WHEN WILL PEOPLE OPT IN

A Growth Mindset Frame Increases Opting In to Reading Information About Bias

Mary C. Kern*
Baruch College
55 Lexington Avenue
New York, New York 10010
Phone: 646.312.3673

Aneeta Rattan
London Business School
Regent's Park, Sussex Place
London NW1 4SA UK
Phone: +44 7000 8907

Dolly Chugh
New York University Stern School of Business
44 W. 4th Street, KMC 7-55
New York, New York 10012
Phone: 212.998.0250

*Corresponding author

Note. Study and analysis plans for Studies 1c-1g, 2, and 3 were pre-registered and a link to these is provided in the overview of studies; however, Studies 1a and 1b were not pre-registered due to having been conducted before this was a normative practice.

Word Count: 9,229

Abstract

We explore the conditions under which people will opt in to reading information about bias and stereotypes, a key precursor to the types of self-directed learning that diversity and anti-bias advocates increasingly endorse. Across 1 meta-analysis (total N = 1,122; 7 studies, 5 pre-registered) and 2 pre-registered experiments (total N = 1,717), we identify a condition under which people opt in to reading more about implicit bias and stereotypes. People randomly assigned to read a growth, rather than fixed, mindset frame about bias opted in to read more information about stereotypes and implicit bias (Study 1, Study 3). The mechanism that drove these effects was individuals' construal of the task as a challenge (Studies 2-3). Our findings offer insight into how to promote voluntary engagement with information about stereotypes and biases. We discuss how this work advances the study of mindsets and diversity science.

Keywords: mindsets, implicit bias, diversity, bias

A Growth Mindset Frame Increases Opting In to Reading Information About Bias

Major organizations and institutions globally are encouraging their employees to learn more about sexism and racism. While earlier industry engagement with diversity issues led to widespread diversity training, research has found that the effectiveness of some mandatory trainings can be muffled by backlash, anger, and resentment (Chang et al., 2019; Dobbin & Kalev, 2016; Kulik et al., 2007). Voluntary approaches to learning about diversity and bias thus become critical–indeed, individuals who opt in to diversity training are more favorable toward it (Bezrukova et al., 2016). Moreover, whether mandatory or voluntary, training people to better understand the dynamics of bias in the workplace can have positive effects on behavior (Bezrukova et al., 2016). More recently, following the global #MeToo and #BlackLivesMatter movements, there is further encouragement from advocates for diversity and anti-bias efforts for people to go beyond formal trainings to voluntarily explore the topics of bias against women and minoritized groups (Stephens et al., 2020). But how do we foster people's curiosity in such a way as to encourage them to voluntarily learn more about bias?

We build upon the longstanding study of prejudice reduction in social psychology (e.g., Paluck et al., 2021) and connect it to the established literature on mindsets (also known as self-theories, implicit, or lay theories, Dweck, 1999) to investigate the question of how to encourage voluntary reading about stereotypes and implicit bias. When one construes a task as a challenge, this represents a "perceived opportunity for mastery, growth, or gain" (Lazarus, 1991; Lazarus & Folkman, 1984). Given this, we focus our investigation on identifying a framing message that would prompt a challenge construal, and thus motivate individual reading, even when individuals have just been exposed to potentially self-threatening information about their own biases (as would happen in diversity training or "challenging conversations" now common in

organizations). The focal framing message we test draws on the study of self-theories in social psychology to propose that mindsets about the malleability of prejudice and bias (Carr, Dweck, et al., 2012; Neel & Shapiro, 2012) can be used to frame opportunities to learn about bias as a challenge, thus motivating people to voluntarily read more about bias.

Mindsets

Mindsets are a well-studied motivational self-schema (Dweck, 1999). Mindsets describe lay people's beliefs about the malleability versus fixedness of human characteristics over time (Dweck, 1986). People who fall on the side of believing that a characteristic (e.g., intelligence, personality, or bias and prejudice) cannot be changed are described as holding a fixed mindset, or entity theory. People who fall on the side of believing that the characteristic can be changed are described as holding a growth mindset, or incremental theory. People range in their beliefs along a continuum from the fixed to growth mindset, though these terms are used to efficiently describe (not to classify) people toward either end of the belief spectrum, and an individual's beliefs can differ across domains (Dweck & Leggett, 1988; Dweck & Yeager, 2019). Decades of research reliably shows that mindsets about the malleability of intelligence (Blackwell et al., 2007; Broda et al., 2018; Ehrlinger et al., 2016; Yeager et al., 2016) and personality (Chiu et al., 1997; Levy et al., 2001; Madan et al., 2019; Rattan & Dweck, 2010; 2018) can shape people's goals, perceptions, and behavior in academic and social situations (Burnette et al., 2020). Mindsets are at the core of people's sense-making processes, and emerge to differentiate behavior in the context of challenge or difficulty. In this way, mindsets function to create the motivational foundations for people's responses to information, experiences, and feedback.

Mindsets as a Motivational Lever for Voluntarily Reading About Bias

More recently, research has extended the study of mindsets to intergroup interactions related to diversity (for reviews, see Carr, Rattan, et al., 2012; Rattan & Georgeac, 2017; Rattan & Ozgumus, 2021) as well as to the study of mindsets within the domain of prejudice itself (Carr, Dweck, et al., 2012, Neel & Shapiro, 2012). For example, a growth mindset about personality–the belief that people can change their personality over time–has been shown to increase minoritized groups' and women's willingness to directly address a peer's biased comment (Rattan & Dweck, 2010) and coping thereafter (Rattan & Dweck, 2018) compared to a more fixed mindset about personality–the belief that personality is fixed and unchanging. Growth mindsets about personality also reduce people's likelihood of stereotyping others (Chiu et al., 1997; Levy & Dweck, 1999; Levy et al., 1998), their willingness to help outgroups (Hoyt & Burnette, 2013; Levy & Dweck, 1999), and their willingness to engage in reconciliation behaviors (Goldenberg et al., 2018; Halperin, 2011; Saguy & Halperin, 2014).

Our work draws on and extends a related but nascent field of study, mindsets about whether bias is fixed or malleable (Carr, Dweck, et al., 2012; Neel & Shapiro, 2012). This work conceptualizes intergroup interactions around issues of bias as inherently challenging performance situations and theorizes that a growth mindset about prejudice invokes a learning-orientation among individuals, while a fixed mindset about prejudice invokes a performance-orientation instead. Indeed, this research shows that people with a more growth (relative to fixed) mindset about prejudice exhibit more comfort (relative to anxiety) when engaging in challenging interactions with outgroup members, and more (relative to less) interest in enrolling in university courses on topics related to race and diversity (Carr, Dweck, et al., 2012; Neel & Shapiro, 2012). In this way, past work has found that mindsets about prejudice parallel mindsets about

intelligence, in terms of fostering learning versus performance orientations and engagement versus withdrawal behaviors. This past work showed that people's beliefs about the malleability of bias and prejudice are naturalistically occurring and can be measured, and also that these beliefs can be shaped by compelling messages focusing on either the malleability or the fixedness of these biases (Carr, Dweck, et al., 2012; Neel & Shapiro, 2012).

In the current work, we extend the study of mindsets about the malleability of prejudice to test whether mindsets can be used as an informational frame to promote desired behavior (Tversky & Kahneman, 1981). Specifically, we explore mindset framing as a lever that can activate engagement in the moment (also see Hennes et al., 2018), rather than seeking to shift people's individually-held beliefs (as studied in Carr, Dweck, et al., 2012; Neel & Shapiro, 2012). Further, our work extends from the past research that has studied responses to intergroup interactions (e.g., a cross-race conversation about diversity, sitting in a college course about race), to explore prejudice mindsets in response to intergroup information–explanations about the nature of people's own biases, which people can choose to read, or avoid, without direct observation or strong social desirability pressures. Finally, we extend the mindsets literature by going beyond investigating people's behavioral intentions (Carr, Dweck, et al., 2012) to study an actual learning-oriented behavior–how much people voluntarily read information about bias and prejudice. Consistent with past work (Carr, Dweck, et al., 2012; Neel & Shapiro, 2012), we theorize that a growth mindset engenders greater engagement, operationalized as reading more information about stereotypes and implicit bias, relative to a fixed mindset. Specifically, we hypothesize that a growth (vs. fixed) mindset framing message will be associated with opting in to be exposed to (vs. opting out of being exposed to) more information about the nature of implicit bias and stereotypes.

