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Learning objectives

Upon completion of this activity, participants will be able to:

1. Evaluate sociodemographic risk factors for poor outcomes in visual acuity after cataract surgery among men.
2. Evaluate sociodemographic risk factors for poor outcomes in visual acuity after cataract surgery among women.
3. Evaluate sociodemographic risk factors for poor outcomes in visual function after cataract surgery among men.
4. Evaluate sociodemographic risk factors for poor outcomes in visual function after cataract surgery among women.

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Relationship of sociodemographic variables with outcomes after cataract surgery

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CLINICAL STUDY

Abstract

Purpose **The objective of this study is to analyse the relationship between sociodemographic characteristics of patients undergoing cataract extraction and their outcomes.**
Methods **The method comprised a prospective cohort study of patients recruited from 17 hospitals of different areas of Spain. Data gathered before surgery included sociodemographic variables, visual acuity, and visual function (using the Visual Function Index-14). After surgery, we assessed visual acuity and visual function at 6 weeks and at 3 months, respectively. Multivariate multilevel analysis was performed to assess the relationship of sociodemographic variables with changes in visual acuity and function, analysing whether improvements surpassed the minimal clinically important differences (MCIDs).**
Results **Multivariate analysis showed that for visual acuity, (i) older men had a lower odds ratio (OR) of surpassing the MCID (OR: 65–75 years, 0.64; >75 years, 0.51); (ii) those with primary (1.65) or secondary (1.41) education had higher ORs than those with no formal education; and (iii) those living in a residential home had a lower OR than men living alone (0.36). In women, we found that the higher the educational level, the greater the improvement in visual acuity (primary, 1.41; secondary, 1.76), whereas socially dependent women (0.70) were less likely to exceed the MCID. With regards to predictors related to achievement of an MCID in visual function, only dependency was associated with more improvement in men (OR: 1.39), whereas in women the educational level was the only predictor (primary: 0.72; secondary: 0.61).**
Conclusions **This study found that patients with certain sociodemographic characteristics were less likely to experience an MCID in visual acuity or visual function after cataract surgery.**
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Keywords: cataract extraction; quality of life; visual acuity; outcomes; sociodemographic factors

Introduction

Age-related cataract is one of the most common diseases, and is one whose prevalence is expected to rise in the coming years in industrialised countries.[1,2] To a great extent, the occurrence of this type of cataract is determined by ageing and, therefore, with longer life expectancies, it is bound to increase.[3,4] Cataract extraction surgery is among the most common surgical procedures. In general, it is highly beneficial for patients as has been demonstrated by numerous studies.[5–7]

The outcome of this type of intervention is usually evaluated by ophthalmologists or opticians by measuring visual acuity. Visual function is also assessed on the basis of the perception of the patient, but in routine clinical practice this is not usually done in a standardised way. To standardise the process, there are some questionnaires that measure visual function in relation to the carrying out of or difficulty in performing some common tasks. These include the Visual Function Index (VF-14), the validity of which has been demonstrated in the original paper and in the version translated into Spanish.[8,9]

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In the case of cataracts, some studies have found differences due to sociodemographic factors in the occurrence of this disease or in the indication for surgery.[10–11] Few studies, however, have assessed changes in visual acuity or function in relation to sociodemographic variables.

Our objective was to explore whether there were differences after cataract surgery as a function of a range of sociodemographic factors. The outcomes were measured in the classical way, recording changes in visual acuity, but also considering the perception of patients and assessing their visual function using the VF-14. Our study was based on a large sample from several hospitals.

Materials and methods

This was a prospective cohort study of patients consecutively recruited, who were scheduled to undergo cataract surgery by phacoemulsification in 17 hospitals in 4 autonomous regions in Spain, between October 2004 and July 2005. All participating hospitals are public centres of the Spanish National Health System and have similar human resources and technology. The study was assessed and approved by the Clinical Research Ethics Committees of all of the participating hospitals.

The inclusion criteria of the study were patients being 18 years old or above, and giving informed consent before participation in the study. Patients undergoing other intraocular procedures, in addition to cataract extraction, were excluded from the study. Likewise, patients with cancer or severe organic psychiatric disorders that prevented them from collaborating in the study and also any patient with difficulty in reading or understanding the questionnaires were excluded.

Patients' personal information was collected exclusively to carry out the follow-up, and their confidentiality was guaranteed and safeguarded, in particular, with respect to the database where information was stored during the study period.

The ophthalmologists and nurses who participated in the study collected clinical data masked (without knowing the objectives of the study) before the cataract extraction surgery, intraoperatively and postoperatively (6 weeks after surgery). This information included sociodemographic data (sex, age, level of education, marital status, living arrangements, and social support), clinical data before surgery (visual acuity of the eye to be operated on, laterality, visual acuity of the other eye, presence of other ocular comorbidities, and visual function and technical complexity of the cataract extraction), information related to the surgical technique, and complications within 6 weeks after the intervention.

