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STRABISMUS ACADEMY**
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OPHTHA CAPSULE · RESEARCH DIGEST

Recent Advances in Strabismus Research 2025

25 key studies across three domains

- A** Technology, AI, Digital & VR
- B** Surgical, Interventional & Outcomes
- C** Pediatric, Psychosocial, Epidemiologic & Genetics

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RESEARCH DIGEST 2025

At a Glance

A curated selection of 2025 publications shaping strabismus practice. Each study is condensed into a single card: what was asked, how it was studied, who was included, and the one finding worth remembering.

25

peer-reviewed studies published in 2025

3

research domains, from AI to genetics

125,984

surgeries in the largest registry cohort (IRIS)

683,942

participants in the largest meta-analysis

INSIDE THIS BOOKLET

A

Technology, AI, Digital & VR

Studies 1–6 · 6 studies

B

Surgical, Interventional & Outcomes

Studies 7–17 · 11 studies

C

Pediatric, Psychosocial, Epidemiologic & Genetics

Studies 18–25 · 8 studies

How to read a study card

Number · Study title · first author & journal (linked to PubMed where available)

DESIGN study type **POPULATION** sample studied

KEY OUTCOME the take-home finding, highlighted in the section colour

A

SECTION A · 6 STUDIES

Technology, AI, Digital & VR

Deep learning, large language models, virtual reality and binocular eye tracking applied to detecting, screening and measuring strabismus.

01 Automated Strabismus Detection and Classification Using Deep Learning Analysis of Facial Images

[Yarkheir et al.](#) · Sci Rep · 2025

DESIGN Diagnostic accuracy POPULATION 4,257 facial images

KEY OUTCOME **CNN accuracy 86.4% (binary), 92.7% (multiclass)**

02 Diagnostic Accuracy and Counseling Quality of GPT-4o for Strabismus and Pseudostrabismus in Patient-Generated Mobile Photographs

[Esposito et al.](#) · Clin Ophthalmol · 2025

DESIGN Diagnostic accuracy POPULATION 35 mobile photos

KEY OUTCOME **Poor diagnostic accuracy; counseling quality acceptable**

03 Accuracy of a System Combining Virtual Reality and Artificial Intelligence for Screening Pediatric Strabismus

[Wang et al.](#) · Digit Health · 2025

DESIGN Diagnostic accuracy POPULATION 110 children

KEY OUTCOME **Sensitivity 83%, specificity 79%; best for ET**

04 Evaluation of a Novel Virtual Reality Simulated Alternate Cover Test to Assess Strabismus

[Mori et al.](#) · Am J Ophthalmol · 2025

DESIGN Prospective masked POPULATION 85 children

KEY OUTCOME **Moderate correlation; strong for ET**

05 A Novel Virtual Reality-Based System for Measuring Deviation Angle in Strabismus

L. et al. · Diagnostics · 2025

DESIGN Prospective POPULATION 18 patients

KEY OUTCOME **VR comparable to APCT; XT underestimated**

06 Quantitative Assessment of Fixational Disparity Using a Binocular Eye-Tracking Technique in Children with Strabismus

Hou et al. · J Eye Mov Res · 2025

DESIGN Case-control POPULATION 57 children + 60 controls

KEY OUTCOME **Horizontal disparity improved post-surgery**

B

SECTION B • 11 STUDIES

Surgical, Interventional & Outcomes

Anatomy, reoperation rates, adjustable sutures, suturing techniques and long-term results across children, adults and the elderly.

07 Insertional Anatomy of Horizontal Rectus Extraocular Muscles in Patients with Esotropia and Exotropia

Wen et al. · Graefes Arch Clin Exp Ophthalmol · 2025

DESIGN Retrospective POPULATION 4,781 pts

KEY OUTCOME Shorter MR insertion → larger esodeviation

08 Strabismus and Strabismus Surgery Reoperation Rates at 1, 3, and 5 Years: IRIS Registry

Repka et al. · Ophthalmology · 2025

DESIGN Registry cohort POPULATION 125,984 surgeries

KEY OUTCOME Reop: 5.6% (1y), 10.1% (5y)

