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Associations between health-related quality of life and the decision to perform surgery for childhood intermittent exotropia

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Abstract

Objective—To assess associations between health-related quality of life (HRQOL) and the decision to perform strabismus surgery for children with intermittent exotropia (XT).

Design—Retrospective chart review

Participants—Children with intermittent XT

Methods—Included subjects, identified in a clinical practice, had assessment of HRQOL using the intermittent exotropia questionnaire (IXTQ), comprising Child, Proxy and Parent components (Parent domains: Function, Psychosocial, Surgery). IXTQ scores were evaluated for association with surgery, along with standard clinical measures: prism and alternate cover test (PACT), stereoacuity, and control score (mean of the 3 most recent scores). Included data were from preoperative (surgical cohort), or most recent follow-up (non-surgical cohort) examinations. Univariate and multivariate logistic regression analyses were performed and relative risk (RR) ratios calculated. Spearman rank correlations were calculated to identify highly correlated items.

Main outcome measures—Association of individual factors with the decision to perform surgery, calculated using relative risk ratios.

Results—106 children with intermittent XT (median age 6, range 2 to 16 years) were eligible for inclusion. 19 (18%) of 106 underwent surgery. Using all available data, IXTQ Proxy score, IXTQ Parent-Function score, IXTQ Parent-Psychosocial score, distance control score, near control score, near PACT, and Preschool Randot stereoacuity were associated with undergoing surgery ($P < 0.1$). 69 of 106 patients had complete data on all factors identified in univariate analysis and were included in multivariate analyses. 14 (20%) of these 69 underwent surgery. In multivariate analyses poor distance control score (RR 1.83, confidence interval [CI] 1.25, 2.68) and reduced IXTQ Parent-Function score (RR 0.96, CI 0.92, 0.99) were associated with surgical intervention. Repeat multivariate analyses retaining only one of highly correlated items showed IXTQ Proxy IXTQ Parent-Psychosocial, larger near PACT and worse near control were also associated with surgery.

Conclusions—After accounting for poorer exodeviation control at distance, reduced Parent and Proxy HRQOL were associated with undergoing strabismus surgery for childhood intermittent

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XT. Recognizing reduced parental HRQOL may be important, with a possible role for educational or counselling interventions.

In childhood intermittent exotropia (XT), severity is commonly evaluated by assessing a variety of factors, including angle of exodeviation, control or frequency of the exodeviation, stereoacuity, presence and severity of any symptoms and effects of intermittent XT on health-related quality of life (HRQOL). Nevertheless, specific indications for surgical intervention are poorly defined and it is unclear which factors, or combination of factors, are currently associated with surgical intervention.¹ The often-cited indicator for surgery is “poor” control, sometimes quantified as an exotropia that is manifest >50% of the time.²⁻⁴ Nevertheless, social concerns, symptoms or other concerns expressed by either the child or the parent may also play a role in surgical decision making in intermittent XT. In the present study we evaluated child and parent HRQOL for possible association with strabismus surgery in children with intermittent XT, along with clinical measures of control, angle of deviation and stereoacuity.

Methods

Institutional Review Board approval was obtained from the Institutional Review Board at Mayo Clinic, Rochester MN, and all procedures and data collection were conducted in a manner compliant with the Health Insurance Portability and Accountability Act. All research procedures adhered to the tenets of the Declaration of Helsinki.

Patients

Children (aged less than 17 years) with a diagnosis of intermittent XT were identified from departmental databases in a clinical practice and were considered eligible for inclusion if they had basic intermittent XT, pseudo divergence excess type intermittent XT, true divergence excess type intermittent XT or convergence insufficiency intermittent XT in the absence of neurological disease.⁵ A minimum distance angle of 10 prism diopters (pd) exodeviation by prism and alternate cover test (PACT) was also required for eligibility. Patients with sensory exotropia, paralytic exotropia and co-existing developmental delay were excluded.