Specifically, in the visit before the surgical intervention, before including patients on the waiting list for surgery, ophthalmologists measured visual acuity in each eye. Visual acuity was measured again in both eyes 6 weeks after surgery. In all cases, each eye was assessed independently using Snellen charts and recording the best-corrected visual performance in decimal units.

The VF-14 is a validated index, which measures the difficulty that the patients have in performing 14 vision-dependent activities of daily living, such as daytime and night-time driving, reading traffic signs or small print, and engaging in recreational activities. Scores on the VF-14 range from 0 (unable to do any activities) to 100 points (able to do all activities without difficulty).[8] The VF-14 has been translated and validated in Spanish.[9] This questionnaire was sent by mail to the patients at the time of the visit when they were included on the list for surgery. To increase the response rate, two reminders were sent by mail to those patients who had not returned completed questionnaires; in addition, telephone calls were made to further increase the response rate. Three months after surgery, the questionnaire was sent to the patients again, following the same strategy as described above.

Statistical analysis

For descriptive statistics, frequencies and percentages were used for categorical variables, whereas means, SD, and 95% confidence intervals were used for continuous variables. To assess the differences between responders (patients with any of the outcomes assessed after the surgical intervention) and non-responders, Student's *t*-test was used for visual acuity and VF-14 scores, and for categorical variables we used the χ^2- or the Fisher's exact tests. The same tests were also used to study the relationship between the sociodemographic variables and outcomes, by sex.

The change in visual acuity was defined as the difference of the best-corrected visual acuity measured at 6 weeks after surgery minus the baseline assessment. Similarly, the change in the overall VF-14 score was calculated as the difference of the score 3 months after surgery minus the score obtained at baseline, before the intervention.

The analysis was carried out stratifying by sex given that we found differences in some sociodemographic variables between men and women. Further, patients were categorised into two groups according to their change in visual acuity (<0.41 and ≥ 0.41), in line with previous studies that identified 0.41 as the cut-off point for a minimal clinically important difference (MCID)[12,13] after this type of surgery. Similarly, patients were divided into two groups by VF-14 score, using 15 as the cut-off

point (<15 or ≥15) based on the results of a study mentioned earlier.[5] In both cases, a change equal to or greater than the cut-off point indicated an improvement in the outcome measured, this change being a minimal clinically important improvement. To assess the association between the explanatory variables and improvement in visual acuity and function, we used the χ^2- or the Fisher's exact tests.

Finally, multivariable multilevel analysis was carried out by means of generalised estimating equations with changes in visual acuity and the VF-14 score as dependent variables, the independent variables being those with $P<0.15$,[14] in the bivariate analysis, and adjusting for other clinical variables, such as ocular comorbidities, the pre-intervention value of the dependent variable under study, contralateral visual acuity, and the complexity of the cataract surgery, which showed association with the outcomes studied.[15,16] For this analysis, the patient was considered as the level 1 unit and the hospital as the level 2 unit. For categorical variables, the criteria used for defining categories were the patient characteristics most frequent, or those which might potentially be the most meaningful, for interpreting the results obtained.

The statistical analysis was carried out using the SAS software for Windows (version 9.2; SAS Institute Inc., Cary, NC, USA).

Results

During the study period 7458 patients were identified, and of these, 927 were excluded for not complying with the inclusion criteria (300 patients because of age, 53 as they were not from the catchment areas of the participating hospitals, 48 declined to participate, 60 because of the additional diagnosis of corneal dystrophy, 455 because of re-intervention, and 11 for other reasons). Of the 6531 patients who met the inclusion criteria, 5512 completed the questionnaires before surgery and these represent the study sample. Overall, there were data on visual acuity 6 weeks after the intervention for 4715 patients, whereas 4186 patients completed the VF-14 questionnaire 3 months after surgery. Therefore, our final samples were 4715 patients for visual acuity and 4186 patients for visual function (as measured by the VF-14).

We found statistically significant differences between responders ($n=4186$) and non-responders ($n=1326$) in some variables; for example, among the non-responders there were higher percentages of people with primary-level education (32.26 *vs* 28.09%) and of individuals who were dependent (55.86 *vs* 54.49%), and a lower percentage of married people (54.77 *vs* 63.42%). In addition, the mean visual acuity (0.25 ± 0.17 *vs* 0.28 ± 0.17) and the pre-intervention VF-14 score (56.31 ± 24.46 *vs* 61.18 ± 22.39) were lower in non-responders.

