Population data from EUROSTAT.

or education (Fokkema et al., 2014). Other studies have found that fertility and marriage rates for older cohorts of the GGS are underestimated when compared with population data even when the sampling weights are applied, although period rates from 1970 broadly approximate those in population data (Kreyenfeld et al., 2013; Vergauwen et al., 2015). In SHARE, use of the post-stratification "calibrated weights" produces estimates that are very similar to the target populations (Börsch-Supan and Jürges, 2005). As a further check we compared weighted distributions by age group and gender for the SHARE and GGS samples with distributions from national population data for the respective survey years (Figure 1). Overall, the SHARE and GGS samples had very similar age structures, with the exception of Hungary which in SHARE had a markedly higher proportion of men and women aged 55-59 years. This is partly due to a 5-6 year difference in the timing of the surveys which meant that the later survey included a larger proportion of people born during the post-war baby boom. The largest disparities between national and survey data were seen for women in the Belgian and German GGS samples, men in the French and Polish GGS samples and the Hungarian SHARE samples. The weights in the Polish GGS did not adjust for age so it was not surprising to see more differences. It was common in the GGS (Estonia, France, and Poland) for weighted survey estimates to under-represent men and women aged 50-54 years. This could be related to the fact that a different age categorization with a larger age bracket (45-64 years) was used to construct the GGS weights whereas in SHARE the weights adjust from age 50. Figure 2 shows the weighted proportion of women

in SHARE and GGS compared with national population data. Unsurprisingly the largest disparity was in the Poland GGS where the weights did not adjust for gender. The survey gender distributions were most similar for Germany and Hungary. In no country was the difference larger than 2 percentage points.

II. Results

Distributions by socio-demographic characteristics and health

Tables 3 and 4 show the weighted (but unadjusted) distributions of socio-demographic and health indicators in SHARE and GGS, for women and men respectively. The differences between SHARE and GGS in the proportion married and childless were relatively small (results were similar using the non-dichotomized measures of marital status and number of children). In Belgium, the GGS sample had proportionally more childless respondents than the SHARE sample. Overall the largest differences between the surveys in the distributions were seen for education and long-standing illness, with similar differentials for men and women.

In Estonia and Hungary, higher proportions of people reporting a low educational level were recorded in the GGS samples, whereas in the Netherlands and Poland, higher proportions were recorded in SHARE. In the Polish GGS, 30% of women had low education, compared with 51% in SHARE. The proportion of Polish women with higher education was also twice as high in the GGS as in SHARE (12% versus 5%) (see Appendix Figure A.1). These differences might reflect inadequate weighting in the Polish GGS resulting in different age structures, which suggests the importance of adjusting for basic demographic variables such as age and sex when comparing cross-country estimates. When the analysis was repeated using equivalent birth cohorts instead of age groups to assess if any differences were introduced by the different timing of the surveys, the differences in education completely disappeared for Estonia (where the SHARE and GGS surveys were conducted 5-6 years apart). In Hungary and Poland (where surveys were conducted 6-7 and 4-5 years apart, respectively), the differences were attenuated but remained substantial.

When using the European variant of SRH in both surveys, there were few substantial differences. The US variant of SRH produced a lower prevalence of poor health than when using the European variant, which is consistent with previous studies (Jürges et al., 2008). The proportions with poor SRH, however it was measured, were highest in the Eastern countries, Estonia especially.

As expected from the different question wording, the proportions reporting LSI were consistently different between the surveys (higher in SHARE than in GGS). All countries except the Netherlands and France had differences in excess of 10 percentage points, and in Germany and Estonia it approached 30 percentage points. The proportional differences between the surveys were

Table 3. Weighted distributions by socio-demographic variables
in GGS and SHARE, women aged 50-80 years