H1: A growth mindset framing message will increase opting in to read information about implicit bias and stereotypes compared to a fixed mindset framing message.

Challenge as a Mechanism

Further, our research explores multiple possible mechanisms which derive from past scholarship on mindsets but have not yet been studied in the context of mindsets about prejudice. We argue that with a growth mindset framing message, participants will construe this learning situation as a positive challenge and fully engage in the opportunity to learn more by reading more information about bias and stereotypes. In contrast, with a fixed mindset framing message, participants will not construe this performance situation as a challenge, and thus self-protectively seek to disengage by not reading more information about bias and stereotypes. We base these predictions on past research in the domain of mindsets about intelligence, suggesting further that mindsets about prejudice may exhibit patterns consistent with this previously well-studied domain. For example, growth, relative to fixed, mindsets about intelligence have been shown to invoke more of a sense of challenge among students, and challenge is an affective precursor to the cognitive processes of goal setting and the engagement of effort in learning contexts among individuals experiencing performance difficulties (Diener & Dweck, 1978; Dweck & Leggett, 1988; Dweck & Yeager, 2019; Rege et al., 2021). Extending this potential mechanism to the context of mindsets about prejudice, we test whether a growth (relative to fixed) mindset framing message might similarly invoke the experience of challenge among individuals who are reading potentially self-threatening information about implicit bias and stereotypes, thus promoting opting in to read more about stereotypes and implicit bias.

H2: A growth mindset framing message will foster greater perceptions of challenge compared to a fixed mindset framing message.

H3: Challenge construal will mediate the effect of a growth (vs. fixed) mindset framing message on opting in to reading information about implicit bias and stereotypes.

We also explored three potential alternatives. The second potential mechanism was threat, which we drew from research indicating that fixed mindset messages in academic environments can be threatening to students (Canning et al., 2022; Good et al., 2012; Lacosse et al., 2021). When presented with potentially self-threatening information about their biases, participants might construe the situation as threatening, particularly after reading a fixed mindset framing message (McGregor & Elliott, 2002). If that were to be the case, then people in the fixed (vs. growth) mindset framing condition might read less not because of lower challenge perceptions as we hypothesize, but instead due to higher threat perceptions.

The third potential mechanism was defensiveness, which has been explored separately in both mindset and implicit bias research. Following negative feedback, individuals induced to believe that intelligence is fixed (vs. malleable) engaged in more defensive strategies, rather than remediation strategies (Nussbaum & Dweck, 2008). Defensiveness has also been explored in people's responses to information about their implicit and explicit intergroup attitudes (Howell et al., 2015) and in interventions designed to enhance bias awareness (Vitriol & Moskowitz, 2021). Indeed, an intervention which reduced people's sense of moral threat and increased their sense of efficacy in controlling their biases led participants to feel less defensive about feedback and exhibit heightened bias awareness than simply receiving feedback about their biases (Vitriol & Moskowitz, 2021). Given that both research on mindsets and research on responses to implicit bias feedback show links to defensiveness as a process, it is possible that a growth (vs. fixed) mindset reduces defensiveness (rather than increasing challenge as we hypothesize) and thus promotes reading more.

Finally, a fourth exploratory mechanism was emotion regulation. Recent research has linked mindsets and self-regulation (Mrazek et al., 2018). Given that receiving information about one's biases may generate affective reactions (Hahn & Gawronski, 2019), people's emotion regulation processes may come into play. If the growth (vs. fixed) mindset frame invokes more effective emotion regulation in response to the upsetting reality of one's biases, then this could represent an alternative process by which the mindset frame promotes reading about bias. Thus, we tested our hypothesized mechanism (challenge) and two alternatives (threat and defensiveness) in Studies 2 and 3; we tested an additional alternative (emotion regulation) in Study 3.

A Question of Moderation

We also test a potential moderator of the effects we describe above. This moderator was less theoretically driven than observationally–our initial studies (Studies 1a, 1b, and 1c) were focused on the impact of mindset only. However, in shifting from a minimal framing manipulation to a previously validated mindset manipulation in Studies 1d, 1e, and 1f we removed one sentence from the previous materials that we realized could represent a confound–a reminder that individual biases and stereotyping contribute to broad societal inequalities–and the previously observed effects were not replicated. For this reason, we began to test a mindset by reminder moderation in Study 1g, to evaluate whether a reminder about the link between individual biases and societal inequalities might activate the growth mindset to promote challenge and thus more reading (cf. Chao et al., 2017; Rattan & Dweck, 2018). Across the 7 individual studies we present in the Study 1 meta-analysis, we found consistently inconsistent results. These inconsistencies inspired us to present Study 1 as a meta-analysis, as well as shift methods and pre-register a competing hypothesis to Hypotheses 1-3 listed above. While this

moderation of mindset by reminder is tested across studies, the weight of our empirical evidence does not fall in favor of the competing hypothesis.

Overview of Studies

Our approach in this manuscript is to disclose, as fully as possible, the scientific and empirical odyssey this research took us on. We test the 3 primary hypotheses (H1, H2, H3) plus the competing hypothesis (of mindset moderated by reminder) across 1 large study relying primarily on student samples and 2 well-powered studies using samples of working professionals. Study 1 was composed of Studies 1a-1f, which tested for the main effect of mindset, with and without the reminder, and Study 1g, which systematically manipulated both a mindset framing message (using the validated manipulation) and a reminder linking individual biases to social issues. Across Study 1, our focal outcome variable was how much information about bias participants chose to read voluntarily.

Study 2 took an experimental approach to examining the mechanism (Pirlott & MacKinnon, 2016). In addition, Study 2 used a different introduction to implicit bias. Instead of participants completing an IAT and receiving feedback on their implicit bias (which is not typical in most organizational diversity trainings), we introduced participants to the idea of implicit bias via a riddle that evoked a gendered assumption. After this induction of the experience of implicit bias, participants were randomly assigned to the mindset framing message manipulation and the reminder manipulation. We then measured our hypothesized mechanism of challenge, as well as two of the alternative mechanisms, threat and defensive responding. Finally, Study 3 followed the same general methods of Study 2 with the addition of the focal dependent variable, our measure of the amount of information about bias participants read. We operationalized this as the number of pages participants chose to read in a FAQ about implicit

bias and stereotypes, as we did in Study 1. Study 3 again tests our hypothesized mediator of challenge and also the exploratory mechanisms of threat, defensive responding, and emotion regulation. See https://osf.io/ctvn5/?view_only=89dcb4dc7dca4c7a9c929b8c5c654874 for pre-registrations, study materials, analysis syntax, and data. All manipulations, measures, and exclusions are reported below or in the SOM.

Our research adds a novel approach to the tradition of prejudice reduction research in social psychology (Paluck et al., 2021), focuses on differences in behavior (rather than intentions), and extends the study of mindsets about prejudice to the use of mindsets as an informational frame. Moreover, our research advances the study of intergroup relations by addressing, with rigorous, controlled methods, an emergent and pressing challenge: how to create the conditions under which people will opt in to engaging with information about bias, instead of hoping that some individuals naturally want to learn about implicit biases, and accepting that others do not.

Study 1: Meta-Analysis of Studies 1a-1g

All studies that are included in Study 1 use the same basic methods to test Hypothesis 1, though they vary in sample size, source, and specific details. Because this series of 7 studies offered inconsistent results, we followed field recommendations (Eisenhauer, 2022; Goh et al., 2016) to represent the results in the most reliable way possible and in line with the highest standards of open science–by meta-analyzing the studies–rather than relegating this work to a file drawer.

