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Socioeconomic differences in physical disability at older age

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Background: This paper aims to investigate the association between socioeconomic position (SEP) and physical disability at older age, using a framework that incorporates education, social class and wealth. Wave One data of English Longitudinal Study of Ageing is used.

Methods: Self- reported difficulties with activities of daily living, instrumental activities of daily living and motor skills were combined and categorised into ‘no disability’, ‘mild disability’ and ‘severe disability’. The indicators of SEP used were wealth, education and social class. Multinomial regression was used to assess the associations between socioeconomic position and physical functioning reflecting the temporal relationship between education, social class and wealth.

Results: We found that men and women who had the highest level of wealth, education and social class also had the lowest disability rates. The association was stronger in younger age groups and in men. The association of education with disability which was found to be significant in the unadjusted models was further attenuated when adjusted for other factors such as occupation or wealth. This supports a temporal model of education feeding into occupation and then wealth. The association of SEP with disability was stronger for men and for men and women in the younger age group.

Conclusions: Socioeconomic circumstances affect prevalence and scale of physical disability even at older ages. In particular wealth appears more important as a socioeconomic factor for physical disability than social class or education. Socioeconomic gradients in physical disability are greater for men than women and for those in the younger ages.

Physical disability or impairment of physical function is a key marker of population health at all ages. A number of studies have shown that prevalence of limitations in physical functioning and difficulties with motor skills increase with age^{1;2} hence are likely to impinge increasingly on daily life.

Reductions in prevalence of disability in the USA and Europe have been noted^{1;3} and it is surmised that some of this may have been the result of greater receptivity by lower socioeconomic groups concerning preventive measures^{3;4}. Thus it is of interest to see whether socioeconomic differences among older people are present in England as an indicator of scope for change. The socio-medical model of disablement assumes that the social and physical environmental have a part to play as well as medical conditions⁵. Most studies of health inequality have concentrated on people of working age but since the 1990s there has been interest in older age people⁶⁻⁹ and there is evidence that physical and mobility disability at older ages are negatively associated with measures of socioeconomic position (SEP) such as wealth, education or social class¹⁰⁻¹³.

Socioeconomic differences in health have been widely studied using a number of indicators such as education¹⁴⁻²⁴ social class²⁵⁻²⁸, income^{8;17;18;21;23;26;29;30} and wealth^{29;31;32}. Increasingly researchers are focusing on mechanisms and pathways of various SEP determinants to health. This suggests employing different mediating mechanisms such as workplace conditions, health behaviour, self-esteem, satisfaction, control etc^{23;27}. The causal process through which this is done could be different for each of the SEP dimensions.

Duncan (1961) recognizes three aspects of social class: income, education and occupation and describes their temporal relationship as: "Education qualifies the individual for participation in occupational life, and pursuit of an occupation yields him a return in the form of income"³³.

Education has been widely perceived as one of the most important socio-economic determinants of health and mortality. It is acquired early in life and for most people remains relatively unchanged thereafter. It has been suggested that education affects health through

a number of pathways, such as lifestyle, health behaviour, problem-solving abilities, social relations, self-esteem and stress-management, in ways which, with regard to health, are to the advantage of the more educated³⁴, as well as through income or occupation^{13;30;35-43}. Research from a number of countries has shown that this effect is present even at older ages⁴⁴⁻⁴⁶, although its direct effects may weaken with age⁴⁷.

Likewise, social position is also thought to affect health and mortality in many ways: by influencing attitudes, beliefs and values people use to make life-course choices, through psychosocial stresses, and by influencing life-course opportunities. Studies have demonstrated clearly that even marginal class differences can strongly affect health and mortality and that this effect remains even at older ages^{10;44;48-51}. However the social classification of older people is ambiguous, because the majority are no longer employed¹⁸. It has been suggested⁵² that 'instead of an elderly person's previous class, an alternative indicator of structural position such as current material circumstances could be used.

Wealth is particularly important when studying SEP at older ages since it can reflect an individual's accumulated lifetime experience. Because this information is scarce and hard to collect, there is little evidence on the association of wealth with disability, health and mortality especially at older ages. As a result of difficulties in data collection, proxy indicators have often been used^{44;52-54}. Wealth, especially at older ages, is likely to influence health by providing material resources and a feeling of security and control⁵⁵ and by influencing healthy behaviours. It has been suggested that wealth is a better measure of economic status than income especially after retirement^{29;32}.

Gender differences in disability are also worth exploring. It is established that women have higher survival but also report higher disability⁵⁶⁻⁵⁸. The role of SEP to these differences it is not clear. Gender is thought to influence health through occupation and social position (which differs especially at older ages) and as a result through employment and earning history it can also influence personal wealth^{15;59-61}.

Accordingly we investigated the association between wealth, education and social status (seen as distinct SEP dimensions within a temporal framework) with physical functioning. We look at each of the SEP dimensions independently and also when the other two are taken into account. Secondly, we aim to investigate whether the association of SEP and physical disability varies by level of disability. Thirdly, we compare the socioeconomic patterns of disability for men and women. Finally, we compare the socioeconomic patterns in two broad age groups. This is important as both disability and the effect of SEP factors to disability follow a different pattern at older ages.

