E-B
Environment - Behaviour
Proceedings Journal

AicE-Bs2026Sokcho

e-IPH
e-International Publishing House Ltd., United Kingdom

https://www.amerabra.org/index.php/aice-bs2026sokcho-04-06-jun-2026/

14th Asia-Pacific International Conference on Environment-Behaviour Studies

Kyungdong University Global (KDU Global), Sokcho (Goseong), South Korea, 04-06 Jun 2026

KAM-C Model of Myopia Management for School-aged Children

Ng Mam Yien[1], Madhubala Bava Harji[2], Fakhruddin Shamsheer Barodawala[3]
**Corresponding Author*

[1] Faculty of Optometry and Vision Science, SEGi University, Malaysia,
[2] Faculty of Education, Languages and Psychology, SEGi University, Malaysia
[3] Auckland Bioengineering Institute, University of Auckland, New Zealand.

mamyien86jocelyn@gmail.com, madhu7560@gmail.com; fakhruddin.barodawala@auckland.ac.nz
Tel: +60123399095

Abstract
Myopia has emerged as a significant public health concern, particularly among children in Malaysia, driven by lifestyle and environmental changes. Despite the availability of effective myopia control strategies, adoption remains inconsistent, largely shaped by parental decision-making. This study employs a qualitative phenomenological approach to exploring parental awareness, knowledge, attitudes, and practices in myopia management. Guided by the Health Belief Model (HBM) and the Theory of Planned Behavior (TPB), the study proposes the Knowledge–Attitude–Practice Clinical Integration (KAM-C) Model. The model integrates behavioral insights into clinical workflows to enhance treatment uptake, adherence, and long-term visual outcomes aligned with SDG-11.

Keywords: Myopia; Parental Behavior; KAM-C Model; SDG 11; Sustainable Cities and Communities

eISSN: 2398-4287 © 2026. The Authors. Published for AMER by e-International Publishing House, Ltd., UK. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/). Peer–review under responsibility of AMER (Association of Malaysian Environment-Behaviour Researchers).
DOI: https://doi.org/10.21834/e-bpj.v11i37.7979

1.0 Introduction

Myopia has become a critical global public health issue (Pan et al., 2024), particularly in Asia, where prevalence among school-aged children is rising rapidly (George et al., 2023). In Malaysia, the prevalence and progression of myopia have accelerated due to environmental and behavioral factors, including increased near work, prolonged digital device use, and reduced outdoor activity (Tan et al., 2026). Initial-onset myopia significantly increases the risk of high myopia and associated ocular complications, including retinal detachment, glaucoma, and myopic maculopathy (Haarman et al., 2020). Despite the availability of evidence-based treatments such as orthokeratology, low-dose atropine, and specialized glasses, integrating them into standard clinical practice remains unfeasible (Eppenberger et al., 2024). Parents' decision-making plays a significant role in treatment adherence and acceptance (Hung et al., 2025). In pediatric eye care, parents are essential not only for providing consent but also for modeling perceptions, beliefs, and behaviors (Liu et al., 2026). Previous studies have shown that parental knowledge, attitudes, and perceptions significantly affect healthcare decisions, yet these factors are rarely incorporated into routine myopia management pathways. Consequently, a gap exists between evidence-based interventions and real-world implementation. To address this gap, this study aims to develop a parental behavior-informed clinical integration model for childhood myopia, the Knowledge–Attitude–Practice Clinical Integration (KAM-C) Model. This structured framework integrates parental behavioral determinants into clinical decision-making to improve communication, treatment uptake, adherence, and long-term outcomes in the management of childhood myopia in Malaysia. The objectives of this study are to explore parental awareness of myopia; to identify how KAP contributes to the development of the KAM-C Model; and to develop the KAM-C Model. To address the lack of a model for the Malaysian context, the following research questions are addressed in this article: 1) What is the level of parental

eISSN: 2398-4287 © 2026. The Authors. Published for AMER by e-International Publishing House, Ltd., UK. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/). Peer–review under responsibility of AMER (Association of Malaysian Environment-Behaviour Researchers).
DOI: https://doi.org/10.21834/e-bpj.v11i37.7979

awareness regarding myopia control interventions? 2) How do knowledge, attitudes, and practices (KAP) contribute to the KAM-C Model integration? 3) What are the drivers of the KAM-C Model?

