ZMATH 06690689

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Fluid reasoning predicts future mathematical performance among children and adolescents.

J. Exp. Child Psychol. 157, 125-143 (2017).

Summary: The aim of this longitudinal study was to determine whether fluid reasoning (FR) plays a significant role in the acquisition of mathematics skills above and beyond the effects of other cognitive and numerical abilities. Using a longitudinal cohort sequential design, we examined how FR measured at three assessment occasions, spaced approximately 1.5 years apart, predicted math outcomes for a group of 69 participants between ages 6 and 21 years across all three assessment occasions. We used structural equation modeling (SEM) to examine the direct and indirect relations between children's previous cognitive abilities and their future math achievement. A model including age, FR, vocabulary, and spatial skills accounted for 90% of the variance in future math achievement. In this model, FR was the only significant predictor of future math achievement; age, vocabulary, and spatial skills were not significant predictors. Thus, FR was the only predictor of future math achievement across a wide age range that spanned primary school and secondary school. These findings build on Cattell's conceptualization of FR as a scaffold for learning, showing that this domain-general ability supports the acquisition of rudimentary math skills as well as the ability to solve more complex mathematical problems.

Classification: C30 C40
Keywords: children; math; cognitive development; fluid reasoning; working memory; problem solving
doi:10.1016/j.jecp.2016.12.005