During the study period, children at our center were under the active care of a pediatric ophthalmologist (n=3) or pediatric optometrist (n=1). All care providers followed a conservative approach to intervention in intermittent XT. Patients were generally considered for surgery if: 1) the deviation became constant at both near and distance, 2) there was a decrease in near Randot stereoacuity, or 3) there were overwhelming social concerns or symptoms. Increase in angle of deviation alone (in the absence of worsening control, decreased stereoacuity, or social concerns) was not considered sufficient to justify surgical intervention. Because, in the present study, we aimed to primarily assess the association between HRQOL and strabismus surgery we included only patients with HRQOL data using the previously described intermittent exotropia HRQOL questionnaire (IXTQ).⁶⁻⁸ From mid-2008, we aimed to administer the IXTQ to all children with intermittent XT, minimizing selection bias. IXTQ data were collected as part of a research protocol and were not directly reviewed by the care provider, nevertheless we assumed that any concerns were also expressed to the care provider and that the IXTQ would simply provide a standardized measure of these concerns. Data were taken from the most recent (pre-surgical) assessment. Therefore, for patients who underwent surgery data from the immediate preoperative examination were included and for patients who did not undergo surgery data from the most recent examination with IXTQ data (typically the patient’s most recent follow-up examination) were included. Data on regularly measured clinical parameters (exodeviation control, angle of deviation, stereoacuity) were also collected where available.

Assessment of HRQOL using the IXTQ

The IXTQ is a condition-specific, patient-derived HRQOL questionnaire for intermittent XT. The specific methods utilized in the development and validation of the IXTQ are reported elsewhere.^{6, 7} The IXTQ comprises three components: Child self-report, completed by children aged 5–17 years (age-specific formats for 5–7 year olds and 8–17 year olds), Proxy report (completed by parents of children aged 2–17 years), and Parent report (completed by parents of children aged 2–17 years).⁶ The IXTQ Proxy provides a parent rating of the child's HRQOL: IXTQ Child and Proxy reports contain 12 parallel items. The IXTQ Parent assesses the effect of the child's intermittent XT on the HRQOL of the parent themselves and has a total of 17 items in 3 domains: 1) psychosocial effects (n=7 items); 2) function (n=8 items) and 3) surgery (n=2 items). Each domain was identified as an independent factor during the development of the IXTQ⁶ and was retained as such following Rasch analysis.¹⁹ (Questionnaires available online in administrable format with user instructions: www.pedig.net accessed July 22, 2013). Proxy and Parent questionnaires use a 5-point Likert type scale for responses. The Child questionnaire uses a 3-point Likert type scale for 5- to 7-year-old child responses and a 5-point Likert type scale for 8- to 17-year-old child responses. The design of the Child report, including face-symbols to enable matching for younger children, reflects that of the well-established PedsQL questionnaire.⁶ Questionnaires were self-administered following simple verbal and written instructions, with supervision as necessary (depending on the child) by a trained observer. For each patient, on each questionnaire and each domain (IXTQ Parent only), mean composite scores were calculated ranging from 0 to 100 (worst to best HRQOL).

Assessment of control

Control assessment was standardized using a previously described 0- to 5-point control scale,⁹ generating separate control scores for distance fixation (3 meters) and near fixation (1/3 meter). Using this control scale, any spontaneous exotropia occurring during a 30-second observation period was graded either: 5 for constant exotropia, 4 for exotropia more than 50% of the observed time or 3 for exotropia less than 50% of the observed time. If there was no spontaneous exodeviation during the 30-second observation period, exodeviation recovery was rated as the worst of three, 10-second dissociations, scoring 2 for more than 5 seconds to recovery, 1 for 1–5 seconds to recovery and 0 for less than 1 second to recovery.⁹ Previous studies of control have shown that reporting a single control score at distance and at near is often inadequate for representing severity in an individual patient due to variability of control throughout the day.¹⁰ Triple control scores (mean of 3 measures) have been shown to be closer to the patient's overall severity (day score) than single or double (mean of 2) scores.¹¹ Therefore for the present study, we used the 3 most recent control scores to calculate a triple control score. Since we now routinely measure control 3 times over an examination when possible, some patients had 3 control scores at a single examination, while for others a triple control score was calculated using scores from previous examinations.

Measurement of angle of deviation

Angle measurements were obtained using the PACT, the patient viewing an accommodative target at distance fixation (3 meters) and near fixation (1/3 meter). The largest prism magnitude that neutralized the exodeviation was recorded as the angle of deviation.

Measurement of stereoacuity

Near stereoacuity was measured using the Preschool Randot test and distance stereoacuity was measured using the Distance Randot test, both according to previously described protocols.¹² The Preschool Randot measures stereoacuity from 800 to 40 arc seconds with 2

of 3 correct responses required to pass each level. The Distance Randot measures from 400 to 60 arc seconds with 2 of 2 correct responses required to pass each level. The best level passed was recorded as the patient's stereoacuity; scores were log-transformed for analysis. If the patient was unable to identify 2 correctly at the largest testable disparity (800 arc seconds on Preschool Randot, 400 arc seconds on Distance Randot), the patient was classified as having "nil" stereoacuity and assigned the next level on the logarithmic scale i.e. 1600 arc seconds / 3.20 log arc seconds for Preschool Randot and 800 arc seconds / 2.90 log arc seconds for Distance Randot.

