

**ZMATH 2016f.00920**

**Ye, Ai; Resnick, Ilyse; Hansen, Nicole; Rodrigues, Jessica; Rinne, Luke; Jordan, Nancy C.**  
**Pathways to fraction learning: numerical abilities mediate the relation between early cognitive competencies and later fraction knowledge.**

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Summary: The current study investigated the mediating role of number-related skills in the developmental relationship between early cognitive competencies and later fraction knowledge using structural equation modeling. Fifth-grade numerical skills (i.e., whole number line estimation, non-symbolic proportional reasoning, multiplication, and long division skills) mapped onto two distinct factors: *magnitude reasoning* and *calculation*. Controlling for participants' ( $N = 536$ ) demographic characteristics, these two factors fully mediated relationships between third-grade general cognitive competencies (attentive behavior, verbal and nonverbal intellectual abilities, and working memory) and sixth-grade fraction knowledge (concepts and procedures combined). However, specific developmental pathways differed by type of fraction knowledge. Magnitude reasoning ability fully mediated paths from all four cognitive competencies to knowledge of fraction concepts, whereas calculation ability fully mediated paths from attentive behavior and verbal ability to knowledge of fraction procedures (all with medium to large effect sizes). These findings suggest that there are partly overlapping, yet distinct, developmental pathways from cognitive competencies to general fraction knowledge, fraction concepts, and fraction procedures.

*Classification:* F43 C33 C43

*Keywords:* fraction learning; cognitive competency; numerical skills; magnitude understanding; calculation; mediation analysis

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