



Social dominance orientation moderates the effectiveness of mindset messages

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In this work, we examine whether differences in social dominance orientation (SDO) moderate the effectiveness of mindsets of intelligence messages. We suggest that SDO is a foundational ideological belief system, on which individuals vary, that maintains the desire to endorse fixed beliefs about the nature of human intelligence. Thus, attempts to change individuals' mindsets should be met with resistance from those who strongly endorse the social dominance ideology – individuals high on SDO. In contrast, individuals low on SDO are less likely to use mindsets of intelligence to justify an ideological belief system, and thus, mindset manipulations should be effective for them. We test these predictions across three experimental studies ($N_{\text{Study1}} = 271$, $N_{\text{Study2}} = 207$, $N_{\text{Study3}} = 313$). Across the studies, we find that individuals who are high, relative to low, on SDO have more fixed beliefs about the nature of intelligence and show smaller effects of manipulations of mindsets. However, when comparing to a control condition, there was no evidence that high-SDO participants resisted the growth message that contradicts their ideology more than the fixed one that supports it; additionally, low-SDO participants showed heightened responsiveness to a fixed message. We discuss implications for theoretical advances in our understanding of mindsets.

Mindsets, or implicit theories, refer to the lay, intuitive beliefs people have regarding the changeable vs. fixed nature of human abilities (Dweck, 2000). According to the implicit theory perspective, individuals hold different mindsets about the nature of human attributes (e.g., intelligence). Individuals with growth mindsets believe attributes are changeable and can be developed, whereas individuals with fixed mindsets believe attributes are relatively unchangeable and static. Mindsets are attribute-specific. For example, an individual could have a growth mindset about the nature of intelligence but a fixed mindset of athletic ability (Dweck, Chiu, & Hong, 1995). Regardless of domain, these belief systems are an important part of people's motivational systems and influence both self-regulatory processes and goal achievement (e.g., Burnette, 2010; Burnette, Oboyle, VanEpps, Pollack, & Finkel, 2013; Hong, Chiu, Dweck, Lin, & Wan, 1999; Martocchio, 1994; Wood & Bandura, 1989).

Individuals with growth mindsets are focused on learning goals, engage in mastery-oriented strategies, and maintain positive expectations about the potential for future

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success when facing setbacks. In turn, these approaches to goal setting, operating, and monitoring predict better performance. In contrast, those who believe in the fixed nature of abilities focus on proving their abilities, engage more in helplessness, and feel anxious when facing setbacks, which, in turn, hampers performance (Burnette *et al.*, 2013). Indeed, the compelling self-regulatory benefits of these mindsets mobilized many scholars and practitioners to develop psychological interventions to promote growth mindsets of intelligence in order to improve academic performance, especially for struggling students (e.g., Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003; Paunesku *et al.*, 2015).

Despite many successful interventions, there has been little to no focus on understanding individual differences in the effectiveness of mindset manipulations and interventions. In this work, we suggest that there are individual differences in belief systems that make intra-individual shifts in mindsets minimal if not impossible for some people. More specifically, we suggest fixed mindsets serve as a legitimizing belief system to justify hegemony. Thus, decreasing fixed mindsets (or, alternatively, strengthening growth mindsets) can be more difficult for those individuals who are highly motivated to support the hierarchical structure of society – an individual difference termed *social dominance orientation* (SDO; Pratto, Sidanius, Stallworth, & Malle, 1994; Sidanius & Pratto, 1999).

Social dominance orientation

According to social dominance theory, societies can help curtail conflict among groups by developing ideological belief systems that legitimize the supremacy of certain groups over others (Pratto, 1999; Sidanius & Pratto, 1999). People who are high on social dominance orientation (SDO) more strongly endorse ideologies, policies, and practices that maintain hegemony rather than those that counter it (Hoyt & Simon, 2016). Hegemonic social systems are maintained through what social dominance theorists have termed hierarchy-enhancing legitimizing myths, meaning ‘consensually held values, attitudes, beliefs, or cultural ideologies that provide moral and intellectual justification for group inequality, or even the oppression of some groups by others’ (Hewstone, Stroebe, & Jonas, 2016, p. 445). Legitimizing beliefs, such as racism, sexism, meritocracy, or political conservatism (Matthews, Levin, & Sidanius, 2009), all serve to validate the superiority of some people over others, thus justifying the greater social power that some people have (Jost, Glaser, Kruglanski, & Sulloway, 2003).

