# Cleaner air could slow childhood myopia progression amid rising pollution concerns



Emerging research increasingly implicates air pollution as a significant factor harming children’s eyesight, with particular attention on how cleaner air could slow the progression of myopia, or short-sightedness. A study from the University of Birmingham highlights that exposure to traffic-related pollutants such as nitrogen dioxide (NO₂) and fine particulate matter (PM2.5) adversely affects children’s uncorrected visual acuity. This scientific evidence suggests that air quality is not just a matter of respiratory health but also a critical component in protecting children’s visual development, especially during their vulnerable primary school years.

The Birmingham team, in collaboration with Tianjin Medical University Eye Hospital, analysed data from 30,000 school-aged children to understand how environmental, genetic, and lifestyle factors influence vision development. Their findings demonstrate that children living in areas with cleaner air display significantly better vision, with younger children most responsive to improvements in air quality. Professor Zongbo Shi, who co-supervised the study, stated that while genetics and screen time are established contributors to myopia, air pollution stands out as a modifiable risk factor that warrants immediate public health intervention. The study proposes measures such as installing air purifiers in classrooms and enforcing clean-air zones around schools to shield children's eyesight.

These findings resonate with research from China Medical University Hospital, where a comprehensive cohort study involving children aged six to twelve revealed a dose-response relationship between air pollutants—including PM2.5, carbon monoxide, and ozone—and worsening refractive errors. Notably, carbon monoxide had a pronounced effect, with incremental increases linked to significant changes in vision. This work underscores the urgent need to control air pollution levels to curb the rising incidence of myopia globally.

Supporting this evidence, a separate ecological study conducted in China found a direct correlation between the Air Quality Index and the prevalence of reduced visual acuity among children and adolescents aged seven to twenty-two. The study revealed that an interquartile range increase in PM2.5 exposure results in a 5% rise in reduced visual acuity prevalence, reinforcing the role of fine particulate matter as a key environmental risk factor.

The widespread prevalence of myopia among schoolchildren is also documented in a large study from Shantou, China, where over half the children surveyed were myopic. The research highlights compounding factors such as age, gender, and urban living environments that contribute to the condition, while also identifying a serious gap in refractive correction among affected children. This points to a critical need for public education on eye care and access to corrective measures, alongside pollution management.

Moreover, a longitudinal study in Guangdong Province has linked prolonged exposure to pollutants like NO₂ and PM2.5 with aggravation of astigmatism, another common vision defect. This association suggests that gaseous and fine particulate pollutants can access the eyes more readily, causing structural changes to the eyeball that impair vision.

Biological mechanisms underlying these effects are further elucidated in a recent review, which discusses how air pollution exacerbates allergic conjunctivitis, corneal injury, and retinal dopamine reduction—factors that promote abnormal eyeball growth leading to myopia. The review also highlights systemic inflammation and oxidative stress as pathways through which pollutants affect eye health, emphasizing the complexity of the relationship and the necessity for further research.

The timing of these findings is significant as the UK faces a landmark class action lawsuit against car manufacturers accused of fitting vehicles with emissions-cheating devices that have led to excessive nitrogen dioxide pollution. Campaigners point out that children are among the most vulnerable victims of this pollution, suffering respiratory distress and, as emerging evidence suggests, visual impairment. Such legal and environmental efforts underline heightened societal recognition of how poor air quality undermines children's health and future wellbeing.

Collectively, this robust body of research from diverse regions and methodologies converges on a clear message: improving air quality could be a vital public health strategy to protect and enhance children's eyesight. Early interventions targeted at reducing pollutant exposure during the formative years may slow or prevent the progression of myopia and related visual impairments, reducing long-term risks and healthcare burdens.

### 📌 Reference Map:

* Paragraph 1 – [[1]](https://www.independent.co.uk/news/health/air-pollution-children-harm-eyesight-b2829816.html), [[2]](https://www.birmingham.ac.uk/news/2025/air-pollution-is-harming-childrens-eyesight)
* Paragraph 2 – [[1]](https://www.independent.co.uk/news/health/air-pollution-children-harm-eyesight-b2829816.html), [[2]](https://www.birmingham.ac.uk/news/2025/air-pollution-is-harming-childrens-eyesight)
* Paragraph 3 – [[3]](https://pubmed.ncbi.nlm.nih.gov/40368946/)
* Paragraph 4 – [[4]](https://pubmed.ncbi.nlm.nih.gov/39903915/)
* Paragraph 5 – [[5]](https://ouci.dntb.gov.ua/en/works/4a6DmzMl/)
* Paragraph 6 – [[6]](https://arxiv.org/abs/2310.08843)
* Paragraph 7 – [[7]](https://pubmed.ncbi.nlm.nih.gov/36031679/)
* Paragraph 8 – [[1]](https://www.independent.co.uk/news/health/air-pollution-children-harm-eyesight-b2829816.html)

