Scholars Academic Journal of Biosciences
Abbreviated Key Title: Sch Acad J Biosci
ISSN 2347-9515 (Print) | ISSN 2321-6883 (Online)
Journal homepage: https://saspublishers.com
NLM ID:101629416

OPEN ACCESS

Ophthalmology

Virtual Learning and its Impact on Visual Health in School-Age Children

Amani Suleiman Abdelhalim Almanasrah[1*], Asma Abdel Halim Alamer[2], Reham AlGhazo[3], Amjad Jamil Abusharar[4], Ali Ahmed Alomari[5]

[1]Ophthalmology Consultant, Primary Health Care Corporation, Doha, Qatar
[2]Ophthalmology Consultant, Primary Health Care Corporation, Doha, Qatar
[3]Rheumatology Consultant, Al Emadi Hospital, Doha, Qatar
[4]Pediatric Consultant, Primary Health Care Corporation, Doha Qatar
[5]Staff Pharmacist, Hamad Medical Corporation

DOI: https://doi.org/10.36347/sajb.2025.v13i11.002 | **Received:** 12.09.2025 | **Accepted:** 29.10.2025 | **Published:** 03.11.2025

***Corresponding author:** Amani Suleiman Abdelhalim Almanasrah
Ophthalmology Consultant, Primary Health Care Corporation, Doha, Qatar

Abstract **Review Article**

Introduction: The coronavirus disease 2019 pandemic has caused a hasty global transition to virtual schooling and excessive screen time among children. ***Aim:*** The goal is to summarize the influence of virtual studying on the visual health of school-age children along with some practical safeguards. ***Methodology:*** We collected and presented research on four domains that prolonged near work and digital device usage affects. They are; refractive error most notably the incidence and progression of myopia, ocular surface and asthenopic symptoms (dryness, irritation, headache, eye strain), convergence insufficiency, accommodation accommodative insufficiency and spasm. ***Results:*** The incidence of myopic shift and symptoms of eye-strain, dryness, and diplopia were seen to worsen amongst the students during the lockdown. Their disruptions in convergence and accommodative functions were also seen to show declines. These effects were most noticeable when their virtual schedules matched their pre-pandemic schedules and they were required to attend constantly, continuously and synchronously. Risk seemed to be linked to the dose and able to be changed by different factors in our environment and how we act. ***Conclusions:*** The pandemic-related increase in online learning appears to have added burden of visual complaints and complaints, and may have adverse effects on the academic performance and quality of life among children. Schools and families can take steps that involve 20-20-20 breaks, ergonomics, bigger displays, limiting near-work blocks, outdoor time and more. Educators and policymakers should evaluate hybrid models in matters that involve access and well-being. Future research should standardize screen time, viewing distance, and outdoor hours' exposure measures, include longitudinal designs with cycloplegic refraction, and test multicomponent school interventions to prevent myopia progression and visual fatigue in digitally intensive learning settings.

Keywords: Virtual learning; Screen time; Myopia; Digital eye strain; Convergence insufficiency.

1. INTRODUCTION

The widespread adoption of virtual learning in schools creates a unique intersection with visual health [1]. Most academic programs transitioned to fully online or hybrid formats during the COVID-19 pandemic, raising concerns about the potential impact on children's vision [1]. Educators developed various platforms for remote instruction, combining synchronous and asynchronous formats to deliver the curriculum [1]. Many school systems implemented online learning schedules that paralleled regular in-person routines, with students attending classes in real time throughout the day [2]. Even as in-person instruction resumed, some virtual elements remained in many systems. The pivot to online instruction generated widespread apprehension that extensive screen time could adversely affect children's visual health [3].

Concerns about children's visual health are particularly salient because the global prevalence of myopia has increased dramatically during the pandemic, straining already insufficient eye-care resources [4]. Children's visual health is also critical for their overall health, learning, and development [4]. Research on visual health during digital instruction highlights the significance of the learning context [5]. Even before the pandemic, screens were already the predominant near-reading device in children's lives, with many children using screens as their primary means of educational access [6]. The shift to digital learning accelerated the rate at which educational content assumed

predominantly digital formats [7]. Children who are not yet symptomatic, particularly early readers, often receive minimal assessment of vision and may not benefit from informal screenings in digital itineraries [8]. Changes in digital instructional platforms frequently alter screen-use practices; understanding which elements consistently influence children's visual health remains an important factor informing the design of digital instruction [9].

Visual health encompasses a range of factors related to the optimal functioning of the visual system [10]. Recognizing the lexicon surrounding visual health, this study adopts the following definitions [10]. Digital eye strain is used synonymously with computer vision syndrome and includes ocular discomfort caused by prolonged near-visual work on screens, the usage of digital devices, and near-work activities [11]. Accommodative amplitude refers to the ability to change the eye's optical power by elongating or shortening the eye's focus [12]. Accommodation is considered decreased or inadequate when children can focus only at the classroom or board distance, given the extensive near-work demands associated with reading [13]. Convergence is defined as the inward movement of both eyes toward each other as they focus on an observed object, and a reduction in convergence limits the maximum amount of inward eye movement expected to be still comfortable [14]. When available findings indicate differences between younger and older students, the term "school-age children" is utilized [15].

2. Background on virtual learning in schools

The transition to virtual learning during the pandemic provided educational continuity but raised health concerns [16]. Digital screens were already prevalent in schools; children under 18 spent 4.5 hours daily during class and 3.5 hours during non-class hours [17]. Emerging evidence indicated that remote learning affects visual health, and schools in remote and hybrid contexts needed the information [18]. The combination of near-vision and screen-time increases would particularly strain accommodations [19].

Visual health encompasses refractive status and the physiological demand of accommodation, convergence, and binocular vision [20]. Children's visual systems continue to develop throughout childhood; school-age children acquire the ability to sustain accommodation, converge while fixating, and maintain convergence during prolonged near tasks [20]. These skills, essential for classroom learning, can deteriorate without careful attention [21]. Prolonged near-work tasks on digital screens—common in virtual settings—risk visual fatigue and discomfort [22]. Furthermore, business and recreational screen time often add to exposure; near-work-and-screen-related habits established at this stage may persist into adulthood [23].

The recognition of computer vision syndrome (CVS) as a public-health issue has led the World Health Organization to declare that digital screen use generates common visual-health symptoms [24]. Current definitions cluster under the broader umbrella of visual health, which can be affected both by specific screen-use characteristics and by the learning environment accompanying the use of screens outside of class [25].

2.1. Rationale for focusing on visual health

Health considerations are crucial in evaluating virtual education and distance learning. Visual health is particularly relevant because school-age children are extensively involved with electronic devices, both during and after school hours [26]. Infectious diseases and health-related problems significantly affect children's learning capabilities and socioeconomic progress [27]. Although learning-related environmental factors are also essential, a focus on visual health offers the benefit of prioritizing potential short- and long-term effects of virtual learning on children's well-being [28]. During the COVID-19 pandemic, virtual learning shifted from touchscreen devices to conventional computers, thereby increasing demand for a safe, health-conscious, yet effective approach to schooling [29]. Digital devices are commonly used for education, entertainment, and socializing, thus serving an integral role in children's lives [30].

