

## The Psychological Impact of Visual Impairment in Patients of Different Age

Gabriele Helga Franke\*, Joachim Esser<sup>†</sup>,  
Jens Reimer<sup>#</sup> and Nicole Maehner\*

\* Institute of Medical Psychology, <sup>†</sup> Center of Ophthalmology, <sup>#</sup> Center of Medicine,  
University Hospital Essen, Hufelandstr. 55, D-45122 Essen, Germany

**Abstract.** *Objective:* To examine discrepancies and similarities regarding the psychological impact of visual impairment in patients of different age. *Design:* 424 consecutive patients observed at the Center of Ophthalmology, University Hospital Essen, FRG were interviewed in person using the National Eye Institute Visual Function Questionnaire (NEI-VFQ) and the SF-36. *Patients:* Participants had to have one of the following eye conditions: diabetic retinopathy, age-related macular degeneration, age-related cataract, primary open-angle glaucoma, cytomegalovirus retinitis, and low vision from multiple causes. Patients were divided into age-related quintiles: group I (mean age  $37 \pm 7$  years,  $n=51$ , 35% female), group II ( $56 \pm 3$  years,  $n=53$ , 38% female), group III ( $64 \pm 3$  years, 63% female), group IV ( $74 \pm 3$  years, 66% female), group V ( $85 \pm 4$  years, 75% female). *Results:* According to age, comorbidity increased and visual acuity decreased. Especially in groups IV and V visual acuity, global physical quality of life and vision-dependent quality of life decreased on a statistical significant level. *Conclusion:* The psychological impact of visual impairment in patients depends mainly on visual acuity. Elderly patients between 70 and 79 years and very old patients between 80 and 93 years suffered the most from low global and vision-specific quality of life. In conclusion, attention has to be drawn to a marked decrease in global and vision-specific quality of life in old and very old patients.

Visual function is important for an optimal orientation in functional and social life and has an effect on physical and emotional well-being [1, 2, 3, 4, 5]. Therefore, loss of vision leads to restrictions in all areas of health-related quality of life (QOL) [6]. In ophthalmology traditional measures, such as retinal photographs, and performance-based examinations like Snellen visual acuity predominate. Recently the construct of QOL has gained increasing importance in medical research [7, 8, 9, 10]. In ophthalmology QOL was first studied in patients with cataract [11, 12, 13, 14, 15], possible due to the frequency of cataract operations. Therefore, questionnaires were developed that were specifically designed for this group of patients [16, 17, 18, 19, 20, 21]. However, they may not fully describe the range of disability and functional impairment experienced by persons with other ocular diseases. To remove these limitations a survey entitled the National Eye Institute Visual Function Questionnaire (NEI-VFQ) [22, 23] was developed, which allows a comparison between groups of patients under different ocular conditions. This questionnaire was derived from an analysis of the transcript-content of 26 focus-groups

with different ocular diseases; and its usefulness was demonstrated in several studies [24, 25, 26, 27].

The major goal of the present study was to investigate the social and psychological effects of mild to severe visual loss in patients of different age. The second aim was to detect the most important influencing factors: is age a stable predictor, that means: do older people suffer the most from vision dependent decreasing quality of life? Or is the visual capacity itself the main predictor, that means: do severely visually impaired people suffer more than mildly visually impaired people?

## Methods

### Study population

Case patients consisted of 424 consecutive in- and out-patients observed at the Department of Ophthalmology, University Hospital Essen, FRG. We excluded patients already in other clinical trials, no other exclusion criteria were used. Participants had to have one of the following eye conditions: diabetic retinopathy, age-related macular degeneration, age-related cataracts, primary open-angle glaucoma, cytomegalovirus retinitis, and low vision from multiple causes.

### Questionnaires

The SF-36 Health Survey [28] includes one multi-item scale that assesses eight health concepts:

- (1) Physical Functioning: limitations in performing all physical activities including bathing or dressing,
- (2) Role Physical: problems with work or other daily activities as a result of physical health,
- (3) Bodily Pain: limiting pain,
- (4) General Health: evaluation of personal health,
- (5) Vitality: energy and fatigue,
- (6) Social Functioning: interference with normal social activities due to physical and emotional problems,
- (7) Role Emotional: problems with work or other daily activities as a result of emotional problems,
- (8) Mental Health: feelings of nervousness and depression.

The first four scales were added and called global Physical Health: limitations in self-care, physical, social, and role activities, severe bodily pain, frequent tiredness.

The last four scales were added and called global Mental Health: frequent psychological distress, social and role disability due to emotional problems.

This instrument was chosen to assess global health-related QOL because of its demonstrated validity and reliability. The official German version of the SF-36 was used [29].

