

Nearsightedness increases with level of education and longer schooling

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Researchers at the Department of Ophthalmology of the Mainz University Medical Center found a correlation between education and nearsightedness. Credit: Thomas Hartmann

Education and behavior have a greater impact on the development of nearsightedness than do genetic factors: With each school year completed, a person becomes more nearsighted. The higher the level of education completed, the more severe is the impairment of vision. These are the conclusions drawn by researchers at the Department of Ophthalmology at the Mainz University Medical Center from the results of the first population-based cohort study of this condition. A nearsighted eye is one in which the eyeball is too long in relation to the refractive power of the cornea and lens. As a result, distant objects are displayed on the retina out of focus. The eyeball continues to grow in humans until they reach adulthood and this means that myopia can also continue to progress in persons who have reached their 30s. It has been shown that both genetic predisposition as well as environmental stimuli play a role in the development of nearsightedness.

The team at the Department of Ophthalmology at the Mainz University Medical Center led by Professor Norbert Pfeiffer and PD Dr. Alireza Mirshahi found strong evidence that attaining a higher level of education and spending more years in school are two factors associated with a greater prevalence and severity of nearsightedness, or [myopia](#). The results of the ophthalmologic segment of the population-based Gutenberg Health Study (GHS) undertaken by the Mainz University Medical Center provides evidence that environmental factors may outweigh [genetic factors](#) in the development of myopia. A related article by the Mainz team has just been published in the American Academy of Ophthalmology's scientific journal, *Ophthalmology*.

Nearsightedness is widespread. However, it has become more prevalent around the world in recent years and presents a growing global health and economic concern. Severe myopia is a major cause of visual impairment and is closely associated with an increased risk of complications, such as retinal detachment, macular degeneration, premature cataracts, and glaucoma. Developed Asian countries report increasing myopia rates of up to 80 percent. The rapidity of this escalation suggested that [environmental factors](#), for example near work such as reading, using a computer, and higher education, might play an important role.

To analyze the correlation between myopia development and education, researchers at the Mainz University Medical Center examined nearsightedness in 4,658 Germans aged 35 to 74, excluding anyone with cataracts or who had undergone refractive surgery. This research was undertaken as part of the Gutenberg Health Study and the results demonstrate that myopia becomes more prevalent with a higher level of education. Only 24 percent of the nearsighted subjects had no [high school education](#) or other training, while 35 percent of high school graduates and vocational school graduates were nearsighted. In contrast, no

less than 53 percent of university graduates were nearsighted.

In addition to education levels completed, the Mainz-based researchers also found that people who spent more years in school proved to be more myopic, with nearsightedness worsening for each year of school. Furthermore, the researchers looked at the effects of 45 genetic markers, but found that these have a much lower impact on the severity of nearsightedness compared to the level of education achieved.

So what can be done to remedy this situation? It is not possible to 'cure' nearsightedness; it can only be corrected with visual aids or by surgical intervention designed to change refractive parameters. Attempts to slow the progression of myopia with drugs, special spectacles, or contact lenses have proven unsuccessful to date. Recent studies among children and young adults in Denmark and Asia showed that the risk for the development of myopia may be less with spending more time outdoors and, thus, by greater exposure to sunlight. Fifteen hours per week are advisable, while, at the same time, the eyes should not be used for close-up activities such as reading, watching TV, or using computers and smart phones for more than 30 hours per week. "Since students appear to be at a higher risk for [nearsightedness](#), it makes sense to encourage them to spend more time outdoors as a precaution," said PD Dr. Alireza Mirshahi, lead author of the study.

The Gutenberg Health Study (GHS) is an interdisciplinary, population-based, prospective, monocenter cohort study, which has been conducted at the Mainz University Medical Center since 2007. Cardiovascular diseases, cancer, eye diseases, metabolic disorders as well as immune system and mental disorders are being investigated as part of the study. The goal of the study is to improve the individual risk prediction for these diseases. To this end, lifestyle, psychosocial factors, environment, clinical laboratory parameters, and the severity of any subclinical disorder are being taken into consideration. A comprehensive biorepository is being developed so that molecular biological investigations can be conducted. During the baseline visit, 15,010

participants aged 35 to 74 years were invited to participate in a 5-hour examination program at the study center. This was followed by a computer-assisted telephone interview (CATI) using a standardized questionnaire and the assessment of diseases and health problems after 2.5 years. All endpoints will be subjected to extensive validation. In April 2012, a detailed follow-up examination of participants similar to the baseline examination was conducted at the center five years after their inclusion in the study. The aim is to continue to monitor the cohort and conduct further tests.

More information: Mirshahi, A. et al. (2014), Myopia and Level of Education: Results from the Gutenberg Health Study, *Ophthalmology*, DOI: [10.1016/j.ophtha.2014.04.017](https://doi.org/10.1016/j.ophtha.2014.04.017)

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