The study sample included more women (58.83%) and the overall mean age was 73 years (SD 8.90). The main sociodemographic and clinical characteristics of the sample are described in Table 1, and it can be observed that there were statistically significant differences between sexes.

Table 2 reports the results of the bivariate analysis of the sociodemographic variables under study and the changes in VF-14, stratified by patient sex and whether there was an MCID between scores before and after cataract surgery. It can be seen that by analysing the changes in VF-14 score in this way, as a dichotomous outcome (eg, was the change an MCID or not), significant associations were found only for the level of education in women and for social dependence in men.

Similarly, in Table 3 we present the results of the bivariate analysis of the sociodemographic variables and changes in visual acuity due to surgery, again converting changes into a dichotomous outcome using the MCID cut-off point. In this case, age, level of education, and employment status were found to be associated with change in visual acuity in both men and women, while social dependence and marital status were also associated in women.

The multivariate analysis of improvement in visual acuity (dichotomous), including all the variables that were $P<0.15$ in the bivariate analysis, is reported in Table 4 stratified by sex. The data were adjusted by pre-surgery values of the corresponding outcome variable, the presence of other ocular conditions, and the technical complexity of the intervention. In men, the variables' age, level of education, and living arrangements were found to be statistically significant, whereas in women the level of education and being socially dependent were significant.

Similarly, the results of the multivariate analysis for the improvement in visual function, in terms of the MCID, are reported in Table 5. In this case, in men only being socially dependent was associated with an improvement in VF-14 score, whereas in women the level of education was found to be correlated with this change.

Discussion

This multicentre study with a large cohort of patients who underwent cataract surgery indicates that there are some sociodemographic factors that have a relationship with the main outcomes following this type of intervention.

After the multivariate analysis, and the corresponding adjustments, the main findings of this study had slightly different patterns according to patients' sex, and the

Table 1 Description of the clinical and sociodemographic characteristics of the study sample ($n = 4715$)

	Men (n = *1941*)	*Women* (n = *2774*)	P-*value*
Age[a]	72.12 (9.15)	73.98 (8.65)	<0.0001
Age (categories, years)			*<0.0001*
<65	328 (17.11)	330 (11.97)	
65–74	732 (38.18)	957 (34.71)	
≥75	857 (44.71)	1470 (53.32)	
Ocular comorbidity			*0.25*
Simple cataract	1503 (77.43)	2108 (75.99)	
Retinopathies (diabetic and others)	438 (22.57)	666 (24.01)	
Social dependency (yes)	876 (52.42)	1235 (50.84)	0.32
Employment			*<0.0001*
Employed	210 (11.06)	114 (4.25)	
Housework	8 (0.42)	1234 (45.98)	
Retired	1681 (88.52)	1336 (49.78)	
Level of education			*<0.0001*
None	410 (22.42)	849 (32.50)	
Primary	984 (53.80)	1509 (57.77)	
Secondary or more	435 (23.78)	254 (9.72)	
Marital status			*<0.0001*
Married/with partner	1499 (81.42)	1274 (48.51)	
Divorced	147 (7.98)	226 (8.61)	
Widowed	195 (10.59)	1126 (42.88)	
Living arrangements			*<0.0001*
Live alone	167 (8.85)	691 (25.83)	
Live with partner	1699 (90.08)	1949 (72.86)	
Live in a residential home	20 (1.06)	35 (1.31)	
VA pre-intervention			*0.28*
≤0.1	495 (25.50)	654 (23.58)	
0.2–0.4	1133 (58.37)	1675 (60.38)	
≥0.5	313 (16.13)	445 (16.04)	
Contralateral VA			*0.0002*
≤0.1	120 (6.23)	136 (4.93)	
0.2–0.4	613 (31.84)	1030 (37.37)	
≥0.5	1192 (61.92)	1590 (57.69)	
VA change[a]	0.49 (0.26)	0.46 (0.25)	<0.0001
VA change			*0.01*
<0.41	575 (29.62)	915 (32.98)	
≥0.41	1366 (70.38)	1859 (67.02)	
VF-14 pre-intervention[b]			*0.10*
<45	403 (22.83)	605 (24.99)	
≥45	1362 (77.17)	1816 (75.01)	
VF-14 change[a,b]	23.71 (24.40)	24.29 (24.28)	0.44
VF-14 change[b]			*0.06*
<15	660 (37.39)	837 (34.57)	
≥15	1105 (62.61)	1584 (65.43)	
Time to intervention (months)[c]	1.73 (1.67–3.87)	2.90 (1.83–4.03)	0.01
Time to intervention (months)			*0.02*
≤2	509 (31.52)	646 (27.99)	
2–4	751 (46.50)	1083 (46.92)	
≥4	355 (21.98)	579 (25.09)	

Abbreviations: VA, visual acuity; VF-14, Visual Function Index-14.
[a] Mean (SD).
[b] Calculated from the available data of the completed post-intervention VF-14 questionnaires ($n = 4186$).

identification of the level of education, type of living arrangements, and dependence were the factors associated with changes in visual acuity, and the level of education and dependence were related to changes in visual function measured by the VF-14. In short, some sociodemographic variables were found to be significantly associated with changes in visual acuity obtained after the intervention, differences were found in the variables according to patient sex, and, notably, the level of education repeatedly emerged as a relevant factor.

