Stereotype Threat

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Abstract

When members of a stigmatized group find themselves in a situation where negative stereotypes provide a possible framework for interpreting their behavior, the risk of being judged in light of those stereotypes can elicit a disruptive state that undermines performance and aspirations in that domain. This situational predicament, termed stereotype threat, continues to be an intensely debated and researched topic in educational, social, and organizational psychology. In this review, we explore the various sources of stereotype threat, the mechanisms underlying stereotype-threat effects (both mediators and moderators), and the consequences of this situational predicament, as well as the means through which society and stigmatized individuals can overcome the insidious effects of stereotype threat. Ultimately, we hope this review alleviates some of the confusion surrounding stereotype threat while also sparking further research and debate.

Contents

INTRODUCTION

At a recent visit to an elite college, one of the authors met two Black men who described their experience at the college. The first man, a student, told of his struggles to succeed in his chemistry class, despite studying for five hours each day. He feared that he might be misjudged based on his race, and he questioned whether he belonged at such a prestigious school. These concerns kept him from studying with other students and from asking professors for help. The second man, an administrator at the college, described his determination to excel in his position in spite of cultural stereotypes. He felt so much pressure to excel that he turned down an opportunity to participate in a day-long diversity event because he was reluctant to let his workload pile up in his absence.

The experience these men described is one that social psychologists term "stereotype threat" (Spencer et al. 1999, Steele 1997, Steele & Aronson 1995). Stereotype threat describes the situation in which there is a negative stereotype about a persons' group, and he or she is concerned about being judged or treated negatively on the basis of this stereotype. When the above men are required to perform in the negatively stereotyped domain—for example, when the student must write a chemistry test, or the administrator must give a presentation—they will be motivated to succeed for the same reasons as a White student or administrator: to meet personal standards, to

impress others, and perhaps to advance their careers. Because of the stereotype about their group, however, they face extra pressure that a White student or administrator does not—pressure to avoid confirming the stereotype alleging their group's intellectual inferiority. Stereotype-threat studies have shown that this extra pressure can undermine the targeted groups' performance, making it more difficult for them to succeed than it would be for a nonstereotyped person in their position. In fact, stereotype threat can explain much of the underperformance phenomenon—the finding that minority students and women (in mathematics) tend to receive lower grades than their SAT scores would predict, as compared to their nonstereotyped counterparts (see Steele et al. 2002a, Walton & Spencer 2009). Stereotype threat also explains an important part (but not all) of the race gap in academics and the gender gap in mathematics (Walton & Spencer 2009), and it may help elucidate why minorities are underrepresented in prestigious academic programs and institutions and women are underrepresented in math and science fields (Major & O'Brien 2005, Steele 1997, Steele et al. 2002a).

Identification: to take on a domain as being a central part of one's personal identity or self-concept

Stereotype threat can negatively affect performance in domains as diverse as negotiations (Kray et al. 2002), financial decision making (Carr & Steele 2010), golf putting (Stone et al. 1999), safe driving (Yeung & von Hippel 2008), and memory performance among older adults (Mazerolle et al. 2012). In the past, the majority of research has examined stereotype threat effects on academic performance. The theory, however, has now been extended to examine how stereotype threat is related to identity and well-being and how it is associated with feelings of belonging in various environments.

We begin by considering the sources and triggers of stereotype threat and describing common methodology used to examine stereotype threat in the lab. Next, we discuss the mechanisms through which stereotype threat undermines performance and then examine the consequences of stereotype threat—moving beyond performance decrements to investigate stereotype threat's effect on people's identification with the stereotyped domain and their well-being. We end the article by reviewing the emerging literature on how to overcome stereotype threat and by making recommendations for policymakers, educators, and individuals facing stereotype threat.

A THREAT IN THE AIR

Every individual is potentially vulnerable to stereotype threat, because every individual has at least one social identity that is targeted by a negative stereotype in some given situation.

Sources of Threat

The men described at the beginning of this article are well aware of the cultural stereotype alleging Blacks' inferior intelligence. Knowing about this stereotype, regardless of whether they believe it, they are likely to become highly skilled at reading each situation they encounter to determine whether the stereotype may be applied to them in that setting. The student, for example, may recognize this risk each time he enters a classroom or is called upon by a professor to answer a difficult question.

