

# Impact of Low Vision on Well-Being in 10 European Countries

S.M. Mojon-Azzi<sup>a</sup> A. Sousa-Poza<sup>a, d</sup> D.S. Mojon<sup>b, c</sup>

<sup>a</sup>Research Institute for Labour Economics and Labour Law, University of St. Gallen, <sup>b</sup>Institute of Ophthalmology, Kantonsspital St. Gallen, St. Gallen, and <sup>c</sup>University of Bern, Bern, Switzerland; <sup>d</sup>Institute for Consumer and Household Economics, University of Hohenheim, Stuttgart, Germany

## Key Words

Visual impairment, quality of life · Depression · Concentration · Well-being

## Abstract

**Background:** Because of the growing life expectancy in developed countries and the exponential increase in vision loss with increasing age, a growing number of elderly persons will eventually suffer from visual impairment and blindness. This paper describes the association between self-reported vision and well-being in individuals aged 50 years and older and their families. **Methods:** Using binary logistic regressions on data from the 2004 Survey of Health, Ageing and Retirement in Europe (SHARE), we analysed the association between self-reported corrected vision in general, corrected distance vision and corrected reading vision on 11 variables capturing emotional well-being, future hopes and perspectives, and concentration on daily activities. **Results:** For 22,486 individuals from 10 European countries, aged  $64.23 \pm 10.52$  years, lower vision was associated with a highly significant negative impact on all measured aspects of well-being. **Conclusions:** These data from a large population base in Europe provide evidence that persons with low vision have a higher probability of concentration problems during reading and entertainment; losing interest and enjoyment in their activities; feeling fatigued, irritable, sad, and tearful; having less hope for the future; and wishing for death. Effec-

tive measures of early detection, prevention, rehabilitation, education and research, as well as a holistic view of a patient, could help counter these problems, thereby improving mental and physical health and reducing the economic impact of low vision.

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## Introduction

Because of the growing life expectancy in developed countries and the exponential increase in vision loss with increasing age [1], a growing number of elderly persons will eventually suffer from visual impairment and blindness. Indeed, a tripling of vision loss can be expected with each additional decade of life after the age of 40 years until, by their 90s, nearly half of all people have visual impairments and 1 person in 6 is officially classified as blind [2].

The impact of visual impairment on visual functioning, health and well-being has been the subject of some previous studies. One analysis based on the 25-item National Eye Institute Visual Function Questionnaire (NEI-VFQ-25) showed that visual impairment negatively affects visual functioning. This study obtained different results between unilateral and bilateral, as well as between correctable and non-correctable, visual impairment [3]. With the help of the Standard Short Form Health

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Daniel Mojon, MD  
Department of Ophthalmology  
Kantonsspital  
CH-9007 St. Gallen (Switzerland)  
Tel. +41 71 494 28 24, Fax +41 71 494 28 82, E-Mail [daniel.mojon@kssg.ch](mailto:daniel.mojon@kssg.ch)

Survey Questionnaire (SF-36) it could be shown that even a moderate to severe unilateral visual impairment has a noticeable impact on a general measure of quality of life (QoL) and independent functioning [4]. Another study, which measured the impact of both unilateral and bilateral visual impairment on health-related QoL using the NEI-VFQ-25 and the Medical Outcomes Study 12-Item Short Form Health Survey (SF-12), associated increasing severity of visual impairment with poorer self-reported visual functioning, particularly concerning difficulties with driving, distance and near tasks, vision-related dependency and vision-related mental health [5]. Loss of unilateral and bilateral vision has also been associated with problems reading the telephone book or a newspaper, watching television and seeing faces [6].

In addition, visual impairment greatly affects independence in the elderly [6–8] – especially elderly women [8] – particularly in daily activities like driving, preparing hot meals and managing money [9]. Moreover, non-correctable unilateral vision loss has been linked to vision-related activities, falling and independent living, whereas non-correctable bilateral vision loss has been associated with dependency, nursing home placement and deficits in emotional well-being and visual tasks, which means that overall visual impairment increases the probability of nursing home residence [6].