2.0 Literature Review

This chapter reviewed childhood myopia, evidence-based interventions, parental behavioral influences, and the theoretical model underpinning the development of the KAM-C Model. Myopia has become a significant public health issue worldwide, especially in Asia (Pan et al., 2025). Malaysia has seen a rising incidence among school-aged children, driven by urban development, high use of digital devices, prolonged near work, and reduced time spent outdoors (Tan et al., 2025). Recent evidence indicates an increase in myopia prevalence among Indian schoolchildren, reaching 28.9% and surpassing rates documented in earlier studies (Madhavan et al., 2018). Environmental factors strongly influence the onset and course of myopia. Modifying environmental factors, such as time spent outdoors and time spent on near work, slows myopia progression (Biswas et al., 2024). The review assessed scientifically supported strategies for managing myopia, including low-dose atropine, orthokeratology, multifocal contact lenses, and DIMS spectacle lenses, which reduce axial elongation and slow myopia progression, thereby supporting the KAM-C Model (Lanca et al., 2023).

Despite these interventions, adoption remains inconsistent due to barriers such as cost, safety concerns, convenience, and limited parental awareness. The literature highlighted the critical role of parental decision-making in pediatric eye care, as parents significantly influence treatment uptake, compliance, and adherence (Chang et al., 2024). The Health Belief Model (HBM) and the Theory of Planned Behavior (TPB), which together describe parents' attitudes, perceptions, subjective norms, and perceived behavioral control, were used in this study to explain these behavioral patterns. This chapter highlights a notable shortcoming in the existing literature on myopia management in Malaysia: most studies emphasize prevalence and treatment efficacy while overlooking systematic clinical models that account for parental behavioral influences on decision-making. Unlike previous studies that examined behavioral and clinical factors independently, the KAM-C Model integrates both domains into a practical framework for managing childhood myopia. Therefore, this paper proposes that the KAM-C Model extends existing behavioral frameworks, such as HBM and TPB, by integrating parental knowledge, attitudes, and practices into structured clinical workflows to support communication, decision-making, treatment adherence, and long-term outcomes in the management of childhood myopia.

3.0 Methodology

3.1 Research participants

This study used a qualitative phenomenological approach to explore parents' experiences and decision-making in childhood myopia management, guided by the Health Belief Model (HBM) and the Theory of Planned Behavior (TPB). Using purposive sampling, 10 parents of children aged 6–12 years with mild-to-moderate myopia (≤ -6.00 D) were recruited from optometry clinics. Parents of children with ocular pathology or a history of ocular surgery were excluded. Semi-structured interviews lasting 30–45 minutes were audio-recorded, transcribed verbatim, and analyzed in NVivo 14. Data saturation was reached after ten interviews. Braun and Clarke's six-step thematic analysis framework ensured systematic coding, theme development, methodological rigor, and trustworthy interpretation of parental perceptions, barriers, benefits, and behavioral influences in myopia management. Phenomenology was chosen to explore parents' lived experiences of managing childhood myopia. Klang Valley clinics were selected due to the growing burden of myopia and the availability of eligible participants. Ten participants were sufficient, as data saturation was achieved. HBM and TPB informed interview development and thematic interpretation. The KAM-C Model emerged from inductive analysis of participant experiences and was subsequently aligned with behavioral theory to strengthen conceptual understanding.

3.2 Data collection

Data were collected through semi-structured interviews with parents at optometry clinics in the Klang Valley and subsequently analyzed in NVivo. Themes related to awareness, attitudes, barriers, and professional influences informed the model's development, while ethical protections were upheld.

4.0 Findings

This section presents findings organized by themes derived from the semi-structured interviews. The themes are ordered by relevance to the research questions and by frequency of mention. Selected verbatim quotations from parents are included to support each theme. Participants are labeled P1 to P10 to ensure confidentiality. The KAM-C Model was derived from recurring themes identified through thematic analysis and subsequently mapped to HBM and TPB constructs to explain the behavioral mechanisms underlying parental treatment decisions.

