Original Article

Normative retinal thickness values in children, measured by swept-source optical coherence tomography

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ABSTRACT

Background: Although optical coherence tomography (OCT) has become essential in pediatric ophthalmology, normative data for children are lacking in most device databases. Due to ongoing ocular growth and developmental changes that occur during childhood and adolescence, adult reference values are not appropriate for pediatric use. Additionally, OCT measurements vary across devices, indicating the need for device-specific norms. In this study, we aimed to establish normative values for total macular retinal thickness, macular ganglion cell layer (GCL+) thickness, and circumpapillary retinal nerve fiber layer (cpRNFL) thickness in children aged 5–17 years relevant to the Topcon DRI Triton Plus swept-source OCT device.

Methods: We recruited children aged 5–17 years with normal ocular health, adequate visual acuity, and refractive errors within ±3.00 diopters (D) spherical and ≤ –1.00 D cylindrical under cycloplegia. Each child underwent comprehensive eye examinations and four OCT scans (two macular and two optic disc scans) using the Topcon DRI Triton Plus. Retinal thickness measurements were obtained from the eye with better visual acuity, or from a randomly selected eye in cases where both eyes had similar acuity. Scans were included if image quality was ≥40 and were free from artifacts or segmentation errors. Measurements were compared between age groups (5–7 and 8–17 years). Intra-visit repeatability was assessed using test–retest correlations based on repeated measurements obtained by the same examiner during a single visit.

Results: Sixty-nine children (n = 33, 48% girls), with a median age of 7 years (5–7-year age group) and 13 years (8–17-year age group) were included. The total macular thickness was 287.5 µm (11.1) and 290.5 µm (13.8), GCL+ thickness was 75.7 µm (4.2) and 74.9 µm (5.2), and cpRNFL thickness was 111.5 µm (10.2) and 108.3 µm (7.9) for the 5–7-year and 8–17-year age groups, respectively (mean [standard deviation]). Mean retinal thickness measures did not differ significantly by age or sex (all $P > 0.05$). Correlation between repeated measurements showed excellent repeatability: 0.991 for both total macular and GCL+ thickness, and 0.954 for cpRNFL (all $P < 0.001$). Spherical equivalent did not correlate significantly with retinal thickness measures (all $P > 0.05$).

Conclusions: This study provided normative values for macular total retinal thickness, macular GCL+ thickness, and cpRNFL thickness in children aged 5–17 years, measured using the Topcon DRI Triton Plus OCT device. We observed no significant age- or sex-based differences in these values, and measurement repeatability was excellent. Given the variability in retinal thickness across populations and devices, region- and device-specific pediatric norms are essential. These findings fill a critical gap in pediatric OCT normative databases and contribute to the development of reliable pediatric reference standards for swept-source OCT imaging. This may enhance diagnostic accuracy and clinical decision-making in pediatric ophthalmology.

KEYWORDS

children, optic disc, nerve fiber, macula luteas, normal values, optical coherence tomography

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How to cite this article: Svensson S, Minor AS, Ohnell HMV. Normative retinal thickness values in children, measured by swept-source optical coherence tomography. Med Hypothesis Discov Innov Ophthalmol. 2025 Summer; 14(2): 50-59. https://doi.org/10.51329/mehdiophthal1523

Received: 05 June 2025; Accepted: 20 July 2025

INTRODUCTION

Optical coherence tomography (OCT) was first used to examine the human eye by Huang et al. in 1991. This imaging modality has since revolutionized the field of ophthalmology [1]. Its exceptionally high resolution allows precise measurements of both the total retinal thickness and the individual retinal layers [2]. Several factors, including spherical equivalent (SEQ), ethnicity, and age, have been shown to influence retinal thickness [3].

While all retinal layers are formed prenatally, their maturation continues postnatally [4]. Ocular dimensions also increase throughout childhood and adolescence, with particularly rapid growth occurring during infancy, followed by slower but continuous development into the teenage years [5].

Numerous studies have employed various OCT devices to assess the total retinal thickness and ganglion cell layer (GCL) thickness in children [3, 6–9]. Central macular thickness has been reported to increase up to approximately 5 years of age, after which no statistically significant growth has been observed, despite continuation of retinal development during childhood [3].

Most OCT devices include normative databases for adults (age 18 years and older). However, owing to ongoing ocular growth and development throughout childhood and adolescence, the use of adult reference intervals is not appropriate for pediatric assessments [5]. Furthermore, owing to variations in image acquisition and data processing, normative values cannot be generalized across different OCT devices [10]. Thus, device-specific normative data must be established for children and adolescents as well as adults. Although normative values for the Topcon DRI Triton Plus OCT device have been published previously, they were derived from a different ethnic population [11, 12].

The objective of the present study was to establish normative retinal thickness values for children aged 5–17 years, divided into younger and older age groups, in a predominantly Scandinavian population, relevant to the Topcon DRI Triton Plus swept-source OCT device. We also assessed the intra-rater repeatability of these thickness measurements.