Characteristic	GGS % (95% CI)	SHARE % (95% CI)	Absolute difference in proportions (GGS-SHARE)
Low education			
Belgium	48.0 (45.5-50.5)	52.1 (49.5-54.6)	− 4.1
Estonia	33.1 (31.1-35.0)	25.0 (23.5-26.5)	8.1
France	55.9 (53.7-57.9)	56.5 (53.7-59.1)	− 0.6
Germany	26.8 (24.6-28.9)	27.3 (24.7-29.8)	− 0.5
Hungary	48.3 (46.6-49.9)	39.9 (34.8-45.2)	8.4
Netherlands	58.6 (56.1-61.0)	64.0 (61.1-66.6)	− 5.4
Poland	30.4 (29.0-31.7)	51.1 (48.0-54.1)	− 20.7
Married			
Belgium	68.1 (65.7-70.4)	67.3 (67.3-69.7)	0.8
Estonia	51.7 (49.6-53.7)	44.7 (42.9-46.3)	7.0
France	62.1 (60.1-64.1)	61.5 (58.8-64.1)	0.6
Germany	60.1 (57.8-62.3)	59.6 (56.6-62.4)	0.5
Hungary	51.6 (49.9-53.2)	50.4 (44.9-55.8)	1.2
Netherlands	68.0 (65.8-70.0)	66.6 (63.6-69.4)	1.4
Poland	64.7 (63.4-66.1)	58.3 (55.0-61.4)	6.4
Childless			
Belgium	21.6 (19.6-23.7)	12.1 (10.0-14.5)	9.5
Estonia	10.2 (9.0-11.4)	10.0 (8.8-11.3)	0.2
France	10.5 (9.3-11.7)	11.5 (9.6-13.6)	− 1.0
Germany	17.4 (15.6-19.2)	15.0 (15.0-17.7)	2.4
Hungary	10.6 (9.5-11.6)	8.6 (5.8-12.4)	2.0
Netherlands	11.1 (9.8-12.5)	12.3 (10.0-14.9)	− 1.2
Poland	7.2 (6.6-7.8)	6.5 (4.8-8.6)	0.7
Less than good self-rated health (European version)			
Belgium	34.1 (31.7-36.5)	31.3 (29.0-33.6)	2.8
Estonia	74.7 (72.8-76.3)	na	na
France	42.1 (40.0-44.2)	35.5 (33.0-38.1)	6.6
Germany	43.8 (41.5-46.1)	46.3 (43.5-49.1)	− 2.5
Hungary	65.3 (63.6-66.8)	na	na
Netherlands	30.2 (27.9-32.4)	31.3 (28.5-33.9)	− 1.1
Poland	68.9 (67.5-70.1)	na	na
Less than good self-rated health (US version)			
Belgium	na	25.6 (23.4-27.7)	na
Estonia	na	68.7 (67.0-70.3)	na
France	na	32.0 (29.5-34.5)	na
Germany	na	38.7 (35.9-41.5)	na
Hungary	na	62.6 (57.4-67.5)	na
Netherlands	na	27.2 (24.6-29.8)	na
Poland	na	61.1 (58.0-64.0)	na

Table 3 (cont'd). Weighted distributions by socio-demographic variables in GGS and SHARE, women aged 50-80 years

Characteristic	GGS % (95% CI)	SHARE % (95% CI)	Absolute difference in proportions (GGS-SHARE)
Long-standing illness[a]			
Belgium	34.6 (32.2-37.0)	46.2 (43.6-48.6)	– 11.6
Estonia	42.7 (40.6-44.8)	73.3 (71.7-74.8)	– 30.6
France	41.3 (39.2-43.4)	49.2 (46.5-51.9)	– 8.0
Germany	31.9 (31.2-35.6)	59.6 (56.9-58.1)	– 27.7
Hungary	58.4 (56.9-60.1)	75.1 (70.9-78.8)	– 16.7
Netherlands	42.6 (40.1-45.0)	44.1 (41.2-46.8)	– 1.5
Poland	57.5 (55.9-58.7)	66.7 (63.7-69.5)	– 9.2

na: Not available.
(a) Questions were worded differently in GGS and SHARE.
Source: SHARE baseline surveys and GGS wave 1.

not correlated with the overall prevalence of reported poor health in each country.

Figures 3 and 4 show results from several multivariable logistic regression models fitted to explore the associations between socio-demographic factors and poor health in the different countries and surveys. Figure 3 shows (unweighted) associations between low education (ISCED score 1-2) and two binary outcomes – reporting poor SRH, and reporting having an LSI, adjusted for age and marital status. All odds ratios in Figure 3 are above one, meaning that low education is associated with higher odds of reporting poor SRH or LSI. For some countries (Hungary and Poland particularly), the GGS sample was larger than the SHARE sample, and standard errors accordingly lower, which may affect differences in significance levels. Models fitted to data from each survey pooled across countries showed that odds of poor SRH and LSI associated with low education were slightly larger in the GGS than SHARE although the confidence intervals overlap. For SRH, the same pattern of effect was seen for men and women, but there was some gender variation in results from the models for LSI. Some of the country-specific coefficients show substantial differences, most notably in Hungarian men and women where the SHARE analysis showed higher odds of poor health by low education than the GGS results. This cannot be explained by large differences in the prevalence of poor health in general. In very few countries were the odds from both surveys similar (possibly France, the Netherlands and Germany were most consistent). As described in the methods section, we combined the SHARE and GGS data, and tested for significant differences in the associations by survey. In most cases the differences were non-significant, but notable exceptions were SRH and LSI in Hungary, and SRH in Poland (see Appendix Table A.2).