Other research has linked reportedly severe bilateral visual impairment with an increased risk of death in women [10, 11]. In addition, the older visually impaired in general have a higher prevalence of depression [7, 9, 12] and an increased risk of suicide [13].

Some research on the association between visual function and driving has further shown that older drivers with lower levels of visual functioning reported driving limitations due to eyesight [9, 14] and that they modified their driving to avoid risky situations [15], but that their condition was not associated with more automobile crashes [16, 17].

Visual impairment also has a major economic impact and high costs. Taylor et al. [18] estimated the direct and indirect financial costs of vision loss at AUD 252 for every Australian, or 0.6% of the GDP. Therefore, as the authors pointed out, even a developed country cannot afford avoidable vision loss. Indeed, the financial burden of visual impairment ranks with that of cancer, dementia and arthritis [19]. According to one study of US Medicare patients, the costs of eye-related care were USD 237–407 higher in persons with visual impairment than in persons with normal vision, while the non-eye-related costs, like lost income or loss of well-being, were USD 2,198–

4,443 higher, depending on the level of vision loss. Moreover, these costs increased almost linearly as vision loss progressed [7].

Several studies have assessed the QoL of persons with cataracts [20], glaucoma [21] and age-related macular degeneration [22], which represent the most common causes of visual impairment. Macular degeneration, particularly, has been the subject of several studies showing that the loss of central vision it produces can be an impediment for daily activities like reading, watching TV, driving and recognising faces. As such, it can lead to depression, functional decline, loss of leisure activities and even an increase in suicidal feelings [22].

Taking into account these prior findings, this present study analyses the influence of self-reported corrected general eyesight, corrected distance eyesight and corrected reading eyesight on several variables that describe emotional well-being, future hopes and concentration on daily activities. It therefore measures new aspects of the lives of the visually impaired that were not assessed by previous studies. Moreover, because our study is based on data from a large respondent pool from 10 European countries, the results do not only reflect the situation in 1 country, as in previous studies, but are representative of the well-being of those with low vision in a large part of Europe.

## Subjects and Methods

### *Setting and Subjects*

The data analysed were originally collected in 2004 from 10 European countries – Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece and Switzerland – as part of the Survey of Health, Ageing and Retirement in Europe (SHARE). This dataset, amassed using computer-assisted personal interviews, encompasses individuals aged 50 years and older and members of their families. The overall study population consisted of 22,777 individuals (10,088 men, 12,685 women, 4 gender unknown) aged between 10 and 104 years (mean =  $64.2 \pm 10.5$ ) [23, 24]. The probability samples were based on households with at least 1 member speaking the local language and aged 50 years or more, and were generated from national, regional or local registers or from telephone directories. The survey items recorded 4 aspects of respondents' vision: the use of glasses or contact lenses, general eyesight with glasses or contact lenses, distance eyesight with glasses or contact lenses (specifically, how well the respondent sees a friend on the other side of the street) and reading eyesight with glasses or contact lenses (how well the respondent can read a newspaper with normal-sized letters).

### *Statistical Methods*

Descriptive characteristics of the study population and their subgroups include means, proportions and 95% confidence intervals of proportions.