METHODS

Data source

The data for this study come from Wave One of the English Longitudinal Study of Ageing (ELSA). ELSA collects information on personal, economic and social circumstances of ageing. The ELSA Wave One sample excluding proxies and young partners of core members comprised 11,392 people who were aged 50 and over in March 2002 and were living in private households in England at the time the survey. After omitting 491 (4%) participants due to incomplete information, the sample size for the analysis was 10901 people. The response rate at Wave 1 was 67%. Technical details and the primary analyses for Wave One have been published⁶². Participants gave their informed consent to take part in the study. International Review Board (IRB) number for the ethics approval of the ELSA study: IRB 00002380 and the London Multi-Research Ethics Committee approval for ELSA ref: MREC/01/2/91.

Measure of disability

Information regarding physical functioning was collected via self-reported questions during a computer-assisted personal interview. The core questions about physical functioning in ELSA fall into one of three domains: mobility (motor skills and strength in both lower and upper limb); activities of daily living (ADLs) or self-care activities; and instrumental activities of daily living (IADLs) or activities necessary for independent living in a community.⁶³ These scales were simplified from items proposed by Katz⁶⁴, Lawton and Brody⁶⁵ and the activities very similar to those used in the Longitudinal Study on Aging

(<http://www.cdc.gov/nchs/lsoa.htm>) and in the Health and Retirement Survey⁶⁶. The full list of items is given in Appendix 1. There were ten mobility items, six ADLs and seven IADLs. These are listed on cards and respondents select the activities with which they have difficulty (this should be expected to last at least three months)⁶⁷.

We aggregated the difficulties from ADLs, IADLs and mobility as Cronbach's alpha was greater than 0.70 for the three measures of physical functioning. From a simple count of the number of activities for which difficulty was reported, we created three categories: no disability (0 difficulty), mild disability (1-6 difficulties) and severe disability (7-22 difficulties). Under this categorisation, 40% of the sample had no disability, 42% had mild disability and 18% had severe disability.

Socioeconomic position variables

We used three measures of socioeconomic position, all measured at Wave One: education, social class and wealth.

ELSA respondents were asked about their highest educational qualification and also whether they had attained any further qualifications since they were interviewed for the Health Survey for England (HSE). If they answered 'yes', respondents were given a list of response options from which to choose. For the purpose of this paper educational attainment is re-categorized into three groups: high (higher vocational qualification and degree and above), middle (A-level¹ and below) and low (no qualification or a foreign qualification).

Information on the most recent occupation of the ELSA respondent, derived from the HSE interview and updated at ELSA wave 1, was used for the socioeconomic classification. The three category version of the National Statistics Socioeconomic Classification (NS-SEC) was used in this analysis: managerial and professional; intermediate; routine and manual⁶⁸. The NS-SEC is based on the theory that employer relations (autonomy, security, prospects) are key factors in social class position.

¹ A- levels are usually taken at age 18 after two years study.

Finally, the measure of wealth comprises total net assets held by the benefit unit² (including owner occupied housing wealth, pension wealth, financial assets and other physical assets such as business assets, jewellery and antiques)^{69;70}. Debts were deducted. Wealth was categorized into tertiles.

Statistical Methods

Multinomial logistic regression was used to model disability in relation to SEP because the outcome variable has more than two categories. Analyses were done separately for men and women, because likelihood ratio tests showed significant interaction between sex and all the three measures of social position. Analyses were also broadly stratified by age, using 2 categories of age: 50-74 and 75 and over. We constructed the following three models, all adjusted for age (as a continuous variable), using the framework of a temporal sequence: Model 1 - individual associations of disability with each of SEP factors: education, social class and wealth; Model 2: containing education as early-life measure and social class to represent working age measure; Model 3: adding in wealth as the accumulation of lifetime experience. The results presented are for mild versus no physical disability and severe versus no physical disability for men and women.

RESULTS

The sample comprises 46% males and 54% females. Table S1 (see supplemented material) shows the basic characteristics of the ELSA cohort at Wave 1. The average age was 64.8 years and 65.3 years for men and women respectively. More women than men reported physical disability of any kind. Men were more likely to have higher educational attainment, be in the managerial and professional classes and have more wealth. Both genders report higher physical disability in the older age group.

As expected, the prevalence of severe physical disability increases with the decrease in wealth, education and social class (Table S2, see supplemented material). These patterns are evident both in men and women for the two age groups.

² A benefit unit is a couple or a single person plus any dependent children.

Table 1: Association of disability with socioeconomic position among men aged 50-74 at wave 1 of ELSA

		Model 1		Model 2		Model 3	
		OR	95 % CI	OR	95 % CI	OR	95 % CI
Mild disability vs no disability							
Education	High	1.00		1.00		1.00	
	Middle	1.23**	1.04, 1.45	1.11	0.92, 1.32	1.05	0.88, 1.25
	Low	1.52**	1.28, 1.81	1.25*	1.03, 1.52	1.11	0.91, 1.36
NS-SEC	Managerial & professional	1.00		1.00		1.00	
	Intermediate	1.19	0.98, 1.43	1.12	0.92, 1.36	1.03	0.84, 1.26
	Routine & manual	1.58**	1.35, 1.83	1.44**	1.21, 1.71	1.23*	1.02, 1.48
Wealth	Highest tertile	1.00				1.00	
	Middle tertile	1.49**	1.28, 2.36			1.36**	1.15, 1.59
	Lowest tertile	1.96**	1.63, 2.35			1.70**	1.38, 2.09
Severe disability vs no disability							
Education	High	1.00		1.00		1.00	
	Middle	2.54**	1.84, 3.50	1.91**	1.36, 2.67	1.55**	1.10, 2.19
	Low	5.60**	1.01, 1.04	3.49**	2.48, 4.92	2.31**	1.62, 3.29
NS-SEC	Managerial & professional	1.00		1.00		1.00	
	Intermediate	2.17**	1.57, 3.01	1.55**	1.10, 2.18	1.15	0.81, 1.64
	Routine & manual	4.08**	3.13, 5.31	2.46**	1.84, 3.30	1.44*	1.06, 1.97
Wealth	Highest tertile	1.00				1.00	
	Middle tertile	3.83**	2.85, 5.14			2.79**	2.03, 3.81
	Lowest tertile	10.29**	7.63, 3.87			6.44**	4.63, 8.96