Visual health comprises a broad range of eye-related issues, such as ametropia, visual discomfort, and the ability to use visual information (holistic) [31]. The focus herein is on visual comfort and visual strain (specific) [31]. Visual discomfort includes the sensation of tiredness, heaviness, blurred vision, headache, irritation, stinging, and distraction (discomfort symptoms) [32]. Visual strain refers to the inability to comfortably use visual information and includes the same symptoms as visual discomfort [33]. Continued exposure to these symptoms necessitates concern [34]. Binocular vision includes convergence and divergence to maintain a single image with both eyes [35]. Digital books and web-based learning platforms engaged in reading and diagram construction—the core of education—exhibit characteristics suited to children's visual preferences for distance learning [35].

Virtual learning—an approach to education that uses digital technology, such as computers, tablets, and mobile phones, to access instructional content remotely—has been widely adopted by school systems globally, including Hong Kong, mainland China, Taiwan, Singapore, the United States, and the United Kingdom. During lessons, either traditional education took place in classrooms while digital education occurred outside or vice versa. In straightforward scenarios, virtual learning connects all students and teachers simultaneously on dedicated platforms [36]. In complicated scenarios, virtual learning is implemented by direct teaching. Certain locations provide one-to-three-hour sessions on online platforms such as Zoom, Microsoft Teams, or Google Meet that directly teach

adapted syllabuses, represent the first stage of virtual learning, or constitute online classes [37].

2.2. Research questions and definitions

Virtual learning for school-age children creates a number of pressing health issues, particularly related to vision [23]. Digital devices produce large amounts of blue light that can be harmful to a growing visual system [38]. Virtual learning often requires extended use of devices, which leads to widely reported symptoms of digital eye strain including headaches, blurred vision, irritation, and dryness [39]. Such symptoms are of great concern because the visual system undergoes considerable development during the school-age years [40]. Symptoms originating from virtual learning may impede cognitive development and academic performance [41].

The overarching goal of this study is to clarify the impact of extended digital device use associated with virtual learning on visual health [40]. Exactly how virtual learning affects visual health remains unclear, but four specific research questions help to structure the inquiry:

- How do changes in refractive status—specifically, progression of myopia—accompany virtual learning? [42].

The following definitions are relevant to the inquiry: Visual health is defined as health and functioning associated with the visual system [23]. Digital eye strain (DES) describes a group of physical symptoms, including headaches, blurred vision, dry eyes, and eye irritability, linked to prolonged exposure to digital devices [43]. Accommodation refers to the eye's ability to focus on objects at varying distances [44]. Convergence describes the inward turning of the eyes toward each other while fixating on a near object [45].

3. Overview of Visual Health and Digital Screen Use

The visual system in children changes gradually yet profoundly from birth through the ninth year, at which point it approaches adult visual function [46]. Children typically exhibit slower developmental progress in terms of spatial resolution, color, contrast, temporal resolution, and half-angle field, each of which appears to reach adult maturity around age 6 or older [47]. In addition, the remarkable initial growth in visual skills is also tempered by a decrease in the percentage of this potential gain [48]. The operations of accommodation, vergence, and binocular vision are intimately linked and undergo important enhancements during the first two years [49]. Accommodative development continues up to three years and serves as a "teaching function" that helps to coincide further advanced vergence and binocular maturation; at this stage, accommodation can be frequently controlled separately from other parameters [50]. A gradual increase of divergence provisioned for far vision is still an important accessory learning process beyond four years [51].

The ocular muscles in a child perform basic functions at birth and undergo an elongation growth pattern quite similar to that of the general body; a proportion exceeding a typical template is not yet determined [52]. The period of maturity appears to take place around six years, while the surrounding anatomical components, such as orbit and globe, arrive at adult configuration at an even earlier stage [53]. However, stage preferences of ocular muscle alignment and operations persist during years six to ten, and ocular rotation remains a factor to bind even after eyeglasses prescription; approximately three-quarters of subjects still lead with such accommodation and divergence characteristics [54]. Weakness in the development of ocular preferences in alignment parameters is therefore postulated with respect to vocation and screen exposure [55]. Data on accommodative response and binocular vision among schoolchildren nationwide clearly document a strong proclivity toward frequent far vision [56].

The use of near-visual display devices (NDDs) has increased markedly, especially among school-age children, over the past decade with the rise of a digital lifestyle that has changed the nature of daily human activity and provides convenience [1]. Although the process of visual development is normal, their ocular health is declining [57]. A cross-sectional study conducted among the general population of Iraq investigated the use of NDDs and their effects on the eyes and general health of the population. NDDs are continuously utilized indoor, from the beginning to the end of a lesson, and longer than the recommended duration [58]. Students display more blurred vision and higher levels of eye strain than other age categories [59]. The onset of ocular symptoms develops earlier in life, the use of NDDs is frequently prolonged and even continuous in digital classes, and being unaware of such digital health problems are major issues of concern [60].

3.1. Anatomy and function of the visual system in children

The visual system enables perception and interpretation of the environment [61]. It operates through a network of anatomical components, neural targets, and specialized functions [62]. The visual system develops continuously throughout childhood, with structural changes in the eyes and facial features [63]. Children undergo various stages of visual development, predominantly in the first six years of life [63]. Disruption of these stages may lead to permanent visual impairment [64]. Certain parameters, such as accommodation, convergence, and binocular vision, indicate the quality of school-age children's visual health [65]. These measurements show 33% of children with visual fine-motor difficulty had visual-offending conditions compared to only 7% of those without such difficulty [61].

Visual symptoms associated with prolonged near work include headaches, blurred vision, eye strain, fatigue, decreased concentration, and disrupted sleep [23]. Vision symptoms from prolonged near work indicates a need for vision assessment [66]. Adjusting reading distance, monitor size, seating height, and lighting conditions at home significantly improves symptoms of grade five children [67]. A visual-health policy promoting screening, regular checks, and less near work is essential [68]. Distance learning aligns well with children's reading preferences, offering another avenue worth considering [69]. As more children acquire visual or visual-offending fine-motor skills and spend long hours on screens, deteriorating visual health due to online learning warrants detailed survey [70]. A study among 312 visually-offending and visually-well fine-motor skill children revealed similar COVID-19 visual deterioration regardless of online or in-person school [67]. Since virtual learning remains the mainstream educational form, better understanding of related visual factors becomes imperative [71].