**Table 1.** Characteristics of the study population

	General eyesight			Distance eyesight			Reading eyesight		
	age	n	proportion (95% CI)	age	n	proportion (95% CI)	age	n	proportion (95% CI)
Excellent	60.8 ± 9.2	3,309	14.7 (13.5–15.9)	60.8 ± 9.2	4,926	22.0 (20.8–23.1)	60.8 ± 9.2	3,526	15.7 (14.5–16.9)
Very good	62.5 ± 9.8	6,024	26.8 (25.7–27.9)	62.8 ± 9.9	6,670	29.8 (28.7–30.9)	62.8 ± 9.9	5,550	24.7 (23.6–25.9)
Good	64.9 ± 10.3	9,712	43.2 (42.2–44.2)	65.5 ± 10.3	8,202	36.6 (35.5–37.6)	65.4 ± 10.4	8,094	36.1 (35.0–37.1)
Fair	67.7 ± 11.4	2,724	12.1 (10.9–13.3)	69.3 ± 11.5	1,855	8.3 (7.0–9.5)	66.0 ± 11.2	3,454	15.4 (14.2–16.6)
Poor	73.4 ± 11.6	679	3.0 (1.7–4.3)	72.3 ± 11.8	767	3.4 (2.1–4.7)	66.6 ± 11.9	1,813	8.1 (6.8–9.3)
Blind	74.5 ± 11.9	38	0.2 (0–1.5)						
Total	64.2 ± 10.5	22,486	100.0	64.2 ± 10.5	22,420	100.0	64.2 ± 10.5	22,437	100.0

**Table 2.** Prevalence of conditions describing emotional well-being, future hopes and concentration on daily activities at different levels of visual impairment

General eyesight	Excellent	Very good	Good	Fair	Poor	Blind	Total	n
Depression ever (responding yes)	767 (23.3)	1,283 (21.4)	2,560 (26.6)	886 (33.1)	230 (35.7)	9 (26.5)	5,735 (25.7)	22,279
Felt sad or depressed during the last month (responding yes)	950 (28.9)	1,876 (31.4)	3,605 (37.5)	1,298 (48.7)	386 (60.2)	15 (42.9)	8,130 (36.6)	22,222
Tearfulness (having cried during the last month)	674 (20.5)	1,346 (22.5)	2,523 (26.2)	888 (33.3)	275 (43.2)	15 (44.1)	5,721 (25.7)	22,221
Lack of enjoyment (failing to mention any enjoyable activity)	312 (9.5)	620 (10.4)	1,342 (14.0)	599 (22.5)	209 (33.0)	11 (31.4)	3,093 (13.9)	22,200
Hopelessness (mentioning no hopes)	2,999 (8.6)	5,333 (10.7)	8,221 (14.4)	2,026 (23.9)	417 (34.2)	22 (37.1)	19,018 (14.3)	22,188
Wishing to be dead (mentioning suicidal feelings)	103 (3.1)	220 (3.7)	592 (6.2)	332 (12.5)	136 (21.5)	8 (23.5)	1,391 (6.3)	22,189
Fatigue (responding yes)	745 (22.7)	1,446 (24.2)	3,107 (32.3)	1,221 (45.9)	373 (58.7)	15 (42.9)	6,907 (31.1)	22,211
Irritability (responding yes)	667 (20.3)	1,162 (19.4)	2,207 (23.0)	813 (30.6)	228 (35.8)	7 (20.0)	5,084 (22.9)	22,206
Interest in everyday experiences (mentioning less interest than usual)	163 (5.0)	346 (5.8)	781 (8.1)	385 (14.5)	141 (22.2)	8 (22.9)	1,824 (8.2)	22,202
Concentration on reading (mentioning difficulty)	271 (8.3)	548 (9.2)	1,546 (16.1)	814 (30.8)	306 (49.2)	20 (66.7)	3,505 (15.8)	22,138
Concentrating on entertainment (mentioning difficulty)	256 (7.8)	453 (7.6)	1,322 (13.7)	702 (26.4)	251 (39.5)	10 (28.6)	2,994 (13.5)	22,219

Figures in parentheses are percentages.

The influence of the reported visual impairment on the variables capturing emotional well-being, future hopes and perspectives, and concentration on daily activities was analysed using binary logistic regressions including general eyesight, distance eyesight or reading eyesight as a predictor of interest. General eyesight was classified at 6 levels: 1 = excellent, 2 = very good, 3 = good, 4 = fair, 5 = poor and 6 = blind. Reading eyesight and distance eyesight were measured at 5 levels: 1 = excellent, 2 = very good, 3 = good, 4 = fair and 5 = poor. All performed regressions included 4 covariates: age, gender, country and cohabitant status (reflecting

if the respondent lives with a spouse, with a partner, or as a single person). Income was omitted as an explanatory variable because of the large differences between the working and retired populations, as well as because of country differences in income and pensions after retirement. General health was omitted because of the strong influence of eyesight on the perception of general health.