* $p \leq 0.05$; ** $p \leq 0.001$

OR: odds ratios; CI: confidence interval

Model 1: Individual Associations of disability with education, NS-SEC, wealth; adjusted with age

Model 2: Mutually adjusted associations of disability with education and NS-SEC, adjusted with age;

Model 3: Adjusted associations of disability with education, NS-SEC and wealth, adjusted with age;

Table 2: Association of disability with socioeconomic position among men aged 75 and over at wave 1 of ELSA

		Model 1		Model 2		Model 3	
		OR	95 % CI	OR	95 % CI	OR	95 % CI
Mild disability vs no disability							
Education	High	1.00		1.00		1.00	
	Middle	0.82	0.53, 1.28	0.81	0.51, 1.28	0.76	0.47, 1.23
	Low	0.94	0.62, 1.42	0.91	0.57, 1.45	0.84	0.51, 1.38
NS-SEC	Managerial & professional	1.00		1.00		1.00	
	Intermediate	1.09	0.69, 1.69	1.11	0.69, 1.78	1.09	0.68, 1.75
	Routine & manual	1.02	0.73, 1.43	1.05	1.72, 1.54	0.99	0.65, 1.48
Wealth	Highest tertile	1.00				1.00	
	Middle tertile	1.12	0.74, 1.69			1.19	0.76, 1.85
	Lowest tertile	1.15	0.77, 1.72			1.26	0.77, 2.04
Severe disability vs no disability							
Education	High	1.00		1.00		1.00	
	Middle	2.43**	1.22, 4.84	2.05*	1.00, 4.17	1.54	0.73, 3.21
	Low	3.90**	2.03, 7.48	2.99**	1.47, 6.05	2.09*	0.99, 4.38
NS-SEC	Managerial & professional	1.00		1.00		1.00	
	Intermediate	1.44	0.81, 2.55	1.11	0.61, 2.02	1.00	0.55, 1.84
	Routine & manual	2.24**	1.47, 3.41	1.64**	1.03, 2.61	1.28	0.77, 2.09
Wealth	Highest tertile	1.00				1.00	
	Middle tertile	2.73**	1.41, 5.31			2.14*	1.07, 4.29
	Lowest tertile	4.66**	2.48, 8.73			3.00**	1.47, 6.12

* $p \leq 0.05$; ** $p \leq 0.001$

OR: odds ratios; CI: confidence interval

Model 1: Individual Associations of disability with education, NS-SEC, wealth; adjusted with age

Model 2: Mutually adjusted associations of disability with education and NS-SEC, adjusted with age;

Model 3: Adjusted associations of disability with education, NS-SEC and wealth, adjusted with age;

Table 3: Association of disability with socioeconomic position among women aged 50-74 at wave 1 of ELSA

		Model 1		Model 2		Model 3	
		OR	95 % CI	OR	95 % CI	OR	95 % CI
Mild disability vs no disability							
Education	High	1.00		1.00		1.00	
	Middle	1.41**	1.19, 1.67	1.39**	1.15, 1.69	1.32**	1.08, 1.61
	Low	1.40**	1.78, 66	1.31**	1.06, 1.62	1.17	0.94, 1.46
NS-SEC	Managerial & professional	1.00		1.00		1.00	
	Intermediate	1.05	0.89, 1.25	0.92	0.76, 1.11	0.91	0.75, 1.10
	Routine & manual	1.29**	1.11, 1.51	1.12	0.92, 1.35	1.03	0.85, 1.25
Wealth	Highest tertile	1.00				1.00	
	Middle tertile	1.36**	1.17, 1.57			1.30**	1.11, 1.51
	Lowest tertile	1.59**	1.35, 1.87			1.50**	1.25, 1.79
Severe disability vs no disability							
Education	High	1.00		1.00		1.00	
	Middle	1.62**	1.20, 2.17	1.37	0.97, 1.91	1.14	0.81, 1.61
	Low	2.97**	2.24, 3.94	2.03**	1.43, 2.87	1.39	0.97, 1.99
NS-SEC	Managerial & professional	1.00		1.00		1.00	
	Intermediate	1.17	0.88, 1.56	0.94	0.68, 1.29	0.89	0.65, 1.24
	Routine & manual	2.61**	2.04, 3.33	1.79**	1.32, 2.42	1.34	0.98, 1.83
Wealth	Highest tertile	1.00				1.00	
	Middle tertile	2.13**	1.64, 2.76			1.85**	1.42, 2.41
	Lowest tertile	5.30**	4.12, 6.80			4.04**	3.07, 5.31

* $p \leq 0.05$; ** ≤ 0.001

OR: odds ratios; CI: confidence interval

Model 1: Individual Associations of disability with education, NS-SEC, wealth; adjusted with age

Model 2: Mutually adjusted associations of disability with education and NS-SEC, adjusted with age;