Analysis

Logistic regression analyses were performed to evaluate which factors were associated with surgery. In the initial step of univariate logistic regression analysis, we included a wide range of clinical and demographic factors in order to avoid missing possible associations with surgery that may exist. The following factors were entered into univariate logistic regression analyses: IXTQ Child score, IXTQ Proxy score, IXTQ Parent-function score, Parent-psychosocial score, Parent-surgery score, triple exodeviation control score at distance and near, angle of deviation by PACT at distance and near, Preschool Randot stereoacuity, Distance Randot stereoacuity, age, care provider, and sex. To minimize missing any possible associations, each variable with a univariate significance of $P < 0.1$, was included in multivariate regression analyses.

Before proceeding with multivariate analysis, Spearman Rank correlations were calculated to identify moderate to strong correlations ($r \geq 0.5$) between factors identified in univariate analysis. Identifying correlations between factors is important since in multivariate analyses only one of any moderate to strongly correlated variables will appear as a significant factor. Multivariate analyses were performed first with all items identified in univariate analysis, and then were repeated retaining only one of any set of correlated factors to determine whether masking of variable influence was occurring due to the correlation.

Backwards and forwards stepwise logistic regression analyses were performed. The results for each of these approaches were essentially identical, therefore only forwards stepwise logistic regression results are reported. For multivariate analyses, only patients with data on each variable were included. The significance of each variable in relation to the outcome (surgery) was calculated, estimating risk ratios (with 95% confidence intervals [CI]). Risk ratios estimate the risk of a member of one group (e.g. those with worse control scores) ending up with a particular outcome compared with a member of another group (e.g. those with better control scores). We calculated the "relative risk" which is the ratio of the proportions of cases having a positive outcome in the two groups. Ratios with confidence limits excluding 1 are statistically significant.

The predictive accuracy of each logistic regression model was analyzed using the concordance or c-statistic, equivalent to the area under the Receiver Operating Characteristic curve. This statistic provides the probability of predicting an outcome compared with chance and ranges in value from 0.5 (the prediction value of the model is not better than chance) to 1.0 (the model perfectly predicts those with the outcome). Typically, a c-statistic of >0.7 indicates the model is reasonable and a c-statistic of >0.8 indicates the model is strong. All statistical analyses were done using SAS computer software version 9.1.3.

Results

One hundred and six children (median age 6, range 2 to 16 years) were included; 19 (18%) of 106 underwent surgery. The majority of patients were either basic, pseudo divergence excess, or true divergence excess types of intermittent XT. Only three patients had

convergence insufficiency type intermittent XT. As required for eligibility, all 106 patients had completed at least one component of the IXTQ. The Parent component was completed in all 106, the Proxy component was completed in 105 of 106 and the Child component was completed in 90 of 106 (only applicable for children aged 5–17 years). 103 of 106 had distance PACT measures and 102 had near PACT measures. Preschool Randot stereoacuity data were available in 96 of 106 patients and Distance Randot data in 87 of 106 patients. Distance and near triple control scores were calculated for 85 of 106 patients. For 31 (36%) of 85, the 3 control scores were available from a single examination; for the remaining 54 (64%) patients, scores from examination(s) immediately prior to the included examination were used to calculate the triple control score.

Univariate analysis

Using all available data, IXTQ Proxy score, IXTQ Parent-Function score, IXTQ Parent-Psychosocial score, distance control score, near control score, near PACT, and Preschool Randot stereoacuity were associated with undergoing surgery ($P < 0.1$) (Table 1).

Correlation of factors

Sixty-nine patients had complete data on each of the 7 factors identified as significant in univariate analysis (IXTQ Proxy, IXTQ Parent, distance control score, near control score, near PACT, and Preschool Randot stereoacuity). Two sets of correlated factors ($r = 0.5$) were identified, one consisting of HRQOL factors (IXTQ Parent-function, IXTQ Parent-psychosocial, IXTQ Proxy, Table 2) and one consisting of clinical factors (near angle and near control, Table 2).

