Can a Growth Mindset Program Overcome Persistent Messages about the Stability of Intelligence?

BY ALISON KOENKA

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Students are constantly confronted with information about their academic capabilities. One example is labeling students as intellectually gifted or placing students into special education (i.e., *academic labeling*). Another pervasive example is tracking high school students into different levels of mathematics courses based on how others (e.g., educators) perceive their mathematics ability (i.e., *mathematics tracking*).[1] These practices may reinforce a perception among students that ability is unchangeable, which is concerning given the cascade of negative consequences that come from holding a *fixed mindset* about intelligence.[2]

Inspired by the need to better understand the implications of such practices, the researchers investigated two questions:

1) Do academic labeling and mathematics tracking predict differences in students' beliefs about intelligence, motivational beliefs, and academic performance?

2) Does a *growth mindset program* (i.e., an intervention promoting beliefs that intelligence is malleable) differentially influence students' beliefs and performance based on their academic labeling and mathematics tracking experiences?

Study Design

The researchers leveraged data from the National Study of Learning Mindsets (NSLM) in which students were randomly assigned to participate in a growth mindset program consisting of two 25-minute sessions or a control condition. The overarching objectives of the growth mindset program were to convey that intellectual abilities can be developed and that this development could help students make a difference on something that matters to them, such as their family, community, or a social issue they care about. Students who took part in this program read evidence for neural plasticity (the brain's ability to change throughout an individual's life) and reflected on opportunities for strengthening the brain by persisting through challenges; students in the control condition read and reflected on an article about brain functions. Prior to and following the program or control condition, all students responded to a survey that measured fixed mindsets and motivational beliefs.

Key Findings

- Students who were (a) labeled by their school as academically gifted or placed in an International Baccalaureate (IB) program or (b) neither identified as gifted/IB nor placed in special education benefited from the growth mindset program used in the National Study of Learning Mindsets.
- Students in special education who participated in the growth mindset program did not appear to benefit from it.
- Students across all three mathematics tracking levels (remedial, general, and advanced) benefited from a growth mindset program.
- Students in remedial-level mathematics courses experienced a unique motivational benefit from the growth mindset program.
- Students who were tracked into advanced mathematics courses were more likely to report beliefs that intelligence in general – but not mathematics ability in particular – is changeable. They also performed better in mathematics compared to their peers in less advanced courses.

Research Team

- **Early Career Fellow:** Alison C. Koenka, Virginia Commonwealth University
- Amy L. Dent, University of California, Irvine
- Jennifer Henderlong Corpus, Reed College

Areas of expertise: developmental, educational, and social psychology; statistics

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

MINDSET SCHOLARS NETWORK

The National Study of Learning Mindsets Early Career Fellowship is a project of the Mindset Scholars Network and the University of Texas at Austin Population Research Center. The Mindset Scholars Network is a group of leading social scientists dedicated to improving student outcomes and expanding educational opportunity by advancing our scientific understanding of students' mindsets about learning and school. The University of Texas at Austin Population Research Center aims to provide outstanding infrastructure resources and sustain a dynamic interdisciplinary culture geared toward facilitating the highest level of population-related research among its faculty members and graduate and undergraduate trainees.

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Sample

This study leverages data from the National Study of Learning Mindsets (NSLM), the largest-ever randomized controlled trial 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.

Two subsamples from the NSLM were used to investigate this study's research questions. First, the researchers used a subsample of 4,040 students to compare students who (a) were labeled by their school as academically gifted or placed in an international baccalaureate (IB) program; (b) were placed in special education; and (c) received neither of these labels. Second, the researchers used a subsample of 6,880 students to compare students who were tracked into (a) developmental (i.e., remedial); (b) general; and (c) advanced 9th grade mathematics courses. These subsamples were completely independent from one another.

The researchers conducted two analyses with separate NSLM subsamples. In the *academic labeling analysis*, they used data from 4,040 students in 25 schools who were (1) identified by their school as academically gifted or placed in an IB program; (2) enrolled in special education; or (3) assigned neither of these labels. The researchers compared these students' *fixed mindsets about intelligence* (e.g., agreement with statements like, "You have a certain amount of intelligence, and you really can't do much to change it"), *motivational beliefs* (e.g., agreement with statements like, "When I work hard in school, it makes me feel like I'm doing something meaningful"); and *9th grade GPA*. They also examined whether experiencing the growth mindset program differentially influenced these three groups of students.