The effect of visual impairment was examined for the following outcome variables: (1) having ever suffered from depression, (2) having felt sad or depressed in the month before the interview, (3) having cried in the month before the interview (tearfulness),

**Table 3.** Results of binary logistic regressions for general eyesight adjusted for age, gender, country and cohabitant status

Binary independent variable	Estimate $\pm$ SE and p value					n
	very good eyesight	good eyesight	fair eyesight	poor eyesight	blind	
Depression ever	-0.01 $\pm$ 0.05 0.82	0.22 $\pm$ 0.05 9.39 $\times 10^{-6}$	0.55 $\pm$ 0.06 <2 $\times 10^{-16}$	0.68 $\pm$ 0.10 5.24 $\times 10^{-12}$	0.38 $\pm$ 0.41 0.35	22,249
Felt sad or depressed during the last month	0.09 $\pm$ 0.05 0.05	0.33 $\pm$ 0.05 1.34 $\times 10^{-12}$	0.72 $\pm$ 0.06 <2 $\times 10^{-16}$	1.14 $\pm$ 0.09 <2 $\times 10^{-16}$	0.53 $\pm$ 0.36 0.14	22,192
Tearfulness	0.06 $\pm$ 0.06 0.26	0.20 $\pm$ 0.05 9.73 $\times 10^{-5}$	0.48 $\pm$ 0.07 1.11 $\times 10^{-13}$	0.91 $\pm$ 0.10 <2 $\times 10^{-16}$	1.20 $\pm$ 0.37 0.0012	22,191
Lack of enjoyment	0.03 $\pm$ 0.07 0.66	0.28 $\pm$ 0.07 3.92 $\times 10^{-5}$	0.69 $\pm$ 0.08 <2 $\times 10^{-16}$	1.12 $\pm$ 0.11 <2 $\times 10^{-16}$	1.12 $\pm$ 0.38 0.0028	22,171
Hopelessness	0.15 $\pm$ 0.08 0.05	0.35 $\pm$ 0.07 9.71 $\times 10^{-7}$	0.72 $\pm$ 0.08 <2 $\times 10^{-16}$	1.05 $\pm$ 0.11 <2 $\times 10^{-16}$	1.31 $\pm$ 0.38 0.0006	22,159
Wishing to be dead	0.06 $\pm$ 0.12 0.63	0.49 $\pm$ 0.11 1.18 $\times 10^{-05}$	1.10 $\pm$ 0.12 <2 $\times 10^{-16}$	1.56 $\pm$ 0.15 <2 $\times 10^{-16}$	1.76 $\pm$ 0.44 6.29 $\times 10^{-5}$	22,160
Fatigue	0.07 $\pm$ 0.05 0.18	0.39 $\pm$ 0.0 6.26 $\times 10^{-16}$	0.87 $\pm$ 0.06 <2 $\times 10^{-16}$	1.24 $\pm$ 0.10 <2 $\times 10^{-16}$	0.70 $\pm$ 0.35 0.05	22,182
Irritability	-0.01 $\pm$ 0.06 0.88	0.19 $\pm$ 0.05 0.0003	0.51 $\pm$ 0.06 2.43 $\times 10^{-15}$	0.81 $\pm$ 0.10 2.81 $\times 10^{-16}$	0.16 $\pm$ 0.43 0.71	22,177
Less interest in everyday experiences	0.09 $\pm$ 0.10 0.35	0.34 $\pm$ 0.09 0.0002	0.85 $\pm$ 0.10 <2 $\times 10^{-16}$	1.33 $\pm$ 0.13 <2 $\times 10^{-16}$	1.49 $\pm$ 0.42 0.0004	21,476
Difficulty concentrating on reading	0.02 $\pm$ 0.08 0.84	0.50 $\pm$ 0.07 3.32 $\times 10^{-12}$	1.14 $\pm$ 0.08 <2 $\times 10^{-16}$	1.79 $\pm$ 0.11 <2 $\times 10^{-16}$	2.72 $\pm$ 0.40 1.56 $\times 10^{-11}$	22,109
Difficulty concentrating on entertainment	-0.12 $\pm$ 0.08 0.16	0.38 $\pm$ 0.07 1.63 $\times 10^{-7}$	1.03 $\pm$ 0.08 <2 $\times 10^{-16}$	1.50 $\pm$ 0.11 <2 $\times 10^{-16}$	1.17 $\pm$ 0.39 0.0025	22,190

