

Parent-Reported Health-Related Quality of Life in Children with Intermittent Exotropia: A Portuguese Cross-Sectional Study

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ABSTRACT

Purpose: To assess parent-reported health-related quality of life (HRQoL) in Portuguese children with intermittent exotropia (IXT) and explore whether HRQoL differs according to deviation magnitude, clinical subtype, or binocular vision status.

Methods: This cross-sectional correlational study included 60 children aged 4-15 years with IXT attending two paediatric ophthalmology units between September 2021 and April 2025. One parent completed a Portuguese translation of the 12-item Proxy Intermittent Exotropia Questionnaire (Proxy IXTQ; 0-100 scale, with lower scores indicating worse HRQoL). Orthoptic assessment characterized IXT subtype, distance deviation magnitude, and binocular vision status. Descriptive statistics, Pearson correlation, and pairwise group comparisons were performed at a two-sided significance level of 0.05.

Results: Mean age was 7.97 ± 2.99 years and 50% were girls. Mean distance deviation was 24.47 ± 8.85 prism dioptres. Binocular function was maintained in 20%, deteriorated in 60%, and absent in 20%. Mean Proxy IXTQ score was 57.29 ± 20.51 (range, 19-94). The most frequently reported concern was closing one eye in sunlight (43.3% “almost always”), followed by worry about the eyes (43.3% “often”) and being bothered by parental comments (40.0% “often”). HRQoL was not significantly correlated with deviation magnitude ($r=-0.063$; $p=0.742$), and pairwise comparisons showed no significant differences by deviation category, IXT subtype, or binocular vision status (all $p>0.05$).

Conclusions: Children with IXT experienced meaningful parent-perceived functional and psychosocial concerns despite preserved visual acuity. Clinical severity measures alone did not explain the variability in Proxy IXTQ scores. Incorporating condition-specific patient- and proxy-reported outcomes may support more child-centred assessment and shared treatment decisions.

Keywords: Intermittent Exotropia, Strabismus, Children, Health-Related Quality of Life, Proxy IXTQ, Patient-Reported Outcome Measures.

Introduction

Intermittent exotropia (IXT) is a common childhood strabismus in which an exodeviation alternates with periods of ocular alignment. Its intermittency distinguishes it from constant deviations: many children retain good monocular visual acuity and useful binocular function while aligned, yet experience variable loss of control, suppression, reduced

stereopsis, photophobia-related monocular eye closure, asthenopia, or concern about the visible deviation. Consequently, conventional motor outcomes such as prism cover test angle provide only a partial account of disease burden [1-3].

Contemporary paediatric eye care increasingly recognizes health-related

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quality of life (HRQoL) and functional vision as outcomes that complement alignment and sensory measures. Strabismus can affect emotional well-being, self-perception, social interaction, school participation, and family worry. A recent review found that most included studies reported lower quality of life among children with strabismus than among visually normal controls, while also emphasizing heterogeneity across ages, instruments, and reporter perspectives [4]. Portuguese data likewise suggest lower paediatric HRQoL in strabismus, although differences may be difficult to detect with generic instruments and clinically heterogeneous comparison groups [5].

Condition-specific instruments are particularly valuable because they capture concerns characteristic of IXT. The Intermittent Exotropia Questionnaire (IXTQ) includes child self-report, parent-proxy, and parent-focused components. The Proxy IXTQ has shown greater sensitivity than the generic Pediatric Quality of Life Inventory for detecting reduced HRQoL in childhood IXT [6]. Subsequent studies have confirmed that IXT-related concerns extend beyond appearance to functional symptoms, worry, and interactions with others [7,8]. More broadly, eye-specific measures such as the Pediatric Eye Questionnaire have demonstrated deficits in functional vision and eye-related quality of life among children with strabismus even when generic HRQoL differences are limited [9,10].