In this work, we examine the proposition that SDO is a foundational ideological belief system, on which individuals vary, that motivates the endorsement of fixed beliefs about the nature of human intelligence. For example, Yzerbyt, Rocher, and Schadron (1997) argue that ‘the best way to account for the existing social situation is to promote the idea that it stems from the nature of things’ (p. 49). Perceiving human attributes as relatively fixed can serve to justify a hierarchical social structure. This idea is supported by research examining the belief in underlying natures, or essences, of people – termed *psychological essentialism*. A motivated social cognition framework suggests that essentialist lay beliefs stem from the underlying motive to justify and legitimize social hierarchies and inequalities (Keller, 2005; Rangel & Keller, 2011). Furthermore, fixed beliefs facilitate stereotypes, which serve to both explain and rationalize the existing social structure, by linking specific attributes to the very essence and nature of individuals (Yzerbyt *et al.*, 1997).

In this work, we narrow our focus from the broader essentialism framework of beliefs about differences between people to emphasize the fixed nature of intelligence specifically (Rothbart & Taylor, 1992). We focus on mindsets of intelligence both because the majority of mindset interventions seek to foster growth mindsets of intelligence and because intelligence is a personal attribute that is especially relevant for justifying a hierarchical social structure. For example, significant research on system justification theory demonstrates that people justify the existing social order by attributing higher intelligence to higher status individuals and groups relative to those with lower status (Jost & Hunyady, 2002). Thus, adhering more strongly to an ideological belief system that endorses hierarchical group relationships makes it more desirable to hold a fixed mindset. This can make it more difficult to promote growth mindsets in individuals who are high, relative to low, on SDO.

The current research

In summary, we draw on the motivated social-cognitive perspective to predict that stronger adherence to an ideological belief system that legitimizes hierarchical group relationships, that is, strong SDO beliefs, will be positively associated with fixed mindsets. Moreover, we predict that the motivation to endorse hierarchical group relationships, strong SDO beliefs, will moderate the effectiveness of a growth mindset of intelligence intervention. If fixed mindsets help satisfy ideological motives, then attempts to promote growth mindsets should be met with resistance from those who strongly endorse the social dominance ideology. We test these predictions across three experimental studies.

STUDY 1

Method

Participants

In all studies, we recruited participants from the United States using Mechanical Turk, an Internet marketplace used to recruit diverse online samples shown to be a source of high-quality data (Buhrmester, Kwang, & Gosling, 2011; Casler, Bickel, & Hackett, 2013). In Study 1, 271 participants completed the study¹ (56.5% female; 43.5% male) with a mean age of 38.33 years ($SD = 13.41$).

Procedure

First, participants completed demographic measures before responding to a measure of social dominance orientation. Next, we randomly assigned participants to one of two conditions to manipulate implicit theories of intelligence. We employed standard procedures for mindset manipulations (e.g., Burnette, 2010; Dweck, 2000). In the growth

¹ Across studies, we selected sample sizes that yielded adequate power to test our predictions using moderation analyses (Aiken & West, 1991; VanVoorhis & Morgan, 2007). As is typical in online studies, there was some attrition across studies. We retained participants who completed both measures of interest. In Study 1, 50 individuals began the survey but did not complete the survey; out of these, 42% quit before reading the message, 22% did not complete the study after receiving the growth message, and 36% did not complete it after receiving the fixed message. In Study 2, 46 individuals began the survey but did not complete the survey; out of these, 28% quit before reading the message, 37% did not complete the study after receiving the growth message, and 35% failed to complete the study after receiving the fixed message. In Study 3, 32 individuals began the survey but did not complete the survey; out of these, 53% quit before reading the message, 13% did not complete the study after receiving the growth message, 31% failed to complete the study after receiving the fixed message, and 3% quit the study in the control condition.

condition ($n = 132$), participants read a *Psychology Today*-type article to encourage a growth theory of intelligence (see Appendix S1). In the fixed condition ($n = 139$), participants read a similar article about the static nature of intelligence. After reading the article, we asked participants to summarize the theme of the article in one sentence, rate the understandability of the article for ninth graders, and describe in one sentence how the article described intelligence. Next, participants responded to fixed mindset measures. In addition to mindsets of intelligence, participants completed measures assessing mindsets of people and racial bias; the measure of interest in this research is fixed mindsets of intelligence.² Three attention check items were embedded in the measures such that participants were asked to respond a certain way such as ‘strongly agree’ to the items. Across studies, analyses are similar when including participants who did not accurately respond to all attention check items; thus, we retain all participants for analyses.