A short version of the 51-item field test version of the NEI-VFQ, the NEI-VFQ-25 with 25 item-groups and 42 items was used. The NEI-VFQ was designed to evaluate patients' perceptions of the effect of ocular disease on daily functioning and QOL. It assesses patients' ability to perform a broader range of tasks and was designed for ophthalmologic patients in general. It consists of the following twelve subscales,

- (1) General Health: global physical health,
- (2) General Vision: global vision with glasses or contact lenses,

- (3) Ocular Pain:
  - (4) Near Vision stitching, finding some
  - (5) Distance Vision room, recognizing some
  - (6) Vision-Specific friends, talking with friends
  - (7) Vision-Specific
  - (8) Vision-Specific staying at home because
  - (9) Vision-Specific
  - (10) Driving: vision
  - (11) Color Vision.
  - (12) Peripheral Vision
- Upon receipt the and responses were tra with excellent knowled common version of th modification of the for other native German: performance and clar backtranslated into Eng knowledge of German. All translators then m questionnaire [29].

### Procedures

The study was app FRG, and informed co questions, the NEI-VFQ conducted by a single in Psychology, University conducted numerous ps 95% (lack of time was were unaware of the ophthalmologic examin the same day before c diagnosis were extracte

To assess nonoph Monocular Snelle wearing their current "w

### Analysis

Patients were divi group II (50-59 years), g years).

The statistical ana impairment in patients deviation for scales of fr

ed in several studies [24,  
social and psychological  
The second aim was to  
ctor, that means: do older  
of life? Or is the visual  
ly impaired people suffer

patients observed at the  
3. We excluded patients  
used. Participants had to  
hy, age-related macular  
icoma, cytomegalovirus

that assesses eight health  
sical activities including  
ies as a result of physical

ities due to physical and  
activities as a result of

health: limitations in self-  
nt tiredness.  
mental Health: frequent  
problems.  
ed QOL because of its  
1 of the SF-36 was used

-VFQ, the NEI-VFQ-25  
as designed to evaluate  
unctioning and QOL. It  
and was designed for  
ive subscales,

ses,

- (3) Ocular Pain: limiting eye pain, itching, burning of the eyes,
- (4) Near Vision: vision-dependent limitations in reading newspaper, cooking, stitching, finding something
- (5) Distance Vision: vision-dependent limitations in recognizing a friend in a large room, recognizing something across the street or viewing television,
- (6) Vision-Specific Social Functioning: vision-dependent limitations in visiting friends, talking with friends, and recognizing the responses of others,
- (7) Vision-Specific Emotion/Well-Being: vision-dependent fear, restriction
- (8) Vision-Specific Role Difficulties: vision-dependent limitations in working, staying at home because of low vision,
- (9) Vision-Specific Dependency: needing too much assistance,
- (10) Driving: vision-specific problems in driving a car at night, in unknown areas,
- (11) Color Vision, and
- (12) Peripheral Vision.

Upon receipt the original American NEI-VFQ questionnaire, the instructions, items and responses were translated into German by two independent native German speakers with excellent knowledge of English. The translators then met to discuss and agree upon a common version of the questionnaire, keeping all alternative translations for further modification of the form if necessary. The common version was then evaluated by two other native German-speaking raters in terms of conceptual equivalence, linguistic performance and clarity. The German version approved by this procedure was then backtranslated into English by two independent native English translators with excellent knowledge of German. These translators had to agree on a common backtranslated version. All translators then met to discuss and agree upon a common German version of the questionnaire [29].

### Procedures

The study was approved by the Center of Ophthalmology, University Hospital Essen, FRG, and informed consent was obtained from each study participant. Demographic questions, the NEI-VFQ, and SF-36 were administered in this order by a personal interview conducted by a single interviewer. This interviewer was trained in the Institute of Medical Psychology, University Hospital Essen, FRG, by one of the authors (G.H.F.) who has conducted numerous psychodiagnostic studies. The participation rate for the interviews was 95% (lack of time was the main reason for rejecting participation). Ophthalmologists who were unaware of the patients' NEI-VFQ, and SF-36 scores performed complete ophthalmologic examinations on all case patients. Best-corrected visual acuity (measured at the same day before or after the psychodiagnostic investigation) and primary ocular diagnosis were extracted from patients' medical record.

To assess nonophthalmic comorbidities, the Karnofsky Index [30] was used.

Monocular Snellen visual acuity [31, 32, 33] was measured while patients were wearing their current "walking about" correction.

### Analysis

Patients were divided into age-related quintiles: group I (age range: 24-49 years), group II (50-59 years), group III (60-69 years), group IV (70-79 years), and group V (70-93 years).