Figure 4 shows associations between being unmarried (never married, divorced or widowed) and the two health outcomes, adjusted for education

Table 4 . Weighted distributions by socio-demographic variables
in GGS and SHARE, men aged 50-80 years

Characteristic	GGS % (95% CI)	SHARE % (95% CI)	Absolute difference in proportions (GGS-SHARE)
Low education			
Belgium	42.6 (40.1-45.1)	45.5 (42.9-48.1)	–2.9
Estonia	39.9 (37.0-42.7)	29.7 (27.8-31.6)	10.2
France	44.1 (41.7-46.5)	45.8 (42.8-48.7)	–1.7
Germany	9.7 (8.2-11.3)	6.8 (5.4-8.4)	2.9
Hungary	27.5 (25.7-29.3)	16.0 (13.1-19.3)	11.5
Netherlands	38.4 (35.7-41.0)	48.8 (45.8-51.8)	–10.4
Poland	21.1 (19.7-22.4)	34.5 (31.4-37.7)	–13.4
Married			
Belgium	78.2 (76.0-80.1)	82.0 (79.7-83.9)	–3.8
Estonia	74.3 (71.7-76.5)	69.6 (67.4-71.7)	4.7
France	77.8 (75.8-79.5)	80.6 (78.1-82.8)	–2.8
Germany	76.7 (74.6-78.6)	75.6 (72.6-78.2)	1.1
Hungary	78.3 (76.5-80.0)	76.4 (71.3-80.8)	1.9
Netherlands	80.2 (78.2-82.0)	82.4 (79.6-84.9)	–2.2
Poland	84.3 (83.2-85.3)	79.1 (75.8-82.0)	5.2
Childless			
Belgium	24.7 (22.5-26.9)	13.7 (11.7-16.0)	11.0
Estonia	12.2 (10.3-14.2)	13.2 (11.2-15.3)	–1.0
France	10.9 (9.5-12.3)	13.1 (10.9-15.6)	–2.2
Germany	19.6 (17.7-21.5)	23.6 (20.6-26.9)	–4.0
Hungary	10.8 (9.4-12.1)	10.0 (7.7-12.8)	0.8
Netherlands	11.1 (9.7-12.7)	14.0 (11.4-16.9)	–2.9
Poland	9.6 (8.7-10.4)	12.8 (10.1-16.0)	–3.2
Less than good self-rated health (European version)			
Belgium	30.3 (28.0-32.6)	27.7 (25.4-30.1)	2.6
Estonia	71.6 (68.9-74.1)	na	na
France	37.6 (35.2-39.9)	36.1 (33.3-38.9)	2.8
Germany	45.0 (42.6- 47.4)	42.2 (39.4-45.1)	–4.7
Hungary	58.8 (56.8-60.7)	na	na
Netherlands	23.1 (20.8-25.4)	29.3 (26.7-32.1)	–0.3
Poland	62.1 (60.4-63.6)	na	na
Less than good self-rated health (US version)			
Belgium	na	23.2 (21.0-25.5)	na
Estonia	na	66.3 (64.1-68.2)	na
France	na	30.2 (27.5-32.9)	na
Germany	na	36.2 (33.4-39.0)	na
Hungary	na	56.0 (50.3-61.5)	na
Netherlands	na	24.9 (22.4-27.6)	na
Poland	na	57.5 (54.1-60.9)	na

Table 4 (cont'd). Weighted distributions by socio-demographic variables in GGS and SHARE, men aged 50-80 years

Characteristic	GGS % (95% CI)	SHARE % (95% CI)	Absolute difference in proportions (GGS-SHARE)
Long-standing illnes[a]			
Belgium	30.6 (28.3-32.9)	42.8 (40.2-45.4)	−12.2
Estonia	37.5 (34.5-40.5)	67.9 (65.8-69.8)	−30.4
France	42.2 (39.7-44.5)	50.4 (47.4-53.3)	−8.2
Germany	35.2 (32.8-37.5)	55.3 (52.3-58.1)	−20.1
Hungary	50.8 (48.0-52.0)	66.7 (61.2-71.7)	−15.9
Netherlands	35.7 (33.1-38.3)	39.5 (36.3-42.4)	−3.8
Poland	48.5 (46.7-50.0)	58.9 (58.9-62.2)	−10.4

na: Not available.
(a) Questions were worded differently in GGS and SHARE.
Source: SHARE baseline surveys and GGS wave 1.

and age. Results from analyses of samples pooled across countries showed that being unmarried was associated with poor health in both men and women. However, country-specific analyses showed that this association only reached conventional levels of statistical significance in Belgium, Germany and, for women only, the Netherlands. There was more similarity between the surveys in the country-specific odds ratios than appeared the case on the analyses of differentials by low education, particularly for Belgium and Germany and, to a lesser extent, France and Hungary. Estimates for Poland appeared inconsistent, being higher in the GGS than SHARE. We found evidence that the estimates were different between SHARE and GGS for Polish women and the outcome of LSI.

III. Discussion and conclusion

This article makes a unique contribution by comparing the socio-demographic and health data of the population aged 50-80 years from the common SHARE and GGS surveys, and complements previous studies which have compared SHARE or GGS data to national population data or other surveys such as EU-SILC (Croezen et al., 2013; Fokkema et al., 2014; Kreyenfeld et al., 2013; Sauer et al., 2012; Vergauwen et al., 2015). In addition, it extends previous work by comparing the socio-demographic gradient in health variables in the two surveys.