According to theorizing by Claude Steele and his colleagues, the targets of the threat may be largely unaware of the source of the threat (Steele 1997, Steele et al. 2002a). They posit that stereotype threat arises from any situational cue indicating that an individual is at risk of being judged in light of a negative stereotype about one of his or her social identities. Such cues may trigger stereotype threat by simply reminding targets of culturally held stereotypes. For example, gender-stereotypic advertisements can trigger stereotype threat among women facing a math test or leadership task (Davies et al. 2002, 2005). Alternatively, cues may alert targets that their group is

devalued in a particular situation (Emerson & Murphy 2015, Logel et al. 2009b, Stone et al. 2012, Van Loo & Rydell 2014). Numerical imbalances in a setting, for instance, can trigger stereotype threat among women in quantitative fields and Blacks in business settings (Murphy et al. 2007, Purdie-Vaughns et al. 2008). Interpersonal interactions may also be a source of stereotype-relevant information. Prejudiced attitudes held by the high-status group may be revealed by their behavior (Emerson & Murphy 2015, Koch et al. 2014, Logel et al. 2009b) or reported by other members of the targeted group (Adams et al. 2006, Van Loo & Rydell 2014). People tend to be highly sensitive to cues indicating that one of their identities might be devalued (Purdie-Vaughns et al. 2008, Steele et al. 2002a, Wout et al. 2009), so cues do not have to be blatant in order to trigger stereotype threat. In fact, evidence suggests that both blatant and subtle cues can be harmful to performance (McGlone et al. 2006); these cues can have independent negative influences through separate mechanisms and simultaneous detrimental effects on performance (Stone & McWhinnie 2008). Thus, according to Steele's theorizing, the specific characteristics of the source and target of the threat matter less than the mere fact that the threat is in the air (Steele 1997).

Targets: individuals who have negative stereotypes directed at them in a given situation

A Threat in the Lab

To examine stereotype threat in the laboratory, researchers need to recreate the circumstances of a real-world testing situation. In the real world, simply sitting down to write a test in a negatively stereotyped domain is enough to trigger stereotype threat, because the test-taker is at risk of confirming the stereotype through poor performance. Thus, real-world tests require no special instructions to trigger stereotype threat because it is commonly understood that a test in math class measures math ability, or that the SAT exams measure intellectual ability, and it is well known that women and non-Asian minorities tend to be outscored by men and Whites, respectively. Similarly, to capture stereotype threat in the lab, there is often no need to instruct participants that a test is diagnostic of the negatively stereotyped ability (e.g., Steele & Aronson 1995) or shows group differences (Spencer et al. 1999), but these superfluous instructions are often given nevertheless.

Given the prevalence of stereotype threat in traditional testing situations, researchers most often manipulate stereotype threat in the lab by reducing it for some of the participants. For example, to demonstrate stereotype-threat effects on performance, Steele & Aronson (1995) reduced threat by instructing participants that a test was *not* diagnostic of intellectual ability. Black participants who read these instructions scored equally to White students, controlling for SAT scores. However, Black participants who read instructions that the test *was* diagnostic of intellectual ability underperformed. Similarly, Spencer and colleagues (1999) reduced threat by instructing participants that a math test did not show gender differences. Women who read these instructions performed equally to men, whereas women who read instructions that the test showed gender differences underperformed.

Robustness of the Effect

How robust are the laboratory effects of stereotype threat? Stereotype-threat effects are generally robust, with moderate to small effect sizes (Flore & Wicherts 2015, Lamont et al. 2015, Nadler & Clark 2011, Nguyen & Ryan 2008, Picho et al. 2013, Stoet & Geary 2012, Walton & Spencer 2009). Meta-analyses find that the effect size of stereotype threat for women in math ranges from $d = 0.17$ to $d = 0.36$, the effect size for African Americans and Latinos on intellectual tests ranges from $d = 0.46$ to $d = 0.52$, and the effect size for age-based stereotype threat among the elderly is $d = 0.28$.

Interestingly, Nguyen & Ryan (2008) found that subtle cues triggered larger stereotype-threat effects for women in math than did blatant or moderate cues, whereas for minorities moderate cues created the largest stereotype-threat effects. These patterns, however, were reversed for strategies designed to lower stereotype-threat effects. That is, for women in math, blatant strategies aimed at eliminating threat reduced stereotype-threat effects sizes more than subtle strategies, whereas for minorities subtle strategies aimed at eliminating threat reduced effect sizes more than did blatant strategies. Nguyen & Ryan (2008) also found that stereotype-threat effects for women in math were largest among women who moderately identified with math.

A recent meta-analysis by Lamont and colleagues (2015) found some interesting moderators for age-based stereotype threat. There are strong negative stereotypes targeting older adults, which allege that memory, cognitive ability, and physical competencies progressively decline as people get older. Age-based stereotype threat has been shown by numerous researchers to cause underperformance on various cognitive and physical tasks (e.g., Thomas & Dubois 2011). Lamont and colleagues' (2015) meta-analysis of 32 articles investigating age-based stereotype threat found that older adults are particularly susceptible to underperformance when their performance is evaluated using cognitive/memory tasks rather than motor/skill-based tasks (e.g., physical competencies, driving). These researchers also discovered that age-based stereotype-threat effects were larger when the stereotype-threat manipulations were based on stereotypes rather than based on actual facts (Lamont et al. 2015).

