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One test can predict which kids will become nearsighted

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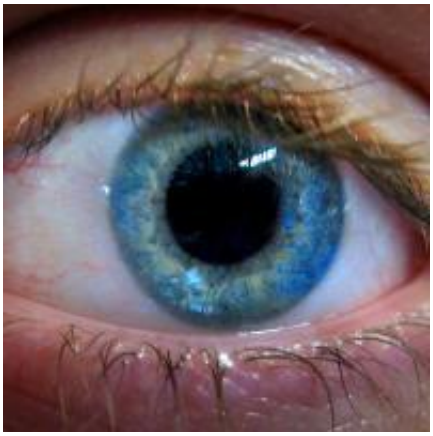

A study of 4,500 U.S. children over 20 years has identified a single test that can predict which kids will become nearsighted by the eighth grade: a measure of their current refractive error.

The refractive error, or eyeglasses prescription, results from mismatches in the size and optical power of the eye that lead to blurry vision.

The study also counters the notion that near work such as frequent reading or sitting too close to the television can bring on myopia, or nearsightedness.

"Near work has been thought to be a cause of myopia, or at least a risk

factor, for more than 100 years. Some of the studies that led to that conclusion are hard to refute," said Karla Zadnik, professor and dean of the College of Optometry at The Ohio State University and lead author of the study. "In this large dataset from an ethnically representative sample of children, we found no association."

Myopia's onset occurs in childhood, and about one in three adults is nearsighted, which means distant objects are out of focus. In addition to requiring corrective lenses to see clearly, people with myopia are at higher risk for retinal detachment and glaucoma.

These results could help set a standard for eye exam recommendations for school-aged children and could be used to identify kids who would be good candidates for testing of experimental therapies designed to prevent myopia, Zadnik said.

The research is published in the April 2, 2015, issue of the journal *JAMA Ophthalmology*.

The study involved 4,512 children between first and eighth grades. When they were between the ages of 6 and 11 years, children with normal vision were evaluated at this range of baseline ages and at least two additional annual visits. Over the course of the study, 414 kids became nearsighted between second and eighth grades.

The primary research question: "What measures could we have done in first grade to predict who was going to need glasses by the eighth grade?" Zadnik said.

She and colleagues assessed 13 potential risk factors for nearsightedness to determine the strongest single predictor or set of predictors that could identify those children most likely to develop myopia. These included physical measures of the eye as well as reports from parents about their

children's activities.

The research confirmed that eight of the 13 expected risk factors did indeed increase the likelihood that kids would become nearsighted. One important risk factor was having two nearsighted parents. The most surprising exception was near work.

Statistical analysis, however, showed that the refractive error at baseline was the best predictor in children at a young age that they would develop myopia by their teen years.

In an eye exam, clinicians measure refractive error by changing lenses as patients view a distant eye chart and asking, "Which is better, one or two?" In this study, scientists used an auto-refractor to measure the children's eyes.

In people with normal vision, the eyeball grows along with the rest of the body and is programmed to stop growing at a point that sustains clear vision. In people with myopia, the typically spherical eyeball becomes elongated, resembling the shape of a grape or an olive.

Kids who will grow up with normal vision are actually slightly farsighted when they are in first grade. So the potential for future myopia can be detected at this young age via a refractive error measure that reveals little to no farsightedness.

For example, the study showed that a 6-year-old child with less farsightedness is at greater risk for developing myopia sooner. The older the child, the more effective the refractive error is as a predictor of nearsightedness onset by age 13.

So even in first-graders, it is possible to use this measure to help parents plan a schedule of eye exams for their children that will appropriately

catch vision problems that require correction.

Nine years ago, the researchers reported data from this study suggesting that children who spent more time outdoors were less likely to become nearsighted. That association held true through the conclusion of the research, but the reasons behind that finding remain a mystery, Zadnik said. Statistically, however, that association is not strong enough to serve as a predictor.

Zadnik began the study in California in 1989 and added more evaluation sites in the mid-1990s to expand the ethnic diversity of the study sample. The sample was equally split by sex, and the racial composition included 36.2 percent white, 22.2 percent Hispanic, 16.2 percent African American, 11.6 percent Native American and 13.7 percent Asian American children.

"These findings apply across ethnicities," she said. "The prevalence of nearsightedness differs among ethnicities, but the mechanism is the same. If you become nearsighted it's because your eyeball has grown too long. This prediction model works."

Pre-school testing of childhood vision varies by state, Zadnik said, "but if everybody went to a mandatory eye exam before school entry, refractive error would be an important variable to report."

"As people become aware of a test for their first-grader that would help predict whether their child will need glasses for nearsightedness, I think myopic parents who want to have this information about their kids could lead to rapid adoption of this test."

Provided by The Ohio State University

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