We assumed that estimates of basic demographic variables from both surveys would be similar after applying post-stratification weights but this was not always the case. Comparisons of weighted estimates of age from the two surveys with national data (Figure 1) show that the post-stratification weights provided, particularly in the GGS, were not always successful at adjusting to

Figure 3. Unweighted associations between low education and reported poor self-rated health/long-standing illness, adjusted for age and marital status (ORs and 95% CIs)
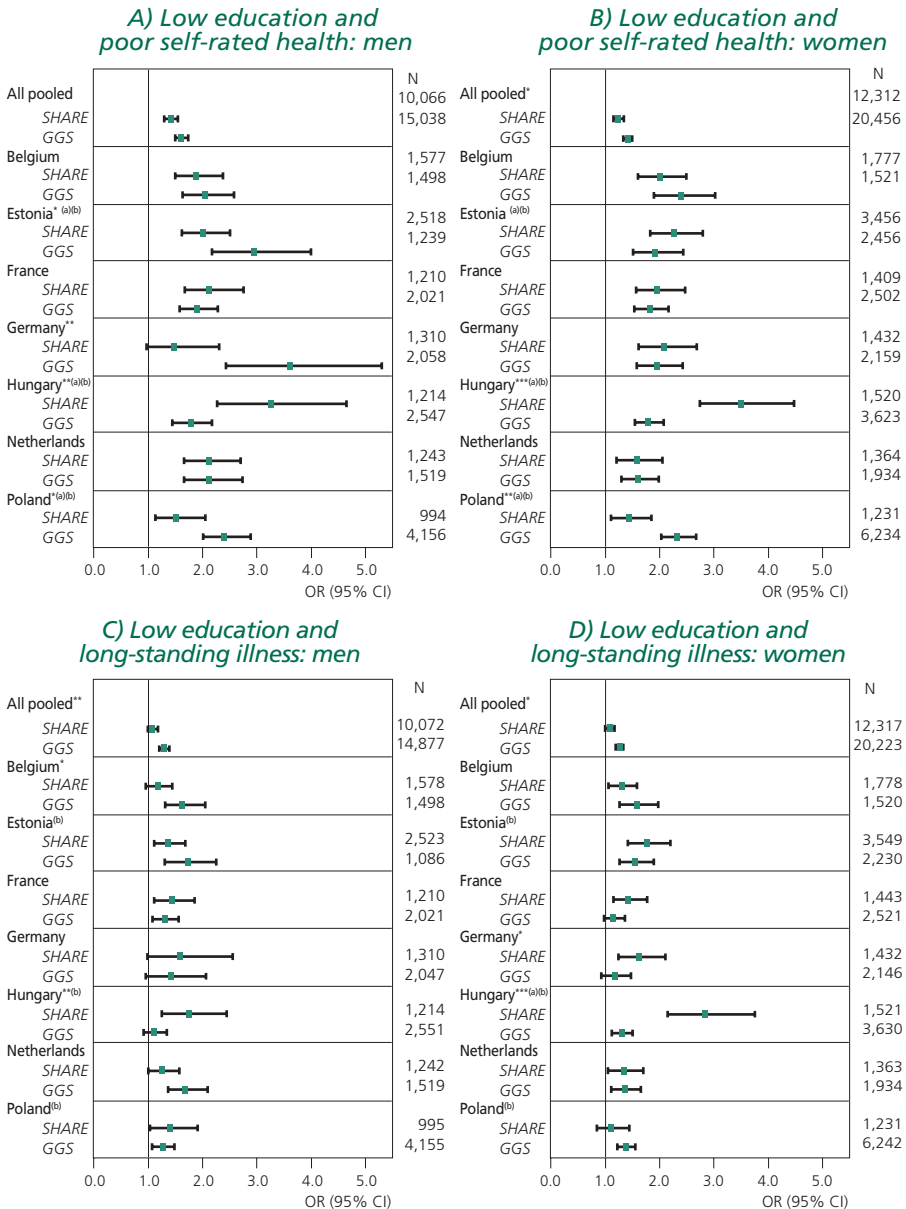
A) Low education and poor self-rated health: men

B) Low education and poor self-rated health: women

C) Low education and long-standing illness: men

D) Low education and long-standing illness: women

(a) SRH question: European variant in GGS, US version in SHARE.

(b) GGS and SHARE surveys were conducted more than 5 years apart.

Notes: OR: Odds ratio. Reference group: medium or high education. CI: Confidence interval.

Significance levels: * $p<0.05$ ** $p<0.01$ *** $p<0.001$.

Source: SHARE baseline surveys wave GGS wave 1.