09 Influence of Age and Underlying Etiologies on Outcomes of Strabismus Surgery in the Elderly Population

Capó et al. · Am J Ophthalmol · 2025

DESIGN Retrospective cohort POPULATION 562 adults ≥60y

KEY OUTCOME Etiology & adjustable sutures predict success

10 Adjustable vs Nonadjustable Suture Surgery for Childhood Strabismus: A Meta-Analysis

Liu et al. · Surv Ophthalmol · 2025

DESIGN Meta-analysis POPULATION 8,744 children

KEY OUTCOME Adjustable sutures ↑ early success

11 Comparison of Two Different Extraocular Muscle Suturing Techniques for Strabismus Surgery

Zhou et al. · Am J Ophthalmol · 2025

DESIGN Prospective cohort POPULATION 248 children

KEY OUTCOME 3-point fixation ↓ overcorrection

12 Strabismus Surgery in Orthophoric Patients with Abduction Limitation

Phanphruk et al. · Clin Ophthalmol · 2025

DESIGN Retrospective POPULATION Rare cases

KEY OUTCOME **LR advancement resolved lateral gaze diplopia**

13 Highly Myopic Strabismus Showing Temporary Large Exotropia After Yokoyama Procedure

Hirota et al. · Cureus · 2025

DESIGN Case report POPULATION 1 adult

KEY OUTCOME **Transient exotropia resolved**

14 Improvement of Stereopsis Following Strabismus Surgery in Adults

Rock et al. · Can J Ophthalmol · 2025

DESIGN Retrospective POPULATION 132 adults

KEY OUTCOME **48% achieved stereoacuity <100 arc sec**

15 Conventional vs Modified Hang-Back Technique in Medial Rectus Recession

Aldofyan et al. · Cureus · 2025

DESIGN Retrospective POPULATION 103 ET pts

KEY OUTCOME **Similar success; low consecutive XT**

16 Long-Term Surgical Outcomes of Esotropic Duane Retraction Syndrome Type 1

Park et al. · Sci Rep · 2025

DESIGN Long-term cohort POPULATION DRS type 1

KEY OUTCOME **Motor success 77%; slow exodrift**

17 Double-Dose Medial Rectus Recession for Sagging Eye Syndrome

First author not listed · Jpn J Ophthalmol · 2025

DESIGN Case series POPULATION 6 elderly pts

KEY OUTCOME **Distance ET corrected without near XT**

C

SECTION C • 8 STUDIES

Pediatric, Psychosocial, Epidemiologic & Genetics

Mental health, parental experience, autism, national practice trends and the first large-scale genome-wide association study of strabismus.

18 Pediatric and Juvenile Strabismus Surgery Under General Anesthesia

[Briem et al.](#) · J Clin Med · 2025

DESIGN Retrospective POPULATION 208 children

KEY OUTCOME **Surgery safe; stereopsis ↑ to >80%**

19 2021 Trends in the Treatment of Patients with Strabismus in Japan

[Kunimi et al.](#) · Jpn J Ophthalmol · 2025

DESIGN National survey POPULATION 10,767 pts

KEY OUTCOME **XT most common; care centralized**

20 Non-Surgical Treatment of Strabismus in Children: Recent Advances

[Huang et al.](#) · Front Med · 2025

DESIGN Narrative review POPULATION Children

KEY OUTCOME **Visual training, occlusion beneficial**

21 Association Between Strabismus and Mental Health Disorders in Children

[Krungkraipetch et al.](#) · Clin Ophthalmol · 2025

DESIGN Meta-analysis POPULATION 683,942 participants

KEY OUTCOME **↑ ADHD, anxiety, depression**

22 Experiences and Support Needs of Parents of Children with Strabismus

Zhao et al. · J Multidiscip Healthc · 2025

DESIGN Qualitative POPULATION Parents of children

KEY OUTCOME Emotional distress; unmet support needs

23 Ocular Findings in Children with Autism Spectrum Disorder

Demir et al. · Medicine · 2025

DESIGN Observational POPULATION 60 children

KEY OUTCOME High strabismus & refractive error

24 Large-Scale GWAS of Strabismus Identifies Risk Loci and Maternal Smoking Link

He et al. · Nat Commun · 2025

DESIGN GWAS meta-analysis POPULATION 20,464 cases

KEY OUTCOME 9 loci identified; smoking causal

25 Reconceptualizing Pediatric Strabismus as a Sensory Processing Disorder

First author not listed · Children · 2025

DESIGN Case-based hypothesis POPULATION Pediatric cases

KEY OUTCOME Fusion dysregulation hypothesis

REFERENCE

Abbreviations

ADHD	Attention-deficit/hyperactivity disorder	IRIS	Intelligent Research in Sight Registry (AAO)
APCT	Alternate prism cover test	LR / MR	Lateral rectus / medial rectus
CNN	Convolutional neural network	SES	Sagging eye syndrome
DRS	Duane retraction syndrome	VR	Virtual reality
ET / XT	Esotropia / exotropia	Reop	Reoperation
GWAS	Genome-wide association study	arc sec	Seconds of arc (stereoacuity unit)

ABOUT



**ISMAIL
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The Academy brings together education, clinical tools, research and surgical innovation in pediatric ophthalmology and strabismus, with resources for clinicians and families in English and Arabic.

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