Values given as log-odds. Reference category: excellent eyesight.

(4) lack of enjoyment, reflected by no mention of enjoying an activity recently, (5) hopelessness, based on no mention of hopes for the future, (6) wishing to be dead, measured by mention of suicidal feelings, (7) fatigue, (8) irritability, (9) having less interest than usual in everyday experiences, (10) having difficulty concentrating on reading and (11) having difficulty concentrating on entertainment, for example, a film or television or radio programme.

In the binary logistic regressions performed for each outcome variable (log-odds), a positive coefficient for the predictor reflects a higher probability of the respondent having (rather than not having) the condition captured by the outcome variable. All tabulations were performed with R (version 2.1.0).

## Results

A total of 22,486 individuals (9,955 males and 12,531 females, aged 64.23  $\pm$  10.52 years) answered the question on general eyesight, 22,420 (9,926 males and 12,494 females, aged 64.20  $\pm$  10.50 years) answered that on distance eyesight and 22,437 individuals (9,932 males and

12,505 females, aged 64.20  $\pm$  10.51 years) responded to the question on reading eyesight. Of these, 67.7% usually wore glasses or contact lenses and judged their eyesight with the visual correction; 84.7% reported good, very good or excellent general eyesight (CI 84.18–85.21%), 88.3% reported distance eyesight that was at least good (CI 87.86–88.76%) and 76.5% (CI 75.88–77.15%) reported good or better than good reading eyesight (table 1). For all 3 aspects of vision measured, decreasing eyesight was associated with an increase in mean age (table 1).

With the exception of the small group of blind individuals, the variables measuring emotional well-being, future hopes and perspectives, and concentration on daily activities decreased in those with lower levels of eyesight (table 2). That is, the worse the eyesight, the higher the percentage of respondents with depressive feelings, sadness or tearfulness; the less the enjoyable activities and hopes for the future; and the more frequent the mention of suicidal feelings or wishing to be dead. In addition, the lower the eyesight level, the more frequently respon-

**Table 4.** Results of binary logistic regressions for reading eyesight adjusted for age, gender, country and cohabitant status

