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Self-reported visual function in healthy older people in Britain: an exploratory study of associations with age, sex, depression, education and income

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Background. Tractable but undetected visual impairment in older people may be relatively common, particularly amongst the very old and in more deprived populations. Measurement of visual acuity is unlikely to be helpful in identifying this impairment, but targeted assessment of visual function may be beneficial. There is uncertainty about the defining characteristics of the target group.

Objective. To explore factors associated with self-reported visual impairment in community dwelling older people.

Methods. Design: secondary cross sectional analysis of baseline data from a randomised controlled trial. Setting: three large group practices in outer London. Participants: older people aged 65 and over enrolled in a study of health risk appraisal. Method: postal questionnaire using questions from the National Eye Institute Visual Function questionnaire.

Results. Moderate or extreme visual function loss occurred in 4 to 12% of community-dwelling older people in this population reporting less than excellent vision, depending on which aspect of visual function is considered. Visual function loss in this subgroup increases in prevalence with advancing age, but is not associated with female sex, low educational attainment or low income. It is associated with depressed mood.

Conclusion. Questions about visual function identify a group of older people whose vision and mental state needs further investigation.

Keywords. Depression, general practice, older people, visual function.

Introduction

Visual impairment is associated with substantial diminution in quality of life[1] comparable with diabetes and stroke,[2] a negative impact on independence in daily living[3,4] including social activities,[5] depression,[6,7] falls[8] and hip fracture,[9,10] and higher all-cause mortality (in women).[11]

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The prevalence of near vision impairment in the population aged 65 and over was 7.6%, and of distance vision impairment of 4.4% in one North American study.[12] A large study in the UK suggests that 12.4% of the 75 and over age group is visually impaired, the prevalence rising rapidly with advancing age, especially for women.[13] A smaller study also in the UK gives a slightly higher prevalence of 14.3%, but for the population aged 65 and over.[14] Community surveys of older populations suggest that over half the visual impairment in this age group could potentially be reduced with treatment, particularly cataract surgery or refractive correction.[15,16] Eye tests are freely available to retired citizens in the UK, and generally readily accessible. There appears to be a gap between the ability to assess need and the uptake of treatment services. The primary care setting may be the most appropriate for assessment of vision and timely intervention to close this gap.[17]

Findings from a UK study of 1683 individuals aged 55 and over[18] suggest a substantial national prevalence of vision-related quality of life (VR-QOL) impairment, and

are consistent with earlier studies linking ocular disease with advancing age[19] and social deprivation. The authors argue that consideration should be given to directing resources more carefully towards groups at higher risk of VR-QOL impairment, in particular the very elderly and socially deprived.

This leaves primary care physicians with a problem. How can we easily identify those with remediable visual function loss, in the course of routine clinical activity? There is no evidence from randomised controlled trials that screening for asymptomatic eye disease in older populations results in improved vision, which may be due to perceptions of need, concerns about costs and long waiting lists for cataract surgery.[20] A strategy for identifying symptomatic individuals with tractable eye disease is needed, but it is unclear what identification methods are best, and who should deploy them, given the failure of practice nurses to improve outcomes in a recent, large trial.[21] Measurement of visual acuity alone is unlikely to be sufficient, since many older people with good acuity are effectively visually impaired in performing everyday tasks involving low and changing light levels, glare and low contrast.[22] Self-reported visual function may be a better way to assess visual impairment, in the absence of a suitable brief test for clinician use.[23] Can primary care physicians select those most likely to have visual impairment according to other characteristics, like age, sex and socio-economic status, and target this at-risk group for assessment? This study explores the factors associated with self-reported impaired visual function in a large community-dwelling sample of older people, in an attempt to identify the characteristics of a group with a greater probability of having visual problems.