Model 3: Adjusted associations of disability with education, NS-SEC and wealth, adjusted with age;

Table 4: Association of disability with socioeconomic position among women aged 75 and over at wave 1 of ELSA

		Model 1		Model 2		Model 3	
		OR	95 % CI	OR	95 % CI	OR	95 % CI
Mild disability vs no disability							
Education	High	1.00		1.00		1.00	
	Middle	1.04	0.61, 1.78	0.96	0.52, 1.76	0.92	0.49, 1.71
	Low	1.33	0.81, 2.18	1.09	0.59, 2.01	1.09	0.58, 2.05
NS-SEC	Managerial & professional	1.00		1.00		1.00	
	Intermediate	1.07	0.68, 1.68	1.05	0.62, 1.76	1.06	0.63, 1.78
	Routine & manual	1.47	0.97, 2.25	1.39	0.82, 2.34	1.47	0.86, 2.49
Wealth	Highest tertile	1.00				1.00	
	Middle tertile	2.19**	1.27, 3.77			2.07**	1.19, 3.59
	Lowest tertile	1.43	0.88, 2.31			1.19	0.71, 1.99
Severe disability vs no disability							
Education	High	1.00		1.00		1.00	
	Middle	0.92	0.49, 1.73	0.83	0.41, 1.68	0.76	0.37, 1.55
	Low	1.92*	1.08, 3.37	1.61	0.80, 3.22	1.41	0.69, 2.87
NS-SEC	Managerial & professional	1.00		1.00		1.00	
	Intermediate	1.29	0.77, 2.14	1.15	0.64, 2.07	1.15	0.64, 2.07
	Routine & manual	1.77*	1.10, 2.84	1.30	0.73, 2.34	1.22	0.67, 2.19
Wealth	Highest tertile	1.00				1.00	
	Middle tertile	1.88	0.97, 3.63			1.77	0.91, 3.45
	Lowest tertile	2.49**	1.40, 4.43			2.02*	1.10, 3.72

* $p \leq 0.05$; ** $p \leq 0.001$

OR: odds ratios; CI: confidence interval

Model 1: Individual Associations of disability with education, NS-SEC, wealth; adjusted with age

Model 2: Mutually adjusted associations of disability with education and NS-SEC, adjusted with age;

Model 3: Adjusted associations of disability with education, NS-SEC and wealth, adjusted with age;

Tables 1 and 2 report the results obtained from multinomial logistic regression for men. In unadjusted models (Model 1) education was found to be negatively associated with physical disability, especially with severe disability. When adjusted for social class only the low level of education remained associated with mild disability. In the fully adjusted model, education remained associated only with severe disability. In men aged 75 and over, education was associated with severe disability only and this association remained in the mutually adjusted model with social class. In the final model, only the low level of education was associated with severe disability.

The odds of having severe disability for men in the intermediate and manual professions were higher than for men in the managerial professions. The association remains even in the fully adjusted models. In men aged 75 and over, only routine and manual category was associated with severe disability and this association did not change in the mutually adjusted association with education (Model 2). In the fully adjusted model, social class was no longer associated with disability.

Among men 50-74 years, wealth was negatively associated with physical disability with a stronger association for severe disability - odds for severe physical disability much higher among men in the lowest wealth category compared to those in the highest. These associations of wealth with mild and severe disability remained unchanged when adjusted with other SEP factors (Model 3) although there is a slight attenuation in the odds.

Tables 3 and 4 show the associations of SEP factors with disability for women. In the younger age group, the unadjusted model showed that education was more strongly associated with severe disability. When adjusted with social class, education remained associated with disability, while in the fully adjusted model, the association loses the significance. Among women age 75 and over, only the low level of education was associated with severe disability and this association became non-significant after adjusting for social class and wealth (Models 2 and 3).

Women in the manual category had higher odds of mild and severe disability. When adjusted with education, only routine and manual category was associated with severe disability while this association became non-significant in the fully adjusted model (Model 3). In women 75 and over, manual category was associated with severe disability in the unadjusted model and this association became less significant in Models 2 and 3.

Wealth was associated with mild and severe disability in all the models among women 50-74 years. However, in women 75+ wealth did not show any pattern with mild or severe disability.

These results were also replicated by selecting other cut-offs for the three categories of disability and no difference was found in the results (results not shown).

DISCUSSION

We found that both men and women who had the highest level of wealth, education and social class also had the lowest disability rates. The association was stronger for the younger age groups and for men. The association of education with disability which was found to be significant in the unadjusted models (model 1) was further attenuated when adjusted for other factors such as social class or wealth. This supports a temporal model of education feeding into occupation and then wealth.

Social class was also found to be strongly associated with disability for both sexes, but the association is stronger for men and at younger ages. When adjusted for education then wealth, the associations that were significant progressively lose their strength. Thus the association is generally stronger for 'manual' category and for severe disability. This may, at least in part, reflect the physical and stressful exposures they experienced in their working lives.

Wealth had strong associations with disability for men and women even after adjustments for education and social class. The associations weakened at older ages especially for

women, but this SEP measure still had the strongest association. When using ‘tenure’ as a proxy for wealth the association (not shown) was in the same direction but weaker, suggesting that, where it is not possible to measure wealth, housing tenure has some value as a proxy.

The greater differentials by SEP in odds of severe disability, suggest that low SEP not only makes people vulnerable to acquiring some limitations but also to accumulation of them to the point where they are likely to be inhibiting.