Although all published meta-analyses have found evidence for stereotype-threat effects, the original studies by Spencer et al. (1999) and Steele & Aronson (1995) have been challenged in the literature. For example, Stoet & Geary (2012) looked at direct replications of Spencer et al. (1999) that have been published. Not surprisingly, they found that studies that used pretest covariates to reduce error in the measure of test performance created larger stereotype-threat effect sizes than the studies that did not use a covariate. As others (Sackett et al. 2004, Wicherts 2005, Yzerbyt et al. 2004) have argued, however, the use of analysis of covariance in these studies did not properly adjust the error term and may not have met all the assumptions needed for the analysis of covariance. Consequently, Stoet & Geary (2012) focused on a select group of studies (i.e., nine) that did not use pretest covariates. Despite this conservative approach, they still found evidence of a stereotype-threat effect ($d = 0.17$), but it was only marginally significant.

In their meta-analysis, Walton & Spencer (2009) were able to avoid the problems associated with using analysis of covariance. Rather than statistically controlling for pretest data when examining performance in the lab, they examined how pretest scores predicted performance in the lab and in university courses independently for stereotyped group members under high stereotype threat, stereotyped group members under low stereotype threat, and nonstereotyped group members. They found that compared to nonstereotyped group members, stereotyped group members experiencing high stereotype threat performed worse than nonstereotyped group members, but stereotyped group members experiencing low stereotype threat performed better than nonstereotyped group members. These findings held for all levels of pretest scores and for both performance in the lab and actual university grades. They found these effects for women in mathematics and for race in general performance (i.e., intellectual tests and overall grade point average).

MECHANISMS

Considering the complexity of a phenomenon such as stereotype threat, and the diversity of groups and environments that are affected, perhaps it is not surprising that stereotype-threat effects are multiply mediated. The potential intricacy of these mediational issues is captured by the work

done by Shapiro and colleagues (Shapiro 2011, Shapiro & Neuberg 2007, Shapiro et al. 2013). In this section, we consider three aspects of stereotype threat that lead to underperformance: extra pressure to succeed, threats to self-integrity, and priming of stereotypes. Throughout this discussion, we focus on mechanisms that lead to underperformance because these mechanisms are among the best-understood processes in the stereotype-threat literature.

Self-integrity: the sense of oneself as a coherent and valued entity

Working memory: an executive process that coordinates cognition and controls behavior in order to achieve performance goals

Underperformance Due to Extra Pressure to Succeed

People experiencing stereotype threat are motivated to disconfirm negative stereotypes targeting their social identity (e.g., Kray et al. 2001, 2004; Nussbaum & Steele 2007; Vandello et al. 2008) or at least to avoid confirming it (e.g., Brodish & Devine 2009; Chalabaev et al. 2012; Davies et al. 2002, 2005; Good et al. 2008; Nussbaum & Dweck 2008; Ståhl et al. 2012). This motivation to disconfirm the stereotype, or to avoid confirming it, represents a pressure to succeed that nonstereotyped individuals do not face. This pressure can undermine performance through at least three main mechanisms: mere effort, working memory depletion, and conscious attention to automatic processes.

Mere effort. People are motivated to disconfirm negative stereotypes about their group. Ironically, this motivation itself can lead to underperformance. According to a "mere effort" account of stereotype-threat effects on performance (Harkins 2006, Jamison & Harkins 2007), which builds on Zajonc's (1965) drive theory account of social facilitation, people experiencing stereotype threat are motivated to perform well in order to disconfirm the stereotype, and this potentiates the prepotent (i.e., dominant) response on a given task. On easy tasks, the prepotent response is generally correct, so extra motivation from stereotype threat tends to produce better performance (e.g., Ben-Zeev et al. 2005, O'Brien & Crandall 2003, Seibt & Forster 2004). The prepotent response, however, is often incorrect on difficult tasks, such as many academic tests. Jamison & Harkins (2007) asked participants to avoid looking at an irrelevant peripheral cue while waiting for a target to appear onscreen. Consistent with the mere effort account, participants taking an antisaccade test under stereotype threat had trouble inhibiting the prepotent tendency to look at the irrelevant cue but were quick to correct this error and look at the actual target (Jamison & Harkins 2007).

A common misconception is that stereotype threat will impair performance among targeted groups on all stereotype-relevant tasks. In reality, stereotype-threat effects are most likely to be found on tasks that are pushing the upper limit of the targets' ability. It is during these challenging tasks that the added burden of stereotype threat will interfere with performance. In fact, on tests that are well within the ability of the targeted group, the added motivation to disprove a negative stereotype targeting a social identity can actually fuel improved performance (Ben-Zeev et al. 2005, O'Brien & Crandall 2003).