Methods

Three large group practices in outer London were invited to participate in a randomised controlled trial of health risk appraisal in older people. A purposive sampling strategy was used to recruit practices, its criteria being a) known interest in primary care for older people; b) prior experience with research projects; c) extensive use of electronic medical records for clinical data capture; and d) similar locality demographics. The details of this trial, including the instruments used, are reported in detail in reports of the pilot and feasibility studies.[24,25]

Local research ethics committee approval was obtained for a postal questionnaire survey of the population aged 65 and over in each practice. GPs identified individuals with severe disabilities, major psychoses, dementia and those receiving palliative care, and these individuals were excluded from the study. A brief, self-completion postal assessment of health was used to identify those with significant disabilities or pathologies requiring in-patient care[26] [Prediction of Recurrent Admission (PRA) questionnaire], and individuals with self-reported impairment in basic activities of daily living were also excluded from the study (because the RCT was focussed on 'well' older people).

Those who responded and did not report the need for human assistance in basic activities of daily living on the postal questionnaire were randomised by household into an intervention group. At baseline those in the intervention group were asked to complete a detailed questionnaire on their health and health risk behaviours, the Health Risk Appraisal—Older people (HRA-O) instrument. This included the 5-item Mental Health Inventory Screening test[27] to identify depressed mood and nine questions from the National Eye Institute Visual Function Questionnaire (NEI-VFQ), a validated instrument for the assessment of visual function[28,29] in age-related eye disease,[30] as well as demographic details and questions about education and sources of income. The questions were selected from the NEI-VFQ in the construction of the HRA-O instrument,[31] and the six utilized (based on clinical relevance) for the present analysis are shown in Tables 1 and 2. Non-responders to the initial mailing were sent a postal reminder.

Data from the questionnaire was entered on a database designed for the study, with double data entry for purposes of quality control, and analysed in a two-stage process using SPSS 12 for Windows. In the first stage of the analysis Chi-square tests were used to explore the associations between female gender, increasing age, low educational level, low income and depression caseness with self-reported visual impairment. In the second stage of the analysis the independent variables with a significant association were entered in a single step into the binary logistic regression model. The dependent variables (shown in Table 3) were dichotomised as 'no difficulty at all' against 'a little, moderate, extreme difficulty or stopped doing this because of eyesight' for all except limitations in doing work or other activities. For this variable the dichotomy was between 'none of the time' and 'a little, some, most or all of the time'.

Results

There were 4466 people aged 65 and over registered with the three practices, of whom 4075 received the PRA questionnaire. A total of 2783 people completed the postal questionnaire, of whom 280 were excluded from the study because of their scores. Randomisation of the 2503 remaining provided an early intervention group of 1240 individuals, of whom 686 were female and 554 male.

Of the 1240 older people sent the HRA-O, 1072 completed the visual function screening question (response rate 86.5%). There were no significant differences between responders and non-responders in age or sex. Of the 1072 respondents 286 (27%) described their eyesight as excellent, 557 (52.0%) as good, 195 (18.2%) as fair and 25 (2.3%) as poor, and 9 (0.8%) as very poor. Amongst the

TABLE 1 *The prevalence of visual function loss in those not describing their eyesight as excellent (total* n = *786)*

	No difficulty		A little difficulty		Moderate difficulty		Extreme difficulty		Stopped because of eyesight problems	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
How much difficulty do you have reading ordinary print in newspapers? *n* = 782	513	65.6	190	24.3	66	8.4	3	0.4	10	1.3
How much difficulty do you have doing work or hobbies that require close vision? *n* = 777 [#5]	403	51.9	268	34.5	82	10.6	11	1.4	5	0.6
Because of your eyesight, how much difficulty do you have going down steps, stairs or, kerbs in dim light or at night? *n* = 765 [#6]	479	62.6	214	28.0	54	7.1	13	1.7	1	0.1
Because of your eyesight, how much difficulty do you have noticing objects off to the side while you are walking along? *n* = 770 [#7]	599	77.8	117	15.2	37	4.8	12	1.6	0	0
Because of your eyesight, how much difficulty do you have finding something on a crowded shelf up close to you? *n* = 771 [#8]	603	78.2	131	17.0	26	3.4	8	1.0	2	0.3
	None of the time		A little of the time		Some of the time		Most of the time		All of the time	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Are you limited in how long you can work or do other activities because of your eyesight? *n* = 769	546	71.0	153	19.9	61	7.9	6	0.8	3	0.4

