Article

BJVI

The British Journal of Visual Impairment
30(1) 22–30

DOI: 10.1177/0264619611427374
jvi.sagepub.com
SAGE

The circumstances of older people in England with self-reported visual impairment: A secondary analysis of the English Longitudinal Study of Ageing (ELSA)

Anna Zimdars
King's College London, UK

James Nazroo
University of Manchester, UK

Edlira Gjonça
King's College London, UK

Abstract

One key challenge to those charged with tackling the social exclusion of visually impaired people is having information about the extent to which visual impairment is related to the ability to enjoy and participate in various aspects of life. Using data from the English Longitudinal Study of Ageing (ELSA), this article considers how self-reported visual impairment is related to older people's physical health and cognitive abilities, their economic and housing conditions, their social engagement, as well as their emotional well-being and life-satisfaction. We find self-reported poor vision to be associated with multiple disadvantages in those outcome measures. Further research is needed to establish causal links between visual impairment and the various health, economic, social and emotional well-being experiences documented in this article. Nevertheless, secondary data analysis of ELSA offers a useful and cost-effective research approach.

Keywords

English Longitudinal Study of Ageing (ELSA), housing, quality of life, social networks, visual impairment

Corresponding author:
Anna Zimdars, King's Learning Institute, Room 6.16 James Clerk Maxwell Building, 57 Waterloo Road, London, SE1 8WA, UK
Email: anna.zimdars@kcl.ac.uk

Introduction

It is estimated that there are around two million people in the UK who have a visual impairment (Charles, 2007) with higher prevalence among the elderly and women (e.g. Evans et al., 2002). However, we have little robust statistical information on the relationship between visual impairment and other physical and cognitive abilities, economic circumstances, social networks, social and civic participation and well-being for the UK. It is noteworthy that research linking vision status and economic impacts (e.g. Rein et al., 2006) and individuals' labour market outcomes (Houtenville, 2003; Kirchner et al., 1999) is more common in the US. There is also more information about visual impairment in children in the UK than for those aged 50 and above (e.g. Gilbert et al., 1999; Rahi and Cable, 2003).

It is however, unfortunate that there is little information on the experience of visual impairment among older people as such information seems crucial for aiding policy-makers and others charged with improving the condition of visually impaired individuals in targeting interventions. For example, one might fear that those with visual impairments fare worse on the various outcomes mentioned above, but due to a lack of information and data, efforts to improve circumstances are constrained. This article then aims to contribute towards filling this knowledge gap by applying empirical research to investigate potential links between visual impairment and various social and well-being outcomes.

Data and methods

We use the English Longitudinal Study of Ageing (ELSA) which contains information on self-reported vision as well as the other dimensions of interest among those aged 50 or older. ELSA was conducted in 2002–2003 with a sample of 11,392 respondents from the nationally representative Health Survey of England (HSE) who were aged 50 and older and living in private households (Taylor et al., 2007). The ELSA interviews collected data on general health and visual impairment and on social, psychological and economic dimensions of people's lives. We also use two data from two other surveys, UK MRC Trial of the Assessment and Management of Older People in the Community and the US Health and Retirement Survey (HRS) supplementary study, Aging, Demographics, and Memory Study (ADAMS), to estimate the validity of the self-reported visual ability measures contained in ELSA.

Measurement and validity of visual acuity

Vision data were collected using the following self-reported measure of impairment with six answer categories 'Is your eyesight (using glasses or corrective lens as usual) excellent (1); very good (2); good (3); fair (4); or poor (5)? The spontaneous response 'registered or legally blind' was coded (6). Responses were recoded into three categories by combining the responses excellent, very good and good, into one category, retaining the fair category, and collapsing poor vision and blind into one category.

In order to draw valid inferences from our analysis, we wished to know how self-reported measure of vision like the one used in ELSA are related to objectively assessed visual acuity information. Two studies contain both types of measurement and Table 1 shows the relationship between reported and objectively assessed eyesight. The first study is the UK 'MRC Trial of the Assessment and Management of Older People in the Community' and the second study is the US 'Health and Retirement Survey' (HRS) supplementary study, 'Aging, Demographics, and Memory Study' (ADAMS).