Measures

Participants responded to measures using a scale ranging from 1 (Strongly Disagree) to 6 (Strongly Agree).

Social dominance orientation

Participants responded to the 16-item SDO scale from Pratto *et al.* (2000). Sample items included ‘Some groups of people are simply inferior to other groups’ and the following reverse-scored item, ‘It would be good if groups could be equal’ ($\alpha = .96$).

Fixed mindsets of intelligence

We used a well-validated and reliable 8-item scale measuring mindsets of intelligence (De Castella & Byrne, 2015). Sample items included ‘You have a certain amount of intelligence, and you can’t really do much to change it’ and ‘You can learn new things, but you can’t really change your basic intelligence’. We recoded items such that higher numbers represent agreement with a fixed mindset of intelligence ($\alpha = .94$).

Results

As predicted, social dominance orientation (SDO) was positively correlated with fixed mindsets, $r(269) = .182, p = .003$. To test the hypothesis that SDO will moderate the relationship between mindset condition and subsequent mindset, we used Hayes’ (2013) PROCESS macro. This macro uses an ordinary least squares regression-based path analytical framework to analyse statistical models involving moderation, mediation, and their combination, termed conditional process modelling. Specifically, we employed Model 1 to test our moderation predictions, regressing the mindset outcome on SDO, mindset condition, and their interaction (1 = Growth message, 0 = Fixed message).

First, both SDO ($B = .21, SE = .06, p < .001; CI [0.10, 0.32]$) and condition ($B = -.91, SE = .14, p < .001, CI [-1.17, -0.64]$) significantly predicted fixed mindsets. Greater

² After responding to implicit theories, participants completed measures on volunteering that are not related to the current research and will not be discussed.

levels of SDO predicted stronger fixed beliefs in the nature of intelligence, and those in the growth, relative to the fixed, condition reported weaker fixed intelligence beliefs – alternatively those in the growth condition report stronger growth than fixed mindsets. Next, as predicted, there was a significant interaction between SDO and mindset condition ($B = .29$, $SE = .11$, $p = .012$, $CI [0.06, 0.51]$). Simple-slope follow-up analyses revealed that the mindset manipulation was significantly more effective for low-SDO individuals ($B = -1.25$, $SE = .19$, $p < .001$, $CI [-1.63, -0.87]$) compared to high-SDO individuals ($B = -.56$, $SE = .19$, $p = .004$, $CI [-0.94, -0.18]$). Alternatively, looking at the simple slopes across conditions, SDO significantly predicted mindsets in the growth condition ($B = .36$, $SE = .08$, $p < .001$, $CI [0.19, 0.52]$) but not in the fixed condition ($B = .07$, $SE = .08$, $p = .372$, $CI [-0.08, 0.22]$). These findings support the argument that SDO motivates the maintenance of fixed beliefs (see Figure 1).

STUDY 2

Study 1 supported the prediction that stronger SDO beliefs and stronger fixed mindsets would be correlated and that SDO would moderate responses to mindset messages. More specifically, individuals who are high on SDO were less open to the mindset messages, whereas those lower on SDO demonstrated the typical between-group differences – those assigned to the fixed mindset message report stronger fixed mindsets than those assigned to the growth mindset condition. Our primary goal in Study 2 is to replicate the moderation effects of SDO on the effectiveness of mindset manipulations. We are also interested in examining whether the mindset articles change SDO. Thus, in this study we measured SDO after the manipulation.

Method

Participants

Two hundred and seven participants from Mechanical Turk (50.5% female; 46.2% male; .5% other) completed the study with a mean age of 37.85 years ($SD = 11.68$).