Binary independent variable	Estimate $\pm$ SE and p value				n
	very good eyesight	good eyesight	fair eyesight	poor eyesight	
Depression ever	0.09 $\pm$ 0.05 0.08	0.25 $\pm$ 0.05 7.78 $\times 10^{-7}$	0.28 $\pm$ 0.06 2.28 $\times 10^{-6}$	0.46 $\pm$ 0.07 2.64 $\times 10^{-11}$	22,210
Felt sad or depressed during the last month	0.13 $\pm$ 0.05 0.009	0.33 $\pm$ 0.05 1.97 $\times 10^{-12}$	0.45 $\pm$ 0.05 <2 $\times 10^{-16}$	0.63 $\pm$ 0.06 <2 $\times 10^{-16}$	22,152
Tearfulness	0.04 $\pm$ 0.06 0.44	0.25 $\pm$ 0.05 2.37 $\times 10^{-6}$	0.37 $\pm$ 0.06 7.40 $\times 10^{-10}$	0.41 $\pm$ 0.07 1.11 $\times 10^{-8}$	22,152
Lack of enjoyment	0.08 $\pm$ 0.07 0.30	0.32 $\pm$ 0.07 3.07 $\times 10^{-6}$	0.49 $\pm$ 0.08 2.63 $\times 10^{-10}$	0.76 $\pm$ 0.086 <2 $\times 10^{-16}$	22,131
Hopelessness	0.17 $\pm$ 0.08 0.03	0.44 $\pm$ 0.07 1.80 $\times 10^{-9}$	0.58 $\pm$ 0.08 7.10 $\times 10^{-13}$	0.74 $\pm$ 0.09 2.64 $\times 10^{-16}$	22,119
Wishing to be dead	0.02 $\pm$ 0.12 0.85	0.47 $\pm$ 0.11 8.13 $\times 10^{-6}$	0.71 $\pm$ 0.11 6.89 $\times 10^{-10}$	0.90 $\pm$ 0.13 5.09 $\times 10^{-13}$	22,121
Fatigue	0.13 $\pm$ 0.05 0.01	0.40 $\pm$ 0.05 2.72 $\times 10^{-16}$	0.51 $\pm$ 0.06 <2 $\times 10^{-16}$	0.68 $\pm$ 0.07 <2 $\times 10^{-16}$	22,142
Irritability	0.04 $\pm$ 0.06 0.48	0.23 $\pm$ 0.05 1.49 $\times 10^{-5}$	0.26 $\pm$ 0.06 2.00 $\times 10^{-5}$	0.47 $\pm$ 0.07 2.15 $\times 10^{-11}$	22,138
Less interest in everyday experiences	0.19 $\pm$ 0.10 0.06	0.53 $\pm$ 0.09 1.92 $\times 10^{-8}$	0.73 $\pm$ 0.10 5.14 $\times 10^{-13}$	1.02 $\pm$ 0.11 <2 $\times 10^{-16}$	21,439
Difficulty concentrating on reading	0.06 $\pm$ 0.08 0.48	0.45 $\pm$ 0.07 3.56 $\times 10^{-10}$	0.98 $\pm$ 0.08 <2 $\times 10^{-16}$	1.28 $\pm$ 0.08 <2 $\times 10^{-16}$	22,075
Difficulty concentrating on entertainment	-0.03 $\pm$ 0.08 0.75	0.42 $\pm$ 0.08 1.83 $\times 10^{-8}$	0.87 $\pm$ 0.08 <2 $\times 10^{-16}$	1.04 $\pm$ 0.09 <2 $\times 10^{-16}$	22,150

Values given as log-odds. Reference category: excellent eyesight.

dents reported feeling fatigued or irritable, having less interest than usual in everyday experiences, and having problems concentrating during reading and entertainment.

The results of the logistic regressions (table 3) indicate that with lower (vs. excellent) levels of respondent general eyesight, the log-odds of ever having suffered symptoms of depression; being sad, depressed or tearful in the month before the interview; having no enjoyment in life; wishing to be dead and not having hopes for the future, increased significantly. The worse the eyesight, the higher the log-odds of feeling fatigued and irritable compared to the reference group with excellent eyesight. In addition, bad eyesight significantly increased the log-odds of difficulty concentrating on reading or entertainment and reduced interest. Similar results were obtained for reading eyesight (table 4) and distance eyesight (table 5). The fact that lower distance vision also affected concentration on entertainment and reading indicates a strong correlation between distance and near vision. This correlation is

confirmed by calculating the Spearman rank correlation between distance and near vision ( $\rho = 0.56$ ,  $n = 22,416$ ,  $p < 10^{-6}$ ).