3.2. Common visual symptoms associated with screen time

Despite the widespread adoption of virtual learning as a response to the pandemic, the emergence of the new Omicron variant together with a global drive towards "living with Covid-19" might create urgency to resume in-person schooling [72]. Even though the epidemiological situation still merits caution in many school systems worldwide, a trend towards a fuller return or hybrid model cannot be excluded [73]. Internationally, the popularity of digital platforms such as Zoom has accelerated the shift to remote online lessons [74]. Elementary, primary, and high school students participating in the virtual learning programmes typically find that their schedules comprise two daily blocks of approximately 2 hours online instruction interspersed with a midday interval of around 1 hour, which contrasts with the earlier experience of continuous classes lasting up to about 90 minutes [20]. With in-person schooling becoming more challenging, the engagement of students with screens for prolonged periods raises concerns for their health [1]. Visual health represents a key aspect of the overall wellbeing of school-age children—from infancy and throughout their formative years—yet remains neglected in discussions on extended screen time viewed through the lens of learning efficiency and educational quality [75]. Addressing this gap requires a focus on the epidemiology of visual health and the opportunity to identify and manage emerging issues sufficiently early via a combination of school-centred initiatives and appropriate support from families and eye professionals [76].

3.3. Factors influencing visual strain (ergonomics, contrast, glare)

Physical factors influencing visual strain among school-age students include workstation ergonomics, ambient lighting, and display device attributes [77]. Studies have shown that correct furniture arrangement, screen position, room brightness, flicker frequency, font size, and text alignment help reduce symptoms such as eye discomfort, tiredness, headaches, and blurred vision [77]. Adjusting intraocular accommodation, preventing excessive convergence, and controlling glare also contribute positively to visual health while using digital devices [78].

4. Evidence on Visual Outcomes in Virtual Learning

Adverse visual effects are documented among children learning with digital devices, and such complaints often intensify during school hours [1]. Myopia, especially concerning during formative years, appears more likely to develop among children engaged for multiple hours in online education [79]. Accommodation difficulties, elevated refractive and ocular-surface stress, and headaches are widely reported (20). Given virtual learning's accelerated integration into curricula worldwide, it is critical to assess the alignment of these adverse visual conditions, class structure, and pedagogic-technological modes of delivery specific to children [80].

Myopia's escalating, global rise continues to cause worldwide concern, with children showing significantly increased risks associated with prolonged digital-screen viewing [81]. Within a period of eleven months, the aggregated data from one location showed myopia incidence han dramatically escalated from seven to almost ninety-two percent among six- to fourteen-year-olds — paralleling the rapid global increase of myopia from the 1930s to early 2000s among Japan's population [82].

4.1. Refractive changes and accommodative demand

Myopia has increased at an unprecedented rate [83]. In China, for example, the prevalence of myopia in school-age children more than doubled following school closures during the COVID-19 pandemic, rising from 38.5% before to 81.0% afterward [79]. Even early childhood myopia began to spike during that time [79]. The urgent need to investigate how to mitigate these risks in educational settings has highlighted the importance of understanding the impact of digital learning on visual health in children. When technology is integrated into teaching, schools can offer educational resources and digital learning experiences to students during distance education [84]. This development is especially relevant for the student population engaged in online learning [5].

Adjustment of the accommodation system generally occurs according to the needs of the visual target [85]. Therefore, distance learning materials with an extended duration consist of prolonged near-vision viewing [86]. Consequently, students engage primarily in viewing materials which aggravate the strain of the accommodation system [87]. Under natural visual conditions, it is common for students to switch from near-vision work to distance viewing on the blackboard

repeatedly [88]. In digital learning, the duration of near-vision viewing while targeting the screens at a short distance increase, leading to reduced cycling of far-and-near vision [89]. The extended continuous near-vision task, especially when the visual displays are set at a closer distance, easily produces symptoms of near-vision-related visual fatigue 85.

4.2. Convergence, binocular vision, and preferences for distance learning

During online e-learning, difficulties in maintaining binocular vision alignment due to convergence insufficiency may coexist with other refractive or accommodative challenges [90]. Virtual learning fits well with remote lectures involving short text passages, where screen use extends beyond 40 cm and mimics distance vision [79]. Consequently, many students exhibit a preference for distance-learning courses despite alternative subjects being offered in-person [91].

Convergence insufficiency hampers the ability to sustain binocular fusion on near objects, leading to symptoms like time-consuming text reading, headaches, blurred vision, double vision, and increased fatigue when engaged in activities requiring convergence, particularly with digital screens [92]. The prevalence of convergence insufficiency is significantly correlated with prolonged near-screen use among school-age children [92].

5. Risk and Protective Factors

As digital technologies play a dominant role in learning, professional and social communication, scientific investigations, and private life, concern has been raised regarding their impact on children's visual health [20]. Screen time has increased in the aftermath of the COVID-19 pandemic due to a restriction of activities outside the home, accompanying the shift in school systems to remote formats [93]. Virtual learning, adopted by a large number of educational institutions together with the increased use of electronic devices (e.g., computers, laptops, tablets, and mobile devices), raises a number of questions regarding its effects on students' visual health [18]. Children undergoing deep learning activities in front of screens are concerned about visual symptoms after an extended period of time [1]. Such symptoms are age-specific manifestations that may also reflect serious vision conditions [94]. In view of practical implications for the well-being of school-age children engaged in virtual learning, this section discusses risk and protective factors related to visual health [95].

The time spent looking at screens is substantial, constituting 79–91% of a student's day in virtual learning [96]. Following the 20–20–20 rule or similar principles and implementing breaks during lessons can reduce the likelihood of developing visual discomfort [97]. Recommended viewing distances are between 30 cm and 60 cm, while the screen should be placed close to the height of the eye and at an angle of 10°–20° in relation to the horizontal [98]. Glare and brightness of the room should be considered as they can lead to discomfort; the interior should be brighter than the screen or the same level of brightness, and half of the room should be filled with light in classrooms [99]. Regarding the color temperature of the electronic device, a warm setting is preferable; other instruments—such as blue-filter glasses, blue-light blocking devices, blue blocker applications, and film coatings—have not been proven to filter blue light during the use of displays [100].

6. Assessment and Monitoring in School Settings

The systematic assessment and monitoring of visual health in school settings is essential for the early identification of emerging symptoms and concerns [72]. Multiple efficient methods are available for screening or flagging potential issues in both remote and in-person learning environments [101]. Effective options include easily administered vision checks and surveys, together with simple observation of online platform usage [102]. Educators serve crucial roles in conducting preliminary screenings, tracking symptom development, and facilitating onward referrals to parents and eye care professionals, thereby supporting the wider effort to monitor visual health. Periodic whole-class checks can be particularly beneficial as they instruct students on the visual demands of new digital formats [103]. Telehealth services and software to record and upload data also offer valuable adjuncts to conventional monitoring practices [104].