Percentages are calculated using responses to questions as the denominator, with missing values excluded.
[#5] 8 (1.0 %) persons answered "Stopped doing this for other reasons"; [#6] 4 (0.5 %) persons answered "Stopped doing this for other reasons"; [#7] 5 (0.6 %) persons answered "Stopped doing this for other reasons"; [#8] 1 (0.1 %) persons answered "Stopped doing this for other reasons".

483 men 32% described their eyesight as excellent, whilst only 22% of the 589 women did so (Pearson Chi square 12.175 df = 1, $P = 0.0005$). Self-report of less than excellent vision increased with advancing age (Pearson Chi square 16.703 df = 3, $P = 0.0008$).

Table 1 shows the prevalence of visual function loss in those not describing their eyesight as excellent. Moderate to extreme visual function loss occurs in 4 to12% of this sample of community-dwelling older people, depending on which aspect of visual function is considered (see Table 1).

Loss in visual function was associated with female sex, advancing age and depressed mood, but not with years of education or with receipt only of the state pension (a proxy for low income), in univariate analyses (Table 2).

Multivariate analysis in a binary logistic regression model in which age, sex and depression caseness were entered in a single step shows that female sex is not independently associated with most functional loss, whilst depressed mood has an independent significant association with all functional losses, and advancing age with some (Table 3).

Discussion

The study was designed as an intervention study, not an epidemiological one, and this may have an influence on the conclusions that can be drawn from the data. However, we are concerned with exploring the

TABLE 2 *Factors associated with visual impairment*

	How much difficulty do you have reading ordinary print in newspapers?[a]	How much difficulty do you have doing work or hobbies that require close vision?[a]	Because of your eyesight, how much difficulty do you have going down steps, stairs, or kerbs in dim light or at night?[a]	Because of your eyesight, how much difficulty do you have noticing objects off to the side while you are walking along?[a]	Because of your eyesight, how much difficulty do you have finding something on a crowded shelf up close to you?[a]	Are you limited in how long you can work or do other activities because of your eyesight?[b]
Gender	Women more than men (trend) Chi sq = 5.191 df = 2, $P = 0.075$	NSD	Women more than men Chi sq = 16.917 df = 2, $P < 0.001$	NSD	NSD	Women more than men Chi sq = 14.422 df = 2, $P < 0.001$
Age 65–74, 75–79, 80–84, 85+	Increases with age Chi sq = 30.299 df = 6, $P < 0.001$	Increases with age (trend) Chi sq = 11.284 df = 6, $P = 0.080$	Increases with age Chi sq = 33.148 df = 6, $P < 0.001$	Increases with age Chi sq = 35.856 df = 6, $P < 0.001$	Increases with age Chi sq = 35.143 df = 6, $P < 0.001$	Increases with age Chi sq = 16.272 df = 6, $P < 0.02$
Education Up to 16 years versus over age of 16	NSD	NSD	NSD	NSD	NSD	Variation in both directions (trend) Chi sq = 5.848 df = 2, $P = 0.054$
State Pension State pension alone versus additional income	NSD	NSD	NSD	NSD	NSD	NSD
Depression Yes, no	Depressed more than not depressed Chi sq = 18.285 df = 2, $P < 0.001$	Depressed more than not depressed Chi sq = 14.911 df = 2, $P < 0.001$	Depressed more than not depressed Chi sq = 32.457 df = 2, $P < 0.001$	Depressed more than not depressed Chi sq = 23.160 df = 2, $P < 0.001$	Depressed more than not depressed Chi sq = 34.780 df = 2, $P < 0.001$	Depressed more than not depressed Chi sq = 25.666 df = 2, $P < 0.001$

NSD = no significant differences.
[a] Based on 3 categories: a little, moderate–extreme difficulty, stopped doing this because of your eyesight
[b] Based on 3 categories: none of the time–a little, some of the time–most, all of the time.