The relation between clinical severity and perceived burden remains uncertain. Some studies have reported associations between poorer IXT control or binocular function and lower HRQoL, whereas others have found weak or inconsistent links between questionnaire scores and deviation magnitude [11,12,7,8]. Longitudinal evidence also shows that HRQoL may remain stable during observation, while successful surgery can improve child, proxy, and parent IXTQ domains [13-15]. These findings suggest that HRQoL is clinically relevant but not reducible to a single motor measurement.

Evidence from Southern European paediatric populations remains scarce, and no condition-specific study has characterized parent-perceived IXT burden in Portuguese children. This study therefore aimed to quantify Proxy IXTQ scores in a Portuguese clinical sample and to explore their relationships with deviation magnitude, IXT subtype, and binocular vision status. We hypothesized that greater motor and sensory severity would be associated with lower parent-reported HRQoL.

Materials and Methods

Study Design and Setting

A cross-sectional, observational, correlational study was conducted in the paediatric ophthalmology units of CUF Cascais Hospital, Portugal. Participants were recruited consecutively by convenience sampling between September 2021 and April 2025. Reporting was structured in accordance with the principles of the STROBE statement for observational studies [16].

Participants

Eligible participants were children with a clinical diagnosis of IXT, aged 4-18 years, followed in either participating unit,

whose parent or legal guardian provided written informed consent. The final sample comprised 60 children aged 4-15 years. All participants had good visual acuity in both eyes and none had amblyopia. Participants were excluded if they had constant exotropia, sensory or paralytic exotropia, restrictive or neurological strabismus, previous strabismus surgery, amblyopia, significant interocular visual acuity asymmetry, ocular disease affecting visual function, developmental or cognitive conditions that could interfere with the clinical assessment or questionnaire completion, or insufficient clinical data. Children whose parents or legal guardians declined to provide informed consent were also excluded.

Clinical Assessment

A standardized ophthalmological and orthoptic assessment was performed by the same orthoptist. IXT subtype was classified from the difference between distance and near deviation as basic, divergence excess, or convergence insufficiency. Deviation magnitude was measured using the prism and alternate cover test and represented by the distance angle in prism dioptres (PD). Binocular vision was assessed with the Worth four-dot test and Wirt stereotest and categorized as present and maintained, present but deteriorated, or absent. Visual acuity was assessed monocularly with an age-appropriate test.

Health-related Quality of Life

One parent completed the 12-item Proxy IXTQ, which measures the parent's perception of the effect of IXT on the child. Items are answered on a five-category frequency scale and transformed to a 0-100 score, where 0 represents the worst and 100 the best HRQoL. The questionnaire was translated into European Portuguese using forward translation and back-translation in earlier master's work by the investigator. In that work, internal consistency was high (Cronbach's $\alpha=0.91$).

Statistical Analysis

Analyses were performed using IBM SPSS Statistics, version 29 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as frequencies and percentages; continuous variables as mean $\pm$ standard deviation, range, and quartiles where appropriate. Pearson's correlation coefficient assessed the linear relationship between continuous deviation magnitude and Proxy IXTQ score. Pairwise comparisons with 95% confidence intervals explored differences in scores across categories of deviation magnitude, IXT subtype, and binocular vision status. All tests were two-sided and $p<0.05$ was considered statistically significant.

Results

Participant and Clinical Characteristics

The sample included 60 children, equally distributed by sex (30 girls and 30 boys). Mean age was 7.97 ± 2.99 years (range, 4-15). Basic IXT was the most common subtype (56.7%), followed by divergence excess (33.3%) and convergence insufficiency (10.0%). Distance deviation ranged from 4 to 40 PD, with a mean of 24.47 ± 8.85 PD. Binocular vision was present but deteriorated in 36 children (60.0%), maintained in 12 (20.0%), and absent in 12 (20.0%) (Table 1).