## Discussion

The study results show that impaired vision negatively affects many aspects of QoL. The greater the impairment, the more the difficulty concentrating on daily activities such as reading and entertainment. The less the vision, the higher the percentage of individuals feeling irritable, fatigued and disinterested in everyday experiences. This greater disinterest – as well as sadness, tearfulness and depression – probably results from difficulty performing daily activities. With growing visual impairment, respondents not only feel sad and depressed more often, they also lose enjoyment and hope and have more frequent suicidal feelings. Overall, the results demonstrate that visual impairment has a strong impact on in-

**Table 5.** Results of binary logistic regressions for distance eyesight adjusted for age, gender, country and cohabitant status

Binary independent variable	Estimate $\pm$ SE and p value				n
	very good eyesight	good eyesight	fair eyesight	poor eyesight	
Depression ever	0.02 $\pm$ 0.05 0.64	0.15 $\pm$ 0.05 0.0007	0.43 $\pm$ 0.07 $5.70 \times 10^{-11}$	0.67 $\pm$ 0.09 $4.53 \times 10^{-14}$	22,195
Felt sad or depressed during the last month	0.09 $\pm$ 0.04 0.05	0.27 $\pm$ 0.04 $7.00 \times 10^{-11}$	0.63 $\pm$ 0.06 $<2 \times 10^{-16}$	0.95 $\pm$ 0.09 $<2 \times 10^{-16}$	22,137
Tearfulness	0.01 $\pm$ 0.05 0.82	0.16 $\pm$ 0.05 0.0005	0.42 $\pm$ 0.07 $4.03 \times 10^{-10}$	0.79 $\pm$ 0.09 $<2 \times 10^{-16}$	22,137
Lack of enjoyment	0.06 $\pm$ 0.06 0.38	0.37 $\pm$ 0.06 $1.17 \times 10^{-9}$	0.71 $\pm$ 0.08 $<2 \times 10^{-16}$	1.03 $\pm$ 0.10 $<2 \times 10^{-16}$	22,116
Hopelessness	0.24 $\pm$ 0.07 0.0004	0.45 $\pm$ 0.06 $2.74 \times 10^{-12}$	0.73 $\pm$ 0.08 $<2 \times 10^{-16}$	1.09 $\pm$ 0.10 $<2 \times 10^{-16}$	22,104
Wishing to be dead	0.19 $\pm$ 0.10 0.07	0.52 $\pm$ 0.09 $4.10 \times 10^{-8}$	0.90 $\pm$ 0.12 $6.67 \times 10^{-15}$	1.47 $\pm$ 0.13 $<2 \times 10^{-16}$	22,106
Fatigue	0.07 $\pm$ 0.04 0.10	0.35 $\pm$ 0.04 $4.75 \times 10^{-16}$	0.81 $\pm$ 0.06 $<2 \times 10^{-16}$	1.08 $\pm$ 0.09 $<2 \times 10^{-16}$	22,127
Irritability	0.004 $\pm$ 0.05 0.93	0.17 $\pm$ 0.05 0.0002	0.44 $\pm$ 0.07 $3.02 \times 10^{-11}$	0.69 $\pm$ 0.09 $3.68 \times 10^{-14}$	22,123
Less interest in everyday experiences	0.27 $\pm$ 0.09 0.002	0.49 $\pm$ 0.08 $1.93 \times 10^{-9}$	1.04 $\pm$ 0.10 $<2 \times 10^{-16}$	1.33 $\pm$ 0.12 $<2 \times 10^{-16}$	21,424
Difficulty concentrating on reading	0.14 $\pm$ 0.07 0.03	0.52 $\pm$ 0.06 $<2 \times 10^{-16}$	1.22 $\pm$ 0.08 $<2 \times 10^{-16}$	1.58 $\pm$ 0.10 $<2 \times 10^{-16}$	22,059
Difficulty concentrating on entertainment	0.04 $\pm$ 0.07 0.56	0.45 $\pm$ 0.06 $4.02 \times 10^{-12}$	1.16 $\pm$ 0.08 $<2 \times 10^{-16}$	1.41 $\pm$ 0.10 $<2 \times 10^{-16}$	22,135

Values given as log-odds. Reference category: excellent eyesight.

dividual lives. This effect is not always true for blind individuals. This can be due to the small size of the group of blind respondents or possibly to the fact that those with lifelong blindness have learned to cope with their loss.