Some studies have led researchers to infer the presence of physiological arousal by showing that people under stereotype threat perform better on easy tests but worse on hard tests (Ben-Zeev et al. 2005, O'Brien & Crandall 2003) and that misattribution of arousal reduces underperformance (Ben-Zeev et al. 2005). Other studies have found direct evidence for a stress response through sympathetic nervous system activation (Murphy et al. 2007), increased blood pressure (Blascovich et al. 2001), and increased cardiac output and total peripheral resistance (Mendes et al. 2002) under stereotype threat. Studies also show cardiovascular arousal (Vick et al. 2008) in response to stereotype threat. Perhaps most alarmingly, recent work by John-Henderson and colleagues (2014, 2015) found that manipulating the amount of stereotype threat experienced by their participants instigated inflammation processes associated with numerous disease processes.

Working memory depletion. Schmader and colleagues' (2008) process model explains how stereotype threat undermines performance on tasks, such as academic tests, that draw on working memory to control attention and effortfully process information (see also Schmader 2010, Schmader et al. 2009). According to this model, when a negative stereotype becomes relevant to one's performance, it triggers a physiological stress response and a monitoring process to detect self-relevant information and signs of failure. It also triggers efforts to suppress negative thoughts and feelings that result from these two processes—each of these mechanisms uses up working memory necessary for successful performance.

There is also evidence for Schmader and colleagues' (2008) proposed monitoring process, in which targets focus attention on themselves and their performance and become vigilant to detect signs of failure. Research reveals that stereotype threat can induce a prevention focus and increased performance monitoring (Beilock et al. 2006, Brodish & Devine 2009, Chalabaev et al. 2012, Kaiser et al. 2006, Murphy et al. 2007, Seibt & Forster 2004). Moreover, indirect evidence indicates that thought suppression plays a role in depleting working memory. A number of studies demonstrate negative emotions in high-threat situations, and these emotions would need to be effortfully suppressed in order to concentrate on a test: thoughts of self-doubt (Steele & Aronson 1995), negative expectancies and thoughts (Cadinu et al. 2005, Stangor et al. 1998), feelings of dejection (Keller & Dauenheimer 2003), and task-related worries (Beilock et al. 2007). Researchers have also provided direct evidence for the role of thought suppression in stereotype threat: Women about to write a high-threat math test suppressed thoughts of the stereotype, and the degree to which they suppressed the thoughts predicted the degree to which they underperformed on the test (Logel et al. 2009a).

Finally, direct evidence shows that stereotype threat reduces performance on a test of working memory capacity (Hutchison et al. 2013), and this reduced capacity mediates and moderates test performance (Régner et al. 2010, Rydell et al. 2009, Schmader & Johns 2003). These findings are further supported by indirect evidence consistent with working memory depletion (e.g., Beilock et al. 2007, Croizet et al. 2004, Inzlicht et al. 2006b, Jamison & Harkins 2007, Schmader 2010, Schmader et al. 2009).

Conscious attention to automated processes. Not all performance requires effortful processing and attentional control. For well-learned skills that do not rely heavily on working memory for successful performance, conscious attention can actually impair performance. For example, expert golf putting is hurt under stereotype threat because attention is allocated to proceduralized processes that normally run outside working memory. Giving expert golfers a secondary task to use up working memory restores performance under threat (Beilock et al. 2006). Schmader and colleagues' model suggests that the monitoring process triggered by stereotype threat undermines such automatic behaviors by making individuals more conscious of their performance and more vigilant for signs of failure, leading to a controlled rather than automated form of behavior regulation.

Underperformance Due to Threats to Self-Integrity and Belonging

In some cases, underperformance may also be explained by the actions targets take to protect their self-worth. They may self-handicap by failing to practice (Stone 2002), by reporting stress and other factors that could explain underperformance (Keller 2002, Steele & Aronson 1995), or by attempting fewer test questions (Davies et al. 2002). Self-handicapping protects the self by providing an explanation for poor performance (e.g., lack of effort) that does not reflect on

ability. Targets may also lower their expectations for themselves (Cadinu et al. 2003), which may be associated with less effort.

Underperformance Due to Priming the Stereotype

Some researchers have suggested an ideomotor paradigm for stereotype-threat findings that do not require "hot" motivational processes to explain underperformance effects (for a review, see Wheeler & Petty 2001). Pointing to research showing that behavior can be a consequence of priming effects, these researchers suggest that when a stereotype becomes activated, stereotype-consistent behavior may follow automatically from that activation (e.g., Bargh et al. 1996, Dijksterhuis et al. 1998). According to the ideomotor paradigm, all individuals aware of the primed stereotypes are equally susceptible to their effects; that is, the actual relevance of the stereotype to the target is immaterial. For example, young participants primed with an elderly stereotype subsequently walk more slowly. In stark contrast to ideomotor paradigms, in stereotype-threat paradigms the relevance of the stereotype to the target is critical—only those individuals whose social identity is targeted by the stereotype are vulnerable to stereotype threat. In fact, participants in stereotype-threat paradigms for whom the primed stereotype is not relevant normally reveal a counter-stereotypic boost in their performance, a phenomenon termed "stereotype lift" (see Walton & Cohen 2003). For example, males primed with female stereotypes reveal this stereotype-lift effect in math performance (Davies et al. 2002).