Several previous studies have assessed the association of sociodemographic factors with the presence of cataracts or with the indication of cataract extraction surgery in these patients.[10,17–20] To our knowledge, however, there have been few studies similar to ours, that is, studies that have focused on exploring differences in outcomes as a function of sociodemographic variables. Some studies have reported differences according to sex[21] and even the level of education,[7] but most commonly the only factor noted is age.[22–24]

What could be the reasons why older patients who are socially dependent and have lower levels of education have a lower probability of achieving a minimal clinically important improvement after cataract surgery? One possible explanation may be that the older the patient, the more likely are the associated non-ocular comorbidities to be present, and these may have an impact on visual acuity. We suggest that this type of factor, basically physiopathological, is most likely to underlie these differences, at least partly. Further, we believe that other more subjective factors at the time of the assessment of visual acuity may also influence results. Hence, the measurement of visual acuity may have a subjective component that affects both the assessor and the assessed. In the case of the evaluation of visual function, there is an even greater degree of subjectivity and this may, in part, explain our findings. Moreover, we have to face that getting the optimal refractive correction after cataract surgery is something that may be influenced by sociodemographic factors. We can suspect that poor people, less-educated people, or other groups may not buy the glasses they need to fully benefit from their cataract extraction. However, in both cases there remains a possibility that these findings are real, and that in the participating hospitals there are differences in outcomes as a function of some sociodemographic characteristics of patients; if so, this would be of concern for politicians, managers, and health professionals involved in their treatment. Other questions that arise, in the light of these findings, include: Would it be advisable to surgically treat these patients earlier? If so, when? From a health policy

Table 2 Bivariate analysis of VF-14 changes

	VF-14 changes					
	Men			*Women*		
	<15 (n = *660*)	*≥15* (n = *1105*)	P-*value*	*<15* (n = *837*)	*≥15* (n = *1584*)	P-*value*
	n *(%)*	n *(%)*		n *(%)*	n *(%)*	
Age (years)			*0.24*			*0.14*
<65	96 (14.81)	191 (17.51)		84 (10.13)	202 (12.87)	
65–75	245 (37.81)	420 (38.50)		294 (35.46)	533 (33.97)	
>75	307 (47.38)	480 (44.00)		451 (54.40)	834 (53.15)	
Level of education			*0.94*			*<0.001*
None	145 (23.02)	234 (22.37)		220 (27.23)	529 (34.55)	
Primary	334 (53.02)	555 (53.06)		485 (60.02)	863 (56.37)	
Secondary or more	151 (23.97)	257 (24.57)		103 (12.75)	139 (9.08)	
Employment			*0.44*			*0.26*
Employed	69 (10.58)	128 (11.70)		34 (4.12)	73 (4.68)	
Housework	1 (0.15)	5 (0.46)		411 (49.82)	723 (46.35)	
Retired	582 (89.26)	961 (87.84)		380 (46.06)	764 (48.97)	
Social dependency			*<0.001*			*0.18*
Yes	250 (45.96)	538 (55.52)		338 (48.22)	726 (51.31)	
No	294 (54.04)	431 (44.48		363 (51.78)	689 (48.69)	
Marital status			*0.39*			*0.35*
Married/with partner	515 (81.49)	884 (83.63)		399 (49.02)	763 (49.61)	
Divorced	52 (8.23)	69 (6.53)		79 (9.74)	123 (8.00)	
Widowed	65 (10.28)	104 (9.84)		333 (41.06)	652 (42.39)	
Living arrangements			*0.98*			*0.42*
Live alone	52 (8.00)	84 (7.72)		221 (29.98)	382 (24.50)	
Live with partner	592 (91.08)	994 (91.36)		589 (71.92)	1160 (74.41)	
Live in a residential home	6 (0.92)	10 (0.92)		9 (1.10)	17 (1.09)	
Contralateral VA			*0.005*			*<0.001*
≤0.1	29 (4.45)	70 (6.42)		24 (2.90)	82 (5.25)	
0.2–0.4	188 (28.88)	376 (34.46)		282 (34.06)	637 (40.78)	
≥0.5	434 (66.67)	645 (59.12)		522 (63.04)	843 (53.97)	
Time to intervention (months)			*0.77*			*0.33*
≤2	166 (31.86)	272 (30.94)		179 (26.72)	335 (27.64)	
2–4	240 (46.07)	422 (48.01)		334 (49.85)	563 (46.45)	
≥4	115 (22.07)	185 (21.05)		157 (23.43)	314 (25.91)	