Methods

Participants

Table 1 provides summary demographic and study characteristics of all seven studies (N = 1,122 participants). We focused solely on the conditions within these studies where mindset frame was manipulated (we excluded the control and pure reminder conditions in Studies 1a and 1b as they did not recur across studies and thus could not be meta-analyzed).

Task and Procedure

We describe the general procedure across studies here. More detailed study-by-study descriptions are in the SOM, along with additional Study 1g measures. After informed consent and completing some demographic measures, participants completed an IAT (either race or gender, Greenwald et al., 1998) either through a link to Project Implicit at www.implicit.harvard.edu or via a privately hosted link to millisecond.com with a university license. After receiving and reporting their result, they completed an attention check and were then randomly assigned to a mindset framing message.

Mindset

In Studies 1a-1c, the fixed [growth] mindset condition was a variation of the following statement: "The latest and best scientific research on bias shows that people's stereotypes are fixed [malleable]. That is, people's stereotypes cannot [can] change." In Studies 1d-1g, participants read an article manipulation established in past research (from Carr, Dweck, et al., 2012), which we pretested.[1] In each condition, participants read a two page article about the

[1] Pretest. N=49 undergraduates who received course credit. Participants were randomly assigned to read the materials for either the fixed or growth mindset conditions. They responded to

relevant mindset, e.g., fixed mindset condition: "Bias tends to set like plaster and does not really change in meaningful ways again," "Bias, once acquired, is relatively fixed and stable over time." e.g., growth mindset condition: "At almost any time in people's lives, with enough effort, a desire to change, and the right experiences, their biases can be reduced," "Bias is not a fixed trait…it is not cast in stone." Following the standard method used in experimental studies of mindsets, participants were told we were testing the article for clarity, content, and length and answered questions on this.

Reminder

In Studies 1a, 1b, and 1f this reminder statement was embedded within the manipulation of mindset: "Research shows that bias and stereotypes contribute to serious inequalities in society today." In Studies 1c, 1d, and 1e, the reminder was not included in the study. In Study 1g, the reminder was manipulated such that this statement was either present or absent. Participants in the "no reminder" condition were not shown anything and went directly onto the next measure.

---

questions about comprehension, clarity, and length, followed by "After reading the article, how much do you think bias is changeable?," "How much do you agree with the main point of the article you just read?" and "In your opinion, is it difficult to bring about change in bias?" on scales from 1 (definitely not/not at all) – 7 (extremely/definitely). There were no differences in means, except as expected on the manipulation check question of "how much do you think bias is changeable" (growth mindset condition: $M = 5.500$, $SD = 1.334$, 95% CI [4.961, 6.039]; fixed mindset condition: $M = 3.696$, $SD = 1.295$, 95% CI [3.136, 4.256], $F(1,47) = 22.950$, $p < .001$, Cohen's $d = 1.372$).

Dependent Measure

On the next page participants read “the following screens include answers to frequently asked questions about the Implicit Association Test (IAT) and implicit stereotypes.” Participants were given the option to click to 'continue ' to read more or to ‘exit.’ Eleven pages followed, with one question and answer about the IAT and/or implicit stereotypes per page. On each page participants elected to continue to read more information about the IAT and implicit stereotypes, or to exit the study.

Measures

IAT

Participants self-reported their IAT result by choosing from 8 options ranging from -3 (“Strong automatic association of male with science and female with liberal arts”) to 0 (“no preference”) to 3 (“Strong automatic association of female with science and male with liberal arts”), plus “did not receive a result.” Participants were excluded if they reported not receiving a result.

Attention Check (IAT)

Participants indicated which did not appear in the IAT: examples of relatives (e.g. grandma), scientific disciplines (e.g. astronomy), or female names (e.g. Mary). If incorrect, they were excluded from further analysis.

Attention Check (Mindset Article: Studies 1d-1g)

Participants reported how strongly they agreed with two statements (“The article was easy to understand” and “The text was clear on the computer screen”) on scales from 1 (strongly agree) to 7 (strongly disagree).

Pages Read

We operationalized the dependent measure as a continuous measure reflecting the number of pages (ranging from 0 to 11).

Results

We conducted an internal meta-analysis with reminder as a moderator using CMA Version 3 (Borenstein et al., 2013). In support of Hypothesis 1, participants in the growth mindset framing condition read more pages than participants in the fixed mindset framing condition, $d = 0.139$ ($SE = .066$), 95% CI [.008, .269], $Z = 2.088$, $p = .037$.

To test the alternate competing hypothesis that the mindset framing message would interact with the reminder, we conducted subgroup analyses based on whether there was a reminder or not. Participants in a growth mindset frame condition read more pages than those in a fixed mindset frame condition when reminded of the societal impact, $d = 0.311$ ($SE = .089$), 95% CI [.137, .485], $Z = 3.508$, $p < .001$ ($d = 0.311$, 95% CI [.137, .485]. There was no significant effect of mindset when the reminder was absent, $d = -0.013$ ($SE = .081$), 95% CI [-.171, .146], $Z = -.159$, $p = .874$.

Discussion

Study 1 indicates that a growth mindset frame can reliably increase people's voluntary consumption of information about bias, compared to a fixed mindset frame. We also found evidence that this effect is particularly strong when people are simultaneously reminded that individual biases relate to societal inequalities. Given this result, we again tested the competing hypothesis in the next studies.

Study 2

Methods

Participants

We ran a power analysis using G*Power 3.1.9.2 (Faul et al., 2007) and based on the results in Study 1g determined that we needed 664 participants to achieve power of .80 with alpha error probability at .05 in this 2 (mindset: fixed vs. growth) X 2 (reminder: present vs. absent) between-subjects design. Based on the earlier studies, we anticipated a 25-30% rate of failing the manipulation checks and so we recruited 1,079 participants from a paid participant pool. In order to participate, participants had to be employed full-time, reside in the U.S., and be fluent in English. We excluded participants who failed the mindset (60) and/or reminder (167) manipulation checks and who did not provide a response to the story prompt (23), resulting in 862 (427 self-identified woman; 413 man; 8 non-binary/gender queer; 4 trans; 1 non-binary man; 2 non-binary woman; 1 non-binary trans man; 1 trans man; 2 trans woman; 1 non-binary trans woman; 3 preferred a different term; M_{age} = 37.78 years, SD = 11.392; participants could select multiple racial/ethnic identifications: 71 Asian/Asian American, 47 Black/African American, 40 Hispanic/Latino/Latina American, 3 Middle Eastern (Arab) American, 5 Native Hawaiian/Pacific Islander, 685 White, and 29 Multiracial). There was no difference in attrition based on condition, $\chi^2(3) = 1.247$, $p = .742$.

Task and Procedure

Implicit Bias

In order to make their implicit bias salient, we presented participants with a story that has been well-established in research (Belle et al., 2021) and is used in diversity training to illustrate gender bias. Participants read, “A father and son are in a horrible car crash that kills the dad. The

son is rushed to the hospital; just as he's about to go under the knife, the surgeon says, "I can't operate–that boy is my son!" and were asked "Please explain what happened in the scenario, below:" with a free response text box.

On the next survey page, participants were re-presented with the story and asked if they, "even for a moment, struggle[d] to explain how the dad could be killed in the car crash and yet the surgeon says "the boy is my son" with the response options of "Yes, I struggled for just a moment before I realized that the surgeon is likely to be the boy's mother (or a second father)."; "Yes, I struggled and did not come to the realization until just now, reading the statement above, to understand that the surgeon is likely to be the boy's mother (or a second father)."; "No, I did not struggle because I have heard the riddle before but I can recall the first time I heard it having a moment of struggle with the answer."; "No, I did not struggle to answer because it was obvious that the surgeon is likely to be the boy's mother (or a second father)."[2] To emphasize the link between participants' response to the story and implicit bias, participants then read an explanation of why even a moment of struggle with the scenario illustrates implicit bias.