METHODS

For this descriptive cross-sectional study, consecutive participants were recruited from the Department of Ophthalmology at Skane University Hospital, Lund, Sweden, between August 2021 and October 2024. Eligible participants were children aged 5–17 years, considered ophthalmologically healthy. To ensure adequate representation of older children, additional participants were recruited through convenience sampling from the researchers' circle of acquaintances. The total number of participants selected was more than twice the sample size suggested by Swanson et al. for establishing normative reference values for adult retinal nerve fiber layer (RNFL) imaging [13]. This study was approved by the Swedish Ethical Review Board (Dnr 2020-05981) and was conducted in accordance with the ethical standards of the Declaration of Helsinki. Written informed consent was obtained from all parents or legal guardians, and from children aged 15 years and older.

Participants were required to cooperate throughout the examination. For children aged under 8 years, a minimum decimal visual acuity of 0.8 was required, and for those aged 8 years or older, this minimum required value was 1.0 [14]. Exclusion criteria were an ocular pathology history, presence of strabismus, spherical refractive error > ± 3.00 diopters (D), or cylindrical error > –1.00 D cylinder (DC) under cycloplegia. Of the 70 children invited, all agreed to participate. One child was excluded owing to exceeding the astigmatism criteria. For analysis, participants were divided into two age groups: 5–7 years and 8–17 years.

A comprehensive ocular examination was performed to confirm ocular health in each participant. Monocular visual acuity was assessed at a distance of 3 m using the HVOT chart (ORTHO KM, Lund, Sweden), KM chart (ORTHO KM), or adult Snellen chart (ORTHO KM), depending on the participant's age and reading ability [15–17]. Stereopsis was evaluated using the TNO stereo test (Lameris Ootech BV, Ede, Netherlands), with a threshold of 120 s of arc considered to be sufficient [18].

The eye with the best visual acuity was selected for imaging. In cases where both eyes had equal acuity, the choice of eye was randomized by the participant. Cycloplegia was induced using 1% cyclopentolate (Minims, 1.0% w/v, Bausch & Lomb, Kingston upon Thames, UK) in children with lightly pigmented irises, while for those with darker irises, both 1% cyclopentolate and a combination of topical cyclopentolate 0.85%/phenylephrine 1.5% (extempore, APL, Stockholm, Sweden) were used. Anterior and posterior segment examinations were conducted using a slit-lamp (BQ900; Haag-Streit, Koniz, Switzerland). Cycloplegic refraction was measured using either the Retinomax® K-plus 3 (Righton, Tokyo, Japan) or the Nidek autorefractor (AR-1a; Nidek Co., Ltd., Tokyo, Japan). The SEQ was calculated by adding the spherical component to half of the cylindrical component [19].

High-resolution swept-source OCT imaging was performed using the Topcon DRI-OCT Triton Plus device (Topcon Corp., Tokyo, Japan). Retinal thickness was measured from the internal limiting membrane (ILM) to the retinal pigment epithelium (RPE). Macular GCL+ thickness was measured from the GCL to the inner plexiform layer (IPL). The circumpapillary RNFL (cpRNFL) thickness was measured from the ILM to the GCL.

Each participant underwent four OCT scans. Two scans were obtained using the Rescan 3D Macula (H) 7 × 7-mm protocol to assess the total retinal and GCL+ thickness. A 6-mm diameter circular grid, automatically centered on the fovea, was used to segment and present data across six macular sectors using the instrument's software (version 1.1.9.53421). Two additional scans were performed using the Rescan 3D Wide (H) 12 × 9-mm protocol to assess cpRNFL thickness, presented in four quadrants. Scans were included in the analyses only if the image quality score met or exceeded the predefined threshold of 40, and if no artifacts or segmentation errors were detected upon visual inspection [20].

To assess intra-visit repeatability, the same examiner performed two successive scans on the same eye during the same visit. Measurements were compared to determine test–retest reliability.

Data were analyzed using SPSS versions 29 and 30 (IBM Corp., Armonk, NY, USA). Normality was assessed through visual inspection of histograms and P-P plots, as well as with the Shapiro–Wilk test. Normally distributed data are reported as mean and standard deviation (SD), while non-normally distributed data are presented as median (interquartile range [IQR]). Spearman's rank correlation coefficient was used to evaluate possible correlations in non-parametric data. Two-sided *P*-values are reported throughout. As previous studies have shown strong correlation between the right and left eyes [7, 8], only one eye per participant was analyzed, consistent with the methodology used in normative software for adult populations [13]. Group comparisons (e.g., between age groups and sexes) were performed using independent-samples *t*-tests, following confirmation of normality of distribution and homogeneity of variances. In the test–retest assessment of the repeatability of the measurements, a correlation coefficient of 1.0 was taken to indicate perfect repeatability.