Screening for visual issues can be accomplished through various approaches suitable for different modalities [105]. In classrooms with limited or no access to ophthalmic instruments, time-efficient vision checks that permit the assessment of both distance and near vision remain possible when conducted solely with a projector or screen [106]. Supplementary surveys can gauge the presence, recurrence, and severity of school-related symptoms such as blurred vision, headaches, or eye strain [107]. Informal assignments can likewise serve as indirect indicators: for example, access to recorded materials or exam preparation conducted instead of class attendance may hint at challenges connected to online learning [108]. In remote settings, conveying the overarching aim of detailed observation speeds up adaptation to more formal approaches [79].

6.1. Methods for screening visual issues in remote and in-person contexts

The method of screening for children's vision issues consists of several options based on commonly used and effective principles [20]. Vision checks can be quickly performed at any time or location by using quick and practical vision checks, online questionnaires and surveys assessing children's vision-related symptoms administered to students and their families during class, and the field of vision analysis often integrated with lesson plans and a system of projection that does not compromise pedagogical objectives and constraints

[109]. The participation in surveys to identify the extent of vision-related symptoms is possible to enhance visibility of the issue among parents, teachers, and health professionals in direct correspondence with the government's "Can I See Clearly" kids' public health initiative, which aims to provide children access to information and assistance for their vision-health needs and is awarded through an educational program for the projected activities [110]. These rapid screening methods are sufficient and convenient for the needs of classrooms engaged in digital learning [20].

The individual roles of educators, families, and eye-care professionals concerning children's vision are distinct and can take place simultaneously without interference or duplication [111]. Teachers are to be observant, not only regarding children's learning and class participation but also their general behaviour during classroom activity and when engaging in any digital activity inside or outside the classroom [112]. Following observation and if symptoms are suspected, teachers are invited to schedule a follow-up with children's families and to share the awareness of children's vision-related issues counting both on protection of children's learning and the long-term achievements of completion and rewards of education [113]. Parents and families are expected to consult children's vision-health concerns and challenges and to assist in arranging the clinical follow-up with eye-care specialists if required [114]. Eye-care specialists are invited to discuss any vision-health matters and regular check-ups are encouraged to be arranged at routine intervals irrespective or independent of any deterioration or impediment in the perception of vision [79].

6.2. Role of educators, parents, and eye care professionals

During virtual learning, collaboration among educators, parents, and eye care professionals can reduce the visual health risks faced by school-age children [115]. Outside the classroom, parents and guardians are the first to see pupils' traces of visual discomfort [111]. They can share their impressions or any notices from their children with educators, who can then widen the monitoring net by gathering insights from other adults who interact with those pupils [116]. Educational inspectors can lend their expertise to notice aspects such as writing or drawing habits that may signal early evocation at screening points [72]. This information can be decisive in determining the exact type of exploration required, narrowing down from the multifaceted nature of vision-related complaints [20].

Family-influenced habits and routines are crucial contributors to the practice of visual hygiene and the development of comfortable and appropriate visual experiences [117]. Such child-centred participation can be instrumental in helping to establish both widespread knowledge and personal awareness of what can be done to keep vision healthy and thereby counteract any negative effects that prolonged screen time consistently exerts [27].

6.3. Technology-assisted monitoring tools

To address the growing concern for children's ocular health due to increased screen time, several screening and monitoring methods can assist educators, parents, and eye care professionals in identifying at-risk individuals and enabling timely intervention [118].

Educators, parents, and eye care professionals can work together to ensure comprehensive monitoring of visual health [115]. Teachers play a critical role in observing symptoms and promoting proactive measures; parent engagement in monitoring and screening at home can further bolster these efforts; and eye care professionals serve as the key contact for guidance, detailed examinations, and clinical interventions [112].

7. CONCLUSION

The findings suggest that virtual learning introduces multiple risk factors for school-age children's visual health [119]. In particular, evidence indicates that prolonged screen time and limited opportunities for distant viewing can increase the likelihood of myopia progression and exacerbate common visual symptoms such as headaches, blurred vision, eye strain, and fatigue (79). Moreover, many students report a preference for asynchronous or blended remote learning modes that align with near-distance content presentation [120].

To mitigate the increased visual health risks associated with virtual learning, schools, families, and policymakers can implement a range of actionable strategies [121]. Firstly, establishing comprehensive guidelines related to screen time duration, including session lengths and break intervals, can help reinforce healthy habits [122]. Secondly, ergonomic best practices pertaining to workstation setup and viewing distance contribute to visual comfort and overall efficacy [123]. Thirdly, promoting vision-friendly design principles in digital materials can alleviate strain during screen-based activities [124]. Finally, early assessment and monitoring of visual health allow for timely identification of emerging concerns that on-campus curricula may inhibit or delay [125].

REFERENCES

1. Demirayak B, Yılmaz Tugan B, Toprak M, Çinik R. Digital eye strain and its associated factors in children during the COVID-19 pandemic. 2022. ncbi.nlm.nih.gov
2. Hamburger JL, Lavrich JB, Rusakevich AM, Leibowitz JA, Zhitnitsky MD, Zhang Q, Makkena AC, Liu CK, Oh GJ, Sharpe JE, Gunton KB. The visual consequences of virtual school: acute eye symptoms in healthy children. Journal of American Association for Pediatric Ophthalmology and Strabismus. 2022 Feb 1;26(1):2-e1. [HTML]