Mindset Manipulation

Participants were randomly assigned to the growth or fixed mindset framing condition, using the two page article manipulation from Studies 1d-1g.

Reminder Manipulation

Participants then received the reminder of serious inequalities manipulation, which was the same as Study 1g.

[2] We ran exploratory analyses in both Studies 2 and 3 excluding participants who report no struggle, and the results were consistent with these results.

Participants then completed the dependent measures of challenge, threat, and defensiveness, the reminder manipulation check, the mindset manipulation check, and some demographic questions.

Measures

Article Clarity. Participants reported on the clarity and complexity of the article with two questions ("How clear was the article?" and "How complex was the vocabulary of the article?") on 6 points scales ranging from "not at all" to "extremely".

Challenge Construal. We adapted two items measuring challenge construal (Elliot & Reis, 2003; McGregor & Elliot, 2002). "I view the IAT as a positive challenge" and "I think the IAT represents a positive challenge to me" (scale: 1 "not at all true of me" to 7 "very true of me," $\alpha = .956$).

Threat Construal. An alternative to our proposed mechanism of challenge could be differences in threat as a function of mindset. While we did not expect this to be the case, we tested this reasonable alternative by adapting two items measuring threat construal (Elliot & Reis, 2003; McGregor & Elliot, 2002). "I view the IAT as a threat" and "I think the IAT represents a threat to me" (scale: 1 "not at all true of me" to 7 "very true of me," $\alpha = .964$).

Defensive Responding. Participants responded to four questions adapted from Vitriol and Moskowtiz (2021) on a 7 point scale from "not at all" to "extremely": "In your opinion, how credible is the IAT; how objective is the IAT; how valid are the results of the IAT; how useful is the IAT for understanding people's attitudes about gender and careers" ($\alpha = .938$). Higher scores indicate less defensiveness about the IAT.

Manipulation Checks

Reminder. Participants reported if this sentence "Research shows that bias and stereotypes contribute to serious inequalities in society today" appeared after the prompt to "Read this sentence." Participants responded "Yes, the sentence…appeared" or "No, I did not see this sentence".

Mindset. Participants reported the "main point of the article" as "Bias is not a fixed trait," "Bias, once acquired is relatively fixed and stable," "Dr. Stacy Conwell's research is focused on healthy living," or "None of the above."

Participants were excluded from analysis if they failed either manipulation check.

Results

Post-article Questions. As expected, there were no differences based on mindset on clarity of the text ($F(1, 860) = .258$, $p = .611$) or complexity of the vocabulary ($F(1, 860) = .053$, $p = .819$). See Table 2 for all descriptive data.

To test Hypothesis 2, we conducted ANOVAs with mindset, reminder, and their interaction on each dependent variable.

Challenge Construal. The main effect of mindset was significant ($F(1, 858) = 15.366$, $p < .001$, $\eta_p^2 = .018$) such that those in a growth mindset reported viewing the IAT as more of a positive challenge (M = 5.241, S.D. = 1.402) than those in a fixed mindset (M = 4.843, S.D. = 1.553). There was no main effect of reminder ($F(1, 858) = 0.012$, $p = .912$) or interaction ($F(1, 858) = 2.318$, $p = .128$) on challenge construal.

Threat Construal. There were no main effects or interaction on threat construal, mindset main effect ($F(1, 858) = .882$, $p = .348$), reminder main effect ($F(1, 858) = .647$, $p = .421$), mindset X reminder interaction ($F(1, 858) = 1.330$, $p = .249$).

Defensive Responding. The main effect of mindset was significant ($F(1, 858) = 8.535$, $p = .004$, $\eta_p^2 = .010$) such that those in a growth mindset reported less defensiveness about the IAT (M = 4.971, S.D. = 1.320) than those in a fixed mindset (M = 4.716, S.D. = 1.249). There was no main effect of reminder ($F(1, 858) = 0.203$, $p = .652$) or interaction ($F(1, 858) = 0.046$, $p = .830$) on defensive responding.

Discussion

In this study, participants in the growth mindset condition reported feeling more challenge than those in the fixed mindset condition, supporting Hypothesis 2. As expected, no differences emerged for the alternate potential mechanism of threat. However, complementing the work of Vitriol and Mozkowitz (2021), the growth mindset manipulation generated less defensiveness about the IAT, which was perceived as more credible, valid, objective, and useful relative to when participants were in the fixed mindset condition. As a result, we retain defensive responding as a potential alternative mechanism. Notably, we found no interaction of mindset and reminder in this study, contradicting Study 1. Given the conflicting evidence, we again tested for this possibility in Study 3.

Study 3

Study 3 was designed to offer a replication and extension of Study 2. Our core goal in this work is to examine whether mindsets, alone or in conjunction with a reminder of how individual biases relate to systemic biases, shape people's willingness to learn more about their biases. Our theory, supported by Study 2, is that a growth (vs. fixed) mindset induces a sense of challenge which would promote reading more about bias. Thus, to replicate and extend these findings, pre-registered Study 3 used parallel methods but added the behavioral measure used in Study 1 to test our full proposed model by giving participants a chance to read a series of FAQs

about implicit bias and the IAT. Our focal outcome measure in this study was thus the number of pages participants chose to read. We again tested challenge (Hypothesis 2), threat (non-hypothesized), and defensive responding (exploratory) as mechanisms. We also added emotion regulation as another exploratory alternate mechanism.

Methods

Participants

We used the same criterion for power as we did in Study 2, and therefore recruited 1,105 participants from a paid participant pool. In order to participate, participants had to be employed full-time, resident in the U.S., and be fluent in English. We excluded participants who failed the mindset (55) and/or reminder (180) manipulation checks, those who did not provide a response to the story prompt (31), and those whose free response text indicated a lack of understanding or engagement (e.g., nonsense answers) (8) resulting in 855 (449 self-identified woman; 395 man; 6 non-binary/gender queer; 1 non-binary/gender queer woman; 1trans woman; 2 preferred a different term; M_{age} = 37.62 years, SD = 11.199; participants could select multiple racial/ethnic identifications: 40 Asian/Asian American, 69 Black/African American, 50 Hispanic/Latino/Latina American, 3 Middle Eastern (Arab) American, 3 Middle Eastern (Non-Arab) American, 6 Native American/Pacific Islander, 666 White, 17 Multiracial, and 1 preferred a different identity). There was no difference in attrition based on condition, $\chi^2(3) = 3.751$, $p = .290$.

Design and Procedure

The design and procedure were identical to Study 2 with the addition of the opportunity for participants to read up to10 pages more about implicit bias. After participants chose to exit or read up to 10 pages, they completed, in the following order, the measures of challenge, threat,

emotion regulation, defensive responding, reminder manipulation check, mindset manipulation check, and some demographic questions.

Measures

Challenge, threat, and defensive responding were measured using the same items from Study 2. The manipulation checks were also the same.

Emotion Regulation

Participants responded to a ten-item scale (α = .754) measuring their tendency to regulate their emotions on a 7 point scale from "strongly disagree" to "strongly agree" (Gross & John, 2003). Sample items include "When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm" and "When I am feeling negative emotions, I make sure not to express them."

Results

Post-article Questions. Unexpectedly, there was a difference based on mindset on clarity of the text ($F(1, 853) = 3.970$, $p = .047$). Those in a fixed mindset perceived the text as more clear (M = 4.86, SD = .896) than those in a growth mindset (M = 4.97, SD = .799); this was thus retained as a control variable. The effect of mindset on complexity of the vocabulary was not significant ($F(1, 853) = .117$, $p = .732$). See Table 3 for all descriptive data.

Challenge Construal (α = .956). Replicating Study 2 and again supporting Hypothesis 2, the main effect of mindset on challenge construal was significant ($F(1, 850) = 5.473$, $p = .020$, $\eta_p^2 = .006$); those in a growth mindset reported greater challenge (EMM = 5.235, S.E. = 0.069) than those in a fixed mindset (EMM = 5.008, S.E. = 0.068). There was no main effect of reminder ($F(1, 850) = 2.514$, $p = .113$) or interaction ($F(1, 850) = 0.038$, $p = .846$) on challenge.