4.1 Parental Awareness of Myopia

All participants demonstrated a basic understanding of myopia, a condition that causes nearsightedness and affects distance vision. Their awareness was mainly triggered by observable signs such as squinting, sitting close to the television, and holding books close to their faces.

...The teacher mentioned that my child struggles to copy correctly from the board…(P2)
…My child sits very close to the television and reads books with them held close to their face…(P3)

Parents recognized myopia primarily through blurred distance vision and increasing spectacle power, but their understanding was largely practical rather than clinical. This indicates the need for improved clinical education to support informed parental decision-making.

4.2 Perceived Severity and Risk of Myopia Progression

Parents expressed concern that myopia might worsen over time, especially since their children are young. Some respondents linked an increase in eyeglass prescriptions to potential future eye health issues. After optometrists explained the risks of high myopia and its long-term implications, the perceived seriousness of myopia increased.

...I think it is quite serious because my child is still young. If the power continues to increase, it may become high myopia in the future…(P1)
…Last time, I thought it was normal, and I could already wear glasses. However, after the optometrist explained the high risk of myopia, I feel it is more serious…(P2)
…Serious because high myopia may cause eye problems later…(P4)

Parents were more likely to consider myopia control after understanding the risks of progression and long-term complications, highlighting the importance of effective clinical communication.

4.3 Knowledge of Myopia Control Strategies

Most parents became aware of myopia control options, including myopia-control spectacles, orthokeratology, atropine, and DIMS lenses, through consultations with optometrists, although their understanding of the treatment mechanisms remained limited.

…Yes, I heard about special myopia-control lenses and Ortho-K lenses from the optometrist…(P1)
…I know about myopia-control spectacle lenses, Ortho-K contact lenses, and atropine eye drops…(P1)
…They help slow down the increase but cannot reverse the power. That is what I understand from the optometrist…(P5)

Although parents were aware that myopia control interventions could slow progression, many lacked a deeper understanding of treatment outcomes and effectiveness, highlighting the need for structured parent education.

4.4 Parental Attitudes Toward Myopia Control

Parents generally viewed myopia management positively when treatments were perceived as safe and effective, although concerns about safety and side effects influenced treatment acceptance.

…I feel it is so important to my son, but I also need to understand more before I make a decision…(P1)
…Spectacle lenses seem okay and safer. Contact lenses need more care and concern…(P3)
…I am willing to try if it is safe…(P2)

Parental acceptance depended on reassurance about treatment safety and effectiveness, with trust in optometrists and clear communication playing key roles in decision-making.

4.5 Decision-Making Determinants

Parents' treatment decisions were primarily influenced by safety, cost, convenience, effectiveness, and optometrist recommendations. They preferred myopia-control options that were safe, affordable, effective, and easy to integrate into their child's daily routine.

…Safety, the cost, and convenience, and the optometrist's recommendation…(P1)
…Costly and long-term, more safety…(P2)
…Safety, price, and child comfort…(P3)

Financial constraints remained a major barrier to treatment adoption, supporting the Theory of Planned Behavior, which posits that affordability and practicality influence parental decision-making.

4.6 Current Practices in Myopia Management

Parents adopted various myopia management practices, including regular eye examinations, reduced screen time, outdoor activity, the 20-20-20 rule, and myopia-control spectacle lenses. However, clinical intervention was not universal, as some parents remained in the decision-making stage before committing to treatment.

…Yes, we switched to myopia-control spectacle lenses and reduced screen time…(P1)
…We reduce tablet time and encourage outdoor play…(P3)
…We attend follow-up every six months…(P4)

Parental practices in myopia management ranged from lifestyle modification to clinical treatment adoption. Clear explanations and strong professional recommendations were key to converting parental awareness and intention into active myopia-control behavior.

4.7 Information-Seeking Behavior:

Optometrists were consistently regarded as the most trusted and reliable source of information on childhood myopia management. Although parents used online platforms and social networks, they preferred professional guidance because it was perceived as more accurate, individualized, and relevant to the child's clinical condition.