CONSEQUENCES OF STEREOTYPE THREAT

Both the diversity of groups impacted by stereotype threat and the variety of domains in which stereotype threat can have its impact have been found to be more universal than originally theorized.

Consequences for Performance

Walton & Spencer (2009) summarize research on the consequences of stereotype threat in two meta-analyses, one examining 39 stereotype-threat experiments, and the other examining 3 field experiments designed to reduce stereotype threat in school settings. As in previous meta-analytic summaries of the literature (e.g., Walton & Cohen 2003), they found that stereotype threat significantly affects participants' test performance, such that people experiencing stereotype threat perform significantly worse when stereotype threat is high than when it is low. This finding holds across diverse stereotype-threat manipulations, test types, and targeted groups (e.g., African Americans, Latino Americans, Turkish Germans, and women). Walton and colleagues (2013) conservatively estimate that psychological threat accounts for 50% to 82% of the gender gap on the SAT-Math test, and it accounts for 25% to 41% of the White/Latino gap and 17% to 29% of the White/Black gap on the SAT.

Perhaps more importantly, Walton & Spencer's (2009) meta-analyses demonstrate a phenomenon they call the latent ability effect. When predicting test performance in an environment in which stereotype threat has been reduced, members of negatively stereotyped groups actually outperform nonstereotyped groups at the same level of prior performance. It is as if the members of stereotyped groups were running all of their heats at a track meet into a stiff headwind. Although they had times similar to the members of nonstereotyped groups, when they all ran the final without a headwind, the members of the stereotype group sprinted to the head of the pack. This latent

ability finding suggests that if the Black student we described in this article's introduction were to take a chemistry course in an identity-safe environment in which he did not risk being judged in light of the negative stereotype about his group, he would earn better grades than a White student with the same SAT score. We return to this point in the Implications section.

Individual Difference Moderators of Performance Consequences

Individual differences tend to moderate the effects of stereotype threat on performance in one of two ways: by affecting the degree to which targets are invested in the evaluative implications of their performance, and by influencing their ability to cope with additional pressure.

One ironic and unfortunate aspect of stereotype threat is that the very people who tend to be the highest achieving and care the most are also those most affected by negative stereotypes. Students experience greater performance decrements under stereotype threat to the extent that they are identified with the stereotyped domain, because their performance in the domain is self-relevant. For instance, Whites who were threatened by the Asian positive math stereotype (Aronson et al. 1999) were found to underperform only if they were highly identified with math. In a field study, students of color who were most strongly identified with academics were more likely to withdraw from school over the course of the study (Osborne & Walker 2006). These findings may explain why disidentifying from a domain—ceasing to connect success in a domain to one's sense of self—can eliminate the negative performance consequences of stereotype threat (Steele 1997).

Similarly, people tend to be more invested in the evaluative implications of their performance to the extent that the stigmatized identity is central to their self-concept. For example, only women who were highly identified with their gender performed worse than men on a math test that was described as evaluating the abilities of women in general (Schmader 2002). People high in stigma consciousness are also especially vulnerable to underperformance in high-threat conditions because they tend to interpret more events in light of their stigmatized identity (Brown & Pinel 2003).

A clever early study on stereotype threat by Shih and colleagues (1999) demonstrated how priming individuals' social identities could either make them vulnerable to stereotype threat or shield them from the negative impact of stereotype threat. Specifically, these investigators employed female Asian American participants who have two readily available social identities with polar opposite stereotypes regarding math ability. Their Asian social identity is stereotyped as having superior math skills, whereas their female social identity is stereotyped as having inferior math skills. As predicted, Shih and colleagues (1999) discovered that priming the participants' racial identity improved their math performance, while priming their gender identity undermined their math performance.

Individual differences that affect people's vulnerability to extra pressure also affect their performance under stereotype threat. Individuals with a stronger internal locus of control (Cadinu et al. 2006), more proactive personalities (Gupta & Bhawe 2007), and higher testosterone (Josephs et al. 2003), and who are highly motivated to succeed in general, tend to underperform under high-threat conditions presumably because they "choke" under the additional pressure. In contrast, strong coping abilities are associated with resilience in the face of stereotype threat. For instance, high self-monitors, who have relatively large amounts of coping resources (Seeley & Gardner 2003), do not underperform under stereotype threat (Inzlicht et al. 2006a,b), nor do people who are high in a coping sense of humor (Ford et al. 2004). Building on the work of Schmader and colleagues (Schmader 2010; Schmader et al. 2008, 2009), Régner and colleagues (2010) discovered that individual differences in working memory can also moderate stereotype-threat effects.