Threat Construal (α = .942). Neither mindset ($F(1, 850) = 0.007$, $p = .933$) nor reminder ($F(1, 850) = 0.386$, $p = .535$) nor the interaction between mindset X reminder ($F(1, 850) = 0.000$, $p = .990$) predicted threat.

Defensive Responding (α = .938). In contrast to Study 2, the main effect of mindset on defensive responding was not significant ($F(1, 850) = 0.765$, $p = .385$). However, unexpectedly, the effect of reminder was significant ($F(1, 850) = 4.262$, $p = .039$, $\eta_p^2 = .005$) such that those who were reminded about the serious inequalities reported less defensiveness about the IAT (EMM = 5.036, S.E. = 0.059) than those who were not reminded (EMM = 4.862, S.E. = 0.060). There was no interaction ($F(1, 850) = 0.030$, $p = .861$).

***Emotion Regulation*.** Neither mindset ($F(1, 850) = 0.098$, $p = .755$) nor reminder ($F(1, 850) = 0.234$, $p = .629$) nor the mindset X reminder interaction ($F(1, 850) = 1.259$, $p = .262$) predicted emotion regulation.

Pages Read[3]. Contrary to Hypothesis 1, there was no main effect of mindset ($F(1, 850) = 0.497$, $p = .481$) on number of pages read. No main effect of reminder ($F(1, 850) = 0.347$, $p = .556$) or interaction ($F(1, 850) = 0.254$, $p = .614$) emerged.

Indirect Effects on Pages Read. While we did not see the predicted total effect of mindset on pages read, this does not preclude the existence of an indirect effect via challenge

[3] Our dependent measure is a count variable, the number of pages read, therefore we considered analyzing this relationship with either a Poisson model or a negative binomial generalized linear model (Agresti, 2007; Coxe et al., 2009). The best fitting of the two models was the Poisson, and as the results were not substantially different than those attained via ANOVA, we present the ANOVA results for consistency across studies.

construal, as predicted by our theory. We tested Hypothesis 3 with an indirect effects model specifying an indirect effect of mindset (X) on pages read (Y) through challenge construal (M) controlling for both clarity and reminder (PROCESS v3.1, Model 4; Hayes, 2018). See Table 4 for the full results.

As predicted, participants who construed the IAT as a greater challenge read more pages (t = 3.294, p = .001). The results for the test of the indirect effect (-.0833, SE = .0445) show that the bootstrapped (with 5,000 samples) 95% confidence interval for challenge construal ranges from -0.1832 to -0.0098, supporting an indirect effect. The mindset framing condition had an indirect effect on number of pages read through challenge construal, supporting Hypothesis 3.

Discussion

Study 3 provides a replication of the effect of a growth (vs. fixed) mindset on challenge construal, providing additional support for Hypothesis 2. We found no indication that a reminder was necessary to prompt the effect. We also found no effect of mindset on either defensiveness about the IAT or emotional regulation, our two exploratory mechanisms. The positive impact of reading that biases are malleable on perceptions of challenge explained individuals' decisions to read more about bias, in support of Hypothesis 3.

General Discussion

Is it possible to nudge people to opt in to reading about diversity and bias? Across 1 large study with mostly student samples (Total N = 1,122) and 2 pre-registered and well-powered studies with samples of working adults (Total N = 1,717), we found that a growth (vs. fixed) mindset frame lead to perceptions of greater challenge (Studies 2-3, Hypothesis 2) and thus participants opted in to read more pages of information about implicit bias and stereotypes (Study 1, Study 3, Hypotheses 1, 3). Given this cumulative evidence, we conclude that it is

possible to create conditions under which people opt in to reading about implicit bias, in the case of the current research through fostering the perception that potentially self-threatening information is a challenge. We identify an important frame that fosters those conditions–when people are told that bias is malleable. Further, across studies we examined the alternative mechanisms of threat, defensive responding, and emotion regulation, but we did not find consistent evidence in favor of these possibilities. Finally, across studies, we repeatedly tested the moderation of the mindset frame by reminder, which emerged in Study 1, but was not replicated in either Studies 2 or 3. Given these results, the weight of the evidence in our investigation suggests that a growth (vs. fixed) mindset frame alone (regardless of a reminder) promotes challenge construal and thus people's likelihood to opt in to reading more about implicit bias and stereotypes.

Theoretical Implications

Our theoretical approach speaks to a paradox in the study of implicit bias. It takes an individual sustained effort to actively shift a particular implicit bias even with training, and questions remain about how longstanding such shifts may be and whether they impact behavior (Bezrukova et al, 2016). On the other hand, our implicit biases are prone to situational factors such as our thoughts, people in our environment at the time of measurement, or procedures that limit their application (Forscher et al., 2019). Thus, it is true that implicit biases can be considered both stable and possible to change, through effort and sustained action (for a meta-analysis, see Forscher et al., 2019). Our work begins to advance beyond this paradox by showing that it is possible to foster people's curiosity and willingness to opt into reading information about implicit bias and stereotypes, by using a growth mindset frame. Our work also extends past research beyond a focus on the experience of defensiveness and evaluating how to foster bias

awareness (Vitriol & Moskowitz, 2021) toward considering how to foster challenge and evaluating a behavior that is a particularly meaningful first step in the context of diversity–reading more information about one's bias and stereotypes. To be sure, future research will be necessary to investigate whether voluntarily reading information about implicit bias and stereotypes leads to information retention over time, application of the information read to novel situations and interactions, and ultimately to more productive approaches to engaging around issues of diversity–i.e., to the sequence of behaviors that would be associated with learning. However, the current work offers the foundational first step to suggest that such investigations would be worthwhile.

Our work also highlights the potential importance of mindset messages for organizational issues related to diversity (Rattan & Ozgumus, 2021; Murphy & Reeves, 2019), and thus advances the science of diversity and intergroup relations. The scientific measurement of implicit associations related to intergroup biases was one of the major advances in this field in recent years, and it was followed by a flurry of organizational engagement with issues of diversity through diversity trainings. As a robust literature has shown, however, the early promise of implicit bias as a vehicle to addressing issues of bias in organizations never fully actualized. Instead, research finds that diversity trainings, which often are built upon and share the science of implicit bias, are sometimes met with hard resistance if people are required to take them. Given the widespread commitment of corporate funds and employee time to diversity trainings (Bezrukova et al., 2016), our work has the potential to provide actionable insights that organizations, managers, and diversity consultants can use, perhaps with fewer drawbacks, when inviting people into, and during, discussions of diversity in organizations. Though organizational variations should be directly tested for their efficacy, our work offers a different path for starting

organizational diversity discussions. In this path, an invocation of the growth mindset about prejudice could foster individuals' construal of the information that follows as a challenge, and thus potentially increase their willingness to opt in to more information exposure. Our findings raise the possibility that a "nudge" (Thaler & Sunstein, 2008) message including the growth mindset could help engage people in learning about their own biases and diversity more broadly in corporate environments. This is an exciting direction for future research to explore, which could include evaluating different ways of presenting the growth mindset manipulation message (e.g., articles, messages from senior leaders) at the end of mandatory talent and learning trainings and tracking how many additional learning resources employees choose to access and read.

This research also advances the study of mindsets and intergroup relations. First, this work adds to the nascent body of research on mindsets about prejudice, investigating mindsets about the malleability of prejudice as an information frame. Further, it advances beyond behavioral intentions to investigate an actual learning-oriented behavior (i.e., the reading of information), and investigates a novel mechanism, challenge, in this domain of mindsets.

Our investigation offers open and full reporting, so that we not only can share our own learning process as scientists studying this question, but also model how we can more honestly represent the developmental nature of science over time. While the weight of evidence did not fall in favor of the mindset by reminder interaction, it is still worthwhile to science to report the lack of a moderation (cf. Rattan & Ozgumus, 2021).