RESULTS

Sixty-nine children, of whom 33 (48%) were girls, were enrolled in the study. Most participants (n = 54, 78%) were of Scandinavian descent; only 15 children (22%) were of non-Scandinavian ancestry. The cohort was divided into two age groups: 37 children were aged 5–7 years (n = 18 girls, 49%) and 32 children were aged 8–17 years (n = 15 girls, 47%). The median age (IQR) for the entire cohort was 7 years (7–12 years), with group-specific medians (IQR) of 7 years (5–7 years) and 13 years (10–13 years) for the 5–7-year and 8–17-year age groups, respectively. The right eye was examined in 57% (n = 39) of all participants, including 62% (n = 23) in the 5–7-year age group and 50% (n = 16) in the 8–17-year age group. The median SEQ refractive error for the full cohort was +1.00 D (IQR: +0.88 to +1.63 D), with medians (IQR) of +1.50 D (+1.00 to +1.81 D) and +0.94 D (+0.75 to +1.22 D) in the 5–7- and 8–17-year age groups, respectively (Table 1).

The mean (SD) values for total macular retinal thickness, macular GCL+ thickness, and cpRNFL thickness for the entire cohort, as well as for the 5–7- and 8–17-year age groups, are presented in Table 1 and Figures 1–5. For the entire cohort, the total macular retinal thickness was 288.9 µm (12.4 µm), the macular GCL+ thickness was 75.3 µm (4.7 µm), and the cpRNFL thickness was 110.0 µm (9.2 µm) (mean [SD] values).

Table 1. Characteristics of the study participants

Variable	5–17-y (n = 69)	5–7-y age group (n = 37)	8–17-y age group (n = 32)
Sex (Boy / Girl), n (%)	36 (52) / 33 (48)	19 (51) / 18 (49)	17 (53) / 15 (47)
Age (y), Median (IQR)	7 (7 to 12)	7 (5 to 7)	13 (10 to 13)
Laterality (Right / Left), n (%)	39 (57) / 30 (43)	23 (62) / 14 (38)	16 (50) / 16 (50)
SEQ (D), Median (IQR)	+ 1.00 (+ 0.88 to + 1.63)	+ 1.50 (+1.00 to +1.81)	+ 0.94 (+ 0.75 to + 1.22)
Total retinal thickness of macula (µm), Mean ± SD	288.9 (12.4)	287.5 (11.1)	290.5 (13.8)
GCL thickness in macula (µm), Mean ± SD	75.3 (4.7)	75.7 (4.2)	74.9 (5.2)
cpRNFL thickness (µm), Mean ± SD	110.0 (9.2)	111.5 (10.2)	108.3 (7.9)

Abbreviations: n, numbers; %, percentage; y, years; IQR, interquartile range; SEQ, spherical equivalent; D, diopters; µm, micrometers; SD, standard deviation; GCL, ganglion cell layer; cpRNFL, circumpapillary retinal nerve fiber layer. Note: SEQ was calculated by summing the spherical component of the refractive error with half of the cylindrical component [19].

No statistically significant differences were observed between the two age groups in terms of the following mean (SD) values: total macular thickness (5–7 years: 287.5 [11.1] μm; 8–17 years: 290.5 [13.8] μm; P = 0.32), macular GCL+ thickness (5–7 years: 75.7 [4.2] μm; 8–17 years: 74.9 [5.2] μm; *P* = 0.53), and cpRNFL thickness (5–7 years: 111.5 [10.2] μm; 8–17 years: 108.3 [7.9] μm; *P* = 0.17). Similarly, no significant differences were observed between boys and girls in terms of total macular thickness (*P* = 0.06), macular GCL+ thickness (*P* = 0.30), or cpRNFL thickness (*P* = 0.33). No statistically significant correlations were found between the SEQ and total macular thickness (r = – 0.03; *P* = 0.079), macular GCL+ thickness (r = + 0.03; *P* = 0.84), or cpRNFL thickness (r = + 0.04; *P* = 0.73).

Acceptable OCT scans could not be obtained from all four imaging protocols in 13 of the participants. In four of these eyes, one of the macular scans was excluded owing to poor image quality and/or motion artifacts. In seven of these participants, one of the optic disc scans was excluded for similar reasons. In the remaining two participants, no optic disc scan could be included: one due to poor image quality and artifacts, and the other because the child declined to complete the examination. Consequently, data from these 13 participants were excluded from the repeatability analysis. However, their available data were included in the analysis to obtain normative values. Total macular retinal thickness, macular GCL+ thickness, and cpRNFL thickness measurments demonstrated excellent intra-rater (intra-visit) repeatability, with correlation coefficients of 0.991 (*P* < 0.001), 0.991 (*P* < 0.001), and 0.954 (*P* < 0.001), respectively.