Multivariate analysis

Fourteen (20%) of the 69 patients included in multivariate analysis underwent surgery. When including all 7 factors identified as significant in univariate analysis, only higher (worse) distance control score (relative risk [RR] 1.83, CI 1.25, 2.68) and lower (worse) IXTQ Parent-Function score (RR 0.96, CI 0.92, 0.99) were associated with surgery in multivariate analysis (Table 3). (c -statistic 0.934).

To account for correlations between factors and to evaluate all possible combinations of eliminating correlated factors, we repeated multivariate analysis retaining only one factor from each set of correlated items, resulting in 6 additional iterations of multivariate analysis (Table 3). For each multivariate model, higher distance control score remained the predominant factor associated with surgery. In addition, for each multivariate logistic regression model, a measure of HRQOL was also associated with surgery. Lower IXTQ Parent-psychosocial score was found to be associated with surgery when it was retained (and IXTQ Parent-function and IXTQ Proxy were removed); likewise lower IXTQ Proxy score was found to be associated with surgery when it was retained (and IXTQ Parent function and IXTQ Parent-psychosocial were removed) (Table 3). Near control score and near angle of deviation were found to be associated with surgery in 2 of the 7 multivariate analyses (Table 3). These models confirmed that poor distance control was consistently associated with surgery and that after accounting for poor control, either IXTQ Parent-Function, IXTQ Proxy, or IXTQ Parent-Psychosocial scores were associated with the decision to perform surgery. Near control and near angle were also associated with surgery in some models.

Discussion

In assessing factors that influence the decision to perform surgery in children with intermittent XT, poorer parental and proxy HRQOL were strongly associated with surgery, after accounting for poor control of the exodeviation at distance. Children with intermittent

XT whose accompanying parent reported poorer HRQOL were more likely to undergo surgery than those whose parents reported better HRQOL.

The Parent component of the IXTQ measures parental HRQOL specifically as it relates to their child's intermittent XT. There are three distinct domains: Function concerns (e.g. "I worry that my child will not be able to see the board at school"), Psychosocial concerns (e.g. "I worry about how my child's eyes will affect him/her socially"), and concerns regarding Surgery (e.g. "I worry about the possibility of surgery"). Of the three parental domains both Parent Function and Parent Psychosocial were associated with the decision to perform surgery, while the Parent Surgery domain was not. There are few previous studies reporting parental health-related quality of life as it relates to their child's strabismus. Our finding of an association between parental worry regarding the child's visual function (IXTQ Parent Function), and the decision to perform surgery is noteworthy. In a previous study in which children with intermittent XT were interviewed,¹³ very few visual function concerns were expressed by the children themselves. The presence of parental concerns may not reflect a true negative impact of intermittent XT on the child's visual function, but may be purely parental perception. Nevertheless, further research to evaluate visual function in childhood intermittent XT is warranted. For the psychosocial domain of the IXTQ Parent, there was also an association with the decision to perform surgery. In a culture where visually obtrusive ocular misalignment is undesirable, it is entirely possible that worry regarding actual or possible psychosocial effects could drive parental desire for surgical correction. Regarding the surgery domain of the IXTQ Parent, our data indicate that concerns regarding the possibility of surgery were present to a similar extent in both the surgical and non-surgical cohorts and that therefore the lower scores in the surgical domain of the IXTQ Parent were not specifically associated with the decision to perform surgery.

Although the IXTQ Parent-function and IXTQ Parent-psychosocial scores were associated with surgery, neither control score or angle of deviation were highly correlated with IXTQ scores, suggesting parental concerns are independent of severity in childhood intermittent XT. In other words, more severe disease (as measured by control score or angle of deviation), was not associated with reduced Parent HRQOL in this particular cohort. It is possible that other factors not evaluated in this study (e.g. spectacle correction, non-surgical treatment) may be correlated with Parent HRQOL and this would be worthy of further study. In addition, there was no correlation between the parent's own HRQOL (using the IXTQ Parent) and the child's own HRQOL (using the IXTQ Child). In a previous study we found that children with intermittent XT rarely reported HRQOL concerns using the IXTQ Child report.⁷ This could suggest insensitivity of the IXTQ Child report but because the IXTQ Child questionnaire was derived from interviews of children with intermittent XT, it more likely confirms that children with intermittent XT in the present study were rarely aware of HRQOL concerns. The association of parental HRQOL with surgery therefore appears to be completely independent of other measures of severity, and may be more a reflection of the parent's personal perception. It would be instructive to study the effects of educational or informational interventions on Parental HRQOL to evaluate whether or not improved understanding of the effects of intermittent XT on visual function might alleviate concerns.