Limitations and Future Directions

The current research took the approach of controlled, laboratory studies to offer causal conclusions and to isolate the key factors that would produce a willingness to read more information about implicit bias. The experimental paradigm allowed us to isolate the impact of

our manipulation regardless of individual's initial beliefs about the malleability of bias, given random assignment to condition. Experimental mindsets research, including ours, does not have a control condition because the theoretical predictions are about the growth mindset compared to the fixed mindset, not compared to mixed mindsets which a no-mindset control condition would capture. Given that no real-world intervention would manipulate a fixed mindset, as it has potential negative consequences and thus would not be appropriate to communicate without immediate and thorough debriefing, future intervention work would be the ideal setting to compare a growth mindset condition to both a no-information condition and to another type of intervention that seeks to engage people in voluntarily reading about their biases and stereotypes. As with past mindset research (Paunesku et al., 2015), this would support the goal of intervention work in the real world which is to both test the efficacy of a growth mindset intervention compared to no intervention, and to test the efficacy of a growth mindset intervention compared to a reasonable alternative effort (i.e., to test whether the growth mindset adds value above and beyond what may already be in use).

Future work might also explore how a growth mindset information frame interacts with an individual's pre-existing mindset, or even their identity and group membership as it relates to the specific bias being considered. On the one hand, the sense of challenge engendered by the growth mindset might be equally applicable across beliefs and identities. On the other hand, it could be that a growth mindset is most effective as an informational frame among those who are most "at risk" of not taking this perspective naturally–possibly communities who previously held more fixed beliefs, or those who have substantial privilege or dominant group status rather than underserved or minority identities.

These investigations would create opportunities for future research to also test variations of how to induce the growth mindset. In the current work, we mostly relied upon the field-standard, established method of manipulating mindsets through articles. Future work can test alternatives, such as shorter mindset inductions, inductions embedded in other types of learning materials (e.g., existing diversity and inclusion trainings), or even mindset inductions communicated via colleagues within the organization. The ideal setting for these investigations would be an organizational field study. A field study would also allow us to evaluate whether the effects are equally strong among individuals from different stigmatized identity backgrounds (e.g., race, gender, LGBTQ+ identities) and among individuals across the organizational hierarchy. And, a field study would create a more realistic test of whether people view the situation as a voluntary opt-in (as opposed to the opt-out nature of a study).

A field study would also allow us to evaluate two additional hypotheses, addressing current limitations. First, our studies presently examine how many pages people opt in to reading, which does not necessarily correspond to sustained change in outlook or behavior. We would expect the same pattern for learning, which could be assessed in future work meaningfully by capitalizing on comprehension tests commonly administered after online trainings in organizations. The second hypothesis that a real-world context would allow us to evaluate is people's ability to apply the insights of a diversity training to their everyday behaviors. We predict that diversity trainings that frame bias as malleable should be more effective in debiasing everyday behaviors. With organizational data on employee evaluations or hiring patterns, we could evaluate whether the mindset framing amplifies the effectiveness of diversity efforts overall by reducing bias in evaluations or hiring.

Conclusion

Organizations today, more than ever before, want employees to learn about bias. To encourage this outlook, we found that framing information with the growth mindset message about prejudice fosters a sense of challenge which in turn promoted the learning-oriented behavior of opting in to read more about stereotypes and implicit bias. Thus, our work suggests that perhaps, under the right conditions, organizations can foster challenge and individuals can opt to grow.

References

Agresti, A. (2007). *An introduction to categorical data analysis* (2nd Ed) Wiley, Hoboken, New Jersey.

Belle, D., Tartarilla, A. B., Wapman, M., Schlieber, M., & Mercurio, A. E. (2021). "I Can't Operate, that Boy Is my Son!": Gender Schemas and a Classic Riddle. *Sex Roles, 85*(3), 161-171.

Bezrukova, K., Spell, C. S., Perry, J. L., & Jehn, K. A. (2016). A meta-analytical integration of over 40 years of research on diversity training evaluation. *Psychological Bulletin*, *142*(11), 1227-1274. http://dx.doi.org/10.1037/bul0000067

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246-263. https://doi.org/10.1111/j.1467-8624.2007.00995.x

Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2013). *Comprehensive Meta Analysis* (Version 3) [Computer Software]. Englewood, NJ: Biostat. Available from https://www.meta-analysis.com/index.php?cart=B2NN4775900

Broda, M., Yun, J., Schneider, B., Yeager, D. S., Walton, G. M., & Diemer, M. (2018). Reducing inequality in academic success for incoming college students: A randomized trial of growth mindset and belonging interventions. *Journal of Research on Educational Effectiveness*, *11*(3), 317-338. http://dx.doi.org/10.1080/19345747.2018.1429037

Burnette, J. L., Knouse, L. E., Vavra, D. T., O'Boyle, E., & Brooks, M. A. (2020). Growth mindsets and psychological distress: A meta-analysis. *Clinical Psychology Review, 77*. https://doi.org/10.1016/j.cpr.2020.101816.

Carr, P. B., Dweck, C. S., & Pauker, K. (2012). "Prejudiced" behavior without prejudice? Beliefs about the malleability of prejudice affect interracial interactions. *Journal of Personality and Social Psychology, 103*(3), 452-471. https://doi.org/10.1037/a0028849

Carr, P. B., Rattan, A., & Dweck, C. S. (2012). Implicit theories shape intergroup relations. *Advances in Experimental Social Psychology*, *45,* 127-165. https://doi.org/10.1016/B978-0-12-394286-9.00003-2

Canning, E. A., Ozier, E., Williams, H. E., AlRasheed, R., & Murphy, M. C. (2022). Professors who signal a fixed mindset about ability undermine women's performance in STEM. *Social Psychological and Personality Science, 13*(5), 927-937.

Chang, E. H., Milkman, K. L., Gromet, D. M., Rebele, R. W., Massey, C., Duckworth, A. L., & Grant, A. M. (2019). The mixed effects of online diversity training. *PNAS, 116*(16), 7778-7783. https://doi.org/10.1073/pnas.1816076116

Chao, M. M., Visaria, S., Mukhopadhyay, A., & Dehejia, R. (2017). Do rewards reinforce the growth mindset?: Joint effects of the growth mindset and incentive schemes in a field intervention. *Journal of Experimental Psychology: General, 146*(10), 1402-1419. https://doi.org/10.1037/xge0000355.

Chiu, C.-y., Hong, Y.-y., & Dweck, C. S. (1997). Lay dispositionism and implicit theories of personality. *Journal of Personality and Social Psychology, 73*(1), 19-30. https://doi.org/10.1037/0022-3514.73.1.19

Coxe, S., West, S. G., & Aiken, L. S. (2009). The analysis of count data: A gentle introduction to poisson regression and its alternatives. *Journal of Personality Assessment, 91,* 121–136. http://dx.doi.org/10.1080/ 00223890802634175

Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy, and achievement cognitions following failure. *Journal of Personality and Social Psychology, 36*(5), 451.

Dobbin, F., & Kalev, A. (2016, July). Why diversity programs fail. *Harvard Business Review*. https://hbr.org/2016/07/why-diversity-programs-fail

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*(10), 1040-1048. https://doi.org/10.1037/0003-066X.41.10.1040

Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development.* Milton Park: Psychology Press.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256-273. https://doi.org/10.1037/0033-295X.95.2.256

Dweck, C. S., & Yeager, D. S. (2019). Mindsets: A view from two eras. *Perspectives on Psychological Science, 14*(3), 481-496. https://doi.org/10.1177/1745691618804166

Ehrlinger, J., Mitchum, A. L., & Dweck, C. S. (2016). Understanding overconfidence: Theories of intelligence, preferential attention, and distorted self-assessment. *Journal of Experimental Social Psychology, 63,* 94-100. https://doi.org/10.1016/j.jesp.2015.11.001

Eisenhauer, J. G. (2021). Meta-analysis and mega-analysis: A simple introduction. *Teaching Statistics, 43*(1), 21-27.