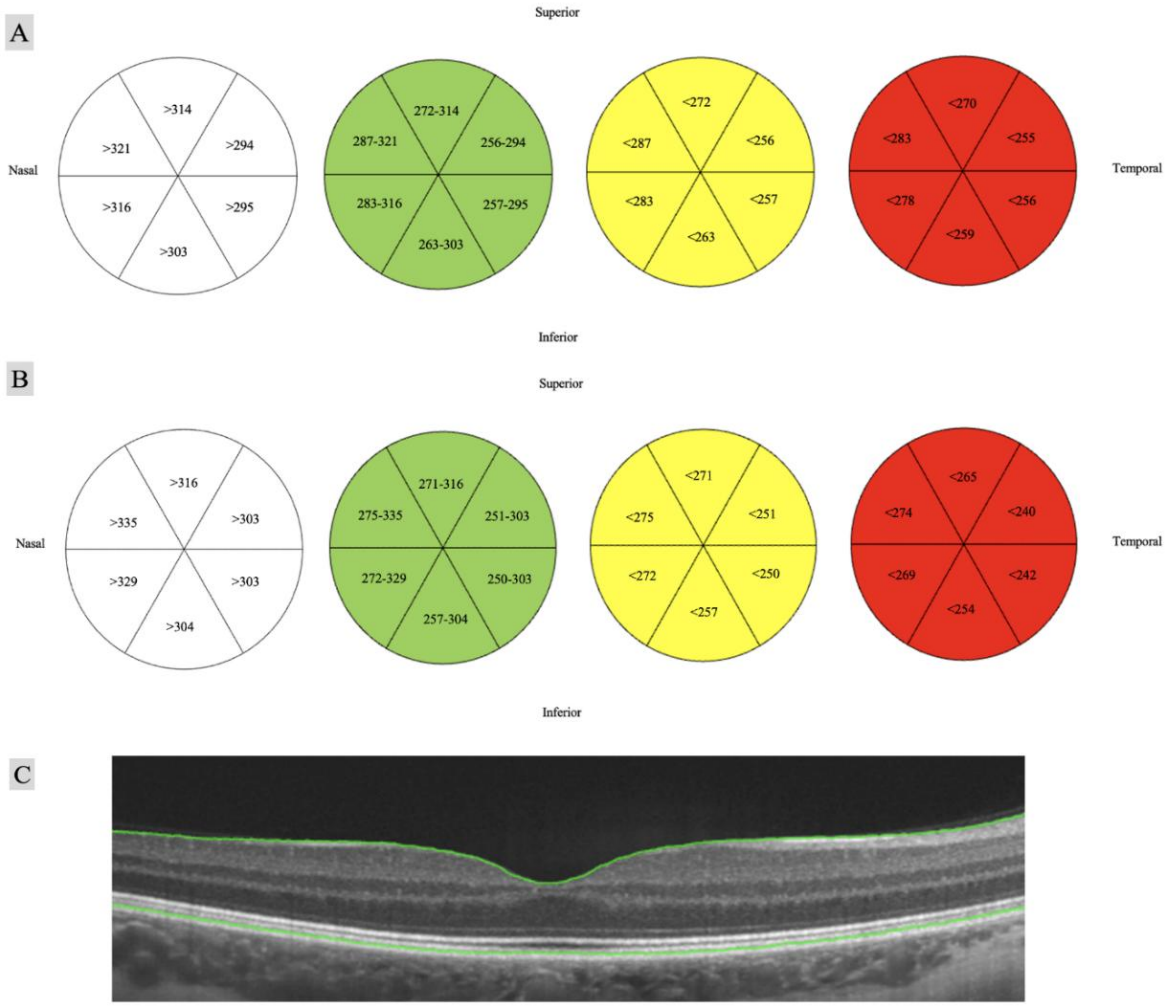


Figure 1. Reference intervals for total retinal thickness in the macula, measured in micrometers (μm), in (A) children aged 5–7 years and (B) those aged 8–17 years. Color coding indicates percentile ranges: green represents the 5th–95th percentile (normal range), yellow the 1st–5th percentile, red below the 1st percentile, and white above the 95th percentile. (C) Segmentation boundaries used to define total retinal thickness in the macula are shown: the upper green line marks the internal limiting membrane (ILM), and the lower green line marks the retinal pigment epithelium (RPE). The total retinal thickness in the macula was measured from the ILM to the RPE.