Table 1 shows a significant, but not perfect, association between measured and self-reported eyesight. Seventy-nine percent of MRC respondents who were identified as having a severe visual

Table 1. Association between measured and self-reported visual acuity from the MRC Elderly Trial and the HRS ADAMS extension. Figures from the MRC trial are adopted from (Tate et al., 2005, pp. 130–31)

Self-reported acuity	Measured acuity			
	MRC Elderly Trial		HRS ADAMS	
	Severe	Good and moderate vision	Severe	Good and moderate vision
Reports problems with eyesight (column %)	79	25	31	8
Number of observations	191	386	17	36
Positive and negative predictive values (%)	Positive predictive value 33	Negative predictive value 96	Positive predictive value 31	Negative predictive value 92
Sensitivity/Specificity (%)	Sensitivity: 79	Specificity 75	Sensitivity 31	Specificity 92
Sample n	*242*	*1541*	*55*	*471*

impairment at the clinical test, self-reported problems with their eyesight, compared with just 25 percent of those who were identified as having good or moderate vision on the visual acuity test. While for the ADAMS study the figures were 31 percent compared with 8 percent. Statistical testing (chi square tests) confirms that the positive association between self-reported and measured visual acuity is not random. However it is perhaps less strong than expected, particularly in terms of over-identifying those with a visual impairment. Estimates of the positive predictive value of the self-report measure for severe visual impairment show that both studies produce two false positives for every true positive, in other words only about one-third of participants who are identified as having a visual impairment according to self-reports are found to have severely impaired vision in the nurse assessment (positive predictive value is 33 percent for the MRC Elderly Trial and 31 percent for HRS ADAMS). The negative predictive values (whether those identified as not having a visual impairment according to the self-report are also identified as having good or moderate vision in the acuity test), however, are high at 96 percent for the MRC Elderly Trial and 92 percent for HRS ADAMS. This means few participants who are identified as having good eyesight according to their self-report are found to have problems on direct testing of their eyesight. For completeness, the table also shows figures for sensitivity and specificity, which suggest that in the MRC trial four-fifths (79%) of those with a measured visual impairment self-report as such, while three-quarters of those without a measured visual impairment report their vision as good. The less robust sensitivity figure for the ADAMS study is likely to reflect the different criteria for inclusion in the sample and thus the different composition of individuals in the two studies.

Apart from methodological issues, such as measurement and data entry errors, it might be the case that individual characteristics, such as respondents' attitude towards their eyesight, impact on their self-reports of problems with their eyesight to produce the mismatch between direct testing and self-report. Nevertheless, these figures suggest that the self-report measure has reasonable validity, with almost all of those classified as not having visual impairment correctly identified, but over identifying those with visual impairment.

Other measures related to physical and cognitive function, economic position, social engagement and happiness

We are interested in exploring the circumstances of elderly people with regards to their physical and cognitive function, economic position, social networks and well-being. We use the following

binary ELSA measures to capture physical functions – mobility difficulties, falls, activities of daily living, instrumental activities of daily living, self-reported health and hearing. The study includes a range of measures of cognitive function, however some of these depended in part on visual acuity. Here we use those measures that did not involve reading or writing skills – animal names recall, word recall and numeracy. For economic circumstances we use measures of income and wealth as well as housing tenure, housing conditions and labour market involvement. Social engagement is estimated by organizational membership, interactions with children, friends and family and feelings of belonging. We operationalize life satisfaction using the eight item CES-D depression scale (Radloff, 1977).

We were fortunate in that missing data in ELSA on the variables used for the analysis was not much of an issue. Where data were missing for particular items, the case with missing data was dropped. But this resulted in very few cases being excluded from the analysis.

Our analytical strategy is to use binary logistic regression to show the association between vision status and the dichotomized health, economic and social participation outcomes, and for modelling the relative impact of vision status on being in the lowest decile of the CES-D depression scale controlling for other health, economic, social and participation measures. Linear regression is used for all scaled variables. All analyses are conducted using sample weights to correct for non-response biases. We also control for the effects of gender and age in all models. This allows us to isolate the effect of vision status taking into account that being female as well as ageing are related to higher levels of visual impairment.