Elliot, A. J., & Reis, H. T. (2003). Attachment and exploration in adulthood. *Journal of Personality and Social Psychology, 85*(2), 317–331. https://doi.org/10.1037/0022-3514.85.2.317

Faul, F., Erdfelder, E., Lang, A. & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191. https://doi.org/10.3758/BF03193146

Forscher, P. S., Lai, C. K., Axt, J. R., Ebersole, C. R., Herman, M., Devine, P. G., & Nosek, B. A. (2019). A meta-analysis of procedures to change implicit measures. *Journal of Personality & Social Psychology*, *117*(3), 522-559. https://doi.org/10.1037/pspa0000160

Goh, J. X., Hall, J.A., & Rosenthal, R. (2016). Mini meta-analysis of your own studies: Some arguments on why and a primer on how. *Social and Personality Psychology Compass, 10*(10), 535-549. https://doi.org/10.1111/spc3.12267

Good, C., Rattan, A., & Dweck, C. S. (2012). Why do women opt out? Sense of belonging and women's representation in mathematics. *Journal of Personality and Social Psychology, 102*(4), 700.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*(6), 1464-1480. https://doi.org/10.1037/0022-3514.74.6.1464

Goldenberg, A., Cohen-Chen, S., Goyer, J. P., Dweck, C. S., Gross, J. J., & Halperin, E. (2018). Testing the impact and durability of a group malleability intervention in the context of the Israeli–Palestinian conflict. *Proceedings of the National Academy of Sciences, 115*(4), 696-701. https://doi.org/10.1073/pnas.1706800115

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348–362. https://doi.org/10.1037/0022-3514.85.2.348

Hahn, A., & Gawronski, B. (2019). Facing one's implicit biases: From awareness to acknowledgment. *Journal of Personality and Social Psychology, 116*(5), 769–794. https://doi.org/10.1037/pspi0000155

Halperin, E. (2011). Emotional barriers to peace: Emotions and public opinion of Jewish Israelis about the peace process in the Middle East. *Peace and Conflict: Journal of Peace Psychology, 17*(1), 22-45. https://doi.org/10.1080/10781919.2010.487862

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis.* New York: Guildford.

Hennes, E. P., Pietri, E. S., Moss-Racusin, C. A., Mason, K. A., Dovidio, J. F., Brescoll, V. L., ... & Handelsman, J. (2018). Increasing the perceived malleability of gender bias using a modified video intervention for diversity in STEM (VIDS). *Group Processes & Intergroup Relations, 21*(5), 788-809. https://doi.org/10.1177/1368430218755923

Howell, J. L., Gaither, S. E., & Ratliff, K. A. (2015). Caught in the middle: Defensive responses to IAT feedback among Whites, Blacks, and biracial Black/Whites. *Social Psychological and Personality Science, 6*(4), 373–381. https://doi.org/10.1177/1948550614561127

Hoyt, C. L., & Burnette, J. L. (2013). Gender bias in leader evaluations: Merging implicit theories and role congruity perspectives. *Personality and Social Psychology Bulletin, 39*(10), 1306-1319. https://doi.org/10.1177/0146167213493643

Kulik, C. T., Pepper, M. B., Roberson, L., & Parker, S. K. (2007). The rich get richer: Predicting participation in voluntary diversity training. *Journal of Organizational Behavior*, *28*(6), 753-769. https://doi.org/10.1002/job.444

LaCosse, J., Murphy, M. C., Garcia, J. A., & Zirkel, S. (2021). The role of STEM professors'

mindset beliefs on students' anticipated psychological experiences and course interest. *Journal of Educational Psychology, 113*(5), 949.

Lazarus, R. S. (1991). *Emotion and adaptation.* Oxford University Press, New York.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company. https://doi.org/10.1007/978-1-4419-1005-9_215

Levy, S. R., & Dweck, C. S. (1999). The impact of children's static versus dynamic conceptions of people on stereotype formation. *Child Development, 70*(5), 1163-1180. https://doi.org/10.1111/1467-8624.00085

Levy, S. R., Plaks, J. E., Hong, Y.-y., Chiu, C.-y., & Dweck, C. S. (2001). Static versus dynamic theories and the perception of groups: Different routes to different destinations. *Personality and Social Psychology Review, 5*(2), 156-168. https://doi.org/10.1207/S15327957PSPR0502_6

Levy, S. R., Stroessner, S. J., & Dweck, C. S. (1998). Stereotype formation and endorsement: The role of implicit theories. *Journal of Personality and Social Psychology, 74*(6), 1421-1436. https://doi.org/10.1037/0022-3514.74.6.1421

Madan, S., Basu, S., Rattan, A., & Savani, K. (2019). Support for resettling refugees: The role of fixed versus growth mind-sets. *Psychological Science, 30*(2), 238-249. https://doi.org/10.1177/0956797618813561

McGregor, H. A., & Elliot, A. J. (2002). Achievement goals as predictors of achievement relevant processes prior to task engagement. *Journal of Educational Psychology, 94*(2), 381-395. https://doi.org/10.1037//0022-0663.94.2.381

Mrazek, A. J., Ihm, E. D., Molden, D. C., Mrazek, M. D., Zedelius, C. M., & Schooler, J. W. (2018). Expanding minds: Growth mindsets of self-regulation and the influences on effort and perseverance. *Journal of Experimental Social Psychology, 79*, 164-180.

Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology, 75*(1), 33-52. https://doi.org/10.1037/0022-3514.75.1.33

Neel, R., & Shapiro, J. R. (2012). Is racial bias malleable? Whites' lay theories of racial bias predict divergent strategies for interracial interactions. *Journal of Personality and Social Psychology, 103*(1), 101-120. https://doi.org/10.1037/a0028237

Nussbaum, A. D., & Dweck, C. S. (2008). Defensiveness Versus Remediation: Self-Theories and Modes of Self-Esteem Maintenance. *Personality and Social Psychology Bulletin*, *34*(5), 599–612. https://doi.org/10.1177/0146167207312960

Paluck, E. L., Porat, R., Clark, C. S., & Green, D. P. (2021). Prejudice reduction: Progress and challenges. *Annual Review of Psychology, 72*(1), 533-560. doi:10.1146/annurev-psych-071620-030619

Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. *Psychological Science*, *26*(6), 784-793.

Pirlott, A. G., & MacKinnon, D. P. (2016). Design approaches to experimental mediation. *Journal of Experimental Social Psychology, 66*, 29-38.

Rattan, A., & Dweck, C. S. (2010). Who confronts prejudice? The role of implicit theories in the motivation to confront prejudice. *Psychological Science, 21*(7), 952-959. https://doi.org/10.1177/0956797610374740

Rattan, A., & Dweck, C. S. (2018). What happens after prejudice is confronted in the workplace? How mindsets affect minorities' and women's outlook on future social relations. *Journal of Applied Psychology, 103*(6), 676-687. https://doi.org/10.1037/apl0000287

Rattan, A. & Georgeac, O. (2017). Understanding intergroup relations through the lens of implicit theories (mindsets) of malleability. *Social Personality Psychology Compass*. https://doi.org/10.1111/spc3.12305

Rattan, A. & Ozgumus, E. (2021). Embedding mindsets in context: Theoretical considerations and opportunities for studying fixed-growth lay theories in the workplace. *Research in Organizational Behavior, 39. https://doi.org/10.1016/j.riob.2020.100127*

Rege, M., Hanselman, P., Solli, I. F., Dweck, C. S., Ludvigsen, S., Bettinger, E., ... & Yeager, D. S. (2021). How can we inspire nations of learners? An investigation of growth mindset and challenge-seeking in two countries. *American Psychologist, 76*(5), 755.

Murphy, M. C., & Reeves, S. L. (2019). Personal and organizational mindsets at work. Research in Organizational Behavior, 39, 100-121.

