Promise and Paradox:
Measuring Students’ Non-Cognitive Skills and the Impact of Schooling

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Key Findings

We studied the relationships between self-reported non-cognitive skills (conscientiousness, self-control, grit, and growth mindset) and student outcomes in grade 8 students attending public schools in Boston.

- At the student level, higher self-reported non-cognitive skills are correlated with better attendance, behavior, and test score gains between grade 4 and grade 8. At the school level, three of the four non-cognitive skills are uncorrelated with test score gains.

- Students attending over-subscribed charter schools with higher average test score gains score lower on these three scales than do students attending district schools, and charter schools appear to have a negative causal impact on non-cognitive skills. These paradoxical results appear to be driven by reference bias, or the tendency for survey responses to be influenced by social context.

Data

In 2010–11, we collected data from 1,368 grade 8 students attending 32 public schools in the city of Boston, including 22 open-enrollment district schools and five over-subscribed charter schools. These students completed a battery of questionnaires designed to measure their non-cognitive skills along various dimensions including conscientiousness, self-control, grit, and growth mindset, as well as a questionnaire about their perceptions of various aspects of their school’s climate. We also acquired school enrollment and demographic information, data on attendance and suspensions, and math and English language arts (ELA) test scores on the MCAS from the Department of Elementary and Secondary Education.

Research Methods

We estimated bivariate Pearson correlations among achievement scores, achievement gains, and non-cognitive measures at the student and school levels and compared mean differences in non-cognitive traits by school type. We also conducted a quasi-experimental analysis of the effect of attending one of five oversubscribed charter schools. Here we used the random offer of enrollment to these schools as an instrumental variable for charter school attendance in a two-stage least squares regression framework. Finally, we tracked the non-cognitive traits of one cohort of students in each of two over-subscribed Massachusetts charter schools and in one open-enrollment district school over three years.
Detailed Results

Each of the four non-cognitive measures (conscientiousness, self-control, grit, and growth mindset) is positively correlated with attendance, behavior, and grade 8 math and ELA test scores. Growth mindset is most strongly related to grade 8 test scores, with correlations of .32 (math) and .36 (ELA). Students in the bottom quartile of self-control are absent 2.8 more days than students in the top quartile, suspended four times as often, and are almost three times as likely to have been suspended at least once. The relationships between the four non-cognitive measures and residualized test score gains, which capture students’ academic performance in grade 8 relative to expectations based on their performance in grade 4, are also positive, and all but one of these correlations are statistically significant. The relationships are strongest for growth mindset, which has correlations with test score gains of .21 and .17 in math and ELA, respectively.

However, the positive relationships between test score gains and three of the measures—conscientiousness, self-control, and grit—dissipate if not reverse when we aggregate the data to the school level. We also find that students attending charter schools report markedly lower average levels of self-control than students in district schools, despite the fact that these students experienced larger test score gains. We then estimate the effect of attending an over-subscribed charter school on students’ self-reported non-cognitive traits by comparing admission lottery losers and winners. We find that each year’s attendance at an over-subscribed charter school had a statistically significant negative effect on students’ self-reported self-control and grit and a marginally significant negative effect on self-reported conscientiousness. These apparently adverse effects of charter school attendance, however, could be an artifact of reference bias: the tendency for social context to influence survey responses.

Finally, we document a steady decline in conscientiousness, self-control, and grit as assessed by self-reports among a cohort of charter school students that we track over the course of their middle school career. Scores on these scales also appear to decline among students attending the open-enrollment district school, but by a smaller amount. We also confirm that students attending over-subscribed charter schools perceive their schools as having very different academic and disciplinary climates than students attending open-enrollment district schools. Thus, the academic and disciplinary climates of the over-subscribed charter schools in our sample do appear to differ in ways that could lead their students to use a higher bar when assessing their conscientiousness, self-control, and grit.

Implications for Policy and Practice

Interest in non-cognitive skills in education is growing, and this study adds to the body of evidence that they matter for academic and behavioral outcomes. Interventions that target them should yield improvements in academic outcomes in addition to any long-term benefits that would accrue if gains in these skills persist into adulthood. However, estimating school impacts on non-cognitive skills based on self-reports may be misleading due to reference bias resulting from differences in school climate. Until measures of non-cognitive skills that are less susceptible to reference bias are developed, school and district personnel should use caution when using them to evaluate the effectiveness of schools, educators, or interventions.