

## Development of the Glaucoma Visual Functioning Questionnaire-40

## Supplementary Content

Table S1. Item Contents and Score Characteristics of the 40-item Glaucoma Visual Functioning Questionnaire (n=354)

Item	Topic	Missing Responses No. (%)	Mean Score (SD)	Median Score (IQR)	Range of Responses	
					Min.	Max.
1	Cross roads in a crowd	0	1.54 (1.02)	1 (1-2)	1	5
2	Avoid bumping into objects	0	1.71 (1.14)	1 (1-2)	1	5
3	Go to an unfamiliar place	0	1.73 (1.22)	1 (1-2)	1	5
4	Get around in parks	0	1.37 (0.88)	1 (1-1)	1	5
5	Get around in markets	1 (0.3)	1.54 (1.06)	1 (1-2)	1	5
6	Go down stairs	0	1.77 (1.14)	1 (1-2)	1	5
7	Use the bus/metro	1 (0.3)	1.65 (1.15)	1 (1-2)	1	5
8	Use escalators	0	1.45 (0.97)	1 (1-1)	1	5
9	Find something on a crowded shelf	0	1.83 (1.18)	1 (1-2)	1	5
10	Find the target floor while riding an elevator	0	1.55 (0.98)	1 (1-2)	1	5
11	Find public toilets	0	1.47 (1.00)	1 (1-1)	1	5
12	Play cards/mahjong/chess	22 (6.2)	1.75 (1.24)	1 (1-2)	1	5
13	Play ball games	13 (3.7)	2.22 (1.50)	2 (1-3)	1	5
14	Watch live ball games	14 (4.0)	2.01 (1.34)	1 (1-2.5)	1	5
15	Look in the direction pointed by sb	0	1.66 (1.05)	1 (1-2)	1	5
16	Take objects sb handed you	0	1.49 (1.01)	1 (1-1)	1	5
17	Read books/magazines/newspapers	0	1.74 (1.10)	1 (1-2)	1	5
18	Read large print on mobile phones	0	1.32 (0.73)	1 (1-1)	1	5
19	Read small print on mobile phones	0	2.12 (1.30)	2 (1-3)	1	5
20	Read instructions on medicine	0	2.28 (1.37)	2 (1-3)	1	5
21	Read product labels	0	1.88 (1.21)	1 (1-2)	1	5
22	Read bus stop signs	0	1.50 (0.93)	1 (1-2)	1	5
23	Read menus	0	1.49 (0.95)	1 (1-2)	1	5
24	Read street signs	0	1.54 (0.98)	1 (1-2)	1	5
25	See bus numbers	0	1.93 (1.16)	2 (1-2)	1	5
26	Recognize persons from a distance ( $\geq 5m$ )	0	2.18 (1.30)	2 (1-3)	1	5
27	Recognize persons up close ( $<5m$ )	0	1.51 (0.94)	1 (1-2)	1	5
28	Recognize facial expressions while talking	0	1.69 (1.12)	1 (1-2)	1	5
29	See stains on clothes	0	1.82 (1.22)	1 (1-2)	1	5
30	Pick out and match clothes	0	1.33 (0.82)	1 (1-1)	1	5
31	Identify eye drops	0	1.56 (1.03)	1 (1-2)	1	5
32	Watch TV	1 (0.3)	1.67 (1.07)	1 (1-2)	1	5
33	Walk on a spacious road at night	0	1.60 (1.09)	1 (1-2)	1	5
34	Walk on a small road at night	0	2.01 (1.31)	1 (1-3)	1	5
35	Go down stairs at night	1 (0.3)	2.19 (1.32)	2 (1-3)	1	5
36	See people around you at night	0	2.14 (1.26)	2 (1-3)	1	5
37	Read street signs at night	2 (0.6)	2.07 (1.22)	2 (1-3)	1	5
38	Recognize objects across the room at night	0	1.71 (1.05)	1 (1-2)	1	5
39	Recognize family's faces at night	0	1.71 (1.06)	1 (1-2)	1	5
40	Go from light to dark	0	2.38 (1.27)	2 (1-3)	1	5

IQR, interquartile range; SD, standard deviation.