Beyond Performance

Disidentification: reconceptualize the self and one's values so as to remove a domain as a self-identity and as a basis of self-evaluation

It is important to understand the consequences of stereotype threat beyond its effect on performance, because such effects are likely antecedents to withdrawal from the domain. One consequence of stereotype threat is that it fosters negative emotions in the stereotyped domain. When people complete a high-threat test, they report decreased task interest (Smith et al. 2007) and rate their experience more negatively (Adams et al. 2006) than do nontargets or targets under low-threat conditions. Stereotype threat also diminishes targets' perceptions of their own abilities in the stereotyped domain. As early as elementary school, girls report decreased math self-confidence under conditions of high threat (Muzzatti & Agnoli 2007), and as young adults, women under stereotype threat make more internal attributions for failure on a computer task than do men (Koch et al. 2008). The combination of decreased enjoyment and diminished self-confidence may explain why women experiencing stereotype threat report less interest in math and science fields and weaker leadership aspirations than men or nonthreatened women report (Davies et al. 2002, 2005).

Pronin and colleagues (2004) found that when their math-identified female participants were confronted with threatening gender stereotypes in the domain of mathematics, the women disassociated themselves from stereotypically feminine characteristics and behaviors potentially linked to math deficits. These stigmatized individuals distanced themselves from stereotypes targeting their gender identity as a means of coping with stereotype threat.

There is also evidence that the pressure of stereotype threat may lead targets to respond defensively, presumably in an effort to deflect the implications for the self and the group. People who experience stereotype threat have been shown to discount the validity of a high-threat test (Lesko & Corpus 2006), deny the importance of the domain (von Hippel et al. 2005), and question the competence of course instructors (Adams et al. 2006). These responses may be adaptive in the short term if they protect targets' self-integrity, but in the long term they may contribute to disidentification.

Stereotype threat can also undermine targets' sense of belonging, affecting their motivation and making them more likely to withdraw from the setting (Walton & Cohen 2007). In professional or academic settings, people whose groups are stereotyped or otherwise stigmatized tend to be uncertain of the quality of their social bonds. For this reason, they are especially sensitive to signs that they do not belong. Events that might seem innocuous to others, such as being left without a lab partner or receiving a disapproving glance from an instructor, may undermine targets' motivation and commitment to the domain. In one study, a manipulation designed to lead students to feel they had few friends in their field of study undermined Black students' sense of belonging and beliefs about their potential to succeed in the field (Walton & Cohen 2007). In another study, a video showing gender imbalances in a setting led women to report a decreased sense of belonging and lesser desire to participate in the setting (Murphy et al. 2007). Emerson & Murphy (2015) investigated how a company's lay theory on diversity being entity based (fixed) or incrementally based (malleable) can impact trust among women. The researchers discovered that women trusted the entity company less than the incremental company, and that this mistrust for the entity company led to disengagement among the women. Similarly, Purdie-Vaughns and colleagues (2008) found that Black professionals exposed to a corporate brochure featuring few minorities reported trust and comfort only if the company explicitly conveyed an identity-safe diversity policy.

The above research confirms how reducing concerns about belonging in potentially threatening environments can reduce vulnerability to stereotype threat and thus allow targeted individuals to perform to their full potential. Walton & Cohen (2007) and Walton and colleagues (2014)

found that increasing feelings of belonging led African Americans and women in engineering, respectively, to do much better in their university courses. Unfortunately, if targeted groups are not made to feel welcome in their university programs, chronic exposure to stereotype threat can lead those targeted students to disidentify from their programs and eventually abandon those programs of study entirely (Woodcock et al. 2012).

Consequences for Well-Being

It seems likely that the ongoing performance pressure of stereotype threat might have long-term consequences on the targets' well-being. Indeed, in research suggesting that targets have increased vulnerability to hypertension, Black students writing a high-threat test exhibited larger increases in mean arterial blood pressure than White students or Black students under little or no stereotype threat (Blascovich et al. 2001). Belonging uncertainty may further undermine health, as suggested by a large literature demonstrating the role of social support in physical health outcomes (for a review, see Cohen 2004).

Sometimes exposure to stereotype threat can even lead to behaviors that directly undermine health. For example, Guendelman et al. (2011) found that among immigrants, the pressure to fit in and avoid immigrant stereotypes led to the adoption of unhealthy eating behavior and subsequent weight gain. Similarly, Inzlicht & Kang (2010) found that stereotype threat led to depleted self-control, which in turn led to increased aggression and unhealthy eating.

Are People Aware of Their Experience of Stereotype Threat?

The two men described at the beginning of this review were clearly aware of the stereotype targeting their group, and they were concerned that they would be evaluated based on that stereotype. Although this level of awareness does not seem to be necessary for stereotype threat to occur (as we review below), at times, awareness of the experience of stereotype threat can play an important role in the mechanism that creates these effects.

