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Depressive Symptoms Associated with Poor Health-Related Quality of Life in Adults with Strabismus

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Successful strabismus surgery improves health-related quality of life (HRQOL) in the majority of patients,[1] but for some, HRQOL does not improve despite successful treatment, suggesting other non-strabismus factors may cause reduced HRQOL. We evaluated associations between psychological, clinical or demographic factors, and HRQOL in adults with strabismus.

Consecutive adult strabismus patients were prospectively enrolled and completed four questionnaires: 1) Adult Strabismus-20 (AS-20) HRQOL questionnaire[2] with four, separately scored domains (Self-Perception, Interactions, Reading Function and General Function: scored 0 [worst] to 100 [best] HRQOL); 2) DS-14 distressed personality questionnaire[3] (classified: Yes/No); 3) Center for Epidemiologic Studies Depression Scale – Revised (CESD-R) depression screening questionnaire,[4] (scored 0–80; ≥ 16 subnormal); 4) Diplopia Questionnaire[5] rating diplopia severity (scored 0 [no diplopia] to 100 [constant diplopia]). Clinical data collected were: direction of deviation, magnitude of deviation, diplopia questionnaire score, best-eye visual acuity (LogMAR), and presence/absence of visually obtrusive co-morbidity. Demographic data collected were: age at onset of strabismus, age at assessment, and sex. Each of these psychological, clinical or demographic data points were included as a factor that may be associated with reduced HRQOL.

Univariate regression analyses were performed for each AS-20 domain. Factors with a univariate significance of $P<0.1$ were included in multiple linear regression analyses. In multiple linear regression analyses factors were considered associated with reduced HRQOL if $P=<0.05$. Spearman rank correlations were calculated. If a strong correlation ($r\geq0.5$)

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between factors was identified separate analyses were performed retaining only the second of any pair of correlated factors, to confirm the associations.

One hundred and seventy-seven patients were recruited, median age 52 years (range 18 to 88 years). Ninety-six (54%) of 177 were female and 171 (97%) were white. 72 (41%) had childhood onset strabismus, 46 (26%) neurogenic, 30 (17%) idiopathic, 15 (8%) mechanical, and 14 (8%) sensory. One hundred and eleven (63%) of 177 had diplopia and 126 (71%) had undergone previous eye muscle surgery at least 5 weeks prior to assessment (only 28 (16%) of 177 patients had undergone surgery within 6 months of assessment). Mean best-eye visual acuity was 20/22 (range 20/15 to 20/63). Visually obtrusive co-morbidity was present in 30 (17%) of 177; Type D personality was present in 32 (18%) and CESD-R scores were elevated (subnormal) in 23 (13%). For 22 of 23 with subnormal CESD-R scores, responses were consistent with subthreshold depressive symptoms. One patient met the definition for a probable depressive episode (known diagnosis of depression and receiving psychiatric care).

In univariate analysis nine factors were associated with reduced HRQOL on at least one AS-20 domain ($P<0.1$, eTable). The only factors highly correlated with each other were age at assessment and age at onset (r=0.57, $P<0.0001$).

In multiple linear regression analysis, for the Self-Perception domain, two of the four initially identified factors (eTable) were independently associated with reduced HRQOL: younger age at assessment ($P<0.0001$) and larger magnitude of deviation ($P<0.0001$, Table 1).

For the Interactions domain, three of the five initially identified factors (eTable) were independently associated with reduced HRQOL: greater magnitude of deviation ($P=0.0002$), younger age at assessment ($P=0.0007$) and higher (worse) CESD-R score ($P=0.02$, Table 1).

For the Reading Function domain, two of the three initially identified factors (eTable) were independently associated with reduced HRQOL: higher (worse) diplopia questionnaire score ($P<0.0001$) and higher (worse) CESD-R score ($P=0.0001$, Table 1).

For the AS-20 General Function domain, five of the six initially identified factors (eTable) were independently associated with reduced HRQOL: higher (worse) diplopia questionnaire score ($P<0.0001$), higher (worse) CESD-R score ($P=0.0008$), younger age at assessment ($P=0.001$), poorer best-eye visual acuity ($P=0.007$) and greater magnitude of deviation ($P=0.01$, Table 1).

Finding higher depression scores associated with reduced HRQOL supports the hypothesis that other factors, unrelated to strabismus (in this case depression), may cause reduced HRQOL. Nevertheless, our data cannot address whether depression develops as a result of the poor HRQOL associated with strabismus or whether depression is an independent cause of reduced HRQOL in strabismus patients. For each of the four AS-20 domains, clinical and/or demographic factors were also associated with reduced HRQOL (Table 1), for example worse diplopia with poorer General Function. If such clinical factors were a cause of higher depression scores, we would expect clinical factors and depression scores to be correlated, which they were not. The uncertainty as to whether reduced HRQOL causes

depression or vice versa has been the topic of previous studies, although conclusions differ. For strabismus patients, longitudinal studies evaluating depression status over time, for example preoperatively and postoperatively, need to be conducted to evaluate the temporal relationship between depression and reduced HRQOL.