Abbreviations: *n* (%), frequency (percentage); VA, visual acuity; VF-14, Visual Function Index-14.
For the association between categorical variables, we used the χ^2- or Fisher's exact test.

perspective, is it necessary to make any changes to maintain equality and attempt to reduce the sociodemographic differences observed in this study? We cannot answer these questions with the data available from this study, but these should be assessed in future research that should also consider more data related to associated comorbid conditions and other factors, both objective and subjective, that might have an impact on changes in visual acuity. In relation to health policy, we believe that these findings are a warning to those responsible of the need to establish mechanisms to check that there are not inequalities in this field. In any case, we found that only two of the sociodemographic variables considered were significantly related to the change in visual function. Other studies have found visual function to be more closely related to patient satisfaction than to visual acuity.[25] If true also in our country, this may suggest that the differences we have found may be of relatively little importance to these patients in their daily lives.

Table 3 Bivariate analysis of VA changes

	VA changes					
	Men			*Women*		
	<0.41 (n = *575*)	*≥0.41* (n = *1366*)	P-*value*	*<0.41* (n = *915*)	*≥0.41* (n = *1859*)	P-*value*
	n *(%)*	n *(%)*		n *(%)*	n *(%)*	
Age (years)			*<0.001*			*<0.001*
<65	67 (11.75)	261 (19.38)		88 (9.71)	242 (13.07)	
65–75	211 (37.02)	521 (38.68)		286 (31.57)	671 (36.25)	
>75	292 (51.23)	565 (41.95)		532 (58.72)	938 (50.68)	
Level of education			*0.002*			*<0.001*
None	147 (26.97)	263 (20.48)		340 (39.86)	509 (28.94)	
Primary	261 (47.89)	723 (56.31)		441 (51.70)	1068 (60.72)	
Secondary or more	137 (25.14)	298 (23.21)		72 (8.44)	182 (10.35)	
Employment			*0.01*			*0.002*
Employed	43 (7.66)	167 (12.48)		28 (3.19)	86 (4.76)	
Housework	1 (0.18)	7 (0.52)		373 (42.48)	861 (47.67)	
Retired	517 (92.16)	1164 (87.00)		477 (54.33)	859 (47.56)	
Social dependency			*0.33*			*0.003*
Yes	240 (54.42)	636 (51.71)		416 (55.39)	819 (48.81)	
No	201 (45.58)	594 (48.29)		335 (44.61)	859 (51.19)	
Marital status			*0.62*			*0.05*
Married/with partner	442 (29.49)	1057 (70.51)		390 (45.30)	884 (50.08)	
Divorced	43 (29.25)	104 (70.57)		74 (8.59)	152 (8.61)	
Widowed	64 (32.82)	131 (67.18)		397 (46.11)	729 (41.30)	
Living arrangements			*0.29*			*0.16*
Live alone	47 (8.47)	120 (9.02)		244 (28.01)	447 (24.78)	
Live with partner	499 (89.91)	1200 (90.16)		614 (70.49)	1335 (74.00)	
Live in a residential home	9 (1.62)	11 (0.83)		13 (1.49)	22 (1.22)	
Contralateral VA			*0.005*			*0.15*
≤0.1	49 (8.60)	71 (5.24)		48 (5.29)	88 (4.76)	
0.2–0.4	193 (33.86)	420 (31)		360 (39.65)	670 (36.26)	
≥0.5	328 (57.54)	864 (63.76)		500 (55.07)	1090 (58.98)	
Time to intervention (months)			*0.39*			*0.51*
≤2	131 (28.98)	378 (32.50)		204 (28.02)	442 (27.97)	
2–4	218 (48.23)	533 (45.83)		331 (45.47)	752 (47.59)	
≥4	103 (22.79)	252 (21.67)		193 (26.51)	386 (24.43)	

Abbreviations: *n* (%), frequency (percentage); VA, visual acuity; VF-14, Visual Function Index-14.
Change of VA is defined as the difference of the best-corrected VA measured at six weeks after surgery and the baseline assessment categorised.
For the association between categorical variables, we used the χ^2- or Fisher's exact test.