A final point regarding operationalization concerns the link between 'good and moderate' vision (in the previously cited MRC and ADAMS studies) and 'fair' vision in the subsequent tables. The question wording and clinical tests categorized vision as 'severe' or 'good and moderate' for the MRC and ADAMS studies. However, ELSA uses 'fair' as a vision category. We consider 'fair' vision in ELSA and 'moderate' vision in other studies to be roughly equivalent in terms of capturing self-reported vision.

Results

Just over 84 percent of respondents reported good or better vision, 12 percent reported fair vision and 4 percent reported poor vision or blindness. In line with other research, ELSA shows poorer vision for women than men and an exponential increase in the prevalence of poor vision among those aged 70 and over.

Physical and cognitive functions

Turning to the analysis of physical and cognitive function, Table 2 shows that self-reported visual impairment is associated with multiple additional disadvantages in this area. Most striking is the association between self-reported level of vision and general self-reported health. Those who reported poor vision have more than seven times higher odds to report poor health than those who reported good or better vision. Self-reported poor vision is also strongly associated with having multiple mobility difficulties, hearing impairment and problems executing activities of daily living (ADLs) or instrumental activities of daily living (IADLs), that is those necessary for independent living in a community. Cognitive function scores were also lower among those with self-reported poor vision than among respondents with good vision: for example, on average, individuals with poor vision recalled two animals fewer (31) in a one minute exercise to 'name as many different animals as you can think of' than their peers with good or excellent vision (33).

Table 2. Association between self-reported vision and physical and cognitive function (controlling for sex and age)

Health	Vision		
	Excellent, very good, good	Fair	Poor
	Odds Ratio	Odds Ratio (95% CI)	Odds Ratio (95% CI)
More than three mobility difficulties	1	2.7 (2.4–3.0)**	3.7 (2.9–4.6)**
Any falls in the last year	1	1.5 (1.3–1.7)**	1.5 (1.2–1.9)**
Activities of daily living (ADL)	1	2.2 (1.8–2.4)**	2.8 (2.3–3.5)**
Instrumental activities of daily living (IADL)	1	2.5 (2.2–2.9)**	4.4 (3.6–5.5)**
Self-reported health	1	4.1 (3.3–5.1)**	7.5 (5.4–10.4)**
Hearing impairment	1	2.1 (1.7–2.6)**	4.7 (3.6–6.2)**
	Linear regression results		
	B (95% CI)	B (95% CI)	B (95% CI)
Cognitive functions: Animal recall	32.7 (28.7–36.7)**	−1.5 (−1.9 to −1.2)**	−2.0 (−2.5 to −1.4)**
Cognitive functions: memory and word recall	7.6 (6.4–8.8)**	−.5 (−.6 to −.4)**	−.7 (−.8 to −.5)**
Cognitive function: numeracy	7.7 (6.8–8.4)**	−.4 (−.4 to −.3)**	−.4 (−.5 to −.3)**

ELSA analysis; Significance level: ** $p < .001$

Economic well-being

The ELSA data also show significant differences in economic well-being by self-reported level of vision.

Table 3 shows that reporting poorer than good vision is furthermore associated with a higher risk of renting rather than home ownership, higher chances of experiencing bad housing conditions, lower labour market participation and increased employment in routine and semi-routine jobs. The magnitude of these effects indicates that those with self-reported poor or fair vision are about twice as likely to be affected by these negative economic circumstances.

Social relationships and social engagement

Following a factor analysis of social relationship variables, we model the relationship between self-reported level of vision and latent social relationship variables. We can see that those reporting less than good vision are less likely to have a 'good spouse', they are more likely to score low on the absence of 'negative relationships', and 'good relationship with children'. All of these associations are statistically significant. There was not a significant association between reported poor vision on having 'good relationships with friends'. Table 4 also shows that reported less than good vision is significantly associated with reduced participation in civic and cultural life.