The association of depressive symptoms with poorer performance on patient-reported outcome measures (PROMs) such as HRQOL has important implications. Increasing emphasis is being placed on PROMs for the assessment of treatment effectiveness, and therefore a comprehensive understanding of the influence of additional factors such as depression is imperative. Without such insight, there may be a mismatch between the perspective of the healthcare provider (judging outcomes using objective, clinical measures), and the perspective of the patient. Any health care provider encountering elevated depression scores at the level of a possible depressive episode or worse, is responsible for ensuring the patient receives appropriate psychiatric care.

Several clinical or demographic factors were associated with poorer HRQOL. The association of younger age at assessment may suggest somewhat greater insecurity and vulnerability in younger adults. Larger magnitude of deviation was also associated, consistent with previous studies showing increased awareness of misalignment with larger deviations. Reduced Reading Function and General Function HRQOL were associated with worse diplopia, as might be expected.

The association of subthreshold depressive symptoms with reduced HRQOL should be considered when evaluating adults with strabismus and when interpreting patient reported outcomes. Further study is needed to elucidate whether depression develops as a result of poor HRQOL associated with strabismus, or whether depression is an independent cause of reduced HRQOL in strabismus patients.

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Table 1

Multiple Linear Regression Analyses Showing Factors Independently Associated With Reduced Health-related Quality of Life (HRQOL) on Each of the Four Adult Strabismus-20 Questionnaire Domains.

Factors associated with reduced HRQOL	Adult Strabismus-20 HRQOL questionnaire domains			
	Self-Perception	**Interactions**	**Reading Function**	**General Function**
CESD-R score		*P*=0.02 Higher (worse) score	*P*=0.0001 Higher (worse) score	*P*=0.0008 Higher (worse) score
Diplopia score			*P*<0.0001 Higher (worse) score	*P*<0.0001 Higher (worse) score
Magnitude of deviation	*P*<0.0001 Greater magnitude	*P*=0.0002 Greater magnitude		*P*=0.01 Greater magnitude
Best-eye visual acuity				*P*=0.007 Poorer visual acuity
Age at assessment	*P*<0.0001 Younger age	*P*=0.0007 Younger age		*P*=0.001 Younger age

Factors were considered associated with reduced HRQOL if *P*<0.05. For each associated factor, *P* value and direction of association with reduced HRQOL are shown.

eTable

Univariate Analysis of Psychological, Clinical and Demographic Factors for Associations with Reduced Health-related Quality of Life in Adults with Strabismus.

Factors included in univariate analysis	Adult Strabismus-20 HRQOL questionnaire domains			
	Self-Perception	Interactions	Reading Function	General Function
CESD-R score	*P*=0.13	***P*=0.028**	***P*<0.0001**	***P*=0.0003**
DS-14 (Type D yes / no)	*P*=0.11	***P*=0.020**	*P*=0.51	*P*=0.19
Diplopia Questionnaire score	*P*=0.94	*P*=0.39	***P*<0.0001**	***P*<0.0001**
Horizontal deviation*	*P*=0.17	*P*=0.19	*P*=0.39	*P*=0.82
Vertical deviation**	*P*=0.18	*P*=0.18	*P*=0.68	*P*=0.85
Magnitude of deviation†	***P*<0.0001**	***P*=0.0009**	*P*=0.84	***P*=0.029**
Best eye visual acuity	*P*=0.53	*P*=0.65	*P*=0.31	***P*=0.040**
Visually obtrusive co-morbidity (yes / no)	*P*=0.27	*P*=0.29	*P*=0.96	***P*=0.092**
Age at assessment	***P*<0.0001**	***P*=0.0002**	***P*=0.039**	***P*=0.0067**
Age at onset	***P*<0.0001**	***P*=0.0018**	*P*=0.88	*P*=0.94
Sex	***P*=0.013**	*P*=0.22	*P*=0.59	*P*=0.20

Factors with a *P* value of <0.1 were considered significant and included in multivariate analysis (indicated in bold type).

CESD-R = Center for Epidemiologic Studies Depression Scale – Revised; DS-14 – Distressed personality questionnaire

* For horizontal deviations patients were classified as esotropia versus not esotropia based on largest magnitude of esotropia, exotropia or vertical deviation measured by simultaneous prism cover test (SPCT) in primary position at distance or near

** For vertical deviations patients were classified as vertical versus not vertical based on largest magnitude of vertical deviation, measured by SPCT in primary position at distance or near

† For uniplanar deviations, magnitude was based on largest of distance or near primary position SPCT measurements. For combined horizontal and vertical deviations, magnitude was based on the combined vector.