3. Poddar R, Naik T, Punnam M, Chourasia K, Pandurangan R, Paali RS, Bhat NR, Biradar B, Deshpande V, Ghosh D, Chaudhuri SR. Experiences from running a voice-based education platform for children and teachers with visual impairments. ACM Journal on Computing and Sustainable Societies. 2024 Sep 16;2(3):1-35. [HTML]
4. Ng DSC, Lai TYY. Insights into the global epidemic of high myopia and its implications. JAMA ophthalmology. 2022. [HTML]
5. Zhang X, Cheung SS, Chan HN, Zhang Y, Wang YM, Yip BH, Kam KW, Yu M, Cheng CY, Young AL, Kwan MY. Myopia incidence and lifestyle changes among school children during the COVID-19 pandemic: a population-based prospective study. British Journal of Ophthalmology. 2022 Dec 1;106(12):1772-8. bmj.com.
6. George AS, George AH, Shahul A. The myopia epidemic: A growing public health crisis impacting children worldwide. Partners Universal International Research Journal. 2023 Sep 25;2(3):120-38. puirj.com
7. Zhang XJ, Zhang Y, Kam KW, Tang F, Li Y, Ng MP, Young AL, Ip P, Tham CC, Chen LJ, Pang CP. Prevalence of myopia in children before, during, and after COVID-19 restrictions in Hong Kong. JAMA Network Open. 2023 Mar 1;6(3):e234080-. jamanetwork.com.
8. Pan W, Morgan I, Flitcroft I, Rose K, Ostrin LA, Rosenfield M, Govender-Poonsamy P, Siu-Villaseñor D, Kaymak H, Khew JM, Woo O. The need to address the myopia pandemic: summary report of the global myopia public health summit 2024. Global Health Research and Policy. 2025 Sep 23;10(1):45. springer.com
9. Hu Y, Zhao F, Ding X, Zhang S, Li Z, Guo Y, Feng Z, Tang X, Li Q, Guo L, Lu C. Rates of myopia development in young Chinese schoolchildren during the outbreak of COVID-19. JAMA ophthalmology. 2021 Oct 1;139(10):1115-21. jamanetwork.com
10. Beeson DR. Digital Eye Strain. 2025. aston.ac.uk
11. Torvela R. Digital Eye Strain in the New Era of Digitalization after the Outbreak of COVID-19: Scoping Review. 2022. theseus.fi
12. Chen TYH. Digital Eye Strain and Repeated Clinical Testing. 2022. suny.edu
13. Sharvit E, Rosenfield M. Cognitive demand, concurrent viewing distances, and digital eyestrain. Optometry and Vision Science. 2022. suny.edu
14. Naipal S, Khumalo N, Rahmtoola M, Chagi S, Didi L, Mthethwa S, Ndhlovu S, Persadh B, Rampersad N. Viewing distance, font size and symptoms of eyestrain in non-presbyopic and presbyopic smartphone users. Ophthalmic and Physiological Optics. 2025 Jan;45(1):269-79. wiley.com
15. Moore PA, Wolffsohn JS, Sheppard AL. Digital eye strain and clinical correlates in older adults. Contact Lens and Anterior Eye. 2025. sciencedirect.com
16. Cortés-Albornoz MC, Ramírez-Guerrero S, Rojas-Carabali W, de-la-Torre A, Talero-Gutiérrez C. Effects of remote learning during the COVID-19 lockdown on children's visual health: a systematic review. BMJ open. 2022 Aug 1;12(8):e062388. bmj.com
17. Fan Q, Wang H, Kong W, Zhang W, Li Z, Wang Y. Online learning-related visual function impairment during and after the COVID-19 pandemic. Frontiers in public health. 2021 Nov 29; 9:645971. frontiersin.org
18. Liu J, Li B, Chen Q, Dang J. Student health implications of school closures during the COVID-19 pandemic: new evidence on the association of e-learning, outdoor exercise, and myopia. Healthcare. 2021. mdpi.com
19. Rifai NA, Sukarsih I, Ramdhania A, Indrasari ER. The effect of online learning during the COVID-19 pandemic on eye health problems of elementary school-aged children. In4th Social and Humanities Research Symposium (SoRes 2021) 2022 Apr 23 (pp. 275-278). Atlantis Press. atlantis-press.com
20. Ekemiri K, Ezinne N, Kamalodeen K, Pierre K *et al.*,Online e-learning during the COVID-19 lockdown in Trinidad and Tobago: prevalence and associated factors with ocular complaints among schoolchildren aged 11–19 years. 2022. ncbi.nlm.nih.gov
21. Bagaji S, Rao R. DIGITAL FATIGUE IN THE AGE OF SCREENS: EYE AND POSTURAL STRAIN AMONG 18–35-YEAR-OLD SCREEN USERS. 2025. researchgate.net
22. Yi Z, Ningli W, Kai C, Yan H *et al.*,Effects of virtual distant viewing technology on preventing nearwork-induced ocular parameter changes. Digital Health. 2024. sagepub.com
23. Kaur K, Gurnani B, Nayak S, Deori N, Kaur S, Jethani J, Singh D, Agarkar S, Hussaindeen JR, Sukhija J, Mishra D. Digital eye strain-a comprehensive review. Ophthalmology and therapy. 2022 Oct;11(5):1655-80. springer.com
24. Kopilaš V, Korać D, Brajković L, Kopilaš M. Visual Functioning and Mental Health in the Digital Age. Journal of clinical medicine. 2025. mdpi.com
25. Gajewski W, Górski J, Janecka J, Hofman M, Skoczek W, Gałęcki W. The Impact of Digital Screens on Eye and Nervous System Health. Journal of Medical Science. 2025 Sep 19: e1283-. ump.edu.pl
26. Qi J, Yan Y, Yin H. Screen time among school-aged children of aged 6–14: a systematic review. Global health research and policy. 2023. springer.com
27. Liu SM, Chang FC, Chen CY, Shih SF *et al.*,Effects of Parental Involvement in a Preschool-Based Eye Health Intervention Regarding Children's Screen Use in China. 2021. ncbi.nlm.nih.gov
28. Negiloni K, Kumar Ramani K, Reddi Sudhir R. Environmental factors in school classrooms: How they influence visual task demand on children. 2019. ncbi.nlm.nih.gov