Proxy-reporting of HRQOL is important when assessing young children,¹⁴ and provides a means of understanding the parent's perspective, a factor known to drive health-care utilization.^{15, 16} We found IXTQ Proxy scores (parental rating of their child's HRQOL) to be highly correlated to IXTQ Parent scores, such that when Parent scores were removed from multivariate analysis, IXTQ Proxy scores showed an association with surgery. This finding indicates that parents who rated their own HRQOL as poor (on the IXTQ Parent), also rated their child's HRQOL as poor. This finding of a correlation between proxy HRQOL and the HRQOL of the parents themselves suggests parents who express worry

about their child's intermittent XT are also more likely to perceive their child as having problems, regardless of clinical severity.

In designing this study, although we were primarily interested in associations with HRQOL, we considered it important also to understand associations with clinical factors. Of the clinical measures evaluated in this study, distance control score was most strongly associated with the decision to perform surgery. The association between distance control and surgery was stronger than associations with HRQOL which may be expected based on current teaching that surgery should be considered in the presence of poor control,²⁻⁴ and the fact that poor control is probably the most commonly encountered form of deterioration: change in stereoacuity has been reported to occur only very rarely.¹⁷ Associations between surgery for intermittent XT and clinical measures were evaluated in a previous study by Buck et al.¹⁸ Similar to this present study, Buck et al performed multivariate logistic regression analysis and found that only high control score (poor control) at last follow-up significantly predicted surgery for intermittent XT, similar to the findings of this present study. Nevertheless measures of HRQOL were not included in their study.¹⁸

Of the clinical measures included in this study, in addition to distance control, near control and near angle of deviation were also found to be associated with surgery in several of the multivariate models. It is probable that patients with larger near exodeviations and poorer near control are also those with more severe disease and are therefore more likely to undergo surgical intervention. It would be interesting to study the natural history of angle of deviation and control in children with intermittent XT to better understand these possible markers of deterioration.

Our study does not address which criteria should be used to decide whether or not a child with intermittent XT requires surgery, or whether applying such criteria influences surgical outcomes. One approach to answer these questions would be to prospectively observe a cohort of children with intermittent XT to determine which factors are associated with subsequent, consensus deterioration criteria. Such factors could then be evaluated in a randomized clinical trial where children who reach these criteria are randomized to surgery versus observation and outcomes evaluated.

There are some limitations to our study. Although the IXTQ was rigorously developed⁶ children themselves appear to rarely report HRQOL concerns (using the IXTQ Child).⁷ This may suggest insensitivity of the instrument, but as questionnaire items were patient-derived, more likely reflects the nature of the condition. Psychometric analysis of the IXTQ (Leske DA, Holmes JM, Pediatric Eye Disease Investigator Group. Evaluation of the Intermittent Exotropia Questionnaire (IXTQ) using Rasch analysis. *Invest Ophthalmol Vis Sci* 2012;53:E-abstract 5450) did not identify the need for item removal or re-scoring in the Child report. We consider the lack of association between child-reported HRQOL and the decision to perform surgery to be consistent with common clinical experience. It is likely that local practice patterns influenced the associations found and that associations with surgery may have been different had we studied a different population or had a greater proportion of patients undergoing surgery. In addition, not all patients had complete data to allow for multivariate analysis, which may have influenced our findings. Because IXTQ data were collected as part of a research protocol, the care provider did not formally review the raw data at the time of the clinical examination. We have assumed that the same concerns were conveyed to the care provider by the parent and that the IXTQ simply quantifies these concerns. Finally, our cohort contained few patients with convergence insufficiency type intermittent exotropia and therefore our findings are generalizable mainly to patients with basic, true divergence excess, or pseudo divergence excess types of intermittent exotropia.

In our population of children with intermittent XT, we found that after accounting for poorer exodeviation control at distance, reduced Parent and Proxy HRQOL were associated with undergoing surgery. Recognizing parental concerns as independent of clinical severity may be important for the management of childhood intermittent XT and the role of parental educational or counselling interventions should be explored.

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Table 1

Univariate Analysis of Various Factors to Assess for Association with Strabismus Surgery in Children with Intermittent Exotropia. Factors with a P value of <0.1 were considered significant and included in multivariate analysis.

