

How much genetics and parental myopia explain myopia?

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Myopia prevalence has increased significantly worldwide during the last decades, especially in urban East Asia where it affects even 95% of young adults. Also in Western Europe and the USA, already about half of young adults are myopic. The greatest public health concerns relate to the rise in myopia complications. Approximately every third individual with high myopia will develop irreversible visual impairment due to myopic macular degeneration, retinal detachment, glaucoma, or other comorbid eye disease. Globally, myopia is already the most common cause of moderate to severe visual impairment and the second most common cause of blindness.

Since parental myopia increases the risk of myopia in their children and having two myopic parents increases the risk more than having just one, genetics has been considered as the main cause of myopia. Additionally, myopia studies have provided high heritability estimates. However, genetic factors alone cannot explain the rapid increase of myopia. Supporting this, while genetic studies carried out in large multiethnic cohorts have already detected hundreds of predisposing variants, the effects of individual variants have been very mild. So far, the detected variants explain only about 20% of high myopia and 10% of all myopia.

Refractive errors seem to result from a complex interaction of lifestyle-related and other environmental as well as genetic factors. For myopia, the most established lifestyle factors are excessive near work and low outdoor exposure. More extensive myopia research is needed about the interaction between genetic variants, genetic pathways, and their interaction with variety of environmental factors.