The strengths of this study include the following: its prospective design; its multicentre nature, with the collaboration of 17 hospitals of the Spanish National Health Service across 4 autonomous regions; the large sample of patients included; the assessment of the intervention outcomes not just clinically, that is, in terms of visual acuity, but also considering visual function as perceived by the patient, using a standardised tool, the VF-14, which has been validated in Spain; and, finally, that the obtained results were properly adjusted by other relevant variables, clinical as well as the participating hospital. With regards to the latter aspect of the study, a multilevel analysis allowed us to simultaneously examine the effect of factors at different levels of the data structure, assessing, thereby, both the within- and between-subject variability. The use of this type of analysis in the field of health service research makes it possible to assess variability between hospitals, assessing, for example, the relationship of hospital stays, level of

Table 4 Multivariate analysis, using GEEs of the changes in VA stratified by sex

	VA changes			
	Men		*Women*	
	OR (95% CI)	P-*value*	*OR (95% CI)*	P-*value*
Age (years)				
<65	Reference		Reference	
65–75	0.66 (0.44–0.99)	0.04	1.24 (0.82–1.88)	0.31
>75	0.52 (0.33–0.80)	0.003	1.04 (0.75–1.43)	0.82
Employment				
Employed	Reference		Reference	
Homemaker	1.42 (0.35–5.87)	0.62	0.72 (0.38–1.37)	0.32
Retired	0.85 (0.52–1.39)	0.51	0.60 (0.32–1.13)	0.11
Level of education				
None	Reference		Reference	
Primary	1.66 (1.24–2.23)	0.001	1.40 (1.22–1.61)	≤0.0001
Secondary or more	1.38 (0.97–1.97)	0.07	1.76 (1.34–2.31)	≤0.0001
Marital status				
Married/with partner	Reference		Reference	
Divorced	0.75 (0.52–1.08)	0.12	0.96 (0.71–1.29)	0.77
Widowed	0.90 (0.62–1.31)	0.58	0.90 (0.73–1.10)	0.30
Social dependency				
Yes	0.96 (0.80–1.16)	0.68	0.70 (0.57–0.87)	0.001
No	Reference		Reference	
Living arrangements				
Live alone	Reference		Reference	
Live with partner	0.69 (0.42–1.11)	0.12	1.01 (0.78–1.32)	0.93
Live in a residential home	0.38 (0.18–0.80)	0.01	0.89 (0.56–1.42)	0.63

Abbreviations: GEE, generalised estimating equation; OR, odds ratio; Reference, reference category; VA, visual acuity; 95% CI, 95% confidence intervals.
Models were developed using GEE models.
Change of VA is defined as the difference of the best-corrected VA measured at 6 weeks after surgery and the baseline assessment categorised.
Adjusted by pre-intervention values of the outcome variable studied, contralateral VA, ocular comorbidities, and technical complexity.

Table 5 Multivariate analysis, by GEEs, of the changes in the VF-14 stratified by sex

	VF-14 changes			
	Men		*Women*	
	OR (95% CI)	P-*value*	*OR (95% CI)*	P-*value*
Age				
<65	Reference		Reference	
65–75	0.97 (0.68–1.40)	0.88	0.71 (0.45–1.13)	0.15
>75	0.79 (0.55–1.14)	0.21	0.65 (0.41–1.04)	0.07
Employment				
Employed	Reference		Reference	
Housework	2.40 (0.21–27.13)	0.48	0.76 (0.43–1.32)	0.33
Retired	0.81 (0.53–1.23)	0.32	0.88 (0.49–1.58)	0.66
Level of education				
None	Reference		Reference	
Primary	1.17 (0.91–1.50)	0.23	0.72 (0.56–0.93)	0.01
Secondary or more	1.03 (0.70–1.50)	0.89	0.61 (0.45–0.82)	0.001
Marital status				
Married/with partner	Reference		Reference	
Divorced	0.57 (0.30–1.10)	0.09	0.95 (0.62–1.46)	0.82
Widowed	0.82 (0.53–1.28)	0.39	1.20 (0.96–1.50)	0.10
Social dependency				
Yes	1.37 (1.12–1.69)	0.003	1.01 (0.84–1.21)	0.92
No	Reference		Reference	
Living arrangements				
Live alone	Reference		Reference	
Live with partner	0.84 (0.45–1.57)	0.59	1.25 (0.97–1.61)	0.09
Live in a residential home	2.28 (0.61–8.57)	0.22	1.35 (0.73–2.47)	0.34

Abbreviations: GEE, generalised estimating equation; OR, odds ratio; 95% CI, 95% confidence intervals; Reference, reference category.
Models were developed using GEE models.
Adjusted by pre-intervention values of the outcome variable studied, ocular comorbidities, contralateral VA, and technical complexity.

satisfaction, and waiting times with patient characteristics.[26]