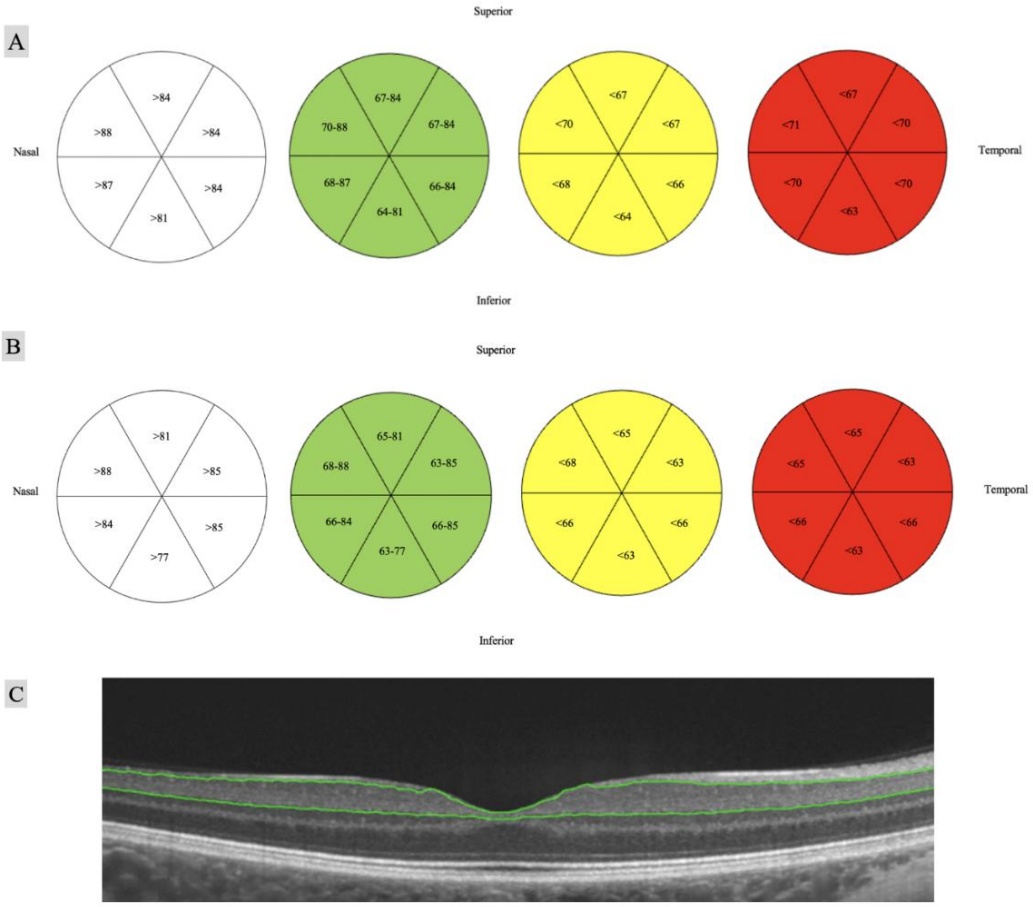
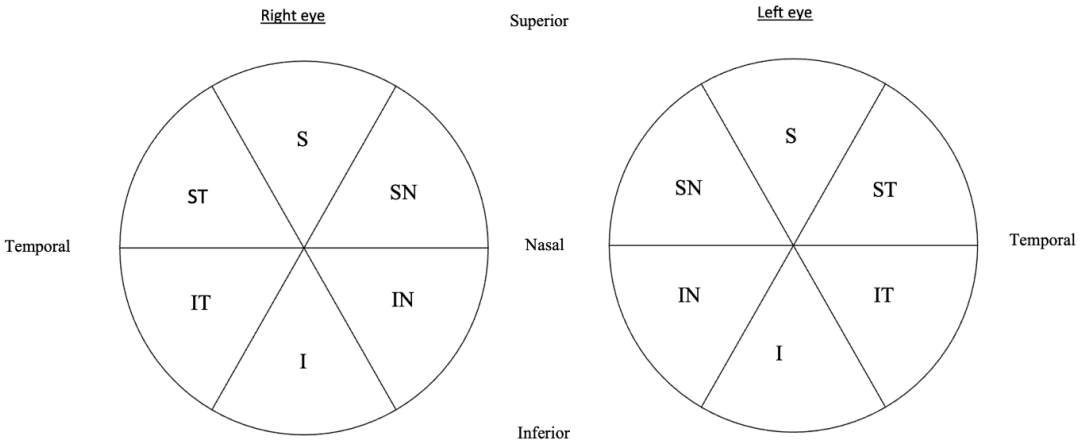


Figure 2. Reference intervals for macular ganglion cell layer (GCL+) thickness, measured in micrometers (μm), in (A) children aged 5–7 years and (B) those aged 8–17 years. Color coding denotes percentile ranges: green indicates the 5th–95th percentile (normal range), yellow the 1st–5th percentile, red below the 1st percentile, and white above the 95th percentile. (C) Segmentation boundaries used to define macular GCL+ thickness are shown: the upper green line represents the interface between the retinal nerve fiber layer and the ganglion cell layer (RNFL/GCL), and the lower green line represents the interface between the inner plexiform layer and the inner nuclear layer (IPL/INL). The macular GCL+ thickness was measured from the RNFL/GCL boundary to the IPL/INL boundary.



Sector	S	ST	IT	I	IN	SN
Macular thickness age 5-7	293 (12)	276 (12)	275 (12)	280 (12)	298 (11)	303 (12)
Macular thickness age 8-17	295 (13)	278 (13)	278 (14)	283 (13)	302 (16)	307 (16)
GCL+ thickness age 5-7	74 (4)	75 (4)	76 (4)	72 (5)	77 (5)	79 (5)
GCL+ thickness age 8-17	74 (5)	75 (6)	76 (6)	71 (4)	76 (6)	78 (6)

Figure 3. Six-sector grid of the macula showing the regional labeling used: S, superior; ST, superotemporal; IT, inferotemporal; I, inferior; IN, inferonasal; SN, superonasal. The values shown in the table represent the mean (standard deviation) of the total macular retinal thickness and the macular ganglion cell layer (GCL+) thickness, measured in micrometers (μm), for children aged 5–7 years and those aged 8–17 years.

