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**Objective:** Reading and math are related generally, and comorbidly at the level of disability. Language, working memory (WM), processing speed (PS), and attention are four domain-general processes important for reading and math separately (Floyd et al., 2003; Fuchs et al., 2010; McDougal et al., 2022). Research of shared cognitive predictors is rarer (e.g., Cirino et al. 2018; Peterson et al., 2017). Therefore, the present study aims to evaluate these factors' shared contribution to both reading and math (both timed and untimed) among middle school students. We hypothesized that each of the four cognitive domains would relate significantly to all academic outcomes, and that together, they would account for the relationship between math and reading performance. We also expected that language and attention would be more relevant for reading than for math; that WM would be more relevant for math than for reading, and that PS would be more relevant for timed than for untimed measures.

**Participants and Methods:** Two-hundred-eighteen Hispanic middle school students completed cognitive assessments on visual attention, visual search, objective attention, behavioral attention, phonological awareness, rapid automatized naming, vocabulary, WM, and PS. Timed and untimed reading and math were measured using the KTEA-3 (Kaufman & Kaufman, 2014). Latent variables were formed, and analyses were conducted via path analyses.

**Results:** A measurement model delineated language, attention, WM, and PS with nine latent variables with 20 indicator variables, with good model fit. Variables from each of the four domains significantly correlated with both reading and math outcomes. However, for untimed (overall  $R^2 = 47.8\%$ ) and timed reading (overall  $R^2 = 56.8\%$ ), language and behavioral attention were the only unique predictors. For untimed math (overall  $R^2 = 51.8\%$ ), WM, PS, and behavioral attention were unique predictors. Finally, for timed math (overall  $R^2 = 26.1\%$ ), WM was the only unique predictor. Reading and math were correlated with one another, whether untimed ( $r = .43$ ) and timed ( $r = .40$ ). Although the set of predictors reduced these correlations, the residual relation between reading and math remained significant, for both untimed ( $p = .002$ ) and timed ( $p = .037$ ) outcomes. When specific paths were constrained, language was found to

be more important for untimed reading than untimed math but was similarly important for timed outcomes. WM was more important for math than reading, whether timed or untimed. Attention and PS were similarly important for achievement outcomes.

**Conclusions:** The present work supported prior work documenting the relation of reading and math, and the relation of language, attention, WM, and PS to both types of achievement. However, unique contributions were much more sporadic, and some, but not all, cognitive domains showed differential prediction. These results highlight the role of shared variance among predictors (Cirino et al., 2018; Cirino et al., 2019), and raise questions as to other sources of the overlap between reading and math, whether timed or untimed. The nature of the sample also raises interesting replicability and generalizability issues but advances our understanding of the relation between cognitive and achievement skills.

**Categories:** Learning Disabilities/Academic Skills

**Keyword 1:** academic achievement

**Keyword 2:** attention

**Keyword 3:** learning

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## 45 Gender Differences in Mathematics and its Cognitive and Non-Cognitive Predictors in Community College Students.

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**Objective:** Historically, numerous studies have supported a male advantage in math. While more recent literature has shown that the gender gap is either decreasing or non-significant, a gender difference remains for higher level math (high school and college) (Hyde et. al. 1990; Casey et. al. 1995). It is known that both cognitive and non-cognitive factors influence math performance. There is little evidence for gender differences in working memory (Miller & Bichsel, 2004), which is a key predictor for mathematics. There is, however, evidence for gender differences in the non-cognitive domain, including math anxiety, with females having

higher levels (Miller & Bichsel, 2004; Goetz, et al. 2013). This study evaluates gender differences in both standardized and everyday math performances, and the way that cognitive and non-cognitive factors impact math. The study is focused on a very understudied group with high levels of math difficulty, namely community college students. We expected to find gender differences in math, and expect these to be in part accounted for by gender differences in strong mathematical predictors, particularly non-cognitive factors.

**Participants and Methods:** Participants included 94 community college students enrolled in their first math class (60 female; 34 male). Participants were administered the Kaufman Test of Educational Achievement – 3rd edition (KTEA3): Math Computation (MC) and Math Concepts Application (MCA) subtests, as well as an original Everyday Math (EM) measure which assessed their math ability in the context of common uses for math (e.g., financial and health numeracy). Additional measures included math anxiety, self-efficacy, and confidence. Finally, complex span working memory tasks were administered to assess verbal and spatial working memory. Analyses were performed using correlation and regression to examine relationships between the cognitive and non-cognitive variables and standardized and everyday math measures.

**Results:** Correlations showed that all cognitive and non-cognitive variables are significantly correlated with all three math measures (all  $p < .05$ ). There were no significant gender differences for any of the math measures, nor the working memory, or non-cognitive measures. Regression showed that across all three math outcomes, math anxiety and verbal working memory are significantly predictive of math performance. Overall  $R^2$  values were significant (range 27% to 37%, all  $p < .001$ ). Working memory and math anxiety were unique predictors in all three regressions (all  $p < .05$ ), but other non-cognitive variables such as self-efficacy did not show unique prediction (all  $p > .05$ ).

**Conclusions:** There was no evidence for gender differences on any studied variable. This stands in contrast to prior studies, although few studies have included community college students. On the other hand, both cognitive and non-cognitive factors were complimentary in the prediction of math outcomes, which is consistent with prior work. Among non-cognitive predictors, math anxiety was particularly prominent. This

study clarifies prior conflicting work regarding gender differences, and highlights the role of both math anxiety and working memory as relevant for multiple math outcomes.

**Categories:** Learning Disabilities/Academic Skills

**Keyword 1:** mathematics ability

**Keyword 2:** working memory

**Keyword 3:** emotional processes

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#### 46 Are Reading Strategies Related to the Orthographic Depth of Languages Acquired Through Bilingual Education?

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**Objective:** This longitudinal study investigates whether reading strategies are influenced by the orthographic depth of languages, specifically Spanish or Cantonese, acquired through enrollment in bilingual immersion programs. Spanish shares an alphabet with English and is considered a phonologically transparent language (Sun et al., 2022). Research has shown that second language learners of Cantonese, an opaque language, performed better on orthographic awareness tasks that involve whole-word visual information processing (Wang and Geva, 2003). We hypothesize that students enrolled in a bilingual immersion program will outperform peers in general education (GENED) on selected reading tasks. More specifically, those in Spanish-immersion programs will perform better on English tasks involving phonological processing; whereas those in Cantonese-immersion programs will perform better on single-word/-character processing tasks.

**Participants and Methods:** Participants (n=102) were native English speakers recruited