---

**Development of the Glaucoma Visual Functioning Questionnaire-40**


---

Table S2. Comparison on the 40-item Glaucoma Visual Functioning Questionnaire Scores between Controls and Glaucoma Subgroups Stratified by Better-eye Presenting Visual Acuity

GVFQ-40 (Score 1-5)	Controls (n=84)*	Glaucoma Subgroups			
		Better-eye PVA $\geq$ 20/40 (n=194)*	<i>P</i> value†	Better-eye PVA<20/40 (n=76)*	<i>P</i> value†
Mobility	1.00 (1.00-1.00)	1.00 (1.00-1.63)	<0.001	2.00 (1.25-3.50)	<0.001
Visual motor skills	1.00 (1.00-1.00)	1.25 (1.00-1.88)	<0.001	2.67 (1.56-4.00)	<0.001
Reading	1.00 (1.00-1.13)	1.25 (1.00-1.88)	<0.001	2.44 (1.63-3.75)	<0.001
Recognition	1.00 (1.00-1.25)	1.25 (1.00-1.75)	<0.001	2.38 (1.63-3.88)	<0.001
Night vision	1.00 (1.00-1.31)	1.50 (1.13-2.25)	<0.001	2.75 (1.88-4.06)	<0.001
Total score	1.04 (1.00-1.15)	1.35 (1.13-1.88)	<0.001	2.35 (1.59-3.90)	<0.001

\* Data are presented as medians (interquartile ranges). A higher score means worse visual ability.

† Wilcoxon rank sum test.

GVFQ-40, 40-item Glaucoma Visual Functioning Questionnaire; PVA, presenting visual acuity.

## Development of the Glaucoma Visual Functioning Questionnaire-40

Table S3. Differences in Scores on the 40-item Glaucoma Visual Functioning Questionnaire between Subgroups Stratified by Better-eye Mean Deviation

	Kruskal-Wallis	Mann-Whitney Tests with Bonferroni Corrections					
	one way ANOVA	Control vs mild	Control vs moderate	Control vs severe	Mild vs moderate	Mild vs severe	Moderate vs severe
<b>GVFQ-40</b>	All groups ( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)
Mobility	<0.001*	0.189	<0.001*	<0.001*	0.041*	<0.001*	<0.001*
Visual motor skills	<0.001*	0.005*	<0.001*	<0.001*	0.009*	<0.001*	<0.001*
Reading	<0.001*	0.006*	<0.001*	<0.001*	0.005*	<0.001*	<0.001*
Recognition	<0.001*	0.022*	<0.001*	<0.001*	0.019*	<0.001*	<0.001*
Night vision	<0.001*	0.016*	<0.001*	<0.001*	0.035*	<0.001*	<0.001*
Total score	<0.001*	0.003*	<0.001*	<0.001*	0.003*	<0.001*	<0.001*

\* Significant at 0.05 level.

GVFQ-40, 40-item Glaucoma Visual Functioning Questionnaire.

## Development of the Glaucoma Visual Functioning Questionnaire-40

Table S4. Differences in Scores on the National Eye Institute Visual Functioning Questionnaire-25 between Subgroups Stratified by Better-eye Mean Deviation

	Kruskal-Wallis	Mann-Whitney Tests with Bonferroni Corrections					
	one way ANOVA	Control vs mild	Control vs moderate	Control vs severe	Mild vs moderate	Mild vs severe	Moderate vs severe
NEI VFQ-25	All groups ( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)	( <i>p</i> values)
General health	<0.001*	1.000	0.671	<0.001*	1.000	<0.001*	0.013*
General vision	<0.001*	0.007*	<0.001*	<0.001*	0.394	<0.001*	<0.001*
Ocular pain	0.299	NA	NA	NA	NA	NA	NA
Near activities	<0.001*	0.343	<0.001*	<0.001*	0.001*	<0.001*	<0.001*
Distance activities	<0.001*	1.000	<0.001*	<0.001*	0.003*	<0.001*	<0.001*
Social function	<0.001*	1.000	0.001*	<0.001*	0.018*	<0.001*	<0.001*
Mental health	<0.001*	0.318	<0.001*	<0.001*	0.085	<0.001*	0.004*
Role difficulties	<0.001*	0.048*	<0.001*	<0.001*	0.225	<0.001*	<0.001*
Dependency	<0.001*	1.000	0.001*	<0.001*	0.053	<0.001*	<0.001*
Driving	<0.001*	0.342	<0.001*	<0.001*	0.076	<0.001*	<0.001*
Color vision	<0.001*	1.000	1.000	<0.001*	1.000	<0.001*	<0.001*
Peripheral vision	<0.001*	1.000	0.002*	<0.001*	0.097	<0.001*	<0.001*
Total score	<0.001*	0.127	<0.001*	<0.001*	0.014*	<0.001*	<0.001*

\* Significant at 0.05 level.

