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Level of education is more decisive than intelligence for the development of short-sightedness

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Environmental factors such as education and leisure activities have a greater influence on the development of short-sightedness or myopia than the ability to think logically and solve problems. Myopia and the so-called "fluid intelligence" of a person are certainly related, but only indirectly through the duration of education. This is the conclusion of researchers at the Mainz University Medical Center involved in the study "Myopia and Cognitive Performance: Results from the Gutenberg Health Study." The results of the study appeared in the October issue of the specialist journal *Investigative Ophthalmology & Visual Science*.

Myopia, also known as short-sightedness or near-sightedness, is the most common disorder affecting the eyesight and the condition is on the increase. Severe short-sightedness is one of the main causes of impaired vision. In addition, it is closely associated with an increased risk of secondary complications such as retinal detachment, macular degeneration, premature cataracts, and glaucoma. Because myopia can be easily treated in the early stages, although it cannot be fully cured, insight into the causes of the disease is of central importance.

"We know from earlier studies that a higher level of education frequently goes hand-in-hand with the development of short-sightedness," said Professor Norbert Pfeiffer, Director of the Department of Ophthalmology at the University Medical Center of Johannes Gutenberg University Mainz (JGU). Together with Professor

Alireza Mirshahi, Director of the Bonn Dardenne Eye Clinic, and Professor Josef Unterrainer, who heads the Department of Medical Psychology and Medical Sociology at the University of Freiburg, Pfeiffer was in charge of the study "Myopia and Cognitive Performance: Results From the Gutenberg Health Study," which was the subject of the recent publication. The core question being considered is whether short-sighted people are not only better educated but also more intelligent.

Based on their findings, the research team lead by Pfeiffer, Mirshahi, and Unterrainer have come to the following conclusions: Considered in isolation, cognitive ability and, thus, intelligence apparently plays a significant role in the development of short-sightedness. But when the researchers took into account already identified potential influencing factors, they discovered that the number of years over which an individual received education exhibited a more direct and closer relationship with short-sightedness than cognitive ability. This means that it is only through educational attainments that cognitive ability is linked to myopia. In other words, the level of education rather than intelligence is more decisive for development of short-sightedness. In the case of two equally intelligent people, it is thus most probably the one who attended school for longer and has the better educational qualifications who will become myopic and experience more defective vision.

For their study, the research team analyzed data collected within the framework of the Gutenberg Health Study conducted by the Mainz University Medical Center. This is one of the largest population-based research studies in the world. The sub-cohort consisted of some 4,000 subjects aged 40 to 79 years. The researchers used the Tower of London (TOL) test to measure cognitive functioning. The 20-minute test assesses cognitive ability by mentally planning ahead and problem solving. In order to diagnose myopia, the researchers examined the refractive power of the eyes of subjects, thus determining how much their eyes had to

adjust to produce a sharp image. Short-sightedness is characterized by negative diopter values. In the study, myopia was diagnosed when the identified diopter value was less than or equal to 0.5.

The average score achieved by subjects with myopia in the TOL test was 14. On the other hand, the average score of the comparison group, consisting of non short-sighted subjects, was only 12.9. The researchers also discovered that the TOL score increased with severity of myopia. Hence the very short-sighted participants with greater than 6 diopter myopia achieved an average score of 14.6. But this apparent correlation between short-sightedness and better results in the planning test disappeared when the researchers also considered the influence of the number of years of education.

"Our current study again indicates the relevance of education when it comes to the development of myopia," concluded Professor Norbert Pfeiffer. "We intend in future to examine in more detail the effects that close work involving a computer screen or the use of smartphones have on sight."

More information: Alireza Mirshahi et al. Myopia and Cognitive Performance: Results From the Gutenberg Health Study, *Investigative Opthalmology & Visual Science* (2016). DOI: 10.1167/iovs.16-19507

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