…From an optometrist and sometimes from Google…(P1)
…Optometrist because they examine my child directly… (P1)
…Parenting groups have mixed opinions, so I trust professional advice more…(P5)

The findings highlight the important role of optometrists in providing trusted information and supporting informed parental decision-making in managing childhood myopia.

4.8 Clinical Experience and Communication

Most parents reported positive consultation experiences when optometrists clearly explained their child's condition and available treatment options. However, some found the explanations too technical or too brief, underscoring the need for simple language, visual aids, written materials, and prescription progression charts to improve understanding.

…The optometrist's consultation was good. The optometrist explained the condition and treatment options clearly…(P1)
…Eye diagram and simple explanation…(P3)
…Good, but I need more time to ask questions… (P5)

Clear clinical communication was central to supporting parental confidence, particularly when risks, benefits, and treatment expectations were explained explicitly. This highlights the need for a standardized consultation pathway that integrates education, risk communication, and shared decision-making.

4.9 KAM-C Model Development Needs

Participants emphasized the need for clearer, more structured clinical guidance to support parental decision-making in myopia management. Their recommendations, including treatment comparison tables, visual aids, written care plans, follow-up reminders, and progress monitoring, directly informed the development of the KAM-C Model.

...A clear explanation of treatment benefits, risks, costs, and follow-up plan…(P1)
…Comparison between normal glasses and myopia control lenses…(P3)
…Optometrists should provide risk communication, treatment comparisons, and follow-up monitoring… (P10)

The findings suggest that parents require structured support beyond clinical advice. The KAM-C Model provides a framework for consultation, risk communication, shared decision-making, and treatment adherence.