Figure 4. Unweighted associations between unmarried status and reported poor self-rated health/long-standing illness by country, gender and survey; adjusted for age and education (ORs and 95% CIs)
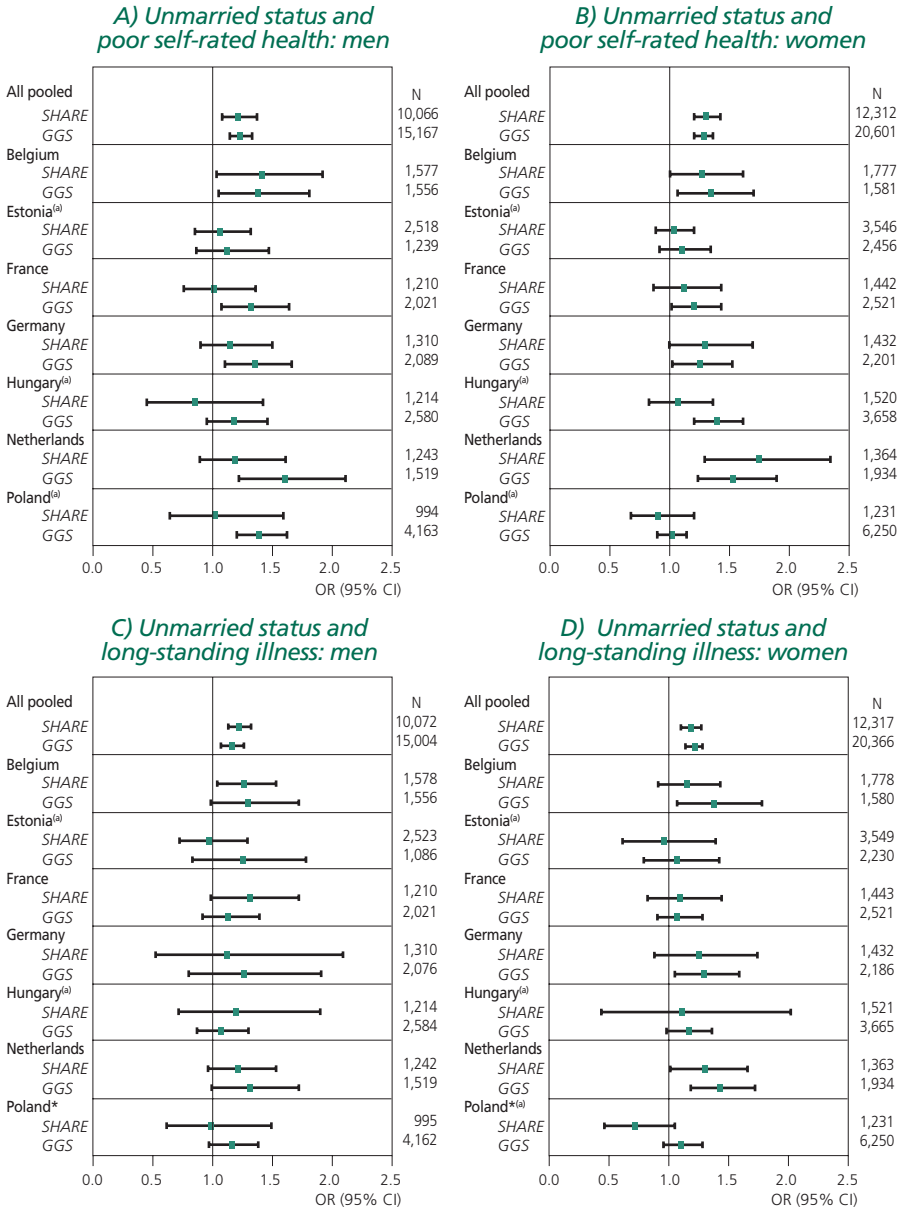
A) Unmarried status and poor self-rated health: men

B) Unmarried status and poor self-rated health: women

C) Unmarried status and long-standing illness: men

D) Unmarried status and long-standing illness: women

(a) SRH question: European variant in GGS, US version in SHARE.

(b) GGS and SHARE surveys were conducted more than 5 years apart.

Notes: OR: Odds ratio. Reference group: medium or high education. CI: Confidence interval.

Significance levels: * $p<0.05$ ** $p<0.01$ *** $p<0.001$.

Source: SHARE baseline surveys wave GGS wave 1.

the target population. The factors used in the weights were inconsistent between the GGS surveys, and between the GGS and SHARE, so differences seen could partly be a consequence of this. The surveys are relatively comparable in terms of distributions by age, gender, marital status, proportions childless, and poor SRH (provided the same variant of SRH was used). Differences in education in Estonia, Hungary and Poland could be related to the different timing of surveys. In these countries the GGS and SHARE surveys were conducted 4-7 years apart, and changes in compulsory schooling occurring during the Soviet period could have resulted in changed distributions of education for older cohorts (Pennar et al., 1971; Róbert, 1991; Szebenyi, 1992). However, it is worth noting that even when comparing the equivalent birth cohorts some differences remained for Hungary and Poland. There were also some differences for the Netherlands despite the two surveys being conducted during a similar time frame. These differences may suggest inconsistencies in matching responses to ISCED codes.

