

Objective We live in an increasingly multicultural society which is reflected in the student population. In the community college (CC) setting, students from underrepresented groups are over-represented in remedial math courses and are less likely to complete the sequence. The extant literature suggests higher levels of acculturation, both cultural adoption and cultural maintenance, support academic success. Working memory (WM) is a well-known domain-general predictor of mathematical development and has been shown to relate to math achievement $r = .38$. Given this moderate relation, additional predictors of math achievement warrant investigation. In the present study, we investigated the potential moderational role of acculturation (cultural adoption and maintenance), on the WM-math relation in a diverse group of CC students ($n = 94$). Math was assessed both by a standardized measure of math computation and a measure of “everyday math” word problems including medical and financial management. We expected that higher levels of acculturation (adoption and maintenance) would decreasing WM load (via cognitive load) and aid math performance. At higher levels of acculturation, the WM-math relation was hypothesized approximate meta analytic findings, $r = .38$. Alternatively, at low levels of acculturation, the WM-math correlation was anticipated to be attenuated due to the added variability in culture and the negative impact low acculturation levels have on WM by increasing cognitive load.

Participants and Methods A diverse sample of CC students (ages 18-25) who were enrolled in a math course were included. Participants completed an online survey covering demographic and cultural domains, then completed an in-person cognitive testing session to assess language abilities, WM, and math ability. Bivariate correlations and regression based moderation analyses were used. Post-hoc analyses were conducted to assess for three-way interactions with baseline verbal or math abilities.

Results WM-math correlations averaged $r = .38$. Acculturation did not significantly relate to either outcome variable. Neither cultural adoption (computations: $F=1.68, p = .199$; word problems: $F=.42, p = .521$) nor cultural maintenance (computations: $F=.83, p = .364$; word problems: $F=.36, p = .550$) moderated the WM-math relations. Post-hoc analyses revealed significant three-way interactions between cultural adoption and math computation across different levels of vocabulary ($F=4.66, p = .034$) and math abilities ($F= 6.16 p = .015$).

Conclusion The hypothesized moderational role of acculturation on the WM-math relation was not supported. Post-hoc analyses, however, revealed that the cultural adoption-math relationship varied across different levels of vocabulary and math abilities, although not in the direction anticipated. Finding suggest complex relationships between the WM, acculturation, and math such that acculturation does impact math performance when either vocabulary or math abilities are strong. At low levels of math or vocabulary, students’ WM may already be overtaxed, such that higher acculturation levels cannot benefit the student. Whereas when baseline abilities are average/high, increased cultural adoption can benefit the student by potentially decreasing cognitive load and freeing additional WM capacity which can be applied to the task. Findings could identify patterns of students at risk for math failure and inform future intervention/policy development to address their needs and support success.