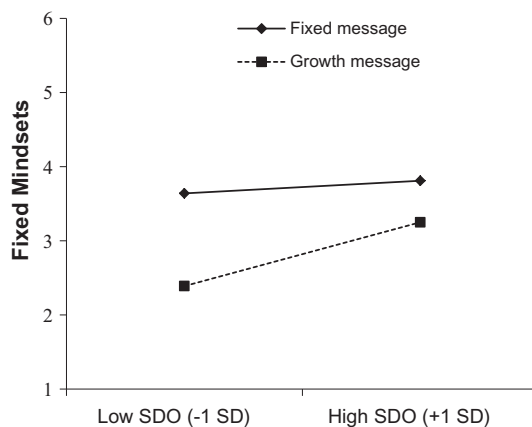


Figure 1. Study 1: fixed mindsets as a function of social dominance orientation (SDO) and intelligence mindset condition.

Procedure

The procedures were identical to Study 1 except for the order of responding to questionnaires. Participants completed the social dominance orientation ($\alpha = .96$) measure after the mindset manipulation (growth condition $n = 106$; fixed condition $n = 101$) and after responding to the fixed mindset measure ($\alpha = .95$). Participants responded to the demographic questions at the end.³

Results

First, we sought to replicate our predictions that SDO will moderate the relationship between condition and mindsets using the SDO scores measured after the manipulation. Specifically, we employed Model 1 to test our moderation predictions, regressing mindsets on SDO, mindset condition, and their interaction (1 = Growth message, 0 = Fixed message). First, both SDO ($B = .26$, $SE = .07$, $p < .001$, CI [0.12, 0.39]) and condition ($B = -.95$, $SE = .15$, $p < .001$, CI [-1.24, -0.66]) significantly predicted fixed mindsets. Greater levels of SDO predicted stronger fixed beliefs of intelligence than lower levels of SDO, and those in the growth condition reported weaker fixed beliefs than those in the fixed condition. Next, there was an interaction between SDO and condition ($B = .30$, $SE = .13$, $p = .028$; CI [0.03, 0.56]). The conditional effect revealed the manipulation was significantly more effective in shaping mindsets for low-SDO individuals ($B = -1.28$, $SE = .21$, $p < .001$; CI [-1.69, -0.87]) compared to high-SDO individuals ($B = -.63$, $SE = .21$, $p = .003$, CI [-1.04, -0.21]). Alternatively, SDO significantly predicted fixed beliefs in the growth condition ($B = .40$, $SE = .09$, $p < .001$, CI [0.22, 0.58]) and not in the fixed condition ($B = .10$, $SE = .10$, $p = .284$, [-.09, .29]; see Figure 2).

Next, to test whether the mindset manipulation might alter social dominance orientation, we conducted a univariate ANOVA, to examine the effect of condition on SDO. The analysis revealed that participants in the growth relative to fixed condition did not report different levels of SDO across conditions, $F(1, 205) = .23$, $p = .630$.

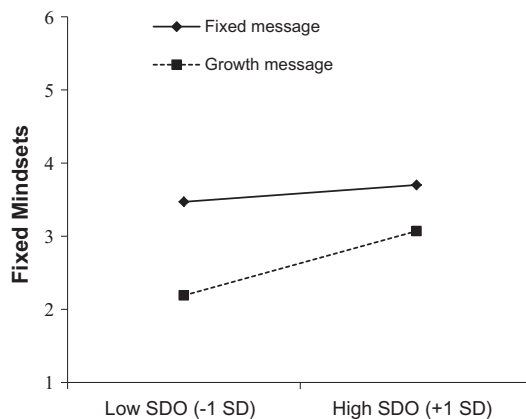


Figure 2. Study 2: fixed mindsets as a function of social dominance orientation (SDO) and intelligence mindset condition.

³ Six participants did not indicate their gender, and 16 did not indicate their age.

Additionally, SDO was again positively correlated with fixed mindsets, $r(205) = .252$, $p < .001$. Thus, there is no evidence that the mindset manipulations alter SDO ratings, providing more support for the argument that SDO comes earlier in the psychological chain and is more of a foundational belief system that propagates fixed beliefs.

