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Developmental Trajectories of Working Memory Updating from Early Childhood to Adolescence: A Meta-Analysis

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Abstract

Working memory updating, the process of replacing outdated information with new data, is a crucial cognitive function for learning that develops significantly throughout childhood and adolescence. However, the developmental trajectory and task-specific patterns remain inadequately understood. This meta-analysis examined 64 studies (N = 22,572 participants) investigating working memory updating performance across five age groups (3-17 years) using various updating paradigms. Results revealed a significant positive developmental trend, with the most substantial improvements occurring between the ages of 3 and 8 years. Additionally, task-specific analyses demonstrated various developmental patterns, with keep track tasks—the selective updating of relevant information from specific categories while discarding irrelevant data—showing the most pronounced age-related improvement. Together, these findings suggest that working memory updating follows a systematic developmental progression, influenced by task-based variations, offering valuable insights into cognitive development and potential applications for educational practices