The differences according to survey in the prevalence of LSI highlight how sensitive health reporting is to question wording and question order (Dubuc et al., 2004; Freedman et al., 2004; Jette, 1994; Picavet and van den Bos, 1996). In SHARE the question on LSI mentioned "disability and infirmity", implying permanence which usually leads to lower reporting of health problems (Picavet and van den Bos, 1996). However, survey content and the ordering of questions are also known to be important (Bowling and Windsor, 2008; Freedman et al., 2004), with some studies suggesting that question order may have a stronger effect on older people's health assessments compared with younger people's (Crossley and Kennedy, 2002). As commonly recommended, the question on SRH in both surveys was asked at the start of the health module, but this may produce biases in different cultural contexts (Lee and Grant, 2009). The GGS collected a rather limited range of information on health whereas in SHARE it was a major part of the survey. Respondents may therefore have been more focussed on considering their health than in the GGS. Our finding that SHARE respondents report better SRH is consistent with a previous study comparing SHARE with other surveys, namely the Health Interview Surveys (HIS), the European Social Survey (ESS), and the EU Statistics on Income and Living Conditions (EU-SILC) survey (Croezen et al., 2013).

The observed differences in the educational or marital status gradient on health questions could in many cases be explained by sampling variability. The main exception was Hungary, and to some extent Poland, where large, significant differences remain which might reflect differences between the surveys in distributions by education. There were also more differences between the surveys for multivariable associations with education compared to marital status, where the underlying distributions of the independent variable were more unequal. Overall this points to the importance of examining the

distribution of underlying variables in detail when interpreting multivariable results.

The comparison has highlighted important differences between the surveys in their objectives and target populations which should guide researchers when choosing which survey to use. For studying the population over 50, the weighted estimates in SHARE usually better approximate age and sex distributions in the target population, however this could be resolved for the GGS surveys by developing more effective weights. Measurement consistency is crucial for cross national comparisons, and in some respects SHARE is more straightforward because the same instrument was used in all countries, rather than being harmonized post-hoc as in the GGS surveys. The SHARE survey asked a larger variety of health questions whereas the GGS has greater breadth in other areas such as attitudes. Our comparisons of health variables show that (contingent on similar wording) distributions and multivariable associations are relatively similar, but that researchers using the surveys jointly should pay attention to differences in question wording and representativeness when analysing the data and interpreting results.

APPENDICES

Table A.1. Factors used to develop post-stratification weights in GGS surveys

	Country-specific weight factors wave 1
Belgium	Age, sex, region
Estonia	Age, sex
France	Age, sex, citizenship, social and occupational status, type of household, number of household members, urbanization
Germany	Age, sex, region, education
Hungary	Unknown
Netherlands	Age, sex, region, urbanization, household type
Poland	No weights provided

Sources: Fokkema et al. (2014); http : //www.ggp-i.org/data/data-documentation.html.

Table A.2. Results of testing for significant differences in odds ratios estimated from SHARE and GGS for the associations shown in Figures 3 and 4

Country	P values for significant difference in odds ratios estimated using SHARE and GGS							
	Dependent variable							
	Poor SRH		LSI		Poor SRH		LSI	
	Variable of interest							
	Low education		Low education		Unmarried		Unmarried	
	Men	Women	Men	Women	Men	Women	Men	Women
Belgium	ns	ns	0.049	ns	ns	ns	ns	Ns
Estonia	0.036	ns	ns	ns	ns	ns	ns	ns
France	ns	ns	ns	ns	ns	ns	ns	ns
Germany	0.002	ns	ns	0.022	ns	ns	ns	ns
Hungary	0.003	< 0.001	0.019	< 0.001	ns	ns	ns	ns
Netherlands	ns	ns	ns	ns	ns	ns	ns	ns
Poland	0.020	0.001	ns	ns	ns	ns	ns	0.004
All pooled	ns	0.039	0.018	0.018	ns	ns	ns	ns

ns: Non-significant ($p \geq 0.05$).
Sources: SHARE baseline surveys and GGS wave 1.