29. Bianca Holhoș L, Cristiana Coroi M, Lazăr L. Observations on Refractive Status and Risk Factors for Visual Impairment in Children with Disabilities. 2021. ncbi.nlm.nih.gov
30. Sonnenschein S, Stites ML, Gursoy H, Khorsandian J. Elementary-school students' use of digital devices at home to support learning pre-and post-COVID-19. Education Sciences. 2023 Jan 22;13(2):117. mdpi.com
31. Immaculata OM, Chukwuma NW. Ergonomic and Ophthalmic Risk Factors for Ocular Discomfort in Computer Operators: A Case Study in Anambra State. Sch Acad J Biosci. 2025. saspublishers.com
32. Han L, Zhang H, Xiang Z, Shang J, Anjani S, Song Y, Vink P. Desktop lighting for comfortable use of a computer screen. Work. 2021 Jan 8;68(s1):S209-21. sagepub.com
33. A Salem F, M Weheida S, Abdel Ghafar Ali K, Mohamed Metwely S, Alkordy A, Y El Emam S, Niazy R, Magdi Farghaly S. Computer Vision Syndrome as Perceived by Undergraduate Nursing Students Versus Clinical Nursing Teachers. Egyptian Journal of Health Care. 2023 Dec 1;14(4):399-418. ekb.eg
34. Wolffsohn JS. Questionnaire Design and Use to Assess Dry Eye Disease. Dry Eye Disease. 2023. [HTML]
35. Garaszczuk IK, Komorowska K, Rusnak MA. The impact of space habitat conditions on visual performance and cognitive load in analogue astronauts. Acta Astronautica. 2025. sciencedirect.com
36. Anthony Jnr B, Noel S. Examining the adoption of emergency remote teaching and virtual learning during and after COVID-19 pandemic. International Journal of Educational Management. 2021 Oct 21;35(6):1136-50. ntnu.no
37. Akpan IJ, Offodile OF, Akpanobong AC, Kobara YM. A comparative analysis of virtual education technology, e-learning systems research advances, and digital divide in the global south. Informatics. 2024. mdpi.com
38. AlQarni AM, AlAbdulKader AM, Alghamdi… AN. Prevalence of digital eye strain among university students and its association with virtual learning during the COVID-19 pandemic. Clinical …. 2023. tandfonline.com
39. Mohan A, Sen P, Shah C, Jain E, Jain S. Prevalence and risk factor assessment of digital eye strain among children using online e-learning during the COVID-19 pandemic: Digital eye strain among kids (DESK study-1). Indian journal of ophthalmology. 2021 Jan 1;69(1):140-4. lww.com
40. Seresirikachorn K, Thiamthat W, Sriyuttagrai W, Soonthornworasiri N, Singhanetr P, Yudtanahiran N, Theeramunkong T. Effects of digital devices and online learning on computer vision syndrome in students during the COVID-19 era: an online questionnaire study. BMJ Paediatrics Open. 2022 Jun 9;6(1):e001429. nih.gov
41. Gupta R, Chauhan L, Varshney A. Impact of e-schooling on digital eye strain in coronavirus disease era: a survey of 654 students. Journal of Current Ophthalmology. 2021 Apr 1;33(2):158-64. lww.com
42. Ghannam AB, Ibrahim H, Mansour H, Kheir WJ, Al Hassan S, Saade JS. Impact of online learning during COVID-19 pandemic on digital device related ocular health. Heliyon. 2024 Jun 30;10(12). cell.com
43. Mylona I, Glynatsis MN, Floros GD, Kandarakis S. Spotlight on digital eye strain. Clinical Optometry. 2023 Dec 31:29-36. tandfonline.com
44. Mataftsi A, Seliniotaki AK, Moutzouri S, Prousali E, Darusman KR, Adio AO, Haidich AB, Nischal KK. Digital eye strain in young screen users: A systematic review. Preventive Medicine. 2023 May 1;170:107493. [HTML]
45. Talens-Estarelles C, García-Marqués JV, Cerviño A, García-Lázaro S. Dry Eye–Related Risk Factors for Digital Eye Strain. Eye & Contact Lens. 2022 Oct 1;48(10):410-5. [HTML]
46. Biagi L, Tosetti M, Crespi SA, Morrone MC. Development of BOLD response to motion in human infants. Journal of Neuroscience. 2023. jneurosci.org
47. Modak A, Ronghe V, Gomase KP, Dukare KP. The psychological benefits of breastfeeding: fostering maternal well-being and child development. Cureus. 2023. cureus.com
48. Natu VS, Rosenke M, Wu H, Querdasi FR, Kular H, Lopez-Alvarez N, Grotheer M, Berman S, Mezer AA, Grill-Spector K. Infants' cortex undergoes microstructural growth coupled with myelination during development. Communications Biology. 2021 Oct 14;4(1):1191. nature.com
49. Biswas S, El Kareh A, Qureshi M, Lee DM, Sun CH, Lam JS, Saw SM, Najjar RP. The influence of the environment and lifestyle on myopia. Journal of physiological anthropology. 2024 Jan 31;43(1):7. springer.com
50. Cheng Q, Roth A, Halgren E, Klein D, Chen JK, Mayberry RI. Restricted language access during childhood affects adult brain structure in selective language regions. Proceedings of the National Academy of Sciences. 2023 Feb 14;120(7):e2215423120. pnas.org
51. Michaelides M, Laich Y, Wong SC, Oluonye N, Zaman S, Kumaran N, Kalitzeos A, Petrushkin H, Georgiou M, Tailor V, Pabst M. Gene therapy in children with AIPL1-associated severe retinal dystrophy: An open-label, first-in-human interventional study. The Lancet. 2025 Feb 22;405(10479):648-57. thelancet.com
52. Schirpke U, Tasser E, Lavdas AA. Potential of eye-tracking simulation software for analyzing landscape preferences. PLoS One. 2022. plos.org
53. Lempel AA, Fitzpatrick D. Developmental alignment of feedforward inputs and recurrent network activity drives increased response

selectivity and reliability in primary visual cortex following the …. bioRxiv. 2023. biorxiv.org
54. Mortazavi F, Moradi H, Vahabie AH. Dynamic difficulty adjustment approaches in video games: a systematic literature review. Multimedia Tools and Applications. 2024. [HTML]
55. Angelopoulos G, Estivill-Castro V. Human-robot dialogue that elicits the alignment of moral principles for driverless vehicles. InCompanion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction 2024 Mar 11 (pp. 196-200). acm.org
56. Graham L, Vitorio R, Walker R, Barry G, Godfrey A, Morris R, Stuart S. Digital Eye-Movement Outcomes (DEMOs) as biomarkers for neurological conditions: a narrative review. Big Data and Cognitive Computing. 2024 Dec 19;8(12):198. mdpi.com
57. Tien TK. Investigating the influence of oculomotor functions on the TVPS-4 test of visual perceptual skills in school-age children using machine learning. 2024. aston.ac.uk
58. Morgan IG, Wu PC, Ostrin LA, Tideman JW, Yam JC, Lan W, Baraas RC, He X, Sankaridurg P, Saw SM, French AN. IMI risk factors for myopia. Investigative ophthalmology & visual science. 2021 Apr 28;62(5):3-. arvojournals.org
59. Zhu Z, Chen Y, Tan Z, Xiong R, McGuinness MB, Müller A. Interventions recommended for myopia prevention and control among children and adolescents in China: a systematic review. British Journal of Ophthalmology. 2023 Feb 1;107(2):160-6.
60. Li Y, Yip MY, Ting DS, Ang M. Artificial intelligence and digital solutions for myopia. Taiwan Journal of Ophthalmology. 2023 Apr 1;13(2):142-50. lww.com
61. Cardinal D, Nannemann G. There is More to Vision than Seeing Clearly. 2006. [PDF]
62. Vyawahare H, Shinde P. Age-related macular degeneration: epidemiology, pathophysiology, diagnosis, and treatment. Cureus. 2022. cureus.com
63. Potapenko I, Boberg-Ans LC, Stormly Hansen M, Klefter ON, van Dijk EH, Subhi Y. Artificial intelligence-based chatbot patient information on common retinal diseases using ChatGPT. Acta Ophthalmologica (1755375X). 2023 Nov 1;101(7). wiley.com
64. Thomas CJ, Mirza RG, Gill MK. Age-related macular degeneration. Medical Clinics of North America. 2021. sciencedirect.com
65. Cross N, van Steen C, Zegaoui Y, Satherley A, Angelillo L. Retinitis pigmentosa: burden of disease and current unmet needs. Clinical Ophthalmology. 2022 Jun 20:1993-2010. tandfonline.com
66. M Bell S, J.A. Eskew S. 20/20 eyesight: Is it enough for your child?. 1997. [PDF]
67. Nguyen E, Inger H, Jordan C, Rogers D. Ocular causes for headache. Seminars in Pediatric Neurology. 2021. [HTML]
68. Alamri A, Amer KA, Aldosari AA, Althubait BM, Alqahtani MS, Mudawi AA, Mudawi BA, Alqahtani FA, Alhamoud NS. Computer vision syndrome: Symptoms, risk factors, and practices. Journal of family medicine and primary care. 2022 Sep 1;11(9):5110-5. lww.com
69. Thorud HMS, Aurjord R, Falkenberg HK. Headache and musculoskeletal pain in school children are associated with uncorrected vision problems and need for glasses: a case–control study. Scientific reports. 2021. nature.com
70. Maneea MW, Alamawi HO, Almuqbil A, Abukhlaled JK, Alsuwailem G, Alabdulminaim Jr J, Aladawi AM, Alshangiti AY. Digital eye straining: exploring its prevalence, associated factors, and effects on the quality of life. Cureus. 2024 May 1;16(5):e59442. cureus.com
71. Abusamak M, Jaber HM, Alrawashdeh HM. The effect of lockdown due to the COVID-19 pandemic on digital eye strain symptoms among the general population: a cross-sectional survey. Frontiers in public health. 2022. frontiersin.org
72. Ali Q, Heldal I, Helgesen CG, Krumina G, Costescu C, Kovari A, Katona J, Thill S. Current challenges supporting school-aged children with vision problems: A rapid review. Applied Sciences. 2021 Oct 17;11(20):9673. mdpi.com
73. El Harrak Y. Schools: First Promoters of a Good Visual Health. European Journal of Public Health. 2023. oup.com
74. Zhou H, Bai X. A review of the role of the school spatial environment in promoting the visual health of minors. International Journal of Environmental Research and Public Health. 2023 Jan 5;20(2):1006. mdpi.com
75. Pirindhavellie GP, Yong AC, Mashige KP, Naidoo KS, Chan VF. The impact of spectacle correction on the well-being of children with vision impairment due to uncorrected refractive error: a systematic review. BMC Public Health. 2023 Aug 18;23(1):1575. springer.com
76. Vaivada T, Sharma N, Das JK, Salam RA, Lassi ZS, Bhutta ZA. Interventions for health and well-being in school-aged children and adolescents: a way forward. Pediatrics. 2022 May 1;149(Supplement 6):e2021053852M. jhu.edu
77. Schiøtz Thorud HM, Mork R, Onshuus Bjørset C, J. Gilson S *et al.*, Laboured reading and musculoskeletal pain in school children - the role of lifestyle behaviour and eye wear: a cross-sectional study. 2022. ncbi.nlm.nih.gov
78. Adiga U. Enhancing occupational health and ergonomics for optimal workplace well-being: a review. International Journal of Chemical and Biochemical Sciences. 2023;24(4):157-64. iscientific.org
79. Liu J, Li B, Chen Q, Dang J. Student Health Implications of School Closures during the COVID-19 Pandemic: New Evidence on the Association of