Table 1: Participant and clinical characteristics

Characteristic	Value
Sample size	60
Age, years, mean $\pm$ SD (range)	7.97 $\pm$ 2.99 (4-15)
Female sex, n (%)	30 (50.0)
Male sex, n (%)	30 (50.0)
Basic IXT, n (%)	34 (56.7)
Divergence-excess IXT, n (%)	20 (33.3)
Convergence-insufficiency IXT, n (%)	6 (10.0)
Distance deviation, PD, mean $\pm$ SD (range)	24.47 $\pm$ 8.85 (4-40)
Binocular vision maintained, n (%)	12 (20.0)
Binocular vision deteriorated, n (%)	36 (60.0)
Binocular vision absent, n (%)	12 (20.0)

IXT, intermittent exotropia; PD, prism dioptres; SD, standard deviation

Proxy IXTQ Scores and Item Responses

The questionnaire was completed by 50 mothers (83.3%) and 10 fathers (16.7%). The mean Proxy IXTQ score was 57.29

$\pm$ 20.51, with a range from 19 to 94. The 25th, 50th, and 75th percentiles were 40.63, 57.29, and 77.08, respectively (Table 2).

Table 2: Distribution of Proxy IXTQ scores

Statistic	Score
Mean $\pm$ SD	57.29 $\pm$ 20.51
Minimum, Maximum	19, 94
25th percentile; Median and 75th percentile	40.63; 57.29; 77.08

Higher scores indicate better health-related quality of life.

The most prominent item was monocular eye closure in sunlight: 26 parents (43.3%) reported that this occurred almost always and a further 14 (23.3%) reported it often. Worry about the eyes was reported often by 26 parents (43.3%) and almost always by 8 (13.3%). Being bothered when parents commented on the eyes occurred often in 24 children (40.0%), according to proxy report. Concentration difficulties were reported often in 20 children (33.3%). By contrast, 48 parents (80.0%) reported that the child's eyes never made it difficult to form new friendships, and 30 (50.0%) reported that the child was never teased because of the eyes (Table 3).

Table 3: Proxy IXTQ item response distribution, n (%)

Item	Never	Almost never	Sometimes	Often	Almost always
Worries about eyes	2 (3.3)	10 (16.7)	14 (23.3)	26 (43.3)	8 (13.3)
Worries while waiting for eyes to become clear	10 (16.7)	8 (13.3)	14 (23.3)	26 (43.3)	2 (3.3)
Worries what people think is wrong with eyes	10 (16.7)	6 (10.0)	18 (30.0)	20 (33.3)	6 (10.0)
Other children tease child	30 (50.0)	14 (23.3)	10 (16.7)	6 (10.0)	0 (0.0)
Bothered when adults talk about eyes	14 (23.3)	8 (13.3)	20 (33.3)	16 (26.7)	2 (3.3)
Bothered when parents talk about eyes	12 (20.0)	8 (13.3)	14 (23.3)	24 (40.0)	2 (3.3)
Bothered by closing one eye in sunlight	4 (6.7)	4 (6.7)	12 (20.0)	14 (23.3)	26 (43.3)
Feels different from other children	26 (43.3)	12 (20.0)	10 (16.7)	6 (10.0)	6 (10.0)
Worries what others think	22 (36.7)	8 (13.3)	18 (30.0)	8 (13.3)	4 (6.7)
Difficulty looking people in the eye	12 (20.0)	18 (30.0)	16 (26.7)	14 (23.3)	0 (0.0)
Difficulty concentrating	8 (13.3)	16 (26.7)	16 (26.7)	20 (33.3)	0 (0.0)
Eyes make new friendships difficult	48 (80.0)	6 (10.0)	4 (6.7)	2 (3.3)	0 (0.0)

Associations with Clinical Severity

Deviation magnitude was weakly and inversely correlated with Proxy IXTQ score, but the association was not statistically significant ($r=-0.063$; $p=0.742$). All pairwise comparisons between deviation-magnitude categories had 95% confidence intervals that included zero (0.886-0.995). Likewise, no pairwise difference was identified among basic, divergence-excess, and convergence-insufficiency subtypes (0.776-0.915), or among maintained, deteriorated, and absent binocular vision groups (0.400-0.791).