One reason for the relative strength of the association between wealth and disability could be that wealth represents better the cumulative life-course opportunities, including education and employment, and may reflect an approach to life that allows for saving material assets and taking steps to prevent disability. Also it is thought that wealth acts as a security or safety measure at an age when many have stopped working and their pension may be their only incompensation. Studies have suggested that the association between disability and income or wealth is stronger at the lower end of the range⁷¹; however our study showed that the top tertile was at a distinct advantage over the middle tertile of wealth. Another explanation for the relative strength of association between wealth and physical disability could be the fact that wealth at old age is the best representative of SEP, education acquired early in life and occupation possibly losing some of its relevance after retirement. The fact that associations were weaker for the older age group points towards this explanation. The weaker effect of education than wealth fits with other findings that education-mortality risks are quite largely explained by deprivation measures^{72;73} suggesting that material aspects of socioeconomic position have a part to play too.

Our study adds to the literature on the relationship between SEP and physical functioning^{10;11;13;14;74;75}. Wealth is included in accordance with recent research which has shown that, even after controlling for the state of health, an individual’s position in the wealth distribution is an important determinant of subsequent mortality^{76;77}. To our knowledge this is the first study that looks at the association between SEP and physical disability at old age, using a comprehensive and complete measure of wealth.

Even though we use self-reported measurements of physical disability, i.e. ADL, IADLs and mobility, these have been validated and applied in many other studies⁶⁶. Although our choice for the cut-offs of categories of disability were arbitrary, the sensitivity analyses showed that our results are robust.

Finally, our study confirms previous findings of higher reported levels of physical disability in women^{52;78} than men. In our study the gradients of socioeconomic measures with disability were generally stronger for men than for women. While this may be partly an artefact of lower prevalence among men, it may also indicate that material aspect of life have more impact for men than for women, who perhaps rely more on emotional support.

Although our sample is 'selected' since the minimum age is 50 and that the lowest SEP group probably consists of "healthy survivors", the effect of SEP in the physical disability inequality was clear. However further research, especially interdisciplinary research, is needed to investigate the pathways and mechanisms behind this effect and how this interacts with other aspects such as health behaviour, biological and environmental. Additionally, because of the cross-sectional nature of these analyses and the unavailability of a sufficiently long follow-up at this stage it is not possible to investigate how SEP affects changes in physical functioning and mobility. As longitudinal data accumulate, we will be able to explore this further.

Despite its limitations this study contributes to the understanding of the association between SEP and physical functioning and mobility in older people. Understanding the reasons and underlying causes of disparities in disability is an important social and policy issue, bearing in mind the challenges it may pose for independence, quality of life, social participation as well as for the resources required. This study suggests that different forms of socioeconomic circumstances, reflecting different stages of life and potential pathways, may contribute to disability, reinforcing recommendations to have preventive policies and to support those with few material resources to prevent deterioration from mild to severe disability. It reinforces the fact that in order to reduce physical disabilities in older age

further efforts should be done to identify the more vulnerable groups of people and to reduce or counteract the socioeconomic differences.

Boxes:

What is already known on this subject?

Physical disability or impairment of physical function is a key marker of population health at all ages. Physical and mobility disability increase with age and is shown to be a reliable measure of physical health and functioning. There is an association between physical and mobility disability at older ages with various measures of socioeconomic position (SEP) such as income, education or socioeconomic classification.

What this study adds?

The study found that socioeconomic differences in physical disability persist to old age. Wealth is a stronger correlate of limitations and difficulties in physical functioning than either educational achievement or social class. We found that the excess of severe disability was greater than that for mild disability among the socioeconomically disadvantaged, suggesting a cumulative disadvantage.

ABBREVIATIONS

ELSA – English Longitudinal Study of Ageing

SEP – Socioeconomic Position

NSSEC - National Statistics Socioeconomic Classification

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The data were made available through the UK Data Archive. ELSA was developed by a team of researchers based at the National Centre for Social Research, University College London and the Institute of Fiscal Studies. The data were collected by the National Centre for Social Research. The funding is provided by the National Institute on Aging in the United States, and a consortium of UK government departments coordinated by the Office for National Statistics. The developers and funders of ELSA and the Archive do not bear any responsibility for the analyses or interpretations presented here.

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APPENDIX 1

Questions used to create the disability scale

1. Mobility, including motor function

Because of a physical or health problem, do you have difficulty doing any of the activities on this card? Exclude any difficulties that you expect to last less than three months.

- 01 Walking 100 yards
- 02 Sitting for about two hours
- 03 Getting up from a chair after sitting for long periods
- 04 Climbing several flights of stairs without resting
- 05 Climbing one flight of stairs without resting
- 06 Stooping, kneeling, or crouching
- 07 Reaching or extending your arms above shoulder level (either arm)
- 08 Pulling or pushing large objects like a living room chair
- 09 Lifting or carrying weights over 10 pounds, like a heavy bag of groceries
- 10 Picking up a 5p coin from a table
- 96 None of these

2. Activities of daily living and instrumental activities of daily living

Here are a few more everyday activities. Please tell me if you have any difficulty with these because of a physical, mental, emotional or memory problem. Again exclude any difficulties you expect to last less than three months.