Figure A.1. Educational levels of men and women aged 50-80 years in SHARE and GGS
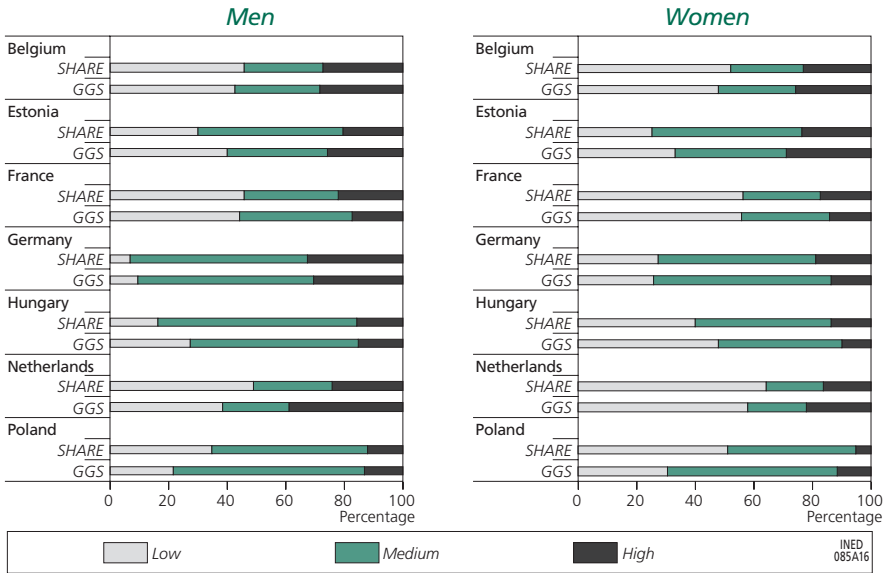

Sources: SHARE baseline surveys and GGS wave 1.

Figure A.2. Marital status of men and women aged 50-80 years in SHARE and GGS

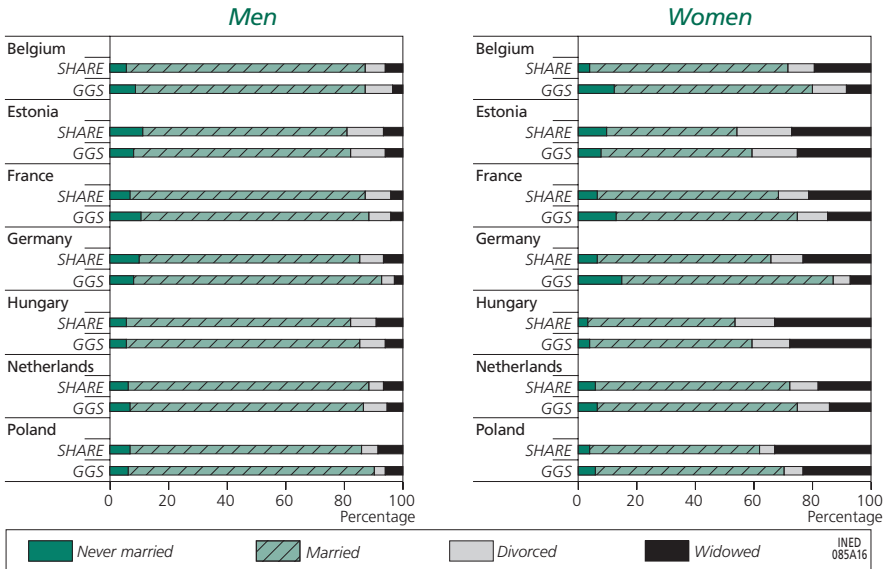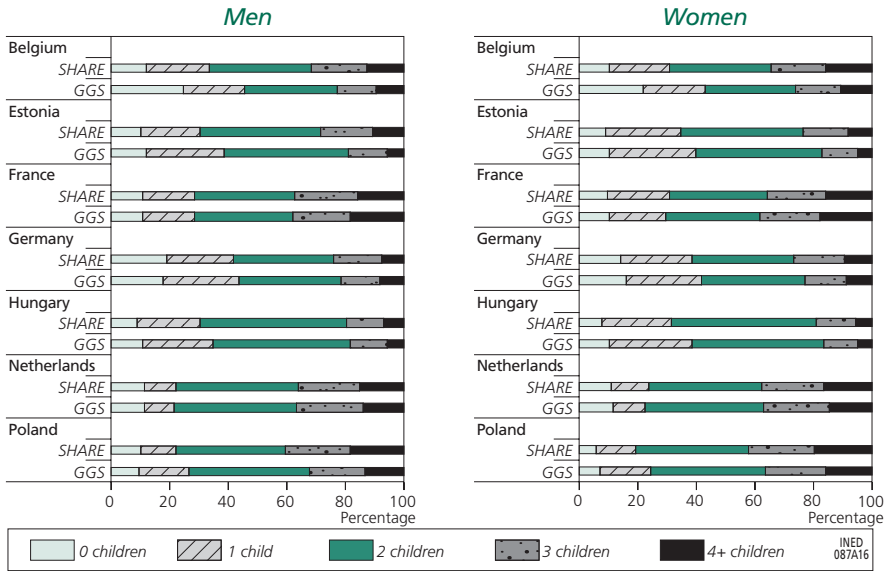*Sources:* SHARE baseline surveys and GGS wave 1.

