

**ZMATH 2016f.00857**

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**Non-symbolic approximate arithmetic training improves math performance in preschoolers.**

J. Exp. Child Psychol. 152, 278-293 (2016).

Summary: Math proficiency at early school age is an important predictor of later academic achievement. Thus, an important goal for society should be to improve math readiness in preschool-age children, especially in low-income children who typically arrive in kindergarten with less mathematical competency than their higher income peers. The majority of existing research-based math intervention programs target symbolic verbal number concepts in young children. However, very little attention has been paid to the preverbal intuitive ability to approximately represent numerical quantity, which is hypothesized to be an important foundation for full-fledged mathematical thinking. Here, we tested the hypothesis that repeated engagement of non-symbolic approximate addition and subtraction of large arrays of items results in improved math skills in very young children, an idea that stems from our previous studies in adults. In the current study, 3- to 5-year-olds showed selective improvements in math skills after multiple days of playing a tablet-based non-symbolic approximate arithmetic game compared with children who played a memory game. These findings, collectively with our previous reports, suggest that mental manipulation of approximate numerosities provides an important tool for improving math readiness, even in preschoolers who have yet to master the meaning of number words.

*Classification:* F31 F21 C31 C51

*Keywords:* preschool math; approximate number system; cognitive training; vocabulary; short-term memory; executive function

doi:10.1016/j.jecp.2016.07.011