

Kindergarteners' mathematics success hinges on preschool skills

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David Geary found that preschoolers who better process words associated with numbers and understand the quantities associated with these words are more likely to have success with math when they enter kindergarten. Credit: MU

While many studies have been conducted on infants' and preschoolers' math competencies, few have evaluated how toddlers' basic mathematics knowledge relates to early elementary school success. Now, in a study funded by the National Science Foundation (NSF), researchers at the University of Missouri discovered that preschoolers who better process words associated with numbers, such as "three" or "four," and understand the quantities associated with these words are more likely to

have success with math when they enter kindergarten. Findings also reveal that children who have a basic understanding that addition increases quantity and subtraction decreases it are much better prepared for math in school. Scientists contend that emphasis on these two skillsets could lead to greater success in school.

"Our previous 10-year longitudinal study followed first graders and how their basic understanding of numbers and the relations among them puts them on a track for future success in high school and work," said David Geary, Curators' Distinguished Professor of Psychological Sciences in the MU College of Arts and Science. "However, there have been few studies that bridge the gap between preschool curricula and later success in early elementary school. Our current study follows kids from preschool to first grade, and we found that future success in [mathematics](#) lies in the basic understanding of number words and the quantities they represent."

Geary and his team including Alex Moore, a postdoctoral fellow, and Kristy vanMarle, an assistant professor in the Department of Psychological Sciences, followed 112 [preschool children](#) ranging in ages from 3 to 5 years old and identified as at risk for school failure. Controls were established to account for general knowledge, parental background and other factors. The children selected were administered several tasks to evaluate non-symbolic skills (such as quantities of collections of objects) and symbolic quantitative and calculation skills, including their understanding of number words and the ability to add and subtract from collections of objects.

"We measured participants' math skills at the beginning of preschool and again at the end of preschool," Geary said. "Kids who better understand the value of number words have an implicit understanding of addition and subtraction and are more fluent at processing numbers going into kindergarten. Preschoolers need to have a good understanding of

quantities associated with number words and need to have experiences manipulating set sizes. Preschool curricula sometimes covers a lot of things, so what seems important may not be—we want to help narrow the most fundamental concepts down so that kids can continue to be successful throughout their school careers."

Geary and his team will continue to follow their participants through first grade in this four-year longitudinal study where they will use the same [preschool](#) measures to evaluate success.

Provided by University of Missouri-Columbia

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