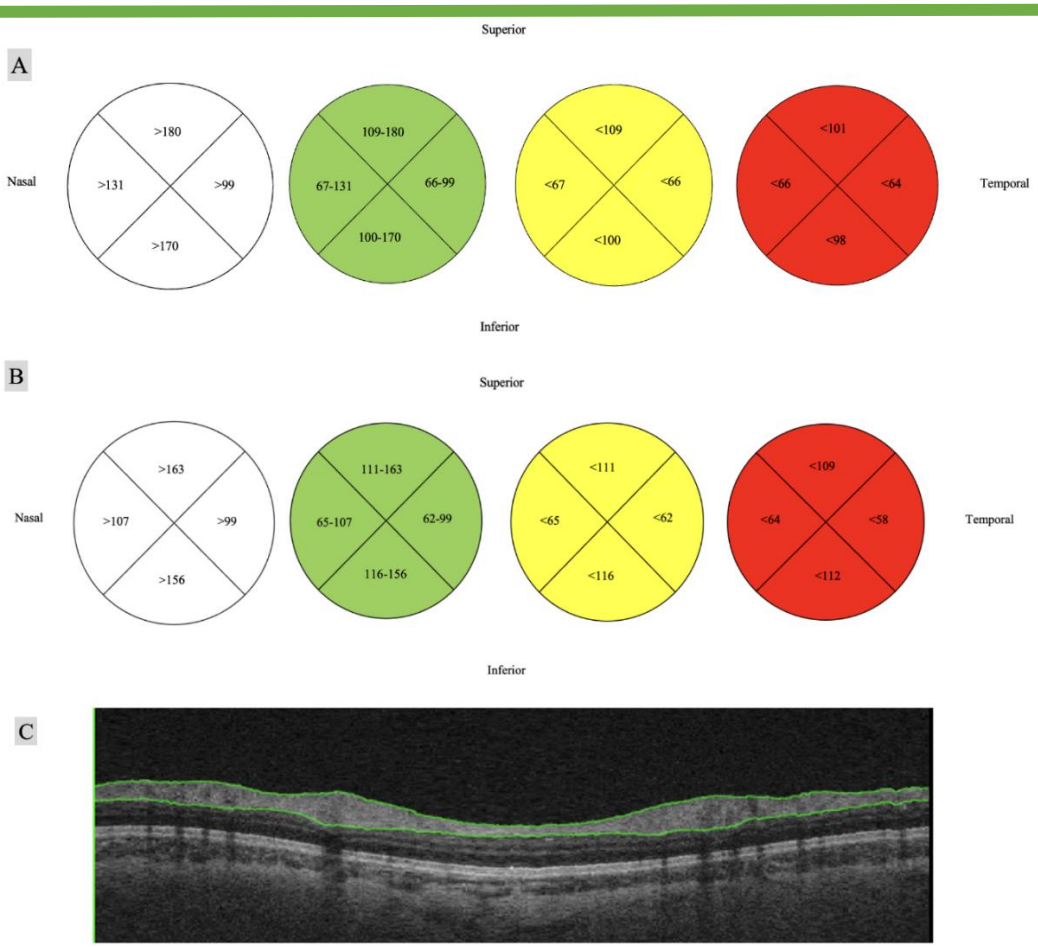
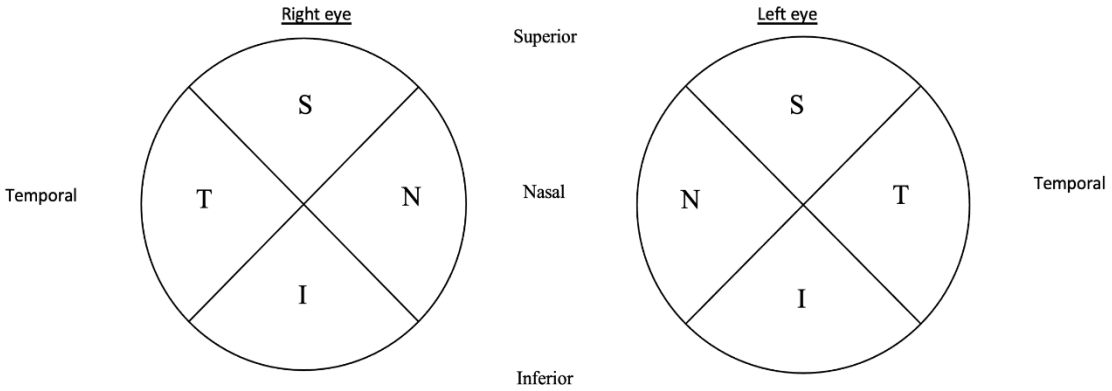


Figure 4. Reference intervals for circumpapillary retinal nerve fiber layer (cpRNFL) thickness, measured in micrometers (μm), in (A) children aged 5–7 years and (B) those aged 8–17 years. Green indicates values within the 5th–95th percentile range; yellow, the 1st–5th percentile; red, below the 1st percentile; and white, above the 95th percentile. (C) Segmentation boundaries used for cpRNFL thickness measurements are shown: the upper green line marks the internal limiting membrane (ILM), and the lower green line marks the interface between the RNFL and the ganglion cell layer (GCL). The cpRNFL thickness was measured from the ILM to the RNFL/GCL boundary.