In the *mathematics tracking analysis*, they used data from 6,880 students in 47 schools who were tracked into (1) developmental (i.e., remedial); (2) general; or (3) advanced 9th grade mathematics courses. The researchers compared these students' *fixed mindsets about intelligence, fixed mindsets about mathematics ability* (e.g., agreement with the statement "Being a 'math person' or not is something that you really can't change. Some people are good at math and other people aren't"), *motivational beliefs* (e.g., agreement with statements like, "I can get a higher score next time if I find a better way to study"), and *9th grade mathematics GPA.* They also examined whether experiencing the growth mindset program differentially influenced these three groups of students.

Key Findings: Academic Labeling Analysis

Students who were (a) labeled by their school as academically gifted or placed in an IB program or (b) neither identified as gifted/IB nor placed in special education benefited from the growth mindset program used in the National Study of Learning Mindsets.

In particular, these students were less likely to report beliefs that intelligence is fixed than their counterparts in the same labeling group who did not experience a growth mindset program. This finding is largely consistent with the growth mindset intervention literature that has accumulated over the past decade.[2]

Students in special education who participated in the growth mindset program did not appear to benefit from it.

Contrary to the researchers' predictions, students in special education who received the growth mindset program reported beliefs about intelligence that were indistinguishable from their peers in special education who did not participate in the program.

Key Findings: Mathematics Tracking Analysis

Students across all three mathematics tracking levels benefited from the growth mindset program.

Students in developmental, general, and advanced mathematics courses who participated in the growth mindset program were less likely to report beliefs that intelligence and mathematics ability are fixed compared to their peers that did not experience this program. They also earned higher mathematics grades.

Students in remedial-level mathematics courses experienced an additional motivational benefit from the growth mindset program.

Although all three tracking levels benefited from the growth mindset program, students in developmental mathematics courses were the only group to more strongly endorse more motivationally optimal beliefs about mathematics underperformance following the program. That is, they were the only students to more strongly endorsed beliefs that effort and improving study strategies can improve mathematics performance.

Students who were tracked into advanced mathematics courses were less likely to report beliefs that intelligence in general – but not mathematics ability in particular – is fixed. They also performed better in mathematics compared to their peers in less advanced courses.

These differences emerged regardless of whether students participated in the growth mindset versus control condition and even after statistically controlling for preexisting

differences (e.g., incoming mathematics achievement) between students in advanced, general, and developmental mathematics courses.

Insights and Future Directions

The academic labeling analysis presents important insights about mindsets among students in special education. In particular, the growth mindset program was unsuccessful in improving mindsets for this population. This suggests that (a) the messages students are receiving about special education placement may reinforce maladaptive beliefs about the nature of intelligence and (b) growth mindset programs that are effective among other students may not translate to this population. For students in special education, it may be critical to emphasize, for example, that intelligence is malleable even if students believe disability status is not, and that appropriate accommodations are part of a strategic pathway for promoting intellectual growth. In future work, the researchers plan to continue investigating these possibilities along with unanswered questions that accompany these findings: why was the program unsuccessful for students in special education? Do these outcomes generalize to all 9th grade students in special education or vary based on student-, classroom-, or school-level factors?

The mathematics tracking analysis simultaneously presents concerning and promising implications for education practice. Regarding the former, this study suggests that students enrolled in developmental and general mathematics courses have more fixed beliefs about ability and earn lower mathematics grades than their peers in advanced mathematics courses. As a result, this finding raises the possibility that tracking may have negative consequences for students in less advanced mathematics courses. It will be important for future research to complement this correlational finding with experimental evidence, which could investigate the causal relation between mathematics tracking and mindsets. However, a more promising implication for education practice also emerged from the mathematics tracking analysis: the growth mindset program promoted more adaptive mindsets and performance across all three tracking levels – and students in developmental mathematics courses experienced an additional motivational benefit. This finding thus highlights the importance of emphasizing the malleability of mathematics ability and the benefits of persisting through challenges to promote motivation and performance in mathematics, especially for students in developmental mathematics courses.

Finally, comparisons across the labeling and tracking analyses revealed that a growth mindset program had unique consequences for two academically vulnerable populations: students placed in special education and students placed in developmental mathematics courses. This finding suggests that students with each of these labels may receive and internalize distinct messages. While placement in special education may be presented to students as more permanent and personal, placement in a developmental mathematics course may signal a more transient message about students' mathematics capabilities. That is, students may be more likely to interpret such a tracking decision as an indication of a more malleable characteristic, which may explain why it appears to be more amendable to a growth mindset program.

References

[1] Loveless, 2013.
[2] Yeager & Dweck, 2012.

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