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Cognitive Predictors of Timed and Untimed Early Arithmetic Performance

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Abstract: Do established predictors of children's arithmetic performance differentially predict performance on timed versus untimed calculation tests? We investigated phonological awareness (i.e., CTOPP), phonological working memory (i.e., digit span), and visuo-spatial short-term memory (i.e., Corsi blocks) as predictors of timed and untimed calculation, both concurrently in Grade 1 (N= 116) and longitudinally in Grade 2 (N = 79). Timed calculation was operationalized as single-digit addition fluency and untimed calculation was operationalized as performance on the Woodcock Calculation subtest and KeyMath Numeration subtest. Examined concurrently, separate multiple regressions revealed that phonological awareness predicted timed calculation and all three cognitive measures predicted untimed calculation performance. Examined longitudinally, separate multiple regressions revealed that phonological awareness again predicted timed calculation and that phonological awareness and visuo-spatial short-term memory predicted untimed calculation performance. These results suggest a difference in the predictive set between timed and untimed calculation tests; furthermore, a difference between concurrent and longitudinal predictors.