The statistical analysis was designed to explore the psychological impact of visual impairment in patients of different age. All data were presented as mean  $\pm$  standard deviation for scales of frequencies for questions. Univariate analyses of variance (ANOVA,

five age-related groups) were performed. To examine if the group differences were independent from the demographic and clinical variables (gender, comorbidity, visual acuity) additional sets of analyses of variance with these demographic variables as covariates were performed. Conclusion of statistical significance was done by Bonferroni adjustment for multiple testing.

Table 1: Characteristics of Patients\*

Groups	40s (n=51)	50s (n=53)	60s (n=104)	70s (n=169)	80s (n=47)	P
Mean $\pm$ age (range)	37 $\pm$ 7 (24-39)	56 $\pm$ 3 (50-59)	64 $\pm$ 3 (60-69)	74 $\pm$ 3 (70-79)	85 $\pm$ 4 (80-93)	
Female	18 (35%)	20 (38%)	65 (63%)	111 (66%)	35 (75%)	.0001 <sup>1</sup>
Retired	11 (22%)	18 (34%)	77 (77%)	136 (81%)	45 (96%)	.0001 <sup>1</sup>
Mean $\pm$ Comorbidity <sup>2</sup>	74 $\pm$ 18	79 $\pm$ 16	78 $\pm$ 11	74 $\pm$ 13	73 $\pm$ 11	.03 <sup>3</sup>
Mean $\pm$ Snellen visual acuity <sup>4</sup>						
Better eye	77 $\pm$ 32	51 $\pm$ 33	54 $\pm$ 29	36 $\pm$ 27	30 $\pm$ 24	.0001 <sup>3</sup>
Worse eye	54 $\pm$ 38	29 $\pm$ 31	29 $\pm$ 26	18 $\pm$ 20	14 $\pm$ 13	.0001 <sup>3</sup>
Snellen visual acuity, median (range)						
Better eye	20/20 (100-16)	20/50 (500-20)	20/40 (500-20)	20/63 (500-20)	20/80 (500-20)	.0001 <sup>3</sup>
Worse eye	20/25 (NLP <sup>5</sup> -16)	20/100 (NLP-20)	20/100 (NLP-20)	20/200 (NLP-20)	20/200 (NLP-40)	.0001 <sup>3</sup>
Basic eye disease						
DR (n=69)	11	14	22	22	0	
ARM D (n=51)	0	4	18	23	6	
Cataract (n=137)	6	13	32	64	22	
Glaucoma (n=38)	8	7	16	7	0	
CMV (n=21)	19	2	0	0	0	
Low Vision (n=108)	7	13	16	53	19	

\* All data are presented as number (percentage) unless otherwise indicated. NLP indicates no light perception; DR, diabetic retinopathy; ARM D, age-related macular degeneration; and CMV, cytomegalovirus retinitis.

<sup>1</sup>  $\chi^2$  Test

<sup>2</sup> Comorbidity score indicates the Karnofsky-Index (100=best, 0=worst)

<sup>3</sup> Analysis of variance

<sup>4</sup> Decimal fraction \* 100 (range 0-125)

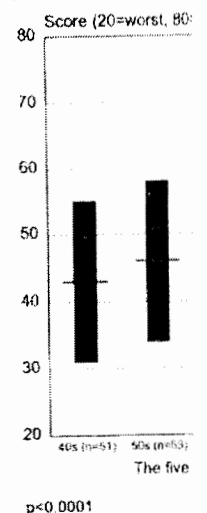
<sup>5</sup> NLP indicates no light perception

## Results

### Summary statistics

Table 1 provides clinical characteristics of the first group of patients – ca 35% were female, a recent diagnosis of cytomegalovirus retinitis. The 40s (mean age 37 years, 38% female), the 50s (mean age 56 years, 38% female), the 60s (mean age 64  $\pm$  3 years, 63% female), the 70s (mean age 74  $\pm$  3 years, 66% female), and the 80s (mean age 85  $\pm$  4 years, 75% female) suffered from cataract or low vision from cataract or low vision (ca 35% female). Visual acuity decreased with age.

Figure 1: Global Physical Functioning



### Global Quality of Life

The main result is that the 40s (mean score 55) and the 50s (mean score 58) had a significantly better functioning (p < 0.0001). The 80s (mean score 45) and the 70s (mean score 50) had a significantly worse functioning (p < 0.0001). The 60s (mean score 55) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 40s (mean score 55) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 50s (mean score 58) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 60s (mean score 55) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 70s (mean score 50) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 40s (mean score 55) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 50s (mean score 58) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 60s (mean score 55) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 70s (mean score 50) and the 80s (mean score 45) had a significantly worse functioning (p < 0.0001). The 80s (mean score 45) had a significantly worse functioning (p < 0.0001).