Saguy, T., & Halperin, E. (2014). Exposure to outgroup members criticizing their own group facilitates intergroup openness. *Personality and Social Psychology Bulletin, 40*(6), 791-802. https://doi.org/10.1177/0146167214525475

Stephens, N. M., Rivera, L. A., & Townsend, S. S. (2020). What works to increase diversity? A multi-level approach. *Research in Organizational Behavior, 39.*

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness.* Yale University Press.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*, 453-458. https://doi.org/10.1126/science.7455683

Vitriol, J. A., & Moskowitz, G. B. (2021). Reducing defensive responding to implicit bias feedback: On the role of perceived moral threat and efficacy to change. *Journal of Experimental Social Psychology, 96*. https://doi.org/10.1016/j.jesp.2021.104165

Yeager, D. S., Romero, C., Paunesku, D., Hulleman, C. S., Schneider, B., Hinojosa, C., Lee, H.Y., O'Brien, J., Flint, K., Roberts, A., & Trott, J. (2016). Using design thinking to improve psychological interventions: The case of the growth mindset during the transition to high school. *Journal of Educational Psychology, 108*(3), 374-391. http://dx.doi.org/10.1037/edu0000098

Table 1.

Characteristics of Studies Included in Meta-Analysis (Study 1).

Study	*N*	*d*	Sample	Manipulation	Reminder	IAT	Age M (SD)	Gender			Race						
								F	M	PNR	A	B	HL	NA	NH	W	PNR
1a	59 (of 102)	0.448	University lab pool	Statement	Present	GS	21.63 (3.76)	4	27	1	Did not collect						
1b	62 (of 96)	0.517	University lab pool	Statement	Present	GS	22 (4.69)	66	29	1	Did not collect						
1c	147	0.002	Mturk	Statement	Absent	GC	36.3 (9.54)	68	79		9	18	14	1		116	
1d	122	0.065	University lab pool	Article	Absent	R	20.74 (2.69)	59	63	1	58	11	16	1	1	33	8
1e	120	-0.014	University lab pool	Article	Absent	GC	20.69 (1.965)	70	50		54	9	21			42	6
1f	165	0.283	University lab pool	Article	Present	GC	21.06 (3.34)	86	79		85	13	24				
1g	447	NR: -.063; R: .240	University lab pool	Article	Manipulated	GC	21.43 (3.80)	207	196	4	169	38	72		2	114	

Notes.
IAT: GS = Gender/Science; GC = Gender/Career; R = Race
NR = No reminder; R = Reminder
F = female; M = male; PNR = "prefer not to respond"
W = White; B = Black; A = Asian; HL = Hispanic/Latino; NA = Native American/Native Alaskan; NH = Native Hawaiian/Pacific Islander; PNR = Other/Prefer not to respond

Table 2.

Study 2.

Variable	Growth Mindset				Fixed Mindset			
	Reminder N = 204		No Reminder N = 224		Reminder N = 223		No Reminder N = 211	
	M (*SD*)	95% CI	*M* (*SD*)	95% CI	*M* (*SD*)	95% CI	*M* (*SD*)	95% CI
Clarity of text	5.01 (0.862)$_{a}$	[4.90, 5.13]	4.92 (0.885)$_{a}$	[4.80, 5.04]	4.94 (0.834)$_{a}$	[4.83, 5.05]	4.93 (0.822)$_{a}$	[4.82, 5.04]
Complex vocabulary	2.37 (1.144)$_{a}$	[2.21, 2.53]	2.36 (1.140)$_{a}$	[2.21, 2.51]	2.39 (1.188)$_{a}$	[2.23, 2.55]	2.38 (1.129)$_{a}$	[2.23, 2.53]
Challenge construal	5.154 (1.432)$_{ac}$	[4.96, 5.35]	5.319 (1.372)$_{a}$	[5.14, 5.50]	4.913 (1.600)$_{bc}$	[4.70, 5.12]	4.770 (1.503)$_{b}$	[4.57, 4.97]
Threat construal	1.767 (1.166)$_{a}$	[1.61, 1.93]	1.621 (1.007)$_{a}$	[1.49, 1.75]	1.751 (1.158)$_{a}$	[1.60, 1.90]	1.777 (1.059)$_{a}$	[1.63, 1.92]
Defensive responding	4.982 (1.329)$_{b}$	[4.80, 5.17]	4.961 (1.314)$_{b}$	[4.79, 5.13]	4.744 (1.285)$_{ab}$	[4.57, 4.91]	4.686 (1.211)$_{a}$	[4.52, 4.85]

Note. CI = confidence interval. Means with different subscripts differ at the $p = .05$ level.

Table 3.

Study 3.

Variable	Growth Mindset				Fixed Mindset			
	Reminder N = 218		No Reminder N = 207		Reminder N = 215		No Reminder N = 215	
	M (*SD*)	95% CI	*M* (*SD*)	95% CI	*M* (*SD*)	95% CI	*M* (*SD*)	95% CI
Clarity of text	4.88 (.861)	[4.77, 5.00]	4.83 (0.932)	[4.70, 4.96]	4.95 (0.775)	[4.84, 5.05]	5.00 (0.823)	[4.88, 5.11]
Complex vocabulary	2.46 (1.192)	[2.30, 2.62]	2.22 (1.101)	[2.07, 2.38]	2.41 (1.188)	[2.25, 2.57]	2.22(1.151)	[2.07, 2.38]
Challenge construal	5.287 (1.369)	[5.10, 5.47]	5.130 (1.507)	[4.92, 5.34]	5.109 (1.418)	[4.92, 5.30]	4.858 (1.539)	[4.75, 5.16]
Threat construal	1.741 (1.177)	[1.58, 1.90]	1.708 (1.097)	[1.56, 1.86]	1.721 (1.012)	[1.58, 1.86]	1.665 (0.982)	[1.53, 1.80]
Defensive responding	5.052 (1.238)	[4.89, 5.22]	4.873 (1.297)	[4.70, 5.05]	5.020 (1.146)	[4.87, 5.17]	4.850 (1.396)	[4.66, 5.04]
Emotion regulation	4.479 (0.846)	[4.37, 4.59]	4.514 (0.826)	[4.40, 4.63]	4.527 (0.815)	[4.42, 4.64]	4.436 (0.850)	[4.32, 4.55]
Pages read	6.22 (4.560)	[5.62, 6.83]	5.87 (4.572)	[5.25, 6.50]	5.85 (4.713)	[5.21, 6.48]	5.82 (4.661)	[5.20, 6.45]

Note. CI = confidence interval.

Table 4.

The Impact of Mindset Frame on Pages Read through Challenge Construal (Study 3).

Predictor	Mediator: Challenge construal					Dependent variable: Pages read				
	Estimate	*SE*	*t*	*p*	95% CI	Estimate	*SE*	*t*	*p*	95% CI
Constant	2.987	0.289	10.340	.000	[2.420, 3.554]	4.468	1.000	4.467	.000	[2.505, 6.432]
Mindset	-0.226	0.097	-2.338	.020	[-0.416, -.036]	-0.143	0.317	-0.451	.652	[-0.764, 0.478]
Reminder	0.569	0.222	2.558	.011	[0.132, 1.006]	0.129	0.315	0.410	.682	[-0.489, 0.748]
Clear	-0.442	0.570	7.765	.000	[-0.036, 0.342]	-0.083	0.192	-0.430	.668	[-0.460, 0.295]
Challenge construal	---	---	---	---		0.369	0.112	3.294	.001	[0.149, 0.588]
	$R^2 = .072$, $F(3, 851) = 22.069$, $p = .000$					$R^2 = .014$, $F(4, 850) = 2.968$, $p = .019$				

Mediator	Bootstrap indirect effect	Bootstrap *SE*	95% bias-corrected CI
Challenge construal	-0.083	0.045	[-0.183, -0.010]

Note. Mindset: 0 = growth mindset; 1 = fixed mindset; Reminder: 0 = no reminder; 1 = reminder. CI = confidence interval.