

Mindset × Context: Schools, Classrooms, and the Unequal Translation of Expectations into Math Achievement

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Mindset × Context: Schools, Classrooms, and the Unequal Translation of Expectations into Math Achievement

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Abstract When do adolescents' dreams of promising journeys through high school translate into academic success? This monograph reports the results of a collaborative effort among sociologists and psychologists to systematically examine the role of schools and classrooms in disrupting or facilitating the link between adolescents' expectations for success in math and their subsequent progress in the early high school math curriculum. Our primary focus was on gendered patterns of socioeconomic inequality in math and how they are tethered to the *school's peer culture* and to *students' perceptions of gender stereotyping in the classroom*.

To do this, this monograph advances Mindset × Context Theory. This orients research on educational equity to the reciprocal influence between students' psychological motivations and their school-based opportunities to enact those motivations. Mindset × Context Theory predicts that a student's mindset will be more strongly linked to developmental outcomes among groups of students who are at risk for poor outcomes, but only in a school or classroom context where there is sufficient need and support for the mindset. Our application of this theory centers on expectations for success in high school math as a foundational belief for students' math progress early in high school. We examine how this mindset varies across interpersonal and cultural dynamics in schools and classrooms. Following this perspective, we ask:

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1. Which gender and socioeconomic *identity groups* showed the weakest or strongest links between expectations for success in math and progress through the math curriculum?
2. How did the *school's peer culture* shape the links between student expectations for success in math and math progress across gender and socioeconomic identity groups?
3. How did *perceptions of classroom gender stereotyping* shape the links between student expectations for success in math and math progress across gender and socioeconomic identity groups?

We used nationally representative data from about 10,000 U.S. public school 9th graders in the National Study of Learning Mindsets (NSLM) collected in 2015–2016—the most recent, national, longitudinal study of adolescents' mindsets in U.S. public schools. The sample was representative with respect to a large number of observable characteristics, such as gender, race, ethnicity, English Language Learners (ELLs), free or reduced price lunch, poverty, food stamps, neighborhood income and labor market participation, and school curricular opportunities. This allowed for generalization to the U.S. public school population and for the systematic investigation of school- and classroom-level contextual factors. The NSLM's complete sampling of students within schools also allowed for a comparison of students from different gender and socioeconomic groups with the same expectations in the same educational contexts. To analyze these data, we used the Bayesian Causal Forest (BCF) algorithm, a best-in-class machine-learning method for discovering complex, replicable interaction effects.

Chapter IV examined the interplay of expectations, gender, and socioeconomic status (SES; operationalized with maternal educational attainment). Adolescents' expectations for success in math were meaningful predictors of their early math progress, even when controlling for other psychological factors, prior achievement in math, and racial and ethnic identities. Boys from low-SES families were the most vulnerable identity group. They were over three times more likely to not make adequate progress in math from 9th to 10th grade relative to girls from high-SES families. Boys from low-SES families also benefited the most from their expectations for success in math. Overall, these results were consistent with Mindset \times Context Theory's predictions.

Chapters V and VI examined the moderating role of school-level and classroom-level factors in the patterns reported in Chapter IV. Expectations were least predictive of math progress in the highest-achieving schools and schools with the most academically oriented peer norms, that is, schools with the most formal and informal resources. School resources appeared to compensate for lower levels of expectations. Conversely, expectations most strongly predicted math progress in the low/medium-achieving schools with less academically oriented peers, especially for boys from low-SES families.

This chapter aligns with aspects of Mindset \times Context Theory. A context that was not already optimally supporting student success was where outcomes for vulnerable students depended the most on student expectations.

Finally, perceptions of classroom stereotyping mattered. Perceptions of gender stereotyping predicted less progress in math, but expectations for success in math more strongly predicted progress in classrooms with high perceived stereotyping. Gender stereotyping interactions emerged for all sociodemographic groups except for boys from high-SES families.

The findings across these three analytical chapters demonstrate the value of integrating psychological and sociological perspectives to capture multiple levels of schooling. It also drew on the contextual variability afforded by representative sampling and explored the interplay of lab-tested psychological processes (expectations) with field-developed levers of policy intervention (school contexts). This monograph also leverages developmental and ecological insights to identify which groups of students might profit from different efforts to improve educational equity, such as interventions to increase expectations for success in math, or school programs that improve the school or classroom cultures.

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This monograph used the Mindset × Context perspective to examine how students' expectations for success in math (mindset) and school- and classroom-based opportunities (context) interact to explain inequalities in the critical first year of high school. Data come from the National Study of Learning Mindsets (NSLM), a nationally representative study of ~10,000 U.S. public-school ninth graders in 2015-2016. Expectations powerfully predicted math progress, more so for boys from more socioeconomically disadvantaged families, who showed the lowest math progress rate overall. Schools' peer norms and students' perceptions of classroom gendered math stereotyping interacted with expectations and group identities (gender and SES) as well. Thus, integrating psychological and sociological perspectives provided complementary insights into young people's trajectories through an unequal educational environment, while highlighting possible policy levers.