

Mindsets and adolescent mental health

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Adolescents differ in their beliefs, or mindsets, about the nature and workings of their personal qualities. Here we present theory and data that show why changing adolescents' mindsets can lead to more productive coping with challenging situations and improved mental health.

Why do some adolescents relish challenges and persist in the face of obstacles, while others avoid challenges, withdraw or show impaired functioning in response to setbacks? This is the question that our research has sought to answer.

Decades of research have highlighted the role of students' mindsets in their seeking of challenges and their thriving amid setbacks¹. In our research, mindsets are beliefs about the nature and working of human attributes, such as intelligence or personality. We note that this definition differs from the colloquial definition of mindset, which refers to any attitude, preparatory set, or schema that people bring to a situation (for example, having a 'positive mindset'). Within the research, a fixed mindset is the belief that an attribute, such as intelligence, is a fixed trait that cannot be changed, while a growth mindset is the belief that the attribute can be developed through hard work, good strategies and help from others.

Here we show that mindset findings can provide information on the etiology of mental health symptoms as well as their prevention or treatment. More specifically, fixed mindsets have been related to less resilient responses to obstacles (for example, poorer performance and/or greater distress)^{2,3}, internalizing symptoms (for example, depression and anxiety) and externalizing ones (for example, aggression). Research has also revealed the cognitive, affective and psychophysiological mechanisms for those results²⁻⁴. In addition, brief mindset interventions have affected both academic and mental health outcomes over time⁴⁻⁸.

Based on these findings, we argue that growth mindset research raises the exciting possibility that scalable and cost-effective interventions for adolescent mental health are within reach and are valuable from a public health perspective. In the USA, the COVID-19 pandemic has led to the steepest decline in academic performance for adolescents in 50 years⁹, while also ushering in the highest-ever recorded levels of clinically elevated internalizing symptoms¹⁰. In this Comment, we discuss the potential of mindset research to contribute to improved adolescent achievement and mental health, and what it will take to fulfill that potential.

Understanding mindsets and how they work

People can have mindsets about many different attributes, such as intelligence (is it fixed or malleable?), personality or social status (can it be changed or not?), and even stress (is it always bad or can it be helpful?). Research has shown that the same person can have a different mindset about each attribute. Moreover, holding a growth mindset

does not mean denying differences between people, or believing that everyone can achieve any level of performance. A growth mindset simply refers to the belief that change and growth are possible under the right conditions (for example, with expert mentoring), no matter where one starts out.

Laboratory experiments, large heterogeneous correlational studies and meta-analyses have demonstrated that mindsets can create different meaning systems, in which the same events (for example, a challenge or a setback) are appraised as having different meanings depending on one's mindset^{1,3}. In a fixed mindset, challenges and setbacks risk judgments of low (permanent) ability. By contrast, in a growth mindset, challenges and setbacks are appraised as vehicles for learning and enhancing abilities. It is through these more positive appraisals of challenge that the mindsets can predict and create improved or impaired motivation, affect and performance.

A novel idea: short scalable interventions

With increasing evidence from careful laboratory experiments, an important question arose: can we change students' mindsets, and will these changes result in enhanced performance? Early programs (also called 'interventions') taught a growth mindset using intensive face-to-face workshops. Although the effects were promising, the interventions were lengthy and costly. We therefore sought to create a short, self-administered, computer-based program that could be distributed widely at minimal cost (Fig. 1b, c). The program aimed to increase students' achievement, especially that of lower-achieving students, and to do so at scale.

In 2014 we launched a randomized trial, called the National Study of Learning Mindsets (NSLM), to evaluate the short (<50 minute) online mindset program⁵. It used a nationally representative sample of over 12,000 9th grade US students who were making the difficult transition to high school⁵. The program taught participants about the plasticity of the adolescent brain, and in that context, the idea that when they did something hard in school and stuck to it, their brains formed new or stronger connections. In this way, over time, they could increase their abilities. Adolescents also completed several compelling exercises that allowed them to apply the message and make it their own. Nothing further was administered to students or their teachers. To increase confidence in the NSLM's conclusions, all of the hypotheses and analyses were pre-registered and the sample selection, recruitment, data collection, data processing and independent data analyses were performed by third-party research organizations.