ADL:

- 01 Dressing, including putting on shoes and socks
- 02 Walking across a room
- 03 Bathing or showering
- 04 Eating, such as cutting up your food
- 05 Getting in or out of bed
- 06 Using the toilet, including getting up or down

IADL:

- 07 Using a map to figure out how to get around in a strange place
- 08 Preparing a hot meal
- 09 Shopping for groceries
- 10 Making telephone calls
- 11 Taking medications
- 12 Doing work around the house or garden
- 13 Managing money, such as paying bills and keeping track of expenses

- 96 None of these

Reference List

- (1) Aijanseppa S, Notkola IL, Tjihuis M, van Staveren W, Kromhout D, Nissinen A. Physical functioning in elderly Europeans: 10 year changes in the north and south: the HALE project. *Journal of Epidemiology and Community Health* 2005; 59(5):413-419.
- (2) Heikkinen E. Disability and physical activity in late life - research models and approaches. *European Review of Aging and Physical Activity* 2006;(3):3-9.
- (3) Manton KG, Stallard E, Corder L. Changes in the age dependence of mortality and disability: Cohort and other determinants. *Demography* 1997; 34(1):135-157.
- (4) Manton KG. Changing Concepts of Morbidity and Mortality in the Elderly Population. *Milbank Memorial Fund Quarterly-Health and Society* 1982; 60(2):183-244.
- (5) Verbrugge LM, Jette AM. The Disablement Process. *Social Science & Medicine* 1994; 38(1):1-14.
- (6) Crimmins EM, Saito Y. Trends in healthy life expectancy in the United States, 1970-1990: gender, racial, and educational differences. *Social Science & Medicine* 2001; 52(11):1629-1641.
- (7) Grundy E, Holt G. Adult life experiences and health in early old age in Great Britain. *Social Science & Medicine* 2000; 51(7):1061-1074.
- (8) Guralnik JM, Lacroix AZ, Abbott RD, Berkman LF, Satterfield S, Evans DA et al. Maintaining Mobility in Late-Life .1. Demographic Characteristics and Chronic Conditions. *American Journal of Epidemiology* 1993; 137(8):845-857.
- (9) Mcgee MA, Johnson AL, Kay DWK. The description of activities of daily living in five centres in England and Wales. *Age and Ageing* 1998; 27(5):605-613.
- (10) Breeze E, Fletcher AE, Leon DA, Marmot MG, Clarke RJ, Shipley MJ. Do socioeconomic disadvantages persist into old age? Self-reported morbidity in a 29-year follow-up of the Whitehall Study. *American Journal of Public Health* 2001; 91(2):277-283.
- (11) Melzer D, Izmirlian G, Leveille SG, Guralnik JM. Educational differences in the prevalence of mobility disability in old age: The dynamics of incidence, mortality, and recovery. *Journals of Gerontology Series B-Psychological Sciences and Social Sciences* 2001; 56(5):S294-S301.
- (12) Rautio N, Adamson J, Heikkinen E, Ebrahim S. Associations of socio-economic position and disability among older women in Britain and Jyvaskyla, Finland. *Archives of Gerontology and Geriatrics* 2006; 42(2):141-155.

- (13) Sulander T, Martelin T, Sainio P, Rahkonen O, Nissinen A, Uutela A. Trends and educational disparities in functional capacity among people aged 65-84 years. *International Journal of Epidemiology* 2006; 35(5):1255-1261.
- (14) Amaducci L, Maggi S, Langlois J, Minicuci N, Baldereschi M, Di Carlo A et al. Education and the risk of physical disability and mortality among men and women aged 65 to 84: The Italian longitudinal study on aging. *Journals of Gerontology Series A-Biological Sciences and Medical Sciences* 1998; 53(6):M484-M490.
- (15) Dahl E. Social Inequalities in Ill-Health - the Significance of Occupational-Status, Education and Income - Results from A Norwegian Survey. *Sociology of Health & Illness* 1994; 16(5):644-667.
- (16) Galobardes B, Shaw M, Lawlor DA, Lynch JW, Smith GD. Indicators of socioeconomic position (part 2)
6. *Journal of Epidemiology and Community Health* 2006; 60(2):95-101.
- (17) Geyer S, Hemstrom O, Peter R, Vagero D. Education, income, and occupational class cannot be used interchangeably in social epidemiology. Empirical evidence against a common practice. *Journal of Epidemiology and Community Health* 2006; 60(9):804-810.
- (18) Grundy E, Holt G. The socioeconomic status of older adults: How should we measure it in studies of health inequalities? *Journal of Epidemiology and Community Health* 2001; 55(12):895-904.
- (19) Karisto A, Notkola V, Valkonen T. Socioeconomic-Status and Health in Finland and the Other Scandinavian Countries. *Social Science & Medicine Part C-Medical Economics* 1978; 12(3-4C):83-88.
- (20) Laaksonen M, Rahkonen O, Martikainen P, Lahelma E. Socioeconomic position and self-rated health: The contribution of childhood socioeconomic circumstances, adult socioeconomic status, and material resources. *American Journal of Public Health* 2005; 95(8):1403-1409.
- (21) Lahelma E, Martikainen P, Laaksonen M, Aittomaki A. Pathways between socioeconomic determinants of health. *Journal of Epidemiology and Community Health* 2004; 58(4):327-332.
- (22) Schrijvers CTM, Stronks K, van de Mheen HD, Mackenbach JP. Explaining educational differences in mortality: The role of behavioral and material factors 1. *American Journal of Public Health* 1999; 89(4):535-540.
- (23) Singh-Manoux A, Clarke P, Marmot M. Multiple measures of socio-economic position and psychosocial health: proximal and distal measures. *International Journal of Epidemiology* 2002; 31(6):1192-1199.