Emotional well-being

In this final analysis we estimate what the effects of reported vision are on scoring in the lowest decile of the CES-D depression score controlling for the associations between poor vision and health,

Table 3. Association between self-reported vision and economic well-being (controlling for sex and age)

Economic wellbeing	Vision		
	Excellent, very good, good	Fair	Poor
	Linear Regression – beta coefficients		
	Mean (95% CI)	B (95% CI)	B (95% CI)
Equalized weekly income (£)	846.8 (686.2–1,007.4)**	–40.0 (–54.4 to –25.7)**	–47.4 (–61.3 to –33.5)**
Total net non-pension wealth (£000)	307K (102K–511K)*	–68K (–81K to –54K)**	–104K (–116K–92K)**
	Logistic Regression – odds ratios		
	Odds Ratio	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Lowest quintile of income	1	1.3 (1.1–1.5)**	1.2 (0.9–1.5)**
Housing tenure renting	1	1.9 (1.7–2.2)**	2.4 (1.9–3.0)**
Bad housing conditions	1	1.8 (1.6–2.1)**	2.0 (1.6–2.6)**
Class risk routine or semi routine	1	1.7 (1.5–1.9)**	1.8 (1.4–2.1)**
Proportion not working aged < 60	1	2.0 (1.6–2.5)**	2.4 (1.5–3.8)**

ELSA analysis: Significance levels: ** $p < .001$; * $p < .05$

Table 4. Association between visual impairment and social relationships and participation (controlling for sex and age)

	Vision		
	Excellent, very good, good	Fair	Poor
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Social relationships			
Lowest quintile of bad spouse (i.e. good spouse)	1	.7 (.6–.8)	.6 (.4–.8)
Lowest quintile of absence of negative relationships (i.e. has negative relationships)	1	1.4 (1.2–1.6)**	1.8 (1.4–2.3)**
Lowest quintile of good relationships with friends	1	1.4 (1.2–1.6)**	1.1 (.8–1.5)**
Lowest quintile of good relationships with children	1	1.4 (1.2–1.6)**	1.5 (1.1–2.0)**
Social participation			
Not being member of an organization	1	1.7 (1.5–1.9)**	2.2 (1.8–2.8)**
Not voting	1	1.4 (1.2–1.7)**	1.5 (1.1–1.9)**
No volunteering	1	1.5 (1.3–1.8)**	2.5 (1.8–3.3)**
Not participating in cultured activities	1	1.9 (1.7–2.2)**	3.1 (2.5–3.8)**
Not having a hobby	1	1.7 (1.4–1.9)**	2.5 (1.9–3.2)**
Combined exclusion on four or five of above	1	2.2 (1.8–2.7)**	3.4 (2.6–4.6)**

ELSA analysis: Significance levels: ** $p < .001$

Table 5. Outcome of binary logistic regression predicting lowest decile of CES-D (weighted for non-response bias)

	Odds Ratios (95% Confidence Intervals)
	Model 5
Socio-demographic	
Female	1.8 (1.4/2.3)**
Age squared	1.0 (1.0/1.0)
Age	1.1 (.9/1.3)
Vision	
Excellent, very good, good	1
Fair	1.4 (1.0/1.8)*
Poor	1.3 (.8/2.0)
Health	
Fall in the last year	1.3 (1.0/1.7)*
Poor activities of daily living	2.1 (1.4/2.9)**
Poor instrumental activities of daily living	1.2 (.8/1.7)
Poor self-reported health	2.4 (1.7/3.4)**
Hearing impairment	1.4 (1.0/2.1)^
Economic well-being	
Net wealth (ordered quintiles)	.8 (.8/.9)*
Housing tenure renting	1.0 (.8/1.4)
High crowding	.5 (.3/.9)*
Two or more home amendments	1.1 (.8/1.4)
Bad housing conditions	1.1 (.8/1.4)
Social class semi-routine or routine	1.1 (.9/1.4)
Social networks	
Good friends	1.0 (.9/1.2)
Bad spouse	1.6 (1.3/2.0)**
Absence of negatives	.6 (.4/.8)**
Good children	.9 (.7/1.1)
Bad family	1.2 (1.0/1.5)*
Writer	.9 (.7/1.2)
Participation	
Exclusion on four or more cultural activities	1.9 (1.4/2.5)**
Low feelings towards area	1.7 (1.3/2.2)**