STUDY 3

In this final study, our goal was to replicate the moderation effects of SDO on the effectiveness of mindset manipulations and to test a control condition without a mindset message. Because Studies 1 and 2 compare fixed and growth mindset messages, it is unclear to what extent the messages promote more or less fixed mindsets relative to their existing mindsets of intelligence. Thus, it remains uncertain whether the moderation effects are, as predicted, driven by a resistance to the growth mindset message from those who strongly endorse the social dominance ideology.

In summary, in Study 3, we seek to replicate the general pattern of findings – a positive correlation between SDO and fixed beliefs, and for individuals high on SDO, it is harder to find an effect of mindset manipulations than it is for individuals low on SDO. And, we add a control condition to more closely explore the prediction that attempts to promote growth mindsets should be met with resistance from those who strongly endorse the social dominance ideology.

Method

Participants

Three hundred and thirteen participants from Mechanical Turk (55.6% female; 42.8% male; 1.3% transgender) with a mean age of 37.54 years ($SD = 12.30$) completed this study.

Procedure

The procedures were identical to Study 1 except there was a third condition where participants did not read an article after responding to demographics and the SDO measure. Instead, they continued on to respond to the fixed mindset measure (growth condition $n = 97$; fixed condition $n = 105$; control condition $n = 111$).

Results

Again, SDO was positively correlated with fixed mindsets, $r(311) = .221$, $p < .001$. To test the moderating hypothesis, we again employed Hayes' (2013) PROCESS macro Model 1 with a multicategorical focal predictor. We used simple indicator, or dummy, coding with the control condition treated as the reference category. First, both SDO ($B = .37$, $SE = .10$, $p < .001$; CI [0.18, 0.56]) and the fixed (relative to control) condition ($B = .77$, $SE = .14$, $p < .001$; CI [0.50, 1.04]) significantly predicted fixed mindsets, with those with stronger SDO beliefs and those in the fixed, relative to the control, condition reporting stronger fixed intelligence beliefs. There was a marginal effect of the growth (relative to control) condition ($B = -.27$, $SE = .14$, $p = .056$; CI [-0.55, 0.01]) such that those in the growth condition reported marginally weaker fixed intelligence beliefs. Next, there was a significant interaction between SDO and fixed (relative to control) condition ($B = -.39$,

$SE = .14, p = .005$; $CI [-0.66, -0.12]$; see Figure 3). There was no significant interaction between SDO and growth (relative to control) condition ($B = .04, SE = .14, p = .758$; $CI [-0.23, 0.31]$). Conditional effects reveal that low-SDO participants reported significantly stronger fixed beliefs in the fixed condition relative to the control condition ($B = 1.18, SE = .20, p < .001$; $CI [0.79, 1.56]$); however, high-SDO participants reported only marginally stronger fixed beliefs in the fixed relative to the control condition ($B = .36, SE = .20, p = .072$; $CI [0.03, 0.76]$). Additionally, SDO positively predicted fixed mindsets in both the control ($B = .37, SE = .10, p < .001$; $CI [0.18, 0.56]$) and growth ($B = .41, SE = .10, p < .001$; $CI [0.22, 0.60]$) conditions but not in the fixed ($B = -.02, SE = .10, p = .818$; $CI [-0.22, 0.17]$) condition.

Discussion

Little focus has been placed on understanding individual differences that might make it more or less difficult to shift mindsets. In this work, we took a motivated cognitive perspective to understanding effectiveness of mindset manipulations and argued that individuals who endorse inequality among social groups are more likely to hold stronger fixed, relative to growth, mindsets of intelligence than those who reject hegemony. Additionally, we argued that SDO will moderate the effectiveness of mindset messages such that those high on SDO will be more resistant to messages promoting a growth mindset than those lower on SDO. Across studies, we found that stronger SDO beliefs were positively associated with more fixed mindsets about the nature of intelligence. Moreover, we find that SDO moderates the effect of mindset messages on mindsets across three studies. Across all three studies, we find that individuals with high SDO beliefs show significantly less change in mindsets between growth and fixed conditions than those with low SDO beliefs.

