



Latino Male High School Math Achievement: The Influential Role of Psychosocial Factors

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Considered an integral part of a student's education, math performance has been found to be correlated to many markers of educational success, including performance in other subjects; high school graduation; career choice; and college acceptance, participation, and success (Alva, 1991; Gaertner, Kim, DesJardins, & McClarty, 2014; Levine & Zimmerman, 1995; Long, Conger, & Iatarola, 2012). Because Latino students underperform in this area and are at risk for low math achievement, consequently restricting their postsecondary education opportunities and even participation in math related careers (Lopez, 2001). Considering the fact that Latino males tend to underperform in high school and have lower postsecondary participation rates than their female counterparts (Sáenz & Ponjuán, 2009), it is imperative to understand the impact and how math performance can be utilized to steer more Latino males into postsecondary education and science, technology, engineering, and mathematics (STEM) – related careers. Given the math achievement disparities, researchers have been tasked to discover ways to promote higher levels of achievement among Latino students as they are faced with multiple challenges and a lack of educational, psychological, and social support (Gandara & Contreras, 2009; Lopez, 2001; Sáenz & Ponjuán, 2009).

In response to this crisis, Dr. Ismael Fajardo, José M. Hernandez, and José Muñoz research focuses on understanding and investigating the psychological, social, and cultural factors that influence standardized math achievement for Latina/o students in a high school context, as it is conducive to completing a high school and college degree. This study uses

Gloria and Rodriguez's (2000) psychosociocultural (PSC) framework as a guide to investigate the three simultaneous dimensions (psychological, social, and cultural) within an educational setting to comprehend academic persistence. Using data from the National Center for Education Statistics' (NCES) High School Longitudinal Study of 2009 (HSL:09) and the first follow up data in 2012 (NCES, 2016), the quantitative study referenced in this brief draws from a larger dataset from that included 23,415 students, and focuses on 3,271 eleventh-grade Latinos attending public schools who self-identify as Hispanic, Latino, or Latina. Within the Latina/o sample, males accounted for 49.4% (n=1,617) and females accounted for 50.6% (n=1,654). The following research questions are what guided this study: 1) What are the direct effects of psychological, social, and cultural factors on eleventh-grade math achievement for Latino students? 2) Does the PSC model vary across gender?

Findings

Psychological Factors

Empirical findings from this study revealed that there were statistically significant relationships between high levels of positive math psychological factors (math identity, math efficacy, and math utility) for Latino students. After controlling for psychological relationships, math identity was found to be the strongest statistically significant predictor of Latino math achievement. The need for Latina/o high school students to identify with math appeared to be the most important factor in math achievement. This finding provides relevant insight into the importance of reaching out to Latina/o students as early as elementary school in order to develop a strong math identity that can be sustained along the educational pipeline (Hemphill & Vanneman, 2011; Smith & Hausafus, 1998).

Social Factors

Consistent with previous research suggesting positive peer social support is predictive of Latino student academic success (Alva, 1991; Gibson, Gandara, & Koyama, 2004; Stanton-Salazar, 2001), this study found Latino students' peer social networks are strong predictors of math test scores. Latino students in the sample who had a peer group of friends receiving good grades, took a standardized college entrance exam (i.e., PSAT, SAT, PLAN, ACT), and planned to attend 2-year community college or 4-year college increased their math achievement. This finding reveals the importance of positive peer influences. Secondary schools should examine their academic messages for Latino students and create strategies for equipping peer groups with information about advanced math courses, college and career options, and resources to improve Latino math achievement.

Cultural Factors

Previous studies found both positive and negative educational outcomes based on cultural factors (Gonzalez & Padilla, 1997). The familismo construct used in this study was found to be a strong predictor of Latina/o math test scores; that is, Latina/os placing importance on family's and friends' recommendations over their own when choosing a college/school (e.g., importance of staying close to home and importance of family legacy). Familismo, a form of Latina/o cultural wealth, is a value present in the classroom that supports their math achievement (Yosso, 2005). This finding supports a vital need to further explore other cultural wealth variables and/or constructs given the positive benefits to Latina/o students. For instance, investigating linguistic, familial, social, and resistant capital can provide additional insight into transformative internal and external practices for Latina/o students (Solórzano & Bernal, 2001; Yosso, 2005).

PSC Gender Differences

A comparison of factor mean differences between Latino male and female students on all five latent factors (i.e., math identity, math utility, math self-efficacy, social factors, and cultural factors) showed that Latina females had statistically significant lower means in all three psychological math latent constructs (math identity, self-efficacy, and utility). These lowered factor means associated with Latina students are focused on the levels of the specified psychological latent constructs and not their actual achievement in math. Recent literature has found Latina females outperform Latino males in various educational benchmarks (Sáenz & Ponjuán, 2009) and are more inclined to enroll in advanced math classes (Aud et al., 2013; Riegle-Crumb, 2006). These findings align with previous research that has found stereotypes about female math inferiority (Lindberg, Hyde, Petersen, & Linn, 2010), which may be impacting Latina females' ability to identify with math, have confidence in their math ability, and find utility in math. Given the importance of math identity as well as self-efficacy and utility, future research will need to further explore how to improve math psychological factors for both Latino males and females.

Conclusion

Given the importance of mathematics as a precursor for various academic successes for high school students, it is imperative that attention be given to all factors indicative of impacting mathematical success. As indicated from this study's empirical findings, Latino male high school students' math achievement is significantly influenced by psychological, social, and cultural factors. Given their continued lower participation rates in postsecondary education, this study is timely in providing a background to inform future policy and practice to improve participation for Latino males in postsecondary education and STEM careers. Facilitating Latina/o math achievement can potentially influence a rigorous math course-taking pathway, which, in turn, can positively influence other areas documented in previous research, such as success in other subjects, high school graduation, college acceptance, and a career choice in math and science majors and ultimately persisting (Alva, 1991; Bonous-Hammarth, 2000; Eamon, 2005; Gaertner et al., 2014; Levine & Zimmerman, 1995; Long et al., 2012; Nora & Crisp, 2012; Simpson, 2001; Sondgeroth & Stough, 1992; Trusty, 2002).

There is a need for future research to expand on the findings from this study. First, future research should explore how elementary, middle, and high school experiences develop Latina/o math identity, math self-efficacy, and math utility. These findings could then be integrated into secondary experiences of Latina/o students that promote stronger math psychological factors influencing math achievement and STEM learning trajectories. Second, there is a need to continue to explore differences in gender with other academic benchmarks and PSC domains—in particular, the role of families, counselors, and teachers in the development of psychological factors, as previous research has found they are more likely to carry math inferiority beliefs for underrepresented students (Lindberg et al., 2010). Third, there is a need to use alternative frameworks like Yosso's (2005) cultural wealth and Solórzano and Bernal's (2001) resistance theory to potentially provide tremendous cultural insight in Latino males' academic achievement. By thoroughly examining each of these sources of influence, educators can gain a better understanding of how to develop practices to better serve the needs of Latinos and help increase their participation, in not only postsecondary education but also STEM-related careers.

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