The NSLM results⁵ showed that the short, scalable growth mindset program delivered early in 9th grade (1) improved grade point averages at the end of the 9th grade year for the pre-registered target group of lower-achieving students (compared with an active control group); (2) increased advanced course-taking in 10th grade math across achievement levels; and (3) increased, four years later, the number of students from under-represented racial and ethnic minority groups who were graduating from high school with a college-ready portfolio of courses (for example, advanced math and science). Given the brevity of the program and the heterogeneity of the sample, the effects were, of course,

a How mindsets affect mental health



b Overview of a mindset intervention

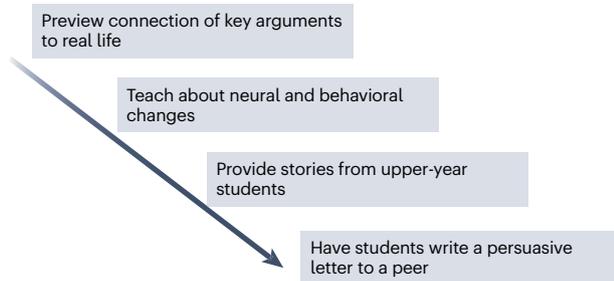


Fig. 1 | Mindsets, mindset interventions and mental health. **a**, Mindsets are beliefs about the nature and working of human attributes. They can lead to more positive or negative appraisals of challenges (for example, attributing difficulty to temporary and changeable factors rather than internal, stable factors) and more resilient coping responses (for example ‘challenge-type’ rather than ‘threat-type’ stress responses)¹. Negative appraisals can also accumulate consequences for mental health problems, including depression and anxiety. **b**, Actionable messages about change are offered to students in self-administered, online programs that are rooted in social psychology, including providing relevance

modest. But the effects were meaningful and they compared highly favorably to the typical results for educational interventions (even long and costly ones) with multiply determined, real-world outcomes that unfold over time⁵.

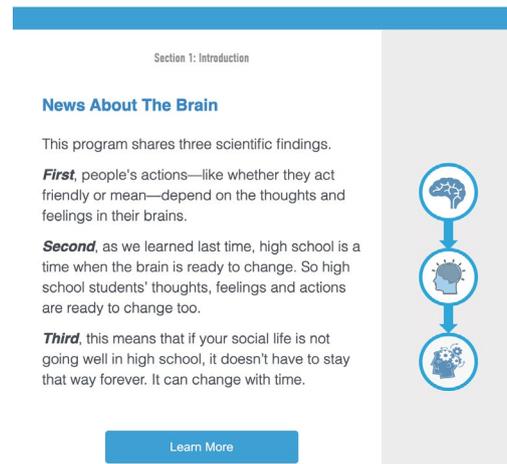
What about mental health?

The reasons that fixed mindset thinking can be so pernicious for mental health are well-known to clinical psychological scientists. These include (1) attentional biases (for example, an increased focus on threat); (2) fixed-trait attributions, also called ‘all or nothing thinking’ (for example, ‘This failure means I’m dumb’, ‘This rejection means I’m a loser’); and (3) threat-type stress appraisals (‘I don’t have the resources to overcome these stressful demands’). Given this, could a growth mindset intervention also have beneficial effects on mental health?

As a means for preventing the onset of mental health problems during the challenging transition to high school, in 2010, we began to develop a one-session self-administered growth mindset program for adolescents that aimed to improve coping with social difficulties (such as peer exclusion or bullying). We taught adolescents a growth mindset of personality – the idea that our behaviors are a product of the thoughts and feelings that live in our brain and that they have great potential for change⁶. Students then learned that social setbacks early in high school do not mean permanently bad things about them and do not foretell a future doomed to isolation and loneliness. Finally, they heard testimonials from older students who had successfully used a growth mindset to help themselves deal with social setbacks, and they engaged in exercises that helped them internalize and apply the message.

With this program, we then evaluated the potential for the growth mindset of personality intervention to serve as a universal preventive

c The introduction to the growth mindset intervention



to real-world problems, credible scientific authority, descriptive norms and exercises to internalize the messages¹. **c**, A screen capture from the introduction to a growth mindset intervention. It seeks to reduce fixed mindset thinking, for example by explaining how people’s behaviors and qualities can be changed⁶. Critically, we note that the majority of growth mindset interventions were developed prior to the COVID-19 pandemic and many other recent societal changes. Therefore, the material in the interventions may well need to be revised to retain its effectiveness in a changing culture.

program for mental health problems. Such programs delay or prevent the onset of normative increases in mental health symptoms in broad populations, regardless of participants’ prior mental health status. Across three randomized, controlled, double-blind trials⁶, totaling 598 9th grade students, the growth mindset program led to a 36% relative reduction in the onset of clinically significant symptoms of depression over the 9-month school year, as assessed by the Children’s Depression Inventory (short form). This effect was stronger for students who previously reported more of a fixed mindset. These findings were later confirmed in a comprehensive meta-analysis¹¹.