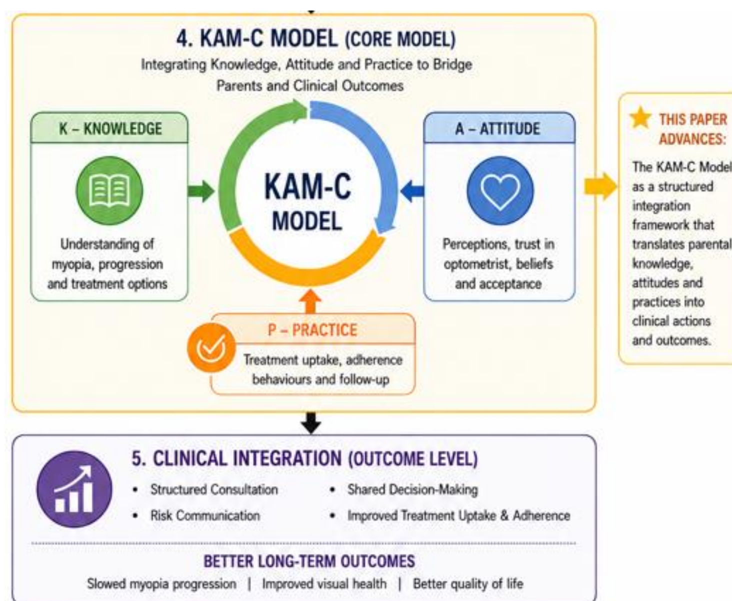

Fig. 1: Development and Advancement of the KAM-C Model

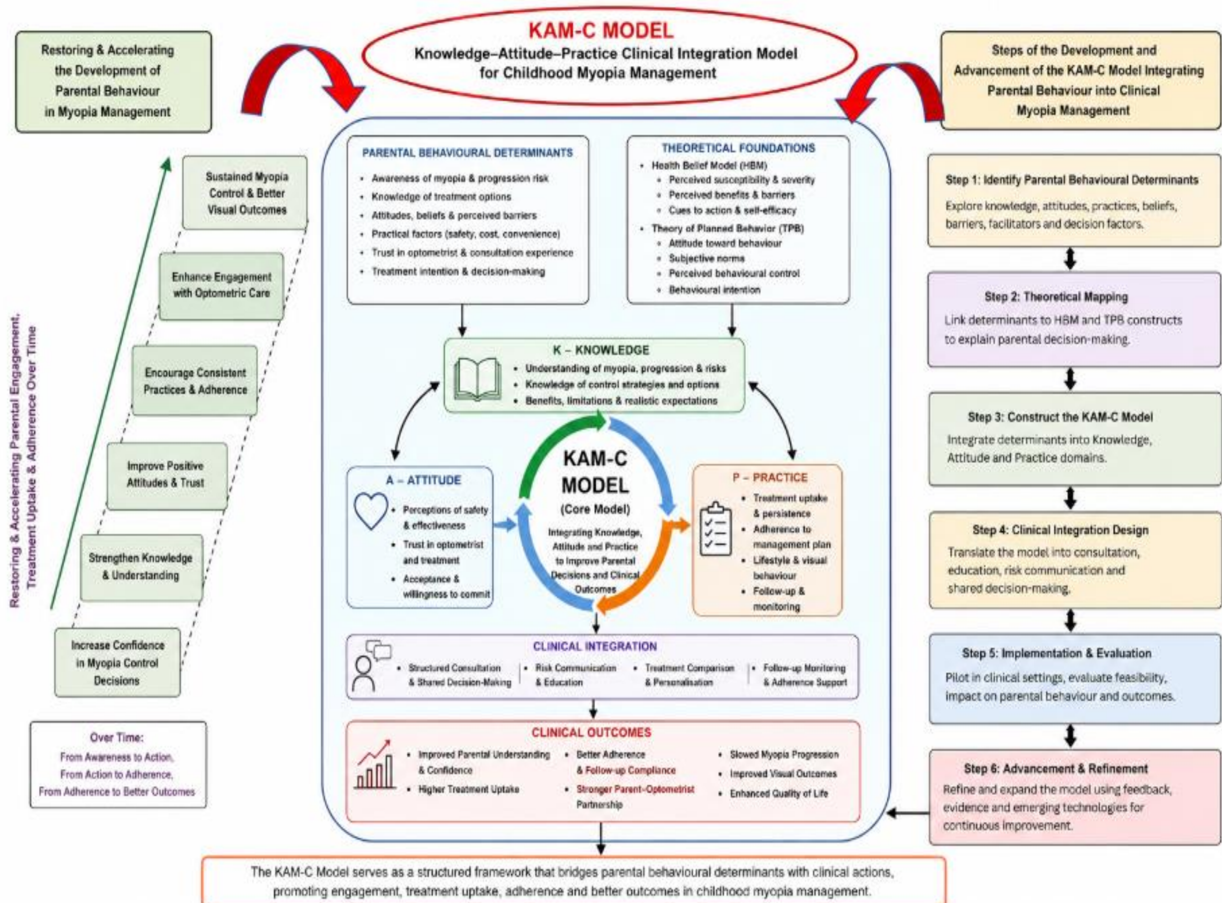

Fig.2. The KAM-C Model -Integrating Parental Behavior into Clinical Myopia Management

Left Figure	Centre Figure	Right Figure
This illustrates the evolution of parental behavior in managing childhood myopia. The upward movement represents the gradual transition from limited awareness to stronger knowledge, positive attitudes, consistent practices, and sustained adherence to myopia control. . This process is presented as a linear upward progression for simplification. However, in real clinical settings, parental behavior may move forward or backward depending on cost, safety concerns, child cooperation, family support, and consultation experience.	This represents the core of the KAM-C Model, where parental behavioral determinants are integrated into clinical myopia management. The model positions **Knowledge, Attitude, and Practice** as the central components that link parental decision-making to clinical action. The KAM-C Model functions as a bridge between parental perceptions and clinical workflow. Through structured consultation, parent education, risk communication, treatment comparison, shared decision-making, and follow-up monitoring, optometrists can translate parental concerns into practical management plans.	This illustrates the development and advancement process of the KAM-C Model. The process begins with identifying parental behavioral determinants through interviews and literature review. These findings are then mapped to the Health Belief Model and Theory of Planned Behavior to explain how parents make treatment decisions. The model is subsequently constructed by integrating knowledge, attitude, and practice components into clinical consultation. It is then applied through structured communication, treatment explanation, shared decision-making, and adherence support. The final stage involves evaluating, refining, and advancing the model to improve parental engagement, treatment uptake, follow-up compliance, and long-term outcomes in the management of childhood myopia.