TABLE 3 *Outcomes of binary logistic regression*

Question	Equation variables	OR	95% CI	Significance
Difficulty in reading ordinary print in newspapers[a]	Male sex	0.91	0.67–1.25	0.573
	Increasing age	2.44	1.37–4.34	0.002
	Positive on depression scale	2.07	1.41–3.04	<0.001
Difficulty in work or hobbies requiring close vision[a]	Male sex	0.98	0.72–1.31	0.870
	Increasing age	1.91	1.10–3.50	0.032
	Positive on depression scale	1.91	1.30–2.84	0.001
Difficulty in going down stairs or kerbs in dim light[a]	Male sex	0.64	0.47–.88	0.006
	Increasing age	2.83	1.54–5.18	0.001
	Positive on depression scale	2.71	1.82–4.04	<0.001
Difficulty in noticing objects off to the side[a]	Male sex	1.14	0.79–1.66	0.482
	Increasing age	4.67	2.52–8.65	<0.001
	Positive on depression scale	2.57	1.67–3.95	<0.001
Difficulty in finding something on a crowded shelf[a]	Male sex	1.23	0.85–1.78	0.273
	Increasing age	2.74	1.48–5.08	0.001
	Positive on depression scale	3.18	2.10–4.82	<0.001
Limited in how long to do work or other activities[b]	Male sex	0.60	0.43–0.85	0.004
	Increasing age	1.82	1.00–3.34	0.052
	Positive on depression scale	2.39	1.60–3.57	<0.001

[a] Based on the dichotomous outcome: no difficulty at all against a little, moderate, extreme difficulty, stopped doing this because of your eyesight.
[b] Based on the dichotomous outcome: none of the time against a little, some, most, all of the time.

implications for clinical practice, and in particular in defining the characteristics of a potential at-risk group. This study was carried out in three group practices in outer London, and the populations studied may not be typical of other areas, partly because they are urban and partly because the GPs had an interest in primary care for older people. Respondents to the questionnaire may be different to non-respondents, particularly in socio-economic status and education (including literacy level), and this may have introduced bias into the results. The questions extracted from the NEI-VFQ may not have captured aspects of visual function loss that are related to socio-economic status, and our assessment of economic status is a simple one that identifies only two groups, those on a minimum income and those receiving more. However, we believe that the high response rate in a large sample of relatively healthy, community dwelling older people does allow us to draw tentative conclusions that may be important for clinical practice. Our results represent a likely yield of information from the use in primary care settings of a self-report questionnaire as part of a programme to improve the health of older people.

The great majority of older people in this study reported no or little difficulty in everyday tasks due to eyesight problems, a finding consistent with a similar study in the same age group in the USA.[32] However, moderate or extreme difficulty, or cessation of tasks because of poor vision, were reported by 4% to 12% of respondents in this study, depending on which aspect of visual function is considered, with the prevalence of visual function impairment increasing with age. We did not find a consistent association between female sex and visual impairment, but our population was younger than that of the MRC study.[13] Depressed mood is also associated with these reported disabilities, although it is impossible to say from this cross-sectional study whether depression causes or is caused by the visual impairment. Our findings do not support the argument that visual function assessment should be targeted at the most deprived older people. If this study reflects a wider pattern of visual function loss in the community clinicians may not achieve an economy of effort by paying special attention to older women of low socio-economic status; the search for self-reported symptoms across a small range of everyday visual tasks may be the closest we can get to identifying the group needing treatment.

This symptomatic group identified using a shortened version of the NEI-VFQ appears to warrant further clinical investigation, and this would also validate the shortened instrument. Such a brief visual function questionnaire may be an appropriate instrument suitable for primary care use, either as a self-completion or as a clinical tool. An experimental study using a shortened VFQ as a case-finding instrument, but with objective outcome measures, would then be needed to show that this targeted approach results in health gain.

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Declaration

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Conflicts of interest: none.

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