Discussion

This Portuguese cross-sectional study found substantial

variability in parent-reported HRQoL among children with IXT. The mean Proxy IXTQ score of 57.29 was lower than values reported in several earlier clinical cohorts, indicating frequent parent-perceived burden, although direct comparisons require caution because clinical composition, language adaptation, and cultural context differ [6-8]. The greatest concerns were characteristic of IXT: closing one eye in bright sunlight, worry about the eyes, comments from adults or parents, and difficulty concentrating. Conversely, most parents did not perceive teasing or difficulty forming friendships, suggesting that social participation may remain preserved for many children despite functional and emotional concerns.

These findings reinforce the value of condition-specific outcomes. Generic paediatric HRQoL measures may overlook symptoms and worries tied directly to ocular misalignment, whereas the IXTQ asks about intermittency, eye closure, social reactions, and gaze-related behavior [6]. Recent evidence using other eye-specific instruments similarly shows that strabismus affects functional vision and eye-related quality of life even when generic health scores are relatively preserved [9,10]. A 2025 review concluded that reduced quality of life may occur throughout childhood, while emphasizing that age effects and reporter agreement remain uncertain [4].

Clinical angle was not significantly related to Proxy IXTQ score. This agrees with work showing that the lived impact of IXT cannot be inferred reliably from deviation magnitude alone [7,8]. A cover-test measurement is a time-specific estimate, whereas IXT burden is shaped by frequency of manifest deviation, control, symptoms, context, the child's awareness, reactions from others, and family expectations. The absence of differences by clinical subtype is therefore plausible. It also cautions against describing a larger angle as necessarily implying worse HRQoL in an individual child.

No significant group difference was observed by binocular vision status, although children with maintained binocular function tended to have better scores in the dissertation analysis. Previous studies have reported associations between clinical severity, control, binocular function, and HRQoL, but findings are inconsistent [11,12]. The broad sensory categories used here may have reduced sensitivity, and subjective tests can be influenced by age and cooperation. Future studies should include standardized distance and near control scores, quantitative stereoacuity, and repeated angle measurements.

The item-level pattern adds clinical nuance. Monocular eye closure in sunlight was the clearest concern, consistent with a recognizable symptom of IXT [7]. Worry and sensitivity to comments indicate that the condition may be salient to children even when the deviation is intermittent and visual acuity is normal. At the same time, the low reported frequency of teasing and difficulty making friends should not be interpreted as absence of psychosocial burden. Proxy reports can differ from children's own perceptions, particularly for internal states such as embarrassment, frustration, or worry [4]. Whenever developmentally feasible, child self-report should complement the parent-proxy perspective.

The results also have implications for management. HRQoL should not be used as a stand-alone indication for intervention, but it can identify concerns that conventional testing misses and help clinicians discuss goals with children and families. Longitudinal studies indicate that HRQoL may remain stable during observation, while successful surgery can produce measurable improvement across IXTQ domains [13-15]. Repeated administration may therefore be more informative than a single score, particularly when combined with control, stereoacuity, symptoms, and the frequency of manifest exotropia.

Strengths and Limitations

Strengths include the use of an IXT-specific instrument,

standardized clinical assessment, and recruitment from two Portuguese paediatric ophthalmology units. The study also excluded amblyopia as an alternative explanation for reduced visual HRQoL. Several limitations must be acknowledged. Convenience sampling and the modest sample size limit generalizability and statistical power, especially for the convergence-insufficiency subgroup. The cross-sectional design precludes causal or longitudinal inference. There was no visually normal comparison group and no child self-report. The Portuguese Proxy IXTQ showed high internal consistency in earlier work, but a full formal cross-cultural validation was not reported. Clinical control and frequency of manifest deviation were not quantified, possible confounders were not modeled, and multiple pairwise testing may increase error if not appropriately adjusted. Finally, parent perceptions may reflect parental worry as well as the child's experience.