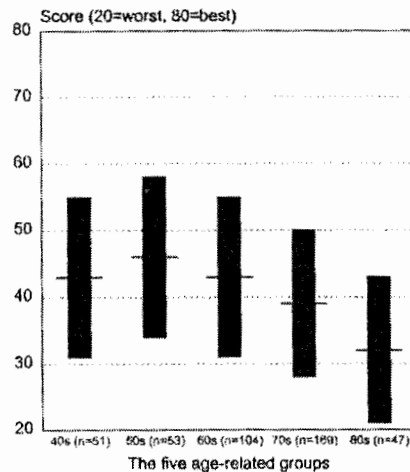
group differences were under comorbidity, visual demographic variables as was done by Bonferroni

**Results**

**Summary statistics**

Table 1 provides clinical and demographic characteristics of the 424 participants. The first group of patients – called the 40s – comprised 51 patients (mean age  $37 \pm 7$  years) only 35% were female, a remarkable proportion suffered from diabetic retinopathy and cytomegalovirus retinitis. The second group – called the 50s – comprised 53 patients ( $56 \pm 3$  years, 38% female), they suffered from diabetic retinopathy, cataract or low vision from multiple causes. The 60s suffered from diabetic retinopathy, cataract or glaucoma ( $n=104$ ,  $64 \pm 3$  years, 63% female). The 70s suffered from age related macular degeneration, cataract or low vision from multiple causes ( $n=169$ ,  $74 \pm 3$  years, 66% female), and the 80s suffered from cataract or low vision from multiple causes ( $n=47$ ,  $85 \pm 4$  years, 75% female). Visual acuity decreased across the age groups.

Figure 1: Global Physical Health (SF-36 Health Survey) regarding the five age-related groups



p<0.0001

**Global Quality of Life**

The main result is presented in figure 1 (T-Scores: 20 indicates worst quality of life, 80 reflects the best,  $50 \pm 20$  demonstrates the distribution of 2/3 of the normative collective). Beside a little decrease in the youngest group (due to the high proportion of HIV-infected patients) the global Physical Health decreased according to age. Even the 70s and the 80s suffered from low physical quality of life (SF-36 subscales: Physical Functioning, Role Physical, Bodily Pain, and General Health). The global Mental Health score did not differ statistically between the five groups.

Age Group	Mean Age (SD)	Female (%)	Diabetic Retinopathy (%)	Cytomegalovirus Retinitis (%)	Visual Acuity (NLP/20)	P
40s (n=51)	37 ± 7	35%	16%	11%	13/38	.0001 <sup>1</sup>
50s (n=53)	56 ± 3	38%	35 (75%)	45 (96%)	45 (96%)	.0001 <sup>1</sup>
60s (n=104)	64 ± 3	63%	13	73 ± 11	73 ± 11	.03 <sup>3</sup>
70s (n=169)	74 ± 3	66%	27	30 ± 24	30 ± 24	.0001 <sup>2</sup>
80s (n=47)	85 ± 4	75%	20	14 ± 13	14 ± 13	.0001 <sup>3</sup>
40s (n=51)	37 ± 7	35%	53	20/80	20/80	.0001 <sup>1</sup>
50s (n=53)	56 ± 3	38%	104	(500-20)	(500-20)	.0001 <sup>1</sup>
60s (n=104)	64 ± 3	63%	169	20/200	20/200	.0001 <sup>3</sup>
70s (n=169)	74 ± 3	66%	47	(NLP-40)	(NLP-40)	.0001 <sup>3</sup>
80s (n=47)	85 ± 4	75%	0	0	0	
40s (n=51)	37 ± 7	35%	6	6	6	
50s (n=53)	56 ± 3	38%	22	22	22	
60s (n=104)	64 ± 3	63%	0	0	0	
70s (n=169)	74 ± 3	66%	0	0	0	
80s (n=47)	85 ± 4	75%	19	19	19	

L.P indicates no light perception; V, cytomegalovirus retinitis.

Figure 2: General Vision (NEI-VFQ)

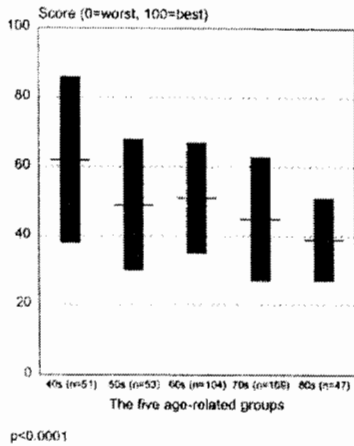
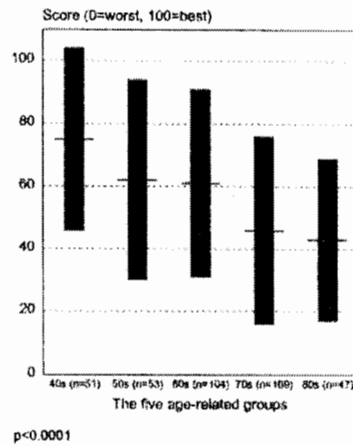


Figure 3: Near Vision (NEI-VFQ)



Further statistical analysis

In a second step analyzed. Regarding the (SF-36), age explained 4 suffer from low physic remained important (ex variance, that means the

Regarding the sea possible influencing cov acuity of the better eye explained 1.1 to 8.7% unimportant.