Numerous lines of research have shown that targets can be consciously aware of their experience of stereotype threat: (*a*) In open-ended responses, Black professionals who have been exposed to threatening corporate ideology report concern about being devalued due to their racial identity (Purdie-Vaughns et al. 2008); (*b*) on a paper-and-pencil scale, Black students who have just written an intelligence test administered by a White experimenter report fears of being judged in light of stereotypes (Marx & Goff 2005); (*c*) female undergraduates in math and science report that some people believe they have weak abilities because of their gender (Steele et al. 2002b); and (*d*) on a scale, females who have just completed a high-threat math test report that gender stereotypes contributed to their anxiety during the test (Johns et al. 2005).

Further supporting the above findings are studies in which targets report anxiety on paper-and-pencil measures under high-threat conditions (Ben-Zeev et al. 2005, Ford et al. 2004, Osborne 2001, Spencer et al. 1999) and studies in which nonverbal behaviors reveal people are more anxious (Bosson et al. 2004) under high-threat conditions. It is not necessarily the case, however, that people are always aware of the experience of stereotype threat. White athletes fail to report anxiety when threatened with a stereotype that Whites lack natural athletic ability (Stone et al. 1999), and men do not report anxiety when threatened with an ostensible negative stereotype about affective processing (Leyens et al. 2000). One way to reconcile these mixed results is to take into account how well articulated a given stereotype is likely to be in the minds of the targets. In the studies that captured self-reports of stereotype threat and anxiety, the participants were Black students or women in mathematics. Both of these groups face stereotypes that are chronic and

relatively well known and thus may be highly accessible to awareness. In contrast, studies that failed to capture self-reported anxiety involved stereotypes that are less well known or more situational in nature (e.g., White athletes and natural athletic ability, men and affective processing).

Does Stereotype Threat Explain Performance on Real-World Tests?

Some individuals have argued that the consequences of stereotype threat do not generalize from the laboratory into real-world testing situations; that is, that stereotype-threat effects do not explain actual gaps in performance between minorities and Whites, or women and men, on tests such as the SAT (Sacket et al. 2004, 2008). These individuals suggest that stereotype threat exists primarily in the laboratory, when researchers use manipulations to ensure stereotypes are especially salient (Sacket et al. 2004, 2008).

In our view, the preponderance of evidence indicates that stereotype threat is, indeed, responsible for performance decrements on real tests. In this section, we review studies that have been used as support for the argument that stereotype threat does not explain underperformance on real-world tests. To illustrate, one study found that reducing the difficulty of Graduate Record Examination (GRE) questions did not have any differential effects on test performance or on explicit indexes of stereotype threat for Black students or women (Stricker & Bejar 2004). A second study showed that performance differences between men and women, and Whites and Blacks, do not emerge only at the highest levels of difficulty on standardized tests (Cullen et al. 2004), or only among those who are highly identified with the domain (Cullen et al. 2006). Stricker & Bejar (2004) and Cullen and colleagues (2004, 2006) may have failed to replicate traditional stereotype-threat patterns in their data sets because they did not include a condition in which stereotype threat was reduced sufficiently to restore performance among targeted groups.

In one set of field studies that are impressive in their scope, researchers manipulated the placement of a demographic questionnaire on actual standardized tests taken by real test-takers—the Advanced Placement Calculus exam and one college's Computerized Placement Tests. In doing so, they tested a replication of Steele & Aronson's (1995, study 4) laboratory finding that asking the test-takers to indicate their race was enough to trigger stereotype threat on even a nondiagnostic test. Stricker & Ward (2004) moved questions about ethnicity and gender from their traditional place at the beginning of standardized tests to the end of the tests. On the basis of students' test results, they concluded that the performance of female and minority test-takers was not affected by this manipulation in any significant way—statistically or practically. Danacher & Crandall (2008) re-examined Stricker & Ward's (2004) data and concluded that the results, although small, were indeed significant in a very practical way. Inquiring about gender at the end of the test instead of in the beginning (as is traditionally done) could increase the number of US women receiving AP Calculus AB credit by more than 4,700 women every year. This finding is striking given that, unlike Steele & Aronson (1995), who showed that asking about race elicits stereotype threat on a nondiagnostic test (a low-threat situation), women taking the AP Calculus test would be well aware the test was diagnostic of math ability and thus would already be writing the test under high-threat conditions. If inquiring about gender produces performance decrements beyond those already observed in high-threat conditions, it would confirm the power of a seemingly subtle gender-identity prime.

Does Stereotype Threat Explain Performance Differences Between Groups?

As we argued in the first section of this article, because stereotype threat exists on real-world tests without explicit mention of anything about group membership or stereotypes (e.g., Smith & White 2002), the best way to manipulate stereotype threat on any given test is to reduce it for

some of the participants. Next, we discuss a variety of studies that do just that, and in doing so, not only hold the promise of being able to address real-world issues of stereotype threat but also provide some of the strongest evidence for its existence.