Sector	S	T	I	N
RNFL thickness age 5-7	138 (17)	81 (9)	143 (18)	84 (16)
RNFL thickness age 8-17	135 (15)	77 (10)	139 (11)	83 (12)

Figure 5. Four-sector grid of the optic disc area: S, superior; T, temporal; I, inferior; N, nasal. The values shown in the table represent the mean (standard deviation) of the circumpapillary retinal nerve fiber layer (RNFL) thickness, measured in micrometers (μm), for children aged 5–7 years and those aged 8–17 years.

DISCUSSION

In this study we presented the normative reference values for the total macular thickness, GCL+ thickness, and cpRNFL thickness in ophthalmologically healthy children aged 5–17 years, determined using the Topcon DRI Triton Plus swept-source OCT device. Our findings revealed age-related trends in retinal layer thicknesses, with younger children generally exhibiting slightly greater macular GCL+ and cpRNFL measurements. However, the measurements were comparable across both age and sex groups overall, and the observed differences did not reach statistical significance. The intra-rater (intra-visit) repeatability of measurements was excellent across all parameters, supporting the reliability of swept-source OCT in pediatric populations. These normative values can serve as a valuable reference in clinical assessments and in future research related to retinal development or pediatric ocular pathologies.

The findings of this study regarding retinal thickness in children are broadly consistent with those of previous investigations. Ali et al. [11], using the same OCT device (Topcon DRI-OCT Triton) as in the present study, evaluated 50 Egyptian children aged 6–17 years [11]. They reported a lower mean macular thickness (276.41 μm) in children from a different ethnic background [11] than the values of 287.5 μm and 290.5 μm that we found in the 5–7-year and 8–17-year age groups, respectively. Their reported mean peripapillary RNFL thickness of 111.26 μm [11] was similar to the corresponding values of 111.5 μm (5–7 years) and 108.3 μm (8–17 years) observed in our study.

Our results also aligned with those of Wolf et al. [6], who studied normative retinal layer thickness in healthy Swedish children, also using the Topcon DRI-OCT-1 Triton device. Wolf et al. [6] focused on the macular ganglion cell complex (GCC) using the 3D Macula 7 × 7-mm scan protocol. They defined a "GCIPL" thickness as the distance from the RNFL/GCL boundary to the IPL/INL boundary, in the same manner as we defined the macular GCL+ thickness, and defined the GCC as the distance from the ILM to the IPL/INL boundary [6]. Our GCL+ measurements encompassed the GCL to the IPL boundaries. Wolf et al. [6] studied 55 children aged 5–16 years (mean age 8.9 years), which was a slightly younger cohort than ours (5–17 years), and reported mean (SD) values of 68.0 μm (4.0 μm) for the GCIPL and 107.1 μm (6.5 μm) for the GCC thickness [6]. In comparison, our study reported a slightly higher GCL+ thickness of 75.3 μm (4.7 μm). Wolf et al. [6] found no significant correlations with age or sex in GCIPL and GCC [6]. Likewise, we found no statistically significant differences in the macular retinal thickness, GCL+ thickness, or cpRNFL thickness between age or sex groups, suggesting the relative stability of these parameters across pediatric subpopulations. Both studies confirmed excellent repeatability of OCT-based measurements, supporting the reliability of OCT in pediatric settings. While Wolf et al. [6] did not assess cpRNFL thickness, a strength of their study was the repeated-measures design (up to three scans per eye), which allowed for robust estimates of intraclass correlation and coefficients of variation [6]. Although our study also evaluated repeatability, our emphasis was on test–retest reliability. Given the physiological variability and differences across OCT platforms, device-specific normative databases relevant to children are needed.

Our findings on the GCL+ thickness in the macula are consistent with those reported by Lee et al. [9], who established a normative database for the GCIPL thickness in healthy Korean children using the same OCT platform (Topcon DRI-OCT Triton) [9]. Lee et al.'s study had a broader demographic span (3–17 years, mean age 9.52 years [3.79 years]) than our study [9]. In our study, the superonasal sector exhibited the highest GCL+ thickness, with mean (SD) values of 79 (5) μm and 78 (6) μm in the 5–7- and 8–17-year age groups, respectively, while the inferior sector was the thinnest, measuring 72 (5) μm and 71 (4) μm in the 5–7- and 8–17-year age groups, respectively. Similarly, Lee et al. [9] reported the highest GCIPL thickness in the superonasal sector (75.1 [5.72] μm) and the thinnest in the inferior sector (66.8 [5.95] μm) [9], reinforcing the reproducibility of topographic macular patterns across pediatric populations and ethnicities. However, some differences in absolute values were observed. Lee et al. [9] reported a lower overall average GCIPL thickness of 71.5 (5.35) μm, as compared to our mean GCL+ thickness of 75.3 (4.7) μm. This discrepancy may stem from ethnic and biometric differences, such as refractive error and axial length. Lee et al. [9] found significant associations between GCIPL thickness and the SEQ and RNFL thickness, and reported that higher myopia was associated with thinner GCIPL values [9]. These findings indicate the importance of device-specific and demographically diverse normative data to allow accurate interpretation of pediatric OCT results. Our findings further validate the utility of the swept-source Topcon DRI-OCT Triton for measuring macular parameters and support its expanding role in pediatric retinal imaging. The values measured by Lee et al. in six sectorial GCIPL thicknesses [9] agree well with ours, although they reported 3–4-μm thinner values in each sector [9]. Previous studies have reported variation between different ethnicities, where people of Asian origin, on average, have thicker retinas than those of Caucasians [21, 22].