However, the pattern of findings in Study 3 does not support the prediction that high-SDO participants will resist attempts to change from a fixed mindset to a growth mindset. That is, there was no evidence that high-SDO participants resisted the message that contradicts their ideology more than the one that supports it. In Study 3, we find that for

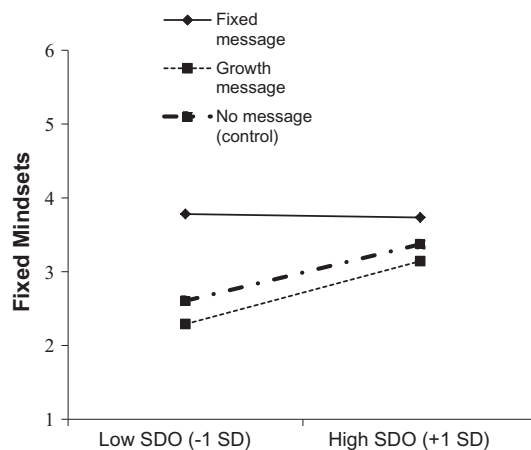


Figure 3. Study 3: fixed mindsets as a function of social dominance orientation (SDO) and intelligence mindset condition.

participants scoring higher on SDO beliefs, the mindset messages, relative to a control only marginally manipulated mindsets. However, for participants scoring lower on SDO beliefs, a fixed message, relative to the control, significantly increased fixed beliefs and a growth message marginally promoted growth beliefs. Study 3 highlights that individuals with lower SDO beliefs may be more open to fixed mindset messages than a growth message.

There are three points that our research makes clear: First, SDO is positively associated with fixed mindsets; second, SDO moderates responses to mindset manipulations; and third, the motivated cognition theoretical explanation for the moderation effects is not supported by the findings in Study 3. We elaborate on each of these below.

First, our work contributes to the scant research examining individual differences in mindsets. Although previous research has focused on demographic and behavioural attributes that predict whether an individual will have a certain mindset such as income level, race, or previous academic performance (Aronson *et al.*, 2002; Claro, Paunesku, & Dweck, 2016; Paunesku *et al.*, 2015), limited research has explored other individual differences that may contribute to the adoption of certain mindsets. As far as we know, no research has examined the role of ideological individual differences in predicting mindsets. A better understanding of these predictors of mindsets will help identify those who might benefit the most from growth mindset interventions.

Second, even less is known about individual differences that may influence the effectiveness of mindset manipulations. Additional and similar work finds that mindsets matter most in times of an ego threat – ‘any event or communication having unfavorable implications about the self’ (Baumeister, Heatherton, & Tice, 1993, p. 143; Burnette *et al.*, 2013). For example, African American students benefited more than White students (Aronson *et al.*, 2002), at-risk students benefited more than students not at risk of dropping out (Paunesku *et al.*, 2015), and growth mindset tempered the effects of poverty on academic achievement (Claro *et al.*, 2016). Thus, the majority of work answering the question “when do mindsets matter most?” finds that the answer is when there are challenging situations. Limited research has explored individual differences that may mitigate the effectiveness of inducing various mindsets. A previous study illustrated that similar traits encompassed within a growth mindset such as a tendency to strive to achieve goals (i.e., grit) moderated the short-term motivational benefits of the intervention such that those high on grit already were less likely to benefit (Orosz, Péter-Szarka, Bóthe, Tóth-Király, & Berger, 2017). We sought to add to this literature by examining an individual difference in belief systems that might make it more or less easy to shift mindsets.

Although SDO did moderate the effectiveness of the mindset manipulations across all three studies, our motivated cognition-based prediction that high-SDO individuals would be particularly resistant to growth messages was not supported. Our findings indicated that the growth message was equally effective for those low and high on SDO and those with high, versus low, SDO were similarly responsive (only marginally) to both the growth and the fixed messages. Moreover, for individuals who do not have relatively high SDO beliefs, the fixed mindset message was more effective than the growth mindset message. More work is needed to gain a better theoretical understanding of why those high on SDO are relatively resistant to all, not just growth, mindset messages and why those with low SDO are more responsive to fixed, compared to growth, messages.