As in all prospective studies, one of the main limitations of this study was the losses to follow-up. Even so, the rate of loss of patients is similar to that in other studies, [27] and although differences were found between responders and non-responders in some clinical and sociodemographic variables, we believe that this was in part due to the large sample size. We should, nevertheless, highlight the potential bias of the larger percentages of people with primary-level education and living alone among non-responders, which might be attributable to difficulties of these patients in completing the questionnaires. Interestingly, these same variables were found to be associated with the outcome variables evaluated; thus, we could hypothesise that this group of non-responders may have obtained poorer outcomes overall. On the other hand, with the large sample of patients some of the statistically significant associations found should be interpreted in the light of the actual differences found, which, in many cases, correspond to differences that are small and may not be clinically important. In relation to VF-14, some studies have argued that it presents an important ceiling effect and poor responsiveness, which may cause a failure capturing the visual function changes of these patients, and, therefore, our results have to be evaluated with caution in relation to that parameter.[28,29]

The main conclusions of the study are that after adjusting by other relevant clinical or sociodemographic parameters, there are patients who are older, with a greater level of social dependence and lower level of education, and who seem to be less likely to achieve a minimal clinically important improvement in visual acuity and, to a lesser extent, visual function after cataract surgery.

Contributors

The IRYSS–Cataract Group (IRYSSCG)

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Summary

What was known before

- Visual Function Index, variations between different geographic areas.
- Longitudinal changes in visual function.

What this study adds

- Differences in mean visual acuity change in some sociodemographic factors by sex.
- Influence of sociodemographic parameters on the mean VF-14 change stratified by sex.

Conflict of interest

The authors declare no conflict of interest.

References

1 Congdon N, Vingerling JR, Klein BE, West S, Friedman DS, Kempen J *et al*. Prevalence of cataract and pseudophakia/aphakia among adults in the United States. *Arch Ophthalmol* 2004; **122**: 487–494.
2 Rochtchina E, Mukesh BN, Wang JJ, McCarty CA, Taylor HR, Mitchell P. Projected prevalence of age-related cataract and cataract surgery in Australia for the years 2001 and 2021: pooled data from two population-based surveys. *Clin Exper Ophthalmol* 2003; **31**: 233–236.
3 Keenan T, Rosen P, Yeates D, Goldacre M. Time trends and geographical variation in cataract surgery rates in England: study of surgical workload. *Br J Ophthalmol* 2007; **91**: 901–904.
4 McCarty CA. Cataract in the 21st Century: lessons from previous epidemiological research. *Clin Exp Optom* 2002; **85**: 91–96.
5 Bilbao A, Quintana JM, Escobar A, García S, Andradas E, Baré M *et al*. Responsiveness and clinically important differences for the VF-14 index, SF-36, and visual acuity in patients undergoing cataract surgery. *Ophthalmology* 2009; **116**: 418–424.
6 Lundqvist B, Monestam E. Longitudinal changes in subjective and objective visual function 5 years after cataract surgery prospective population-based study. *J Cataract Refract Surg* 2006; **32**: 1944–1950.
7 Saw SM, Tseng P, Chan WK, Chan TK, Ong SG, Tan D. Visual function and outcomes after cataract surgery in a Singapore population. *J Cataract Refract Surg* 2002; **28**: 445–453.
8 Steinberg EP, Tielsch JM, Schein OD, Javitt JC, Sharkey P, Cassard SD *et al*. The VF-14. An index of functional impairment in patients with cataract. *Arch Ophthalmol* 1994; **112**: 630–638.
9 Alonso J, Espallargues M, Andersen TF, Cassard SD, Dunn E, Bernth-Petersen P *et al*. International applicability of the VF-14. An index of visual function in patients with cataracts. *Ophthalmology* 1997; **104**: 799–807.
10 Tobacman JK, Zimmerman B, Lee P, Hilborne L, Kolder H, Brook RH *et al*. Visual function impairments in relation to gender, age, and visual acuity in patients who undergo cataract surgery. *Ophthalmology* 1998; **105**: 1745–1750.
11 Goyal R, Shankar J, Sullivan S. Referrals for cataract surgery: variations between different geographic areas within a Welsh Health Authority. *Eye* 2004; **18**: 773–777.
12 Jaeschke R, Singer J, Guyatt GH.. Measurement of health status. Ascertaining the minimal clinically important difference. *Control Clin Trials* 1989; **10**: 407–415.
13 Hays RD, Woolley JM. The concept of clinically meaningful difference in health-related quality-of-life research. How meaningful is it? *Pharmacoeconomics* 2000; **18**: 419–423
14 Vittinhoff E, Shiboski SC, Glidden DV, McCulloch CE. *Regression Methods in Biostatistics. Linear Logistic and Repeated Measures Models. Longitudinal Data*. Springer Verlag: New York, 2005.
15 Quintana JM, Arostegui I, Alberdi T, Escobar A, Perea E, Navarro G *et al*. Decision trees for indication of cataract surgery based on changes in visual acuity. *Ophthalmology* 2010; **117**: 1471–1478.
16 Perea-Milla E, Vidal S, Briones E, Aguirre U, Baré M, Fernández de Larrea N *et al*. Development and validation of clinical scores for visual outcomes after cataract surgery. *Ophthalmology* 2010; **118**: 9–16.
17 Fleming NS. Sociodemographic differences in access to vision care among adults in the United States, 1974-1975. *Med Care* 1983; **21**: 1076–1088.
18 Livingston PM, McCarty CA, Taylor HR. Visual impairment and socioeconomic factors. *Br J Ophthalmol* 1997; **81**: 574–577.
19 Monestam E, Wachtmeister L. Cataract surgery from a gender perspective–a population based study in Sweden. *Acta Ophthalmol Scand* 1998; **76**: 711–716.
20 Navarro Esteban JJ, Gutierrez Leiva JA, Valero CN, Buendía Bermejo J, Calle Purón ME, Martínez Vizcaíno VJ *et al*. Prevalence and risk factors of lens opacities in the elderly in Cuenca, Spain. *Eur J Ophthalmol* 2007; **17**: 29–37.