Conclusion

QOL assessment possibility to obtain the emotional and function evaluation.

The psychological mainly on visual acuity. suffered the most from specific quality of life. I sufficiently with „walking dependent limitations in (Near Vision), they suffer large room, recognizing Vision), and they suffer with friends, and recogni attention has to be drawn in old and very old patient

The statistical anal more strongly influenced QOL. Most of the scores acuity. Analyses of varia substantial variance (expl of the worse eye explai explanation of variance, s minor important role in p

We conclude the inventory, assessing visio studies on QOL of visua

Vision targeted QOL

Regarding the results of the NEI-VFQ (0 means the worst and 100 the best vision specific quality of life), five out of twelve subscales demonstrated statistically significant (p<0.004 adjusted for twelve comparisons) differences between the five different age-groups. No statistical significant results were found regarding the NEI-VFQ subscales Ocular Pain, Vision-Specific Emotion/Well-Being, Vision-Specific Role Difficulties, Vision-Specific Dependency, Driving, Color Vision, and Peripheral Vision.

The 70s and 80s suffered the most from low General Health (p<0.004); this result duplicated the results of the SF-36.

The quality of life due to General Vision decreased (Figure 2; p<0.0001); this result corresponded to the visual acuity of the groups. There was a threshold between the patients aged 40 and the rest. Near Vision demonstrated a threshold between the two old groups and the rest (Figure 3, p<0.0001). Distance Vision (Figure 4, p<0.0001) and Social Functioning (p<0.0001) were difficult for the old and very old, too.

Figure 4: Distance Vision (NEI-VFQ)

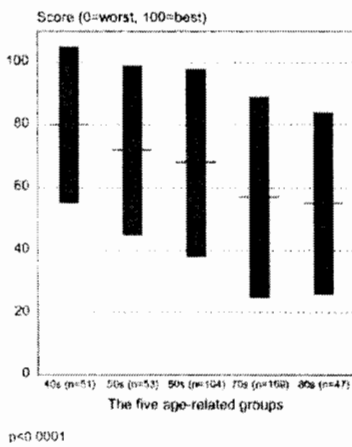
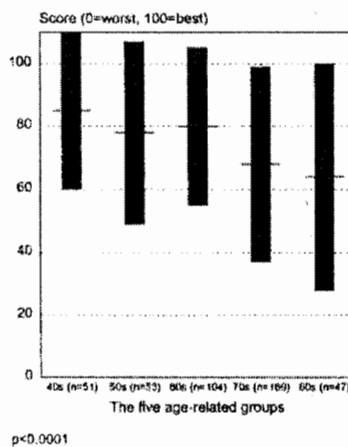
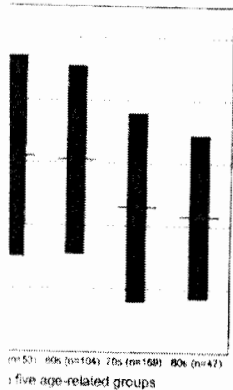


Figure 5: Social Functioning (NEI-VFQ)



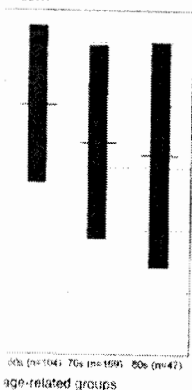
Impairment (NEI-VFQ)  
Scale: 100=best



and 100 the best vision and statistically significant between the five different age-related NEI-VFQ subscales: General Vision, Role Difficulties, Distance Vision, Near Vision, and Social Functioning ( $p < 0.004$ ); this result

( $p < 0.0001$ ); this result was found between the patients in the two old groups and Social Functioning

Social Functioning (NEI-VFQ)  
Scale: 100=best



### Further statistical analysis

In a second step the influence of sociodemographic and clinical variables was analyzed. Regarding the simple analysis of variance in the global Physical Health scale (SF-36), age explained 9.5% of variance, that means the older the patients, the more they suffer from low physical quality of life. After evaluating possible covariates, age still remained important (explanation of variance 5.6%), but comorbidity explained 15.7% of variance, that means the ill patients suffered more from low physical quality of life.