- (24) Zimmer Z, House JS. Education, income, and functional limitation transitions among American adults: contrasting onset and progression. *International Journal of Epidemiology* 2003; 32(6):1089-1097.
- (25) Avlund K, Holstein BE, Osler M, Damsgaard MT, Holm-Pedersen P, Rasmussen NK. Social position and health in old age: the relevance of different indicators of social position. *Scandinavian Journal of Public Health* 2003; 31(2):126-136.
- (26) Chandola T, Bartley M, Wiggins R, Schofield P. Social inequalities in health by individual and household measures of social position in a cohort of healthy people 4. *Journal of Epidemiology and Community Health* 2003; 57(1):56-62.
- (27) Krieger N, Williams DR, Moss NE. Measuring social class in US public health research: Concepts, methodologies, and guidelines 1. *Annual Review of Public Health* 1997; 18:341-378.
- (28) Krieger N, Barbeau EM, Soobader MJ. Class matters: US versus UK measures of occupational disparities in access to health services and health status in the 2000 US National Health Interview Survey 9. *International Journal of Health Services* 2005; 35(2):213-236.
- (29) Smith JP, Kington R. Demographic and economic correlates of health in old age 5. *Demography* 1997; 34(1):159-170.
- (30) Winkleby MA, Jatulis DE, Frank E, Fortmann SP. Socioeconomic-Status and Health - How Education, Income, and Occupation Contribute to Risk-Factors for Cardiovascular-Disease. *American Journal of Public Health* 1992; 82(6):816-820.
- (31) Adams P, Hurd MD, McFadden D, Merrill A, Ribeiro T. Healthy, wealthy, and wise? Tests for direct causal paths between health and socioeconomic status. *Journal of Econometrics* 2003; 112(1):3-56.
- (32) Hurd MD. The Economic-Status of the Elderly 2. *Science* 1989; 244(4905):659-664.
- (33) Duncan D. Occupational components of educational differences in income. *Journal of American Statistical Association* 1961;783-784.
- (34) Bourdieu P. *Distinction, a social critique of the judgement of taste*. London: Routledge and Kegan Paul; 1979.
- (35) Farrell P, Fuchs V. Schooling and health: the cigarette connection. *Journal of Health Economics* 1982; 1:217-230.
- (36) Coppin AK, Ferrucci L, Lauretani F, Phillips C, Chang M, Bandinelli S et al. Low socioeconomic status and disability in old age: Evidence from the InChianti study for the mediating role of physiological impairments. *Journals of Gerontology Series A-Biological Sciences and Medical Sciences* 2006; 61(1):86-91.

- (37) Mackenbach JP, Stirbu I, Roskam AJR, Schaap MM, Menvielle G, Leinsalu M et al. Socioeconomic inequalities in health in 22 European countries (vol 358, pg 2468, 2008). *New England Journal of Medicine* 2008; 359(12):E14.
- (38) Valkonen T. Adult mortality and the level of education: a comparison of six countries. In: Fox J, editor. *Health Inequalities in European Countries*. Aldershot; 1989.
- (39) Freedman VA, Martin LG. The role of education in explaining and forecasting trends in functional limitations among older Americans
1. *Demography* 1999; 36(4):461-473.
- (40) Minicuci N, Noale M. Influence of level of education on disability free life expectancy by sex: the ILSA Study. *Experimental Gerontology* 2005; 40:997-1003.
- (41) Feldman J. *The dissemination of health information*. Chicago: 1966.
- (42) Elo IT, Preston SH. Educational differentials in mortality: United States, 1979-85. *Social Science & Medicine* 1996; 42(1):47-57.
- (43) Pappas G, Queen S, Hadden W, Fisher G. The Increasing Disparity in Mortality Between Socioeconomic Groups in the United-States, 1960 and 1986. *New England Journal of Medicine* 1993; 329(2):103-109.
- (44) Gjonca E. *Socioeconomic determinants of longevity in Denmark, England and Wales -a comparative study*. Odense: University Press of Southern Denmark; 2007.
- (45) Martelin T, Koskinen S, Valkonen T. Sociodemographic mortality differences among the oldest old in Finland. *Journals of Gerontology Series B-Psychological Sciences and Social Sciences* 1998; 53(2):S83-S90.
- (46) Silventoinen K, Lahelma E. Health inequalities by education and age in four Nordic countries, 1986 and 1994. *Journal of Epidemiology and Community Health* 2002; 56(4):253-258.
- (47) Lynch J, Smith GD, Harper S, Bainbridge K. Explaining the social gradient in coronary heart disease: comparing relative and absolute risk approaches. *Journal of Epidemiology and Community Health* 2006; 60(5):436-441.
- (48) Marmot M. *Status Syndrome. How Your Social Standing Directly Affects Your Health and Life Expectancy*. Bloomsbury; 2004.
- (49) Marmot MG, Shipley MJ, Rose G. Inequalities in Death - Specific Explanations of A General Pattern. *Lancet* 1984; 1(8384):1003-1006.