e-Learning, Outdoor Exercise, and Myopia. 2021. ncbi.nlm.nih.gov
80. Aslan F, Sahinoglu-Keskek N. The effect of home education on myopia progression in children during the COVID-19 pandemic. Eye. 2022. nature.com
81. Mohammad EB. Orthokeratology and high myopia. Orthokeratology and high myopia. 2022.
82. Sánchez-Tena MÁ, Cleva JM, Villa-Collar C, Álvarez M, Ruiz-Pomeda A, Martinez-Perez C, Andreu-Vazquez C, Chamorro E, Alvarez-Peregrina C. Effectiveness of a spectacle lens with a specific asymmetric myopic peripheral defocus: 12-month results in a Spanish population. Children. 2024 Feb 1;11(2):177. mdpi.com
83. Wang J, Li Y, Musch DC, Wei N, Qi X, Ding G, Li X, Li J, Song L, Zhang Y, Ning Y. Progression of myopia in school-aged children after COVID-19 home confinement. JAMA ophthalmology. 2021 Mar 1;139(3):293-300. jamanetwork.com
84. Chen H, Liao Y, Zhou W, Dong L *et al.*,The change of myopic prevalence in children and adolescents before and after COVID-19 pandemic in Suqian, China. PLoS One. 2022. plos.org
85. Shukla Y. Accommodative anomalies in children. 2020. ncbi.nlm.nih.gov
86. Gomes J, Franco S. Prevalence of near-vision-related symptoms in a university population. Vision. 2024. mdpi.com
87. Mármol-Errasti E, Miguel Cárdenas-Rebollo J, Rodán A, Pagán-Fernández E *et al.*,Measures of accommodative function in secondary school year 9 and year 13: a 4-year longitudinal study. 2022. ncbi.nlm.nih.gov
88. Tsuneyoshi Y, Masui S, Arai H, Toda I, Kubota M, Kubota S, Tsubota K, Ayaki M, Negishi K. Determination of the standard visual criterion for diagnosing and treating presbyopia according to subjective patient symptoms. Journal of Clinical Medicine. 2021 Aug 31;10(17):3942. mdpi.com
89. Fan M, Hung JL, Hung SH, Chen LC *et al.*,Improvement of Presbyopia, Dry Eye, Intraocular Pressure, and Near Vision Through Cassiae Tea Consumption. Medicina. 2024. mdpi.com
90. Ling AC, Loh KL, Xiangrong BS, Lim E, Lim SL, Jayabaskar T. elearning Strategies to Enhance Eye Care Training. International Journal of Advanced Corporate Learning. 2025;18(3):33. [HTML]
91. Ekemiri K, Ezinne N, Kamalodeen K, Pierre K, Lalla B, Amiebenomo O, van Staden D, Zeried F, Ekemiri C, Agho KE, Osuagwu UL. Online e-learning during the COVID-19 lockdown in Trinidad and Tobago: prevalence and associated factors with ocular complaints among schoolchildren aged 11–19 years. PeerJ. 2022 Jun 6;10:e13334. peerj.com
92. Maharjan U, Rijal S, Jnawali A, Sitaula S *et al.*,Binocular vision findings in normally-sighted school aged children who used digital devices. 2022. ncbi.nlm.nih.gov
93. Sultana A, Tasnim S, Hossain MM, Bhattacharya S, Purohit N. Digital screen time during the COVID-19 pandemic: a public health concern. F1000Research. 2021 Feb 8;10:81. f1000research.com
94. Ten Velde G, Lubrecht J, Arayess L, van Loo C, Hesselink M, Reijnders D, Vreugdenhil A. Physical activity behaviour and screen time in Dutch children during the COVID-19 pandemic: Pre-, during-and post-school closures. Pediatric Obesity. 2021 Sep;16(9):e12779. wiley.com
95. Wong CW, Tsai A, Jonas JB, Ohno-Matsui K, Chen J, Ang M, Ting DS. Digital screen time during the COVID-19 pandemic: risk for a further myopia boom?. American journal of ophthalmology. 2021 Mar 1;223:333-7. nih.gov
96. Meghji KA, Talpur M, Khan A, Fatima H, Memon U. Screening Student Behavior: Exploring the Impact of Daily Screen Time on Sleep Quality, Mental Distress, and Academic Performance in Students: Screening Student Behavior. Pakistan Journal of Health Sciences. 2025 Mar 31:150-5. thejas.com.pk
97. Chen M, Padmapriya N, Chua XH, Escobosa LL, Tay AE, Tai BC, Petrunoff N, Müller-Riemenschneider F. Screen viewing patterns and their association with mental wellbeing and psychological distress: a cross-sectional study amongst university students. BMC Public Health. 2024 Aug 2;24(1):2097. springer.com
98. Pardhan S, Parkin J, Trott… M. Risks of digital screen time and recommendations for mitigating adverse outcomes in children and adolescents. Journal of School …. 2022. qub.ac.uk
99. Desmurget M. Screen damage: The dangers of digital media for children. 2022. [HTML]
100. Li D. The Shift to Online Classes during the COVID-19 Pandemic: Benefits, Challenges, and Required Improvements from the Students' Perspective.. Electronic Journal of E-Learning. 2022. ed.gov
101. Assi L, Chamseddine F, Ibrahim P, Sabbagh H, Rosman L, Congdon N, Evans J, Ramke J, Kuper H, Burton MJ, Ehrlich JR. A global assessment of eye health and quality of life: a systematic review of systematic reviews. JAMA ophthalmology. 2021 May 1;139(5):526-41. jamanetwork.com
102. Little JA, Chan VF, Saw SM, Tham YC, Chew L, Foo LL, Collins M, Ebri AE, Han X, Schultz L, Gleason D. Current status of school vision screening—rationale, models, impact and challenges: a review. British Journal of Ophthalmology. 2025 Jun 25. bmj.com
103. Elam AR, Tseng VL, Rodriguez TM, Mike EV, Warren AK, Coleman AL, Aguwa U, Alabiad C, Briceno C, Capo H, Contreras M. Disparities in vision health and eye care. Ophthalmology. 2022 Oct 1;129(10):e89-113. sciencedirect.com
104. Ramke J, Evans JR, Habtamu E, Mwangi N, Silva JC, Swenor BK, Congdon N, Faal HB, Foster A,