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## Bibliography

1. <https://www.independent.co.uk/news/health/air-pollution-children-harm-eyesight-b2829816.html> - Please view link - unable to able to access data
2. <https://www.birmingham.ac.uk/news/2025/air-pollution-is-harming-childrens-eyesight> - A study by the University of Birmingham reveals that exposure to lower levels of air pollutants, specifically nitrogen dioxide (NO₂) and fine particulate matter (PM₂.₅), is linked to children's uncorrected visual acuity. The research suggests that reducing exposure to these pollutants could help slow the progression of myopia, a condition where distant objects appear blurry. The study highlights the importance of environmental factors, alongside genetics and screen time, in influencing children's vision development. Primary school students are particularly sensitive to air pollution, with cleaner air leading to significant improvements in their vision. The findings advocate for interventions such as installing air purifiers in classrooms and creating 'clean-air zones' around schools to protect children's eyesight during their developmental years. The study was published in PNAS Nexus and involved collaboration with Tianjin Medical University Eye Hospital and Tianjin Medical University General Hospital.
3. <https://pubmed.ncbi.nlm.nih.gov/40368946/> - A comprehensive retrospective cohort study conducted at China Medical University Hospital examined the impact of air pollution on refractive error changes in children aged 6-12 years. The study found a clear dose-effect relationship, with higher levels of PM₂.₅, carbon monoxide (CO), and ozone (O₃) associated with significant changes in refractive error. For every quantile increase in these pollutants, the average change in refractive error decreased by approximately 0.3 diopters. Among the five air pollutants analyzed, CO had the most significant effect, with just one unit increase leading to a considerable change. The study emphasizes the need for better air quality control measures to protect children's eye health and prevent myopia progression.
4. <https://pubmed.ncbi.nlm.nih.gov/39903915/> - An ecological study using data from the Chinese National Survey on Students' Constitution and Health investigated the impact of ambient air pollution on reduced visual acuity among children and adolescents aged 7-22 years. The study found nearly linear positive dose-response relationships between the Air Quality Index (AQI), air pollutant concentrations, and the prevalence of reduced visual acuity. An interquartile range increase in PM₂.₅ exposure was significantly associated with a 5.0% increase in the prevalence of reduced visual acuity. The study suggests that regions with more polluted air tend to have a higher prevalence of reduced visual acuity, highlighting PM₂.₅ as an important risk factor for myopia among children and adolescents.
5. <https://ouci.dntb.gov.ua/en/works/4a6DmzMl/> - A study involving 724,828 schoolchildren in Shantou, China, found that 51.8% had myopia, with the prevalence increasing non-linearly with age. The study indicates that older age, female gender, and urban living environment were independently associated with myopia prevalence and myopic spherical equivalent refraction. Among the children with myopia, 60.0% had no refractive correction, highlighting the need for public education on eye care among schoolchildren, even in urban areas. The study emphasizes the importance of addressing myopia in schoolchildren to prevent potential vision problems later in life.
6. <https://arxiv.org/abs/2310.08843> - A longitudinal study conducted with 127,709 individuals aged 4-27 years from nine cities in Guangdong Province, China, investigated the correlation between air pollution and astigmatism. The study revealed significant associations between astigmatism and exposure to carbon monoxide (CO), nitrogen dioxide (NO₂), and particulate matter (PM₂.₅) over time. A 10 μg/m³ increase in a 3-year exposure window of NO₂ and PM₂.₅ was associated with a decrease in cylinder value of -0.045 diopters and -0.017 diopters, respectively. The study concluded that greater exposure to NO₂ and PM₂.₅ over longer periods aggravates astigmatism, suggesting that gaseous and smaller particulate pollutants have easier access to human eyes, causing heterogeneous morphological changes to the eyeball.
7. <https://pubmed.ncbi.nlm.nih.gov/36031679/> - A review article provides an update on clinical evidence and biological mechanisms regarding the effects of air pollution on myopia. The article discusses various studies that have observed a strong correlation between air pollution and myopia, highlighting that ambient air pollution may aggravate allergic conjunctivitis symptoms and cause corneal injury, leading to peripheral hyperopia defocus and stimulating eyeball growth. The review also discusses potential mechanisms linking air pollution to myopia, including the reduction in ultraviolet exposure and retinal dopamine release, as well as systemic inflammation and oxidative stress caused by pulmonary inflammatory factors and reactive oxygen species entering the blood circulation. The article emphasizes the need for further research to understand the complex relationship between air pollution and myopia.