Figure A.3. Number of children had by men and women aged 50-80 years
in SHARE and GGS

Sources: SHARE baseline surveys and GGS wave 1.

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Katherine KEENAN, Else FOVERSKOV, Emily GRUNDY • DATA SOURCES ON THE OLDER POPULATION IN EUROPE: COMPARISON OF THE GENERATIONS AND GENDER SURVEY (GGS) AND THE SURVEY OF HEALTH, AGEING AND RETIREMENT IN EUROPE (SHARE)

The Survey of Health, Ageing and Retirement in Europe (SHARE) and the Generations and Gender Survey (GGS) are two widely used European longitudinal surveys with data on socio-demographic and health topics, but their comparability has not been systematically investigated. We compared SHARE and GGS data for 50-80 year olds in seven European countries (Belgium, Estonia, France, Germany, Hungary, the Netherlands and Poland) to assess data quality and the potential for joint analyses. The results showed that information on age, gender, marriage and fertility patterns and the corresponding distributions were broadly similar in both sources. For some countries, distributions by educational level varied between the two sources even though both reported using the same International Standard Classification of Education, which may reflect variations in the timings of surveys. The differences also observed for estimates of the prevalence of poor health might come from the wording of health questions and their placement in the questionnaire that sometimes differed between the surveys. We investigated what effect these variations might have on analyses of health inequalities by undertaking multivariable analysis of associations between education and marital status and two standard health indicators: self-reported health (SHR) and long-standing illness (LSI).

Katherine KEENAN, Else FOVERSKOV, Emily GRUNDY • LES SOURCES DE DONNÉES SUR LES POPULATIONS ÂGÉES EN EUROPE : COMPARAISON DE L'ENQUÊTE GÉNÉRATIONS ET GENRE (GGS) ET DE L'ENQUÊTE SUR LA SANTÉ, LE VIEILLISSEMENT ET LA RETRAITE (SHARE)

L'enquête sur la santé, le vieillissement et la retraite en Europe (SHARE) et l'enquête Générations et genre (GGS) sont deux études longitudinales européennes largement utilisées portant sur des sujets sociodémographiques et sanitaires. Toutefois, leur comparabilité n'a pas été examinée de manière systématique. Cet article compare les enquêtes SHARE et GGS pour les individus âgés de 50 à 80 ans dans sept pays européens (Allemagne, Belgique, Estonie, France, Hongrie, Pays-Bas et Pologne) afin d'évaluer la qualité de leurs données et les possibilités d'analyses conjointes. L'information et la répartition par âge, sexe, mariage et niveau de fécondité sont similaires dans les deux sources. Pour certains pays, des différences existent dans la répartition des niveaux d'éducation bien que les deux enquêtes utilisent la même classification internationale, ce qui est peut-être dû à des différences dans le calendrier des enquêtes. Des écarts sont également observés pour l'état de santé, probablement en lien avec la formulation des questions sur la santé et leurs places différentes dans le questionnaire selon les enquêtes. Nous étudions les inégalités de santé par niveau d'instruction et par statut conjugal en menant des analyses multivariées sur deux indicateurs de santé courants : la santé autoévaluée (SAE) et les affections de longue durée (ALD).

Katherine KEENAN, Else FOVERSKOV, Emily GRUNDY • LAS FUENTES DE DATOS SOBRE LAS PERSONAS MAYORES EN EUROPA: COMPARACIÓN DE LA ENCUESTA GENERACIONES Y GÉNERO (GGS) Y DE LA ENCUESTA SOBRE LA SALUD, EL ENVEJECIMIENTO Y LA JUBILACIÓN (SHARE)

La encuesta sobre la salud, el envejecimiento y la jubilación (SHARE) y la encuesta Generaciones y género (GGS) son dos estudios longitudinales europeos ampliamente utilizados. Aquellas tratan de cuestiones socio-demográficas y sanitarias, pero su comparabilidad no ha sido examinada de manera sistemática. Este artículo compara las dos encuestas para los individuos de 50 a 80 años en siete países europeos (Alemania, Bélgica, Estonia, Francia, Hungría, Países Bajos y Polonia) a fin de evaluar la calidad de sus datos y las posibilidades de análisis conjuntos. Los resultados muestran que la información recolectada y la repartición por edad, sexo, estado matrimonial así como el nivel de fecundidad son similares en las dos fuentes. Bien que las dos encuestas utilizan la misma clasificación internacional, se observan diferencias entre ciertos países en el nivel de educación quizá a causa de la diferencia de calendario entre las dos encuestas. Se observan también diferencias en el estado de salud, asociadas probablemente a variaciones en la formulación de las preguntas sobre la salud y al lugar que ocupan éstas en el cuestionario. Hemos estudiado las desigualdades de salud según el nivel de instrucción y el estatuto conyugal con análisis multivariantes sobre dos indicadores de salud corrientes: la salud autoevaluada (SAE) y las afecciones de larga duración (ALD).