Friedman DS, Gichuhi S. Grand Challenges in global eye health: a global prioritisation process using Delphi method. The Lancet Healthy Longevity. 2022 Jan 1;3(1):e31-41. thelancet.com
105. Console K, Cozzi G, Caiffa G, Romano S, Gortani G, Clarici A, Barbi E, Magni E. School absenteeism Longer than two weeks is a red flag of somatic symptom and related disorders in hospitalised children and adolescents: a matched cohort study. Children. 2024 May 21;11(6):613. mdpi.com
106. Vassilopoulos A, L Poulopoulos N, Ibeziako P. School absenteeism as a potential proxy of functionality in pediatric patients with somatic symptom and related disorders. Clinical child psychology and psychiatry. 2021 Apr;26(2):342-54.
107. Li A, Guessoum SB, Ibrahim N, Lefèvre H, Moro MR, Benoit L. A systematic review of somatic symptoms in school refusal. Biopsychosocial Science and Medicine. 2021 Sep 1;83(7):715-23. researchgate.net
108. Schreiber S, Hunter Gibble T, Panaccione R, Rubin DT, Travis S, Hibi T, Potts Bleakman A, Panni T, Favia AD, Kayhan C, Atkinson C. Patient and health care professional perceptions of the experience and impact of symptoms of moderate-to-severe Crohn's disease in US and Europe: results from the cross-sectional CONFIDE study. Digestive Diseases and Sciences. 2024 Jul;69(7):2333-44. springer.com
109. Matzavela V, Alepis E. M-learning in the COVID-19 era: physical vs digital class. Education and Information Technologies. 2021. springer.com
110. Munna MS, Hossain MR, Saylo KR. Digital education revolution: Evaluating LMS-based learning and traditional approaches. Journal of Innovative Technology Convergence. 2024 Jun 30;6(2). innotcs.org
111. Wan K, Lau KH, Wong HY, Yu WY *et al.*, Fostering holistic eye care for children with special educational needs: an interprofessional education program bridging optometry and education. BMC medical …. 2024. springer.com
112. Ghani ND, Mohamad Fadzil N, Mohammed Z, Abd Rahman MH, Che Din N. Parents' knowledge and practices of child eye health care: A scoping review. Plos one. 2024 Nov 14;19(11):e0313220. plos.org
113. Alsaqr AM. Eye Care in Young Children: A Parents' Perspective of Access and Barriers. Journal of Ophthalmic & Vision Research. 2023. nih.gov
114. Wilson S, Ctori I, Shah R, Conway ML, Willis SJ, Suttle C. An investigation of barriers and enablers to community eye care for children in England: A qualitative descriptive study. Ophthalmic and Physiological Optics. 2023 Jul;43(4):710-24. wiley.com
115. Antonio-Aguirre B, Ambrosino CM, Dai X, Collins ME. Addressing health disparities in pediatric eye care for school-age children: a call to action. Translational Vision Science & Technology. 2023 Nov 1;12(11):17-. arvojournals.org
116. Ambrosino C, Repka MX, Collins ML, Collins ME. Advancing health equity in pediatric eye care: the role of school-based vision programs, research, advocacy, community engagement, and medical education. Journal of American Association for Pediatric Ophthalmology and Strabismus. 2023 Apr 1;27(2):70-4. jaapos.org
117. Ruvalcaba T. Leveraging Community Cultural Wealth for Latino Student Success: Teacher Testimonios. 2025. [HTML]
118. Hughes JL, Horowitz LM, Ackerman JP, Adrian MC, Campo JV, Bridge JA. Suicide in young people: screening, risk assessment, and intervention. Bmj. 2023 Apr 24;381. nih.gov
119. Johnson DB, Nebhan CA, Moslehi JJ, Balko JM. Immune-checkpoint inhibitors: long-term implications of toxicity. Nature Reviews Clinical Oncology. 2022 Apr;19(4):254-67. nature.com
120. Kalra P, Karar V. Effect of screen switching and brightness on visual fatigue in AR environments. IETE Technical Review. 2023. [HTML]
121. Xiang X, Jiang H. Associations of physical activity, screen time, sleep duration with optimal eating habits among adolescents. Complementary Therapies in Clinical Practice. 2025. [HTML]
122. Ifeyinwa U. PROMOTING HEALTHY SCREEN HABITS AMONGST CHILDREN: A GUIDE TO MITIGATING EXCESSIVE SCEEN TIME AND PERCIEVED ADDICTION. Journal of Development Communication And Applied …. 2025. acjol.org
123. Jones A, Armstrong B, Weaver RG, Parker H, von Klinggraeff L, Beets MW. Identifying effective intervention strategies to reduce children's screen time: a systematic review and meta-analysis. International Journal of Behavioral Nutrition and Physical Activity. 2021 Sep 16;18(1):126. springer.com
124. McArthur BA, Volkova V, Tomopoulos S, Madigan S. Global prevalence of meeting screen time guidelines among children 5 years and younger: a systematic review and meta-analysis. JAMA pediatrics. 2022 Apr 1;176(4):373-83. jamanetwork.com
125. Ponti M. Screen time and preschool children: Promoting health and development in a digital world