Conclusions

Portuguese children with IXT showed frequent parent-perceived functional and psychosocial concerns despite good visual acuity. Proxy IXTQ scores varied widely and were not significantly explained by deviation magnitude, IXT subtype, or broad binocular vision status. These findings support integrating condition-specific HRQoL assessment with motor and sensory examination. Future multicentre longitudinal studies should combine validated Portuguese child and proxy instruments with standardized control, stereoacuity, and treatment outcomes.

Reference

1. Julius T Oatts (2020) Intermittent exotropia. AAO Disease Review. <https://www.aao.org/education/disease-review/intermittent-exotropia-2>
2. Lim SB, Wong WL, Ho RC, Wong IB (2015) Childhood intermittent exotropia from a different angle: Does severity affect quality of life? British Journal of Ophthalmology 99: 1405-1411. <https://doi.org/10.1136/bjophthalmol-2014-306545>
3. Wang Y, Xu M, Yu H, Xu J, Hou F, et al. (2020) Health-related quality of life correlated with the clinical severity of intermittent exotropia in children. Eye 34: 400-407.
4. Cecil A, Hepworth L (2025) At what age does strabismus impact quality of life in children? A narrative literature review. British and Irish Orthoptic Journal 21: 105-117.
5. Gouveia-Moraes F, Barros S, Vide Escada A, Carreira P, Tardão G, et al. (2023) Strabismus and health related quality of life in a pediatric Portuguese population. Strabismus 31: 262-270.
6. Hatt SR, Leske DA, Holmes JM (2010) Comparison of quality-of-life instruments in childhood intermittent exotropia. Journal of AAPOS 14: 221-226.
7. Hatt SR, Leske DA, Liebermann L, Holmes JM (2016) Symptoms in children with intermittent exotropia and their impact on health-related quality of life. Strabismus 24: 139-145.
8. Oh JS, Jung JH, Shin HJ (2023) Quality of life in intermittent exotropia for Korean children and their parents. BMC Ophthalmology 23: 185.
9. Hatt SR, Leske DA, Castañeda YS, Wernimont SM,

-
- Liebermann L, et al. (2020). Association of strabismus with functional vision and eye-related quality of life in children. *JAMA Ophthalmology* 138: 528-535.
10. Hatt SR, Leske DA, Wernimont SM, Bothun ED, Birch EE, et al. (2022) Applying normal PedEyeQ thresholds to assess eye-related quality of life among children with strabismus. *Journal of Binocular Vision and Ocular Motility* 72: 92-96.
 11. Buck D, Ali N, Tiffin P, Taylor R, Powell C, et al. (2015) Child-rated and parent-rated quality of life in childhood intermittent exotropia: Findings from an observational cohort study. *Ophthalmology Research: An International Journal* 3: 59-66.
 12. Wang X, Gao X, Xiao M, Tang L, Wei X, et al. (2015) Effectiveness of strabismus surgery on the health-related quality of life assessment of children with intermittent exotropia and their parents: A randomized clinical trial. *Journal of AAPOS* 19: 298-303.
 13. Holmes JM, Hercinovic A, Melia MB, Leske DA, Hatt SR, et al. (2021) Health-related quality of life in children with untreated intermittent exotropia and their parents. *Journal of AAPOS* 25: 80.e1-80.e6.
 14. Holmes JM, Hercinovic A, Melia M, Leske DA, Hatt SR, et al. (2021) Improvement in health-related quality of life following strabismus surgery for children with intermittent exotropia. *Journal of AAPOS* 25: 82.e1-82.e7.
 15. Mao D, Lin J, Chen L, Luo J, Yan J (2021) Health-related quality of life and anxiety associated with childhood intermittent exotropia before and after surgical correction. *BMC Ophthalmology* 21: 270.
 16. von Elm E, Altman DG, Egger M, et al. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *PLoS Medicine* 4: e296.