One limitation of this current study is that the measures of vision and well-being are based on self-reports. However, even though self-report measures can differ from clinical measures of impairment [25, 26], there is also evidence of a high correlation between self-report and medical record diagnosis [27–29]. Most particularly, the discrepancies described by Friedman et al. [26] between reported and measured reading function apply primarily to an underestimation of the difficulty in reading a newspaper, which, if true for this sample, indicates that the results may actually be too conservative. Moreover, self-reported measures accurately describe the role of impairment in daily life, allow for patient-centred care by reflecting each patient's individual needs and are strongly related to actual patient performance [9]. Nevertheless, the possibility that persons with low psychologi-

cal well-being tend to report lower levels of eyesight cannot be excluded. However, there is evidence that depression does not influence visual acuity testing in older adults [30]. Additionally, we cannot exclude the possibility that people with depression are less likely to access health care, including eye health care services, and therefore have lower vision scores. Finally, a limitation can result from the response rates of 61.6% at household level and 85.3% at individual level as an average of all analysed countries (country-specific rates are available on the SHARE Internet site [24]).

Together with the results of other studies, these findings show that vision loss is associated with reduced QoL, decreased physical and mental health, and a loss of independence. Therefore, given the prevalence of visual problems among the older population [1] and the costs generated by decreased vision [18], vision impairment must be considered an important public health issue even in developed countries.

Based on evidence that three-quarters of vision loss is either correctable or preventable [31], several measures have been proposed to reduce low vision and its negative implications. First, for undercorrected refractive errors and cataracts (the most common and easily treatable causes of low vision [1]), aids like magnifying devices can reduce the degree of handicap. Because, currently, a large number of those who would benefit are not using such aids, greater provision of these inexpensive devices could help reduce the negative impact of low vision [32]. The problem can also be reduced through rehabilitation and support services [33]; however, evidence from Australia suggests that even when such services exist, they are accessed only by a quarter of the people with vision loss [18]. This situation underscores the importance of public health education and eye health promotion, as well as the need for regular eye examinations among the elderly population [1]. In addition, British [34], French [35] and US research studies [36] have found regional inequities in the distribution of ophthalmologists or visits to eye care professionals and an inverse correlation between the number of ophthalmologists and the prevalence of low vision [35]. Thus, more equity in the distribution of health care providers and a minimum ophthalmologist density might also improve the preservation of vision [35]. Finally, increased funding for research and implementation of research findings would enable evaluation of the impact of service provision on visual function, well-being, satisfaction and QoL, as well as contributing to optimal allocation of resources for vision loss prevention and alleviation of its negative consequences [22]. For instance,

Taylor et al. [31] calculated that a platform of strategic policy interventions to eliminate preventable blindness and vision impairment through early detection, prevention, rehabilitation, education and research would realize a total return of 4.8 times the initial expenditure in the first year and 6.2 times over the lifetime of the interventions. According to this calculation, effective eye care interventions are not only cost-effective, but also cost-saving.

Our results also confirm that, because of the impact of visual impairment on other aspects of well-being, a wider view should be taken of an older patient rather than focusing on a single impairment or disability [12].

Overall, our results show that persons with low vision have a higher probability of difficulty concentrating on reading and entertainment; lose interest and enjoyment in their activities; feel fatigued, irritable, sad and tearful; have less hope for the future and are more likely to wish for death. This strong impact of low vision on well-being, together with its frequency and economic impact, makes visual impairment an important public health issue. Even in developed countries, there is still great potential for improving both eyesight and QoL with impaired vision. Specifically, effective measures of early detection, prevention, rehabilitation, education and research would not only improve mental and physical health, but would also reduce the economic impact of low vision. This impact of vision on several other aspects of health and well-being also underlines the importance of taking a holistic view of patients.

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