How could a short mindset treatment have long-lasting effects without any further reinforcement of the messages from experimenters or adults? A pre-registered replication¹² with over 1,000 9th grade students and over 10,000 daily diary responses showed that the growth mindset of personality treatment changed the meaning of daily stressors. On days characterized by intense social-evaluative threat, treated adolescents showed less of a threat-type appraisal and less negative effect. That is, the growth mindset treatment caused adolescents to respond to challenges resiliently¹². This greater resilience helps to offset the effects of stressors on longer-term mental health.

Targeted growth mindset treatments for depressed and anxious youth

Even before the COVID-19 pandemic, most adolescents who needed mental health treatments went without them. Even among those who were able to access care, many discontinued too soon – often after only one session – and many failed to receive empirically validated treatments⁷. Could a version of growth mindset programs be effective with clinical populations who cannot access conventional therapy?

To find out, Schleider and Weisz revised the program developed for the Yeager et al. research and aimed it more directly at clinical populations. In an initial pilot study, they compared a single-session growth mindset program to an active control group and found that the program reduced depressive symptoms by .32SD at 9-month follow-up⁷. Similar findings emerged in an international replication study⁸ and in a large replication trial conducted during the COVID-19 pandemic. Schleider and colleagues recruited a large and diverse nationwide sample of 13–16 year-old adolescents, and found that the single-session online growth mindset program alleviated depressive symptoms at 3-month follow-up, and these effects were of the same magnitude as the only other successful single-session intervention for depression – ‘behavioral activation’, which aimed at boosting engagement in valued and enjoyable activities⁸. Only the growth mindset program, however, showed significant effects for anxiety symptoms and for COVID-related trauma.

Combining mindsets

Growth mindset interventions, with their messages about the potential for change, encourage people to embrace the opportunity to solve the social or academic challenges they face, rather than avoid them. Yet, when adolescents approach these challenges, they may inevitably experience stress. If they appraise this stress negatively and feel overwhelmed by it, they may then have trouble putting their growth mindsets into action.

Armed with this insight, we recently combined the growth mindset of intelligence message with a second message that encouraged adolescents to put their growth mindsets into action in highly stressful situations⁴. That is, in addition to conventional growth mindset messages, participants in some conditions also learned that stress was in fact an adaptive response that could prepare you to act more effectively. It can do this, for example, by bringing oxygenated blood to your brain. Across six studies in the field and in the laboratory, including two longitudinal randomized trials conducted during the COVID-19 pandemic, our team found that this ‘synergistic’ mindset improved adolescents’ stress-related appraisals, daily cortisol levels, reports of general anxiety symptoms and an index of academic success⁴. The synergistic mindsets showed the greatest benefits for stress physiology and anxiety symptoms among adolescents who showed the greatest risk factors for mental health problems at baseline. To date, only mindsets about intelligence and stress have been combined synergistically. Future work will need to examine synergies between mindset beliefs about other personal qualities (for example, personality) and affective experiences (for example, loneliness and anger) to assess effects on other internalizing and externalizing mental health challenges.

Caveats

The effects of a single-session, self-administered mindset program on mental health symptoms are replicable but modest in size on average, and mindset programs alone are not a replacement for traditional therapies. These modest effects are nevertheless meaningful because (1) they tend to be larger for adolescents who are the most vulnerable to developing depression or anxiety symptoms; and (2) the programs are light touch, low-cost, and have the potential to reach entire populations of adolescents, far beyond the reach of individual therapists.

Several caveats bear mentioning, however. Most notably, mindset programs have been carefully crafted and extensively tested with certain broad populations in mind (for example 9th grade students attending US public schools) and they need to be carefully tailored and

tested when they are adapted to populations of different ages, from different subgroups or in different nations¹. Further, a growth mindset message about change must be realistic and persuasive; it cannot imply an extreme view that anyone can change any personal quality quickly, or that one’s experiences or circumstances are not meaningful factors in their current or future well-being^{4,6}.

Another caveat is that the effects of the interventions are heterogeneous^{5,11}. For example, they depend critically on the opportunities (or affordances) in the environment for adolescents to put the intervention message into practice. Future mindset research will seek to directly examine – and eventually influence – the sources of heterogeneity (such as environmental supports in classroom environments for students’ growth mindset behaviors), which may lead to more enduring treatment effects for larger populations^{5,11}.

Conclusions

In closing, we emphasize that mindset scholars are still at an early stage of developing effective mental health interventions for adolescents. And yet, considering the constraints on the availability and costs of conventional therapies, it is especially important now to pursue the possibility that short, universal, scalable and empirically validated treatments can help prevent the well-documented increases in mental health problems during adolescence. We hope that continued research on well-designed, scalable and rigorously tested programs can help more adolescents to maintain the mental health they need to participate in and contribute to our society.

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Author contributions

D.S.Y. and C.S.D. jointly conceived of and wrote the article.

Competing interests

The authors declare no competing interests.