Regarding the scales of the NEI-VFQ, age explained 5.6 to 12%. After evaluating possible influencing covariates, age disappeared as a statistically significant factor. Visual acuity of the better eye explained 5.5 to 17.3% of variance; visual acuity of the worse eye explained 1.1 to 8.7% of variance. Comorbidity was less important, and gender was unimportant.

### Conclusion

QOL assessment is an important outcome criterion for ophthalmology. The possibility to obtain the patient's account of his situation not only in physical, but also in emotional and functional aspects enhances the potential of medical-psychological evaluation.

The psychological impact of visual impairment in patients of different age depends mainly on visual acuity. Elderly patients (70-79 years) and very old patients (80-93 years) suffered the most from low visual acuity, low global physical health, and low vision-specific quality of life. For the old and very old patients it was generally difficult to see sufficiently with „walking about“ correction (General Vision), they suffered from vision-dependent limitations in reading newspaper, cooking, stitching and finding something (Near Vision), they suffered from vision-specific limitations in recognizing a friend in a large room, recognizing something across the street or viewing television (Distance Vision), and they suffered from vision-dependent limitations in visiting friends, talking with friends, and recognizing the responses of others (Social Functioning). In conclusion, attention has to be drawn to a marked decrease in global and vision-specific quality of life in old and very old patients.

The statistical analyses demonstrated that the SF-36 physical component score is more strongly influenced by poorer general health than by limitations in vision-targeted QOL. Most of the scores of the NEI-VFQ are mainly associated with the level of visual acuity. Analyses of variance revealed that the visual acuity of the better eye explained substantial variance (explanation of variance between 5.5% to 17.3%) and the visual acuity of the worse eye explained variance too (1.1 to 8.7%). Despite these two sources of explanation of variance, sociodemographic variables like gender and comorbidity played a minor important role in predicting vision related QOL.

We conclude the NEI-VFQ to be a very useful and reliable psychodiagnostic inventory, assessing vision-specific QOL. We suggest the use of this instrument in future studies on QOL of visually impaired patients especially in evaluating rehabilitation efforts.