Similar studies utilizing the Cirrus HD-OCT device have been made by Barrio-Barrio et al. [23] and Al-Haddad et al. [7], who reported a mean total macular thickness of 283.62 μm [23] and 280 μm [7], respectively, in contrast to our value of 288.9 μm for the entire cohort. The observed difference could be due to the differences in the segmentation algorithms between the OCT devices [24, 25] and differences between the characteristics of study population (ethnicities and SEQ). Comparison of the macular

thickness values was not possible because different sector grids were applied in these studies.

Several other studies have demonstrated that the peripapillary retina follows the ISNT rule, i.e., where the retina is thickest inferiorly and superiorly, thinner nasally, and thinnest temporally [3, 26, 27]. This trend was also visible in our results. The main reason for this difference between the sectors lies in the distribution of blood vessel distribution in the retina. However, individual variation in vessel positioning may cause variation in the retinal thickness profile, which should be considered when assessing an individual child. Lack of adherence to the ISNT rule cannot be interpreted as abnormal per se [28].

As in other studies with a similar sample size, we found no correlation between retinal thickness and sex within this age range [3]. However, Cirrus-OCT studies involving larger groups of participants have revealed a positive correlation between central macular thickness and age during childhood [7, 23, 29]. Central macular thickness was not specifically measured in this study. In a systematic review encompassing 74 studies on OCT reference values in the pediatric population, 18 studies reported no significant differences in RNFL thickness between boys and girls [3]. Most of the morphological development in the macula is thought to take place during the first 5 years of life and macular thickness should be considered separately for children below this age [3].

The effect of refractive errors on the retinal thickness values could not be investigated in our study in the included range. In a systematic review encompassing 74 studies that included children with varying degree of refractive errors and axial lengths [3], the majority of studies found a positive correlation between the SEQ and peripapillary RNFL thickness, whereas results were inconsistent for the macular parameters. The effect of axial length on OCT parameters have also been contradictory [3]. The high repeatability of measurements in this study indicated that the OCT measurements of the retina are reliable. High repeatability has also been demonstrated in earlier studies [6, 8].

The strengths of this study include the use of the advanced Topcon DRI-OCT Triton Plus device, the high repeatability of the retinal layer measurements, and the rigorous methodology used, including comprehensive ocular examinations and cycloplegic autorefraction. These factors enhance the reliability and clinical relevance of our findings. However, this study had some limitations. The relatively small sample size represents a key limitation, and the reported reference values should be interpreted as preliminary. While our cohort of 69 children spanned a 12-year age range, and was more than the approximately 30 healthy adults (aged 54–82 years) that were included in the adult OCT normative database [13], it remains smaller than ideal. A larger sample would have produced narrower confidence intervals around the reference limits, thereby enhancing the precision and reliability of the pediatric normative values. Furthermore, as the cohort predominantly consisted of children of Scandinavian descent, the generalizability of the results to other ethnic populations is limited. Future studies with larger, more ethnically diverse cohorts, dominant eye selection, and standardized protocols used across different OCT platforms are crucial to establish robust, device-specific, ethnically relevant normative data and to support the broader integration of OCT in pediatric clinical practice and enhance retinal biomarker discovery.

CONCLUSIONS

In this study, we presented normative reference values for the total retinal and GCL+ thickness in the macula, as well as the cpRNFL thickness, in ocularly healthy children of predominantly Swedish descent, aged 5–17 years, without high refractive error. These data serve as a practical benchmark for ophthalmologists using the Topcon DRI-OCT Triton Plus system in pediatric assessments. Our findings aligned well with previous research and contribute to the growing body of evidence supporting OCT-based evaluation in children. By offering age-specific normative ranges, this study can aid clinicians in distinguishing between normal anatomical variation and early signs of retinal pathology, thereby enhancing diagnostic accuracy and clinical decision-making in pediatric ophthalmology. Studies with larger and more ethnically diverse populations are needed in future to establish globally applicable pediatric OCT reference standards.

ETHICAL DECLARATIONS

Ethical approval: This study was approved by the Swedish Ethical Review Board (Dnr 2020-05981) and was conducted in accordance with the ethical standards of the Declaration of Helsinki. Written informed consent was obtained from all parents or legal guardians, and from children aged 15 years and older.

Conflict of interest: None.

FUNDING

This study was funded by the Cronqvist foundation grant number SLS-974322 and Lions' research fund Skane. The funders had no part in planning or executing the project, nor in interpreting or reporting the results.

ACKNOWLEDGMENTS

None.

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