How does Adopting a Growth Mindset Improve Academic Performance? Probing the Underlying Mechanisms in a Nationally Representative Sample

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When adolescents are taught that intellectual abilities can be developed through effort, the use of effective strategies, and by asking for help when they need it—a growth mindset of intelligence—they show improvements in their academic outcomes, as evidenced by several lab and field-experimental studies.[1] However, the chain reaction of changed behaviors that produce such favorable academic outcomes remains under-explored. For example, when students believe that they can improve their ability, do they work harder? Do they seek out more challenging learning experiences? Do they persist through setbacks or challenging tasks that may in turn bring about the positive change in their academic outcomes?

These changed behaviors, called behavioral mediators,[2] that create a pathway or link between students' psychology and their academic outcomes (which are explored in this study using rigorous, empirical causal inference techniques) help illuminate not only *if* psychological factors and academic outcomes are connected, but *how* they are connected.[3]

In this study, researchers integrated two research approaches—theoretically-driven, field-experimental manipulation of mindsets in psychology[4] and empirical advances in econometrics and program evaluation using the potential outcomes framework[5]—to advance the field's understanding of growth mindset and how this belief is connected to adolescents' behaviors and outcomes. Specifically, the researchers examined the role of a key behavioral mediator—students' learning-oriented behavior—in the impact of an online growth mindset intervention on students' grade point averages (GPAs).

Study Design

The present study analyzed data from the NSLM to explore the pathway through which the adoption of a growth mindset brings about positive academic outcomes.

In the NSLM, a random sample of students completed a growth mindset program, delivered in the form of an online module during two 25-minute sessions. Students read and listened to materials describing scientific evidence about how

KEY FINDINGS

- In a nationally representative sample of public high schools in the U.S., a growth mindset program led to more learning-oriented behaviors on average, but the magnitude of these impacts varied significantly from school to school.

RESEARCH TEAM

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Areas of expertise: Public Policy, Education, Psychology

SAMPLE

This study leverages data from the National Study of Learning Mindsets (NSLM), the largest-ever randomized controlled trial (RCT) of a growth mindset program in the U.S. in K-12 settings, in which a brief online growth mindset program was administered to 9th grade students during the 2015-2016 academic year. The NSLM features a nationally representative probability sample of regular U.S. public high schools. Additional information about the NSLM sample of schools and students can be accessed here.

This snapshot was published at the close of the National Study of Learning Mindsets Early Career Fellowship and captures in-progress work.

the brain works and why people can grow their intellectual abilities over time. The program encouraged students to think about why they might want to grow their brain in order to make a difference on something that matters to them, such as their family, community, or a social issue they care about.

Students' learning-oriented behaviors were measured with a "make-a-math-worksheet" task. Students completed the task after they completed the growth mindset program or, for students in the control condition, read and reflected on an article about brain functions. In the "make-a-math-worksheet" task, students chose from mathematics problems described as challenging (that offered the chance to learn a lot) or as easy (that would not lead to much learning). They were informed that they would complete the problems at the end of the session if there was time. Past research provides strong support for the validity of this exercise as a measure of learning-oriented behavior.[6]

Estimating causal mediating effects, even in RCTs, is not straightforward because the mediators (i.e. changes in behavior) are not randomly assigned; rather they are measured after random assignment of the intervention. However, more recently, empirical methods have been developed to isolate the random variation in mediators induced by the randomized experimental manipulation (as well as the variation across experimental sites in a multisite RCT; in this case, schools) to identify the causal effects of various mediators on final outcomes of interest using a multi-site instrumental variables (IV) framework.[7] In effect, in this study, researchers use IV methods to isolate the "exogenous" variation in learning-oriented behavior caused by random assignment to treatment or control groups to estimate the average causal effect of learning-oriented behavior on GPA.

Key Findings

In a nationally representative sample of public high schools in the U.S., the growth mindset intervention led to more learning-oriented behaviors on average, but the magnitude of these impacts varied significantly from school to school.

On average, students exposed to the growth mindset intervention chose significantly more hard problems rather than easy problems in the worksheet task, displaying stronger learning-oriented behaviors than students in the control group. This pattern was stronger in some

schools than in others, and is consistent with the finding of heterogeneity in intervention effects on grades across schools.[8]

Insights and Future Directions

The present research adapted empirical methods stemming from advancements in econometrics and program evaluation to estimate the effect of a key behavioral mediator in growth mindset interventions. Participants exposed to the growth mindset intervention exhibited higher learning-oriented behaviors compared with control participants. This effect, however, varied across the 65 schools in which the intervention was implemented, enabling the researchers to further exploit such variation to estimate the average causal effect of learning-oriented behaviors.

In other words, the present research helped illuminate how the growth mindset intervention affected academic performance many months later. Previous research has relied on self-reported measures as potential mediators rather than exploring behavioral processes induced by growth mindset interventions as mediators on grades. In doing so, the study aims to contribute to a new approach for estimating the causal effect of key mediators in order to better understand the complete pathways by which social psychological interventions influence academic outcomes.

First, this study suggests that behavioral mediators should be measured using performance tasks that elicit hypothesized behavioral changes, rather than relying on self-report measures from students. Second, if behavioral mediators can be measured across contexts (e.g., at multiple schools), one can leverage such context-variation to understand the causal chain in improving adolescents' outcomes. Future research may also explore alternative ways to directly influence students' learning opportunities to further elucidate the causal pathways. For example, teachers can encourage students to explore challenging tasks when mastering a mathematics concept and provide strategies for engaging with such learning opportunities. The results from this study therefore also have important implications for pedagogical practice and policy.

References

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