Third, in trying to understand the unexpected findings in Study 3, we suggest that the moderation effect of SDO and mindset messages could be driven by different processes. For example, for individuals high on SDO, responses to mindset messages might be driven

by other factors such as diminished receptivity to scientific arguments. For individuals low on SDO, the stronger shift in the fixed, relative to the growth, messaging may be a reflection of the way in which these articles are written. That is, it is perhaps more convincing, for people who are open to scientific arguments, to read about biological evidence related to the inherent nature of intelligence (Dar-Nimrod & Heine, 2011). More work is needed that seeks to replicate these effects and tease out the simple effects.

In terms of applied implications, scholars and practitioners are working hard to develop effective methodologies for psychological interventions designed to promote growth mindsets (Yeager *et al.*, 2016). The bulk of the scholarship on mindsets reveals how growth mindsets are adaptive frameworks that lead to advantageous thoughts and behaviours such as enabling resilience in the face of challenges (Yeager & Dweck, 2012), and promoting academic achievement (Aronson *et al.*, 2002; Blackwell *et al.*, 2007; Good *et al.*, 2003). The benefits of growth mindsets extend beyond goal achievement; for example, growth mindsets have been shown to discourage stereotypical judgements of others (Erdley & Dweck, 1993; Levy & Dweck, 1999) and encourage positive interpersonal conflict resolution (Giles & Heyman, 2003). A better understanding of the role of individual differences in moderating responses to mindset messages can help with the design of interventions. Although our research showed that the growth message was equally (in)effective for those low and high on SDO, those high on SDO have significantly more fixed beliefs about the nature of intelligence to start with. This finding suggests that interventions to promote growth mindsets might be bolstered through efforts to target those who could benefit the most.

Limitations and future directions

Despite implications and applications of the present work, there are some limitations worth noting. First, we used Mechanical Turk workers as participants. Research on MTurk workers has found that participants are significantly more likely to hold higher education levels than the average population (Hitlin, 2016). Education has been shown to be strongly related to SDO, as a higher level of formal education predicts a lower dominance belief (Sidanius, Pratto, & Bobo, 1994). Thus, future work should explore whether the SDO-by-mindset manipulation interaction effect holds across individuals with less education and other types of populations, generally.

Second, we focused on individual differences in SDO. However, social dominance orientation is likely not the only ideological belief system that predicts fixed mindsets of intelligence. By exploring other ideologies and beliefs, future research can help elucidate the theoretical underpinnings of the findings. For example, researchers can explore other ideologies that are associated with justifying the status quo such as Protestant work ethic (Jost & Hunyady, 2002) or right-wing authoritarianism (Jost *et al.*, 2003) or other belief systems, beyond ideological, that stem from other motives, including existential and epistemic motives, that might predict mindsets and/or moderate the effectiveness of mindset interventions (Jost *et al.*, 2003).

Third, we homed in on intelligence mindsets both because of the relevance to mindset intervention work and because believing in fixed intelligence contributes to the justification of social hierarchies. To further explore the potential role of justifying hegemony in the moderation effects, future work should examine other mindsets including those regarding people's traits, or their mindsets of personality (Chiu, Hong, & Dweck, 1997; Erdley & Dweck, 1993). Fourth, we did not have specific predictions about the effect of the mindset messages compared to the control for those low on SDO. Low-

SDO individuals' enhanced responsiveness to the fixed message could be due at least in part to them having relatively lower extant levels of fixed beliefs to begin with. Additionally, it could be the case that low-SDO individuals are more receptive to scientific evidence – making it easier to shift their mindsets using the typical manipulations of scientific articles. Future work should more closely examine the processes involved in the low-SDO individuals' greater receptivity to fixed, relative to control, messages.

Conclusions

Individuals who are high, relative to those who are low, on SDO have more fixed beliefs about the nature of intelligence. SDO moderates the effect of mindset messages such that individuals high on SDO were more resistant to changing their mindsets based on scientific evidence than those with lower SDO beliefs. Importantly, when comparing to a control condition, there was no evidence that high-SDO participants resisted the growth message that contradicts their ideology more than the fixed one that supports it. Those with high SDO beliefs only marginally responded to both messages and in the intended directions. However, those low on SDO were particularly responsive to the fixed message. We hope the findings in the current work can be used to foster additional inquiry that seeks to understand for whom mindset messaging works best.

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Supporting Information

The following supporting information may be found in the online edition of the article:

Appendix S1. The origins of intelligence: Is the nature-nurture controversy resolved?

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