## References

- [1] Franke GH, Esser J, Staecker KH & Spangemacher B. The link between disease progression and coping-processes in patients with retinopathy centralis serosa. *Psychother Psychosom med Psychol* 1998; 48: 215-222 (German).
- [2] Franke GH, Esser J, Staecker KH, Maehner N & Spangemacher B. Medical-psychological investigations in patients with retinopathy diseases. *Z f Med Psychol* 1996a; 5: 163-168 (German).
- [3] Franke GH, Esser J, Staecker KH, Maehner N & Spangemacher B. „Filtered normality“: Psychological reasons and consequences of specific retinopathy. *Psychother psychosom med Psychol* 1996b; 46: 157-166 (German).
- [4] Reimer J, Franke GH, Staecker KH & Strunk W. Psychosocial implications in patients with choroidal melanoma after radiotherapy. *Z f Med Psychol* 1997; 6: 23-29 (German).
- [5] Scott I, Schein OD, West S, Bandeen-Roche K, Enger C & Folstein MF. Functional status and quality of life measurement among ophthalmic patients. *Arch Ophthalmol* 1994; 112: 329-35.
- [6] Bullinger M. Quality of life: definition, conceptualization and implications – a methodologist's view. *Theor Surg* 1991; 6: 143-8.
- [7] Franke GH, Jaeger H, Thomann B & Beyer B. Assessment and evaluation of psychological distress in HIV-infected women. *Psychol Heal* 1992; 6: 297-312.
- [8] Franke GH, Reimer J, Kohle M, Luetkes P, Maehner N & Heemann U. Quality of life in end-stage renal disease patients after successful kidney transplantation – Development of the ESRD Symptom Checklist Transplantation Module. *Nephron* 1999; 83: 31-9.
- [9] Spilker B (Ed.). *Quality of life and pharmacoeconomics in clinical trials*. Philadelphia: Lippincott-Raven, 1996.
- [10] Witzke O, Becker G, Franke GH, Binek M, Philipp T & Heemann U. Kidney transplantation improves quality of life. *Transpl Proc* 1997; 19: 1569-70.
- [11] Applegate WB, Miller ST, Elam JT, Freeman JM, Wood TO & Gettlefinger TC. Impact of cataract surgery with lens implantation on vision and physical function in elderly patients. *J Am Med Assoc* 1987; 257: 1064-6.
- [12] Brenner MH, Curbow B, Javitt JC, Legro MW & Sommer A. Vision change and quality of life in the elderly – response to cataract surgery and treatment of other chronic conditions. *Arch Ophthalmol* 1993; 111: 680-5.
- [13] Desai, P, Reidy, A, Minassian, DC, Vafidis, G & Bolger, J. Gains from cataract surgery: Visual function and quality of life. *Br J Ophthalmol* 1996; 80: 868-73.
- [14] Javitt JC, Steinberg EP, Sharkey P, Schein OD, Tielsch JM, West MD, Legro M & Sommer A. Cataract surgery in one eye or both. *Ophthalmology* 1995; 102: 1583-93.
- [15] Mangione C, Phillips RS, Lawrence MG, Seddon JM, Orav EJ & Goldman L. Improved visual function and attenuation of declines in health-related quality of life after cataract extraction. *Arch Ophthalmol* 1994; 112: 1419-25.
- [16] Abrahamsson, M, Carlsson, BM, Törnquist, BS & Sjöstrand, J. Changes of visual function and visual ability in daily life following cataract surgery. *Acta Ophthalmol Scand* 1996; 74: 69-73.
- [17] Bernth-Petersen P. Visual functioning in cataract patients. *Methods of measuring and results*. *Acta Ophthalmol* 1981; 59: 198-205.
- [18] Javitt JC, Wang F, Trentacost DJ, Rowe M & Tarantino N. Outcomes of cataract extraction with multifocal intraocular lens implantation. *Ophthalmology* 1997; 104: 589-99.
- [19] Lundström, M., Fregell, G. & Sjöbolm, A. Vision related daily life problems in patients waiting for a cataract extraction. *Br J Ophthalmol* 1994; 78: 608-11.
- [20] Mangione CM, Phillips RS, Seddon JM, Lawrence MG, Cook EF, Daily R & Goldman L. Development of the “Activities of Daily Vision Scale”. *Medical Care* 1992; 30: 1111-26.
- [21] Steinberg EP, Tielsch JM, Schein OD & Javitt JC. The VF-14. An index of functional impairment in patients with cataract. *Arch Ophthalmol* 1994; 112: 630-8.
- [22] Mangione CM, Lee J. *National Eye Institute* 504.
- [23] Mangione CM, Berry J. *National Eye Institute* 227-33.
- [24] Franke GH, Esser J. *Questionnaire (NEI-V)* *Psychol* 1998; 7: 178-84.
- [25] Franke GH, Esser J. *implications of vision* *National Eye Institute* submitted (German).
- [26] Gutierrez P, Wilson K, C. *Influence of glaucoma* 115: 777-84.
- [27] Parrish RK, Gedde SJ. *Visual function and quality of life* 55.
- [28] Ware JE & Sherbourne KI. *Quality of life* 30: 473-83.
- [29] Bullinger, M. *German results from the IQOLA*
- [30] Schag CC, Heinrich RI. *guidelines*. *J Clin Oncol*
- [31] Ferris FL, Kassof A, F. *Ophthalmol* 1982; 94: 91
- [32] Lowenstein JL. *Palmbe screening*. *Arch Ophthalmol*
- [33] *National Research Council* *measurement and spect*

tween disease progression and other Psychosom med Psychol

er B. Medical-psychological 96a: 5: 163-168 (German).

tered normality": Psychological 1 med Psychol 1996b; 46: 157-

tions in patients with choroidal

2. Functional status and quality 12: 329-35.

ions - a methodologist's view.

on of psychological distress in

11. Quality of life in end-stage ment of the ESRD Symptom

ials. Philadelphia: Lippincott-

dney transplantation improves

finger TC. Impact of cataract ly patients. J Am Med Assoc

ange and quality of life in the conditions. Arch Ophthalmol

om cataract surgery: Visual

D, Legro M & Sommer A.

oldman L. Improved visual ter cataract extraction. Arch

of visual function and visual 16: 74: 69-73.

measuring and results. Acta

of cataract extraction with 9

ms in patients waiting for a

Daly R & Goldman L. 30: 1111-26.