Factor	Number of patients	P value	Relative risk (95% confidence interval)
Age	106	0.14	1.10 (0.98, 1.24)
Sex	106	0.21	0.60 (0.27, 1.34)
Care provider	106	0.43	0.98 (0.26, 3.64)
Control score ^a – distance	85	<0.0001	1.99 (1.47, 2.69)
Control score ^a – near	85	0.0027	1.64 (1.22, 2.22)
PACT – distance	103	0.11	1.04 (1.00, 1.08)
PACT – near	102	0.0024	1.06 (1.02, 1.10)
Distance Randot	87	0.15	2.12 (0.71, 6.30)
Preschool Randot (near)	96	0.055	2.34 (1.03, 5.34)
IXTQ Parent - Function	106	0.0003	0.96 (0.94, 0.98)
IXTQ Parent - Psychosocial	106	0.0018	0.97 (0.96, 0.99)
IXTQ Parent - Surgery	106	0.67	1.00 (0.98, 1.01)
IXTQ Proxy	105	0.0057	0.97 (0.96, 0.99)
IXTQ Child	90	0.87	1.00 (0.97, 1.02)

PACT = prism and alternate cover test

IXTQ = Intermittent Exotropia Questionnaire

^aTriple control score calculated as the mean of the three most recent measures

Table 2
Spearman Rank Correlations of Individual Factors Included in Multivariate Logistic Regression Analysis in Children with Intermittent Exotropia.

	Distance Control	Near Control	Near PACT	IXTQ Proxy Score	IXTQ Parent Function Score	IXTQ Parent Psychosocial Score	Preschool Randot (near)
Distance Control ^a							
Near Control ^a	0.46 (<0.0001)						
PACT near	0.33 (0.003)	0.58 (<0.0001)					
IXTQ Proxy Score	-0.06 (0.6)	-0.07 (0.5)	-0.11 (0.3)				
IXTQ Parent Function Score	-0.29 (0.007)	-0.18 (0.09)	0.08 (0.4)	0.64 (<0.0001)			
IXTQ Parent Psychosocial Score	-0.12 (0.3)	-0.02 (0.8)	0.05 (0.6)	0.65 (<0.0001)	0.64 (<0.0001)		
Preschool Randot (near)	0.17 (0.1)	0.06 (0.6)	0.06 (0.5)	-0.18 (0.08)	-0.20 (0.05)	-0.17 (0.1)	
Surgery	0.41 (0.0001)	0.24 (0.02)	0.29 (0.004)	-0.25 (0.01)	-0.36 (0.0002)	-0.28 (0.004)	0.18 (0.08)

IXTQ = Intermittent Exotropia Questionnaire; PACT = prism and alternate cover test

^aTriple control score calculated as the mean of the three most recent measures

Table 3
Multivariate, Logistic Regression Analyses Showing Factors Associated with Surgery in Children with Intermittent Exotropia.

Factors retained in the model ^a	Relative Risk (95% confidence interval)						
	IXTQ Parent- Function	IXTQ Parent- Psychosocial	IXTQ Proxy	Distance control score ^b	Near control score ^b	PACT near	
All factors retained	0.96 (0.92, 0.99)	NS	NS	1.83 (1.25, 2.68)	NS	NS	
IXTQ Parent Function and Near Angle	0.96 (0.92, 0.99)	Not included	Not included	1.83 (1.25, 2.68)	Not included	NS	
IXTQ Parent Function and Near Control	0.96 (0.92, 0.99)	Not included	Not included	1.83 (1.25, 2.68)	NS	Not included	
IXTQ Parent Psychosocial and Near Angle	Not included	0.97 (0.96, 0.99)	Not included	1.92 (1.32, 2.80)	Not included	1.06 (1.01, 1.11)	
IXTQ Parent Psychosocial and Near Control	Not included	0.97 (0.95, 1.00)	Not included	1.63 (1.01, 2.63)	1.52 (0.97, 2.39)	Not included	
IXTQ Proxy and Near Angle	Not included	Not included	0.98 (0.95, 1.00)	2.04 (1.41, 2.97)	Not included	NS	
IXTQ Proxy and Near Control	Not included	Not included	0.98 (0.95, 1.00)	2.04 (1.41, 2.97)	NS	Not included	

Only patients with data on each factor were included (n=69).

IXTQ = Intermittent Exotropia Questionnaire; PACT = prism and alternate cover test; NS = Not significant

^aDistance control and Preschool Randot stereoacuity were retained in all multivariate analyses since there were no moderate to strong correlations between these factors and other variables:

^bTriple control score calculated as the mean of the three most recent measures