NA, not available; NEI VFQ-25, National Eye Institute Visual Functioning Questionnaire-25.

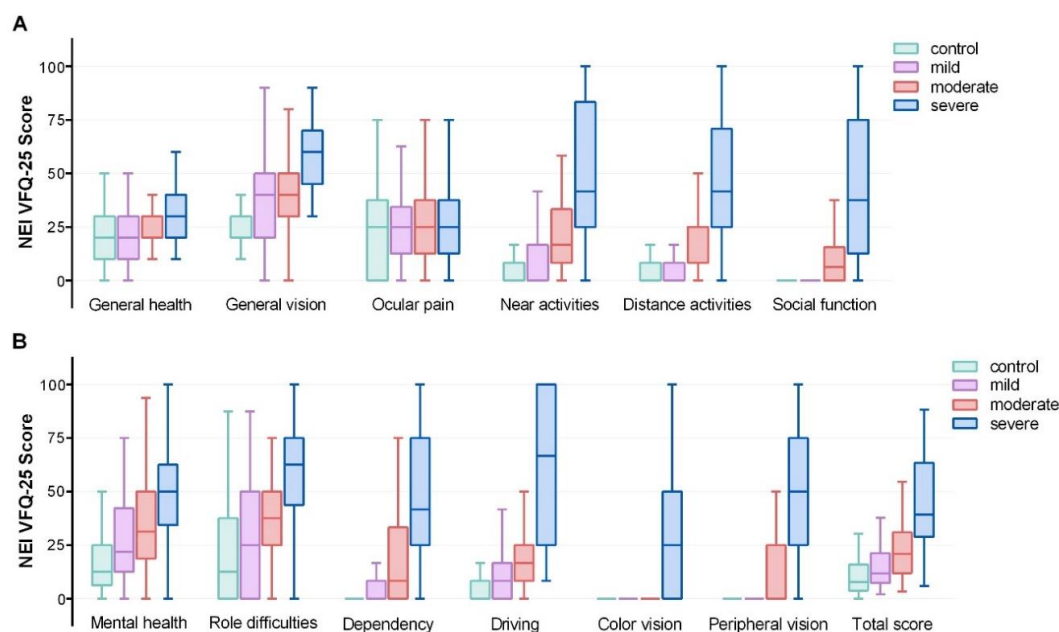
**Development of the Glaucoma Visual Functioning Questionnaire-40**

Table S5. Multiple Linear Regression Results of the Relationship between the Total Score of the 40-item Glaucoma Visual Functioning Questionnaire and Better-eye Mean Deviation

	Total Scores of the GVFQ-40		
	Unstandardized $\beta$ Coefficients (95% CI)	Standardized $\beta$ Coefficients	P value
MD (better eye, dB)	-0.08 (-0.09, -0.07)	-0.72	<0.001
PVA (better eye, LogMAR)	0.65 (0.26, 1.04)	0.15	0.001
Education			
<High school	Reference		
$\geq$ High school	-0.17 (-0.36, 0.03)	-0.08	0.096
Employment			
Employed	Reference		
Unemployed or retired	0.21 (0.04, 0.39)	0.10	0.018
Location			
Urban	Reference		
Rural	-0.04 (-0.23, 0.15)	-0.02	0.675

CI, confidence interval; GVFQ-40, 40-item Glaucoma Visual Functioning Questionnaire; LogMAR, logarithm of the minimum angle of resolution; MD, mean deviation; PVA, presenting visual acuity.

## Development of the Glaucoma Visual Functioning Questionnaire-40



**Figure S1.** Boxplots showing scores for the first six domains (A) and the scores for the last six domains and total scores (B) of the National Eye Institute Visual Functioning Questionnaire-25 (NEI VFQ-25) between subgroups based on stratification of glaucoma patients by the better-eye mean deviation (MD,  $\geq -6$  dB,  $-12 \sim -6$  dB and  $< -12$  dB correspond to mild, moderate, and severe visual field loss, respectively). All scores were converted using the equation,  $100 - \text{raw score}$ , and therefore, higher scores indicate worse vision-related quality of life. The median, interquartile range, minimum and maximum (whiskers) values are presented (see Table S4 for P values).