of functional impairment in

- [22] Mangione CM, Lee PP, Pitts J, Gutierrez P, Berry S & Hays RD. Psychometric properties of the National Eye Institute Visual Function Questionnaire (NEI-VFQ). *Arch Ophthalmol* 1998; 116: 1496-504.
- [23] Mangione CM, Berry S, Spritzer K., Janz KJ, Klein R, Owsley C & Lee P. Identifying the content area for the 51-item National Eye Institute Visual Function Questionnaire. *Arch Ophthalmol* 1998; 116: 227-33.
- [24] Franke GH, Esser J, Voiglaender A & Maehner N. The National Eye Institute Visual Function Questionnaire (NEI-VFQ), an inventory to assess quality of life in the visually impaired. *Z f Med Psychol* 1998; 7: 178-84 (German).
- [25] Franke GH, Esser J, Voiglaender-Fleiss A, Maehner N & Reimer J. Medical-psychological implications of vision loss. German adaptation, evaluation and presentation of normative data of the National Eye Institute Visual Function Questionnaire (NEI-VFQ). *Psychologische Beitrage* 2000, submitted (German).
- [26] Gutierrez P, Wilson R, Johnson C, Gordon M, Cioffi GA, Ritch R, Sherwood M, Meng K & Mangione C. Influence of glaucomatous visual field loss on health-related quality of life. *Arch Ophthalmol* 1997; 115: 777-84.
- [27] Parrish RK, Gedde SJ, Scott IU, Feuer WJ, Schiffman JC, Mangione CM & Montenegro-Piniella A. Visual function and quality of life among patients with glaucoma. *Arch Ophthalmol* 1997; 115: 1447-55.
- [28] Ware JE & Sherbourne CD. The MOS 36-item short form health survey (SF-36). *Medical Care* 1992; 30: 473-83.
- [29] Bullinger, M. German translation and psychometric testing of the SF-36 Health Survey: preliminary results from the IQOLA project. *Soc Sci Med* 1995; 41: 1359-66.
- [30] Schag CC, Heinrich RL & Ganz PA. Karnofsky performance status revisited: Reliability, validity and guidelines. *J Clin Oncol* 1984; 2: 187-93.
- [31] Ferris FL, Kassof A, Bresnik GH & Bailey I. New visual acuity charts for clinical research. *Am J Ophthalmol* 1982; 94: 91-6.
- [32] Lowenstein JI, Palmberg PF & Connett JE. Effectiveness of a pinhole method for visual acuity screening. *Arch Ophthalmol* 1985; 103: 222-3.
- [33] National Research Committee on Vision. Recommended standard procedures for the clinical measurement and specification of visual acuity. *Adv Ophthalmol* 1980; 41: 103-8.

ch Series

Context for Assistive Technology  
Disabled People in Europe  
Assistive Technology  
for the European Citizen  
Biomedical Aspects of Manual  
of the New Millennium

# On the Special Needs of Blind and Low Vision Seniors

Research and Practice Concepts

Edited by

**Hans-Werner Wahl**

*The German Centre for Research on Ageing at the University of Heidelberg,  
Heidelberg, Germany*

and

**Hans-Eugen Schulze**

*The German Association of Blind and Partially Sighted Students and  
Professionals, Karlsruhe, Germany*

**IOS**  
Press  
  
Ohmsha

Amsterdam • Berlin • Oxford • Tokyo • Washington, DC

© 2001, The authors mentioned in the Table of Contents

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior written permission from the publisher.

ISBN 1 58603 152 X (IOS Press)  
ISBN 4 274 90423 7 C3047 (Ohmsha)  
Library of Congress Catalog Card Number: 00-112109

*Publisher*  
IOS Press  
Nieuwe Hemweg 6B  
1013 BG Amsterdam  
The Netherlands  
fax: +31 20 620 3419  
e-mail: order@iospress.nl

*Distributor in the UK and Ireland*  
IOS Press/Lavis Marketing  
73 Lime Walk  
Headington  
Oxford OX3 7AD  
England  
fax: +44 1865 75 0079

*Distributor in Germany, Austria and Switzerland*  
IOS Press/LSL.de  
Gerichtsweg 28  
D-04103 Leipzig  
Germany  
fax: +49 341 995 4255

*Distributor in the USA and Canada*  
IOS Press, Inc.  
5795-G Burke Centre Parkway  
Burke, VA 22015  
USA  
fax: +1 703 323 3668  
e-mail: iosbooks@iospress.com

*Distributor in Japan*  
Ohmsha, Ltd.  
3-1 Kanda Nishiki-cho  
Chiyoda-ku, Tokyo 101  
Japan  
fax: +81 3 3233 2426

#### LEGAL NOTICE

The publisher is not responsible for the use which might be made of the following information.

PRINTED IN THE NETHERLANDS

The substance of Blind and Low V goal of the editors, a visually impaired multiprofessionally l achieve this goal, a v scope of issues affili book. The book itself

- In Part I ("Basic Australia descr later years (Silv
- In Part II ("F attention is plac concerned with loss of central v
- Part III ("Psyc Empirical and t challenges and
- Part IV ("Interv provides the rea techniques curr
- Part V ("Educa explores the pe supporting educ
- Part VI ("Learr experiences and
- Finally, Part V ahead of us in (Robert A. Wea important WHO

The editors of tl of domains, ranging f psychosocial and ed encourage association elders, self-help grou rehabilitation and the leading a rich and hap The publication were only made possi Federal Ministry for F