

**ZMATH 2014e.00506**

**Verdine, Brian N.; Irwin, Casey M.; Golinkoff, Roberta Michnick; Hirsh-Pasek, Kathryn**  
**Contributions of executive function and spatial skills to preschool mathematics achievement.**

J. Exp. Child Psychol. 126, 37-51 (2014).

Summary: Early mathematics achievement is highly predictive of later mathematics performance. Here we investigated the influence of executive function (EF) and spatial skills, two generalizable skills often overlooked in mathematics curricula, on mathematics performance in preschoolers. Children ( $N = 44$ ) of varying socioeconomic status (SES) levels were assessed at 3 years of age on a new assessment of spatial skill (test of spatial assembly, TOSA) and a vocabulary measure (peabody picture vocabulary test, PPVT). The same children were tested at 4 years of age on the Beery test of visual-motor integration (VMI) as well as on measures of EF and mathematics. The TOSA was created specifically as an assessment for 3-year-olds, allowing the investigation of links among spatial, EF, and mathematical skills earlier than previously possible. Results of a hierarchical regression indicate that EF and spatial skills predict 70% of the variance in mathematics performance without an explicit math test, EF is an important predictor of math performance as prior research suggested, and spatial skills uniquely predict 27% of the variance in mathematics skills. Additional research is needed to understand whether EF is truly malleable and whether EF and spatial skills may be leveraged to support early mathematics skills, especially for lower SES children who are already falling behind in these skill areas by 3 and 4 years of age. These findings indicate that both skills are part of an important foundation for mathematics performance and may represent pathways for improving school readiness for mathematics.

*Classification:* G21 C31

*Keywords:* executive function; preschool; geometric skills; spatial skills; school readiness

doi:10.1016/j.jecp.2014.02.012