Significance levels: ** $p < .001$; * $p < .05$ (^ significance at $p < .10$ level)

economic and social factors. Initial models identified a significant and substantial bivariate effect of reported level of vision on CES-D scores (not shown) with those with reported fair or poor vision being more likely than those with good or better vision to report depression. However, the multivariate analysis in Table 5 shows that this effect of reported level of vision is only significant at the .05 level ($p = .046$) for those with fair as compared to good vision and not statistically significant for those with poor as opposed to good vision. Scoring in the lowest decile of the CES-D depression score was the strongest predicted by self-reported poor health, being unable to participate in activities of daily living, an inability to participate in cultural activities, low feelings towards the area of

residence, being female, scoring low on the absence of negatives and having a poor relation with one's spouse. Additional predictors were having experienced a fall in the last year, crowding, bad relationships with family and having the above mentioned fair as opposed to good vision.

Discussion

When interpreting these findings, we have to bear in mind the following three caveats. First, our findings are interpretable primarily as referring to the link between perceived eyesight and other outcomes. Such observations are important because perceived health is a well established independent predictor of actual health and mortality (Idler and Benyamini, 1997) just as perceptions and attitudes can be self-fulfilling in other areas of life (e.g. Lee, 1989). But the overlap between actual vision and reported vision, while statistically significant, needs further investigation as the self-reports appear to over-identify (but not under-identify) the people with visual impairment. This may have led to an under-estimate of the effects of having a visual impairment on the outcomes we have explored. Second, ELSA only sampled individuals residing in private households. This excludes people who live in residential care and it may be that people with visual impairment are more likely to live in these settings – as pointed out in anecdotal evidence (Butler, 2004). Third, our analysis has not attempted any causal modelling, we have here only used a cross-sectional snapshot of one ELSA wave. As further ELSA waves become available, it will be possible to exploit the longitudinal design of ELSA and to undertake more advanced causal analyses and to investigate how changes in (self-reported) vision – deteriorations as well as improvements as might be the case after surgery – influence economic position, social engagement and emotional well-being.

Bearing those caveats in mind, we recapitulate that we set out to investigate whether self-reported visual impairment is related to the ability to enjoy and participate in various aspects of life. Using ELSA, we showed that self-reported vision is associated with multiple disadvantages, in particular with regards to other physical health functions, but also with regards to cognitive functions, economic well-being, social relationships and social participation, and emotional well-being. When investigating whether there was an independent effect of vision on overall well-being, we found the initial negative effect of poor vision on well-being reduced by the collinear association between poor vision and poor health and economic status. Importantly, the analysis found that reported poor vision appears not to be singled out as a crucial factor triggering depression and low well-being, rather other variables (many of which are associated with visual impairment themselves) were found to be significantly associated.

In the absence of measured visual acuity data, self-reported vision status as available through ELSA offers some insights into the relationship between vision and other aspects of life among those aged 50 and older in England and Wales. From our findings, it seems that self-reported poor vision is a proxy for a lower propensity of an individual to be able to enjoy various good fortunes ranging from emotional and physical well-being to economic circumstances and networks. Interventions targeted at reducing the link between impairment and any of the individual outcomes we measured are thus likely to contribute to an increase of the general quality of life of those suffering from visual impairment. For example, policies improving the economic and housing circumstances of those with poor vision might be a comparatively simple intervention that seems likely to have positive over-spill effects for other areas of life of visually impaired elderly people.

Acknowledgements

Work leading to this article was funded by the Thomas Pocklington Trust. ELSA is conducted jointly by University College London (UCL), the Institute for Fiscal Studies (IFS) and the National Centre for Social Research (NatCen). Funding for ELSA is provided by the National Institute on Aging in the US and a

consortium of UK Government Departments: Department of Health, Department for Work and Pensions, Office for National Statistics, Department for Environment Food and Rural Affairs, Department for Transport, HM Revenue and Customs, Communities and Local Government. We would like to thank Nick Shryane for helpful methodological advice.

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