- (50) McMunn A, Breeze E, Goodman A. Social determinants of health in older age. *Social Determinants of Health*, 2nd edn. Oxford University Press; 2006. 267-296.
- (51) Pamuk ER. Social-Class Inequality in Mortality from 1921 to 1972 in England and Wales. *Population Studies-A Journal of Demography* 1985; 39(1):17-31.
- (52) Arber S, Ginn J. Gender and Inequalities in Health in Later Life. *Social Science & Medicine* 1993; 36(1):33-46.
- (53) Filakti H, Fox J. Differences in mortality by housing tenure and by car access from the OPCS Longitudinal Study. *Population Trends* 1995;(81):27-30.
- (54) Fox J, Goldblatt P. Longitudinal study: sociodemographic mortality differentials. London: HMSO; 1982.
- (55) Allin SMCME. Measuring Socioeconomic Differences in Use of Health Care Services by Wealth Versus by Income. *American Journal of Public Health* 2009; 99(3):1-7.
- (56) Waldron I. Why do Women Live Longer Than Men
59. *Social Science & Medicine* 1976; 10(7-8):349-362.
- (57) Verbrugge LM. The Twain Meet - Empirical Explanations of Sex-Differences in Health and Mortality
1. *Journal of Health and Social Behavior* 1989; 30(3):282-304.
- (58) Gjonca A, Tomassini C, Vaupel JW. Why do women outlive men?
8. *Recherche* 1999;(322):96-99.
- (59) Arber S. Comparing inequalities in women's and men's health: Britain in the 1990s
3. *Social Science & Medicine* 1997; 44(6):773-787.
- (60) Lahelma E, Martikainen P, Rahkonen O, Silventoinen K. Gender differences in illhealth in Finland: patterns, magnitude and change. *Social Science & Medicine* 1999; 48(1):7-19.
- (61) Waldron I. Sex-Differences in Illness Incidence, Prognosis and Mortality - Issues and Evidence
1. *Social Science & Medicine* 1983; 17(16):1107-1123.
- (62) Marmot M, Banks J, Blundell R, Lessoff C, Nazroo J. Health, wealth, and lifestyles of the older population in England: the 2002 English Longitudinal Study of Ageing. Marmot M, Banks J, Blundell R, Lessoff C, Nazroo J, editors. 1-374. 2003. London, The Institute for Fiscal Studies.
Ref Type: Report

- (63) Steel N, Huppert FA, McWilliams B, Melzer D. Physical and cognitive function. In Health, wealth, and lifestyles of the older population in England: the 2002 English Longitudinal Study of Ageing. Marmot M, Banks J, Blundell R, Lessoff C, Nazroo J, editors. 249-300. 2003. London, The Institute for Fiscal Studies.
Ref Type: Report
- (64) Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of Illness in the Aged - the Index of Adl - A Standardized Measure of Biological and Psychosocial Function. *Jama-Journal of the American Medical Association* 1963; 185(12):914-919.
- (65) Lawton MP, Brody EM. Assessment of Older People - Self-Maintaining and Instrumental Activities of Daily Living. *Gerontologist* 1969; 9(3P1):179-&.
- (66) Fonda S, Herzog R. Documentation of the physical function measured in on the Health and Retirement Study and the Asset and Health Dynamics among the Oldest Old Study. 2004. Ann Arbor, Ann Arbor Institute for Social Research, University of Michigan.
Ref Type: Report
- (67) Tabassum F, Verropoulou G, Tsimbos C, Gjonca E, Breeze E. Socio-economic inequalities in physical functioning: a comparative study of English and Greek elderly men. *Ageing and Society* 2009.
- (68) Rose D, Pevalin D. A Researchers's Guide to the National Statistics Socio-Economic Classification. London: Sage; 2003.
- (69) Banks J, Karlsen S, Oldfield Z. Socio-economic position. In: Health, wealth, and lifestyles of the older population in England: the 2002 English Longitudinal Study of Ageing. Marmot M, Banks J, Blundell R, Lessoff C, Nazroo J, editors. 71-90. 2003. London, The Institute for Fiscal Studies.
Ref Type: Report
- (70) Banks J, Emmerson C, Tetlow G. Estimating pension wealth of ELSA respondents. IFS Working Paper W05/09. 2005.
Ref Type: Unpublished Work
- (71) Kingdon RS, Smith JP. Socioeconomic status and racial and ethnic differences in functional status associated with chronic diseases. *American Journal of Public Health* 1997; 87(5):805-810.
- (72) Blane D. Commentary: Explanations of the difference in mortality risk between different educational groups. *International Journal of Epidemiology* 2003; 32(3):355-356.
- (73) Avlund K, Damsgaard MT, Osler M. Social position and functional decline among non-disabled old men and women. *European Journal of Public Health* 2004; 14(2):212-216.

- (74) Koster A, Bosma H, van Groenou MIB, Kempen GIJM, Penninx BWJH, van Eijk JTHN et al. Explanations of socioeconomic differences in changes in physical function in older adults: results from the Longitudinal Aging Study Amsterdam. *Bmc Public Health* 2006; 6.
- (75) Rautio N, Heikkinen E, Ebrahim S. Socio-economic position and its relationship to physical capacity among elderly people living in Jyvaskyla, Finland: five- and ten-year follow-up studies. *Social Science & Medicine* 2005; 60(11):2405-2416.
- (76) Attanasio O, Emmerson C. Mortality, health status and wealth. *Journal of European Economic Association* 2003;(1):821-850.
- (77) Mare R. Socioeconomic careers and differential mortality among older men in the United States. In: Vallin, J, D'Souza, Palloni A, editors. *Measurement and Analysis of Mortality: New Approaches*. New York: Clarendon Press; 1990. 362-387.
- (78) Fried LP, Guralnik JM. Disability in older adults: Evidence regarding significance, etiology, and risk. *Journal of the American Geriatrics Society* 1997; 45(1):92-100.