Fig 3: Explanation of the Generated KAM-C Model: Clinical Myopia Management Integration

5.0 Discussion

This study found that parental decision-making is central to managing childhood myopia. Consistent with prior research, parental awareness, professional recommendations, and perceived treatment benefits significantly influenced treatment uptake. Safety, affordability, convenience, and trust in optometrists emerged as key determinants of parental decisions, supporting the Health Belief Model and the Theory of Planned Behavior. Despite growing awareness of myopia control interventions, many parents had limited

understanding of treatment mechanisms and long-term outcomes, revealing a gap between awareness and informed decision-making. This finding underscores the need for improved health literacy and parent-centered communication. The KAM-C Model addresses this gap by providing a structured framework for education, risk communication, shared decision-making, and adherence support. The findings have broader implications for policy, school health programs, and optometric practice. Standardized myopia management guidelines, parental education initiatives, and school-based vision programs may enhance early intervention and treatment adherence. Furthermore, the KAM-C Model may be adapted to diverse cultural settings where parental involvement shapes childhood healthcare decisions and treatment outcomes.

6.0 Conclusion and Recommendations

This study concludes that childhood myopia management is strongly influenced by parental awareness, perceived risk, knowledge, attitudes, practical barriers, trust in optometrists, and consultation experience. Although parents were generally willing to consider myopia control, their decisions were primarily influenced by safety, cost, convenience, perceived effectiveness, and professional recommendations. The study developed the Knowledge–Attitude–Practice Clinical Integration (KAM-C) Model, a structured clinical pathway designed to improve parental engagement, treatment uptake, adherence, and follow-up. By integrating parental behavioral factors into clinical decision-making, the model bridges the gap between evidence-based myopia-control interventions and routine clinical practice. Optometrists should adopt structured consultations involving parent education, risk communication, treatment comparison, shared decision-making, and follow-up monitoring. Clinics should support this process with visual aids, written care plans, progression charts, and comparison tables. Parents should seek early eye examinations, reduce excessive screen time, encourage outdoor activity, and maintain regular follow-up. Despite limitations related to the small urban sample and self-reported data, the KAM-C Model offers a practical framework for improving childhood myopia care and supports SDG 4: Quality Education and SDG 10: Reduced Inequalities in Malaysia.

7.0 Suggestions for Future Research

Future research should validate the KAM-C Model using larger and more diverse Malaysian samples, including urban, semi-urban, and rural populations. Quantitative and longitudinal studies are needed to examine its impact on parental knowledge, treatment uptake, adherence, refractive progression, axial length control, and follow-up compliance. Future studies should include optometrists, ophthalmologists, teachers, and children to provide broader perspectives. Digital tools such as mobile applications, online decision aids, reminders, and interactive education platforms may further enhance parental engagement and long-term myopia management.

Acknowledgement

The authors gratefully thank the academics who volunteered to participate in interviews.

Paper Contribution to the Related Field of Study

This study advances pediatric optometry by developing the KAM-C Model, which integrates parental behavioral factors into clinical decision-making to improve communication, treatment uptake, adherence, and evidence-based care for childhood myopia in Malaysia.

References

Biswas, S., El Kareh, Q. A., Mei, D., Sun, C.-H., Lam, J. S. H., Saw, S.-M., & Najjar, R. P. (2024). The influence of the environment and lifestyle on myopia. Journal of Physiological Anthropology, 43(1). https://doi.org/10.1186/s40101-024-00354-7

Chang, L., Sun, C., Lee, T., Wang, Y., & Liao, L. (2024). Shared decision-making, treatment decision regret, and vision-related quality of life among parents of children with myopia: An online survey in Taiwan. *Contact Lens and Anterior Eye, 47*(6), 102283. https://doi.org/10.1016/j.clae.2024.102283

Eppenberger, L. S., Grzybowski, A., Schmetterer, L., & Ang, M. (2024). Myopia control: Are we ready for an evidence-based approach? *Ophthalmology and Therapy, 13*(6), 1453–1477. https://doi.org/10.1007/s40123-024-00951-w

George, D., George, A., & Shahul, A. (2023). The myopia epidemic: A growing public health crisis impacting children worldwide. Zenodo. https://doi.org/10.5281/zenodo.8361064

