

Uncorrected Farsightedness Linked to Literacy Deficits in Preschoolers

NIH-supported research draws from a multi-center clinical study

Press Release

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Moderate hyperopia, if not treated, may affect reading ability and grade school readiness among preschoolers. Credit: Joe Balintfy, NEI.

A study funded by the National Eye Institute (NEI), part of the National Institutes of Health, has shown that uncorrected farsightedness (hyperopia) in preschool children is associated with significantly worse performance on a test of early literacy.

The results of the Vision in Preschoolers-Hyperopia in Preschoolers (VIP-HIP) study, which compared 4- and 5-year-old children with uncorrected hyperopia to children with normal vision, found that children with moderate hyperopia (3 to 6 diopters) did significantly worse on the Test of Preschool Early Literacy (TOPEL) than their normal-vision peers. A diopter is the lens power needed to correct vision to normal. The higher the diopter, the worse the hyperopia.

“This study suggests that an untreated vision problem in preschool, in this case one that makes it harder for children to see things up-close, can create literacy deficits that affect grade school readiness,” said Maryann Redford, D.D.S., M.P.H, a program director in Collaborative Clinical Research at NEI.

In most children with hyperopia, the condition is mild and has little impact on vision. A small number of preschool children have high hyperopia (more than 6 diopters) that is corrected with eyeglasses. It’s estimated that 4-14 percent have moderate hyperopia, which often goes undiagnosed and untreated.

“Prior studies have linked uncorrected hyperopia and reading ability in school-age children,” said Marjean Taylor Kulp, O.D., M.S., distinguished professor in the College of Optometry at Ohio State University and lead author of the study. “But large-scale investigations looking at reading readiness skills hadn’t been conducted in preschool children. This study was necessary to determine whether or not, at this age, there was a link between the two.”

The VIP-HIP study is a follow-up to the NEI-funded multi-center initiative called the Vision in Preschoolers (VIP) study, which established the most effective tests for preschool vision screening and showed that well-trained non-professionals were able to effectively screen children.

In the current analysis, researchers examined 492 children, aged 4-5 years old, and divided them into two equal-size groups: those with moderate hyperopia and those with normal vision. Participation in the study included an eye examination to determine eligibility. An educational assessor unaware of the child's visual status administered the TOPEL.

The results revealed significantly worse performance on the TOPEL among children with uncorrected moderate hyperopia, especially those who also had reduced near visual function (including clarity of binocular vision and depth perception). Performance was most affected in the print knowledge domain of the test, which assesses the ability to identify letters and written words.

“These differences are meaningful because formal learning for many children begins in the preschool years,” said Dr. Kulp. “In addition, other research exploring the long-term effect of early deficits in literacy has shown them to be associated with future problems in learning to read and write. This makes early detection of these problems important.”

“Preschool children with moderate hyperopia and decreased near vision may benefit from referral for assessment of early literacy skills,” said Elise Ciner, O.D., professor at the Pennsylvania College of Optometry at Salus University in Philadelphia, and co-investigator of the study. “Educational interventions for children with early deficits can lead to greater educational achievement in later years.” Further research is needed to determine whether correction of moderate hyperopia with glasses can prevent the development of deficits in early literacy skills.

The study included three participating clinical centers: The Ohio State University College of Optometry in Columbus, led by Dr. Kulp; Pennsylvania College of Optometry at Salus University, led by Dr. Ciner; and New England College of Optometry in Boston, led by Bruce Moore, O.D. A Data Coordinating Center at the University of Pennsylvania was led by Maureen Maguire, Ph.D.

The VIP-HIP study is funded by NEI grant EY021141. For more information about hyperopia, please visit <https://nei.nih.gov/health/hyperopia>.

References:

Kulp, MT, Ciner E et al. “Uncorrected Hyperopia and Preschool Early Literacy: Results of the Vision In Preschoolers - Hyperopia In Preschoolers (VIP-HIP) Study.” *Ophthalmology*, January 27, 2016

NEI leads the federal government's research on the visual system and eye diseases. NEI supports basic and clinical science programs to develop sight-saving treatments and address special needs of people with vision loss. For more information, visit <https://www.nei.nih.gov>.

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