21 Lundqvist B, Monestam E. Gender-related differences in cataract surgery outcome: a 5-year follow-up. *Acta Ophthalmol* 2008; **86**: 543–548.
22 Westcott MC, Tuft SJ, Minassian DC. Effect of age on visual outcome following cataract extraction. *Br J Ophthalmol* 2000; **84**: 1380–1382.
23 Mangione CM, Orav EJ, Lawrence MG, Phillips RS, Seddon JM, Goldman L. Prediction of visual function after cataract surgery. A prospectively validated model. *Arch Ophthalmol* 1995; **113**: 1305–1311.
24 Schein OD, Steinberg EP, Cassard SD, Tielsch JM, Javitt JC, Sommer A. Predictors of outcome in patients who underwent cataract surgery. *Ophthalmology* 1995; **102**: 817–823.
25 Steinberg EP, Tielsch JM, Schein OD, Javitt JC, Sharkey P, Cassard SD *et al*. National study of cataract surgery outcomes. Variation in 4-month postoperative outcomes as reflected in multiple outcome measures. *Ophthalmology* 1994; **101**: 1131–1140.
26 Leung k, Elashoff R, Rees K, Hasan MM, Legorreta AP. Hospital- and patient related characteristics determining materny length of stay: a hierarchical model approach. *Am J Public Health* 1998; **88**: 377–381.
27 Wright CJ, Chambers GK, Robens-Paradise Y. Evaluation of indications for and outcomes of elective surgery. *CMAJ* 2002; **167**: 461–466.
28 McAlinden C, Gothwal VK, Khadka J, Wright TA, Lamoureux EL, Pesudovs K. A head-to-head comparison of 16 cataract surgery outcome questionnaires. *Ophthalmology* 2011; **118**(12): 2374–2381.
29 Las Hayas C, Bilbao A, Quintana JM, Garcia S, Lafuente I. IRYSS Cataract Group. A comparison of standard scoring versus Rasch scoring of the visualfunction index-14 in patients with cataracts. *Invest Ophthalmol Vis Sci* 2011; **52**(7): 4800–4807.

Medscape EDUCATION

Relationship of sociodemographic variables with outcomes after cataract surgery

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1. You are seeing a married couple, both of whom are 73 years old, in a preoperative evaluation before cataract surgery. Based on the current study by Quintana and colleagues, what is the most important sociodemographic variable in predicting the male patient's improvement in visual acuity after cataract surgery?

A Employment status
B Level of education
C Marital status
D A history of social dependency

2. Which of the following sociodemographic variables was most important in predicting the improvement in visual acuity after cataract surgery among women in the current study?

A Age over 65 years
B Employment status
C Being married
D Level of education

3. In the current study, what was the most important sociodemographic variable in predicting the improvement in visual function after cataract surgery among men?

A Age over 75 years
B Lower level of education
C A history of social dependency
D Living alone

4. In the current study, what was the most important sociodemographic variable in predicting the improvement in visual function after cataract surgery among women?

A Age over 75 years
B Retired employment status
C Lower level of education
D A history of social dependency

Activity evaluation

1. The activity supported the learning objectives.

Strongly disagree				Strongly agree
1	2	3	4	5

2. The material was organised clearly for learning to occur.

Strongly disagree				Strongly agree
1	2	3	4	5

3. The content learned from this activity will impact my practice.

Strongly disagree				Strongly agree
1	2	3	4	5

4. The activity was presented objectively and free of commercial bias.

Strongly disagree				Strongly agree
1	2	3	4	5