Haarman, A. E. G., Enthoven, C. A., Tideman, J. W. L., Tedja, M. S., Verhoeven, V. J. M., & Klaver, C. C. W. (2020). The complications of myopia: A review and meta-analysis. Investigative Ophthalmology & Visual Science, 61(4), 49. https://doi.org/10.1167/iovs.61.4.49

Holden, B. A., Fricke, T. R., Wilson, D. A., Jong, M., Naidoo, K. S., Sankaridurg, P., Wong, T. Y., Naduvilath, T. J., & Resnikoff, S. (2016). Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. *Ophthalmology, 123*(5), 1036–1042. https://doi.org/10.1016/j.ophtha.2016.01.006

Hung, L., Sun, C., Liao, L., Chang, L., & Chen, H. (2025). A web-based, user-centered decision aid to support parental choices in myopia control: A development and usability study. *Digital Health, 11*, 20552076251395560. https://doi.org/10.1177/20552076251395560

Ismail, L. A., & Sukumaran, S. (2022). Prevalence of refractive errors among school children in Wangsa Maju, Kuala Lumpur, Malaysia. *Medical Hypothesis*, Discovery & Innovation in Optometry, 3(3), 106–112. https://doi.org/10.51329/mehdioptometry158

Lanca, C., Pang, C. P., & Grzybowski, A. (2023). Effectiveness of myopia control interventions: A systematic review of 12 randomized controlled trials published between 2019 and 2021. Frontiers in Public Health, 11. https://doi.org/10.3389/fpubh.2023.1125000

Liu, S. M., Wang, Y. T., Chen, J., Wang, F., & Shih, S. F. (2026). Parent engagement in children's eye care behavior and vision-related quality of life: A cross-sectional study. BMC Public Health, 26(1), 879. https://doi.org/10.1186/s12889-026-26277-9

Maulvi, F. A., Desai, D. T., Kalaiselvan, P., Shah, D. O., & Willcox, M. D. P. (2025). Current and emerging strategies for myopia control: A narrative review of optical, pharmacological, behavioral, and adjunctive therapies. Eye, 39(14), 2635–2644. https://doi.org/10.1038/s41433-025-03949-1

Pan, W., Morgan, I., Flitcroft, I., Rose, K., Ostrin, L. A., Rosenfield, M., Govender-Poonsamy, P., Siu-Villaseñor, D., Kaymak, H., Khew, J. M., Woo, O., Tsubota, K., Shinde, L., Prenat, O., Ma, J., Qu, J., Yang, Z., Wang, Y., Tan, K. O., ... Lan, W. (2025). The need to address the myopia pandemic: Summary report of the Global Myopia Public Health Summit 2024. Global Health Research and Policy, 10(1), 45. https://doi.org/10.1186/s41256-025-00445-7

Pan, Z., Xian, H., Li, F., Wang, Z., Li, Z., Huang, Y., Liu, W., Li, Y., Li, F., Wang, J., Chen, H., Wu, Y., Xu, Y., Wu, G., Zhang, Y., He, L., Zhang, J., Zhang, F., Qian, X., & Zhang, X. (2025). Myopia and high myopia trends in Chinese children and adolescents over 25 years: A nationwide study with projections to 2050. The Lancet Regional Health – Western Pacific, 59, 101577. https://doi.org/10.1016/j.lanwpc.2025.101577

Rashidi, N., Rahim, M. A. S. A., & Yusof, F. (2025). Trend and distribution of refractive errors among children attending a private optometry practice in northern Malaysia. International Journal of Allied Health Sciences. https://journals.iium.edu.my/ijahs/index.php/IJAHS/article/view/1099errors among children attending a private optometry practice in northern Malaysia. https://journals.iium.edu.my/ijahs/index.php/IJAHS/article/view/1099

Tan, E. S. Y., Agarwal, P., & Teng, C. L. (2026). Prevalence of Myopia in Children and Adolescents: A Systematic Review of Malaysian Prevalence Studies. Malaysian Journal of Medical Sciences, 33(1), 14–26. https://doi.org/10.21315/mjms-08-2025-592