Kids skilled early in math do better in school

A study involving 16,387 children showed no correlation between behavioral problems in elementary school and subsequent scholastic achievement, but early math skills played a big role.

UCI researcher also finds K-5 students with persistent numeracy issues much less likely to graduate from high school.

April 27, 2011; Michelle S. Kim / University Communications

Continuing research by UC Irvine Distinguished Professor of education Greg Duncan has shed additional light on what constitutes school readiness and which K-5 skills and behaviors predict later academic success.

"Until recently, there has been little agreement on this topic," he notes. "Most kindergarten teachers recognize the inability to follow directions, trouble working independently or in groups, and a lack of academic skills as factors associated with difficult transition to the school environment."

However, one National Research Council report argues that social and emotional aptitude is just as important as language and cognition in young children's scholastic achievement. Another NRC report emphasizes the importance of early acquisition of linguistic skills. And the National Council of Teachers of Mathematics urges high-quality math instruction for 3- to 6-year-olds.

To address this issue, Duncan and colleagues identified six population-based data sets – involving 16,387 children – that included measures of reading and math competency, attention skills, pro-social behavior, and antisocial and internalizing behavior taken around the time of school entry, as well as measures of reading and math competency taken later in the primary or middle school years.

"We found that only three of the school-entry measures predicted subsequent academic success: early reading, early math and attention skills, with early math skills being most consistently predictive," Duncan says.

"Early behavior problems and social skills were not associated with later reading and math achievement. These patterns generally held both across studies and within each of the six data sets examined."

His analysis is widely viewed as providing a clear answer about the relative role of school-entry skills and behaviors: Early academic skills appear to be the strongest predictor of subsequent scholastic success – early math skills more so than early reading skills.

"A student's school-entry ability to pay attention and stay on task is modestly predictive of later achievement, while early problem behavior and other dimensions of social and mental health issues are not at all correlated," Duncan elaborates. "If school readiness is defined as having the skills and behaviors that best predict subsequent academic success, concrete numeracy and literacy skills are decidedly more important than socio-emotional behaviors."

He and Katherine Magnuson of the University of Wisconsin-Madison recently completed a second study using two large data sets (2,843 children) and the same achievement, attention and behavior measures. They determined that K-5 students with persistently low math skills were much less likely to graduate from high school or attend college.

Surprisingly, chronic reading problems were not predictive of these outcomes, after accounting for the fact that children who struggle with reading tend to also struggle with math. In contrast to the first study's findings, persistent antisocial behavior was correlated to dropping out of high school and not attending college. But chronic difficulty paying attention and internalizing behavior were not predictive of this.

The math results were quite striking. Children with persistent math problems in elementary school were 13 percentage points less likely to graduate from high school and 29 percentage points less likely to attend college.

"The next level of research should focus on why math skills – which combine conceptual and procedural competencies – are the most powerful predictor of subsequent achievement and attainment," Duncan says. "Experimental evaluations of early math programs that focus on particular skills and track children's reading and math performance throughout elementary school could help identify missing causal links between early skills and later success."