OVERCOMING THE CONSEQUENCES OF STEREOTYPE THREAT

Having discovered that the potentially negative consequences of stereotype threat are even more far-reaching than originally believed, finding practical means for individuals to deal with this threat in the air has become a critical issue.

Interventions

Most laboratory interventions aim to reduce the pernicious effects of stereotype threat in one of three ways. The first way is to guide targets to reconstrue a potentially threatening situation as nonthreatening. The second way is to provide targets with a way to cope with the threat. The third way is to change the environment to reduce the threat itself.

Reconstrual interventions. Reconstrual interventions reduce stereotype-threat effects not by objectively changing the situation, but rather by leading participants to perceive a lower level of threat. This reduced perception of threat is then reflected in their improved performance. We have already discussed the most commonly used reconstrual method—altering the description of a test. When participants are told that the test is nondiagnostic or does not show group differences, their performance is restored. This is a simple and effective method of manipulating stereotype threat in laboratory studies and even in field studies. For example, when Good and colleagues (2008) instructed students in an actual math class that their test did not show gender differences, women's test performance increased significantly, so much so that they outperformed the men in the class.

Reconstrual of the test, however, involves an essentially false description of the test; consequently, it is not a practical method for reducing stereotype threat in the real world, and continuing to use it exclusively will not advance researchers' theoretical understanding of stereotype threat. An alternative way to change participants' perceptions of the level of threat is to have them reconstrue their experience. Guiding participants to reappraise their anxiety (Johns et al. 2008) or misattribute their arousal (Ben-Zeev et al. 2005) restores targets' performance to a low threat level. Participants may also be subtly encouraged to reconstrue the threatened identity. This may be done within the stereotyped identity by linking stereotypic traits with positive abilities (Kray et al. 2002). Alternatively, it may be done by expanding the threatened identity through a reminder of characteristics shared with the nonthreatened group (Rosenthal & Crisp 2006, Rosenthal et al. 2007, Shih et al. 1999), guiding participants to see their self-concept as composed of multiple roles and identities (Gresky et al. 2005) or leading them to individuate themselves by filling out a measure about their individual qualities (Ambady et al. 2004).

Reconstrual manipulations have also shown promise outside of the laboratory, not only in reducing underperformance but also in addressing nonperformance consequences of stereotype threat. Presenting a test as not showing gender differences significantly raised women's course grades (Good et al. 2008). Guiding Black students to reconstrue their understanding of intelligence as malleable resulted in greater enjoyment of the academic process and higher grade point averages than those in control groups (Aronson et al. 2002). Leading Black students to reconstrue experiences that could undermine their sense of belonging buffered them against daily stress and resulted in higher grade point averages (Walton & Cohen 2007). Indeed, seeing intellectual

performance as something that can grow over time may be an important way to reduce stereotype threat. The "threat in the air" from stereotypes alleges that intellectual performance is both fixed and group based. Seeing intellectual performance as something that can grow and that is not limited can thus serve as an important antidote to stereotype threat.

Identity safety: removing the "threat in the air" from previously threatening situations; that is, removing the risk of being reduced to a negative stereotype targeting a social identity

Coping interventions. With coping interventions, the overall level of threat remains high, but it does not impact targets' task performance. For instance, participants may be given a strategy to aid them in suppressing anxious thoughts (Logel et al. 2009a) or may be instructed to practice once-susceptible test problems so that they are retrieved directly from long-term memory rather than depleting working memory (Beilock et al. 2007). Educating participants about stereotype threat, reassuring them that the stereotype is illegitimate, and guiding them to attribute any anxiety to a stereotype also results in restored performance (Johns et al. 2005).

Self-affirmation has also been shown to effectively reduce the insidious effects of stereotype threat. Participants can be guided to affirm an important value or self-attribute prior to taking a high-threat test. This self-affirmation restores self-integrity (Steele 1988), leading to improved performance (Frantz et al. 2004, Martens et al. 2006, Schimel et al. 2004). To illustrate, Sherman and colleagues (2013) conducted a field experiment in which they had minority students participate in a values affirmation writing exercise during their regular middle-school classes. Those who participated in this self-affirmation exercise earned higher grades than their fellow minority classmates who did not participate.

Mindfulness training is a coping intervention that is currently getting a lot of attention in psychology. Research has found that mindfulness exercises can alleviate working memory load, and considering the relationship between working memory and stereotype-threat effects, it should come as no surprise that mindfulness has found its way into stereotype-threat paradigms. For example, Weger and colleagues (2012) found that a simple five-minute mindfulness exercise eliminated traditional stereotype-threat effects.

Coping interventions have excellent potential to be applied to real testing situations. Until testing environments can be made identity safe, providing targets of stereotypes with coping strategies may be the best way to reduce the performance effects of stereotype threat. Some coping strategies have been highly effective. In one field study, a simple self-affirmation exercise among middle-school children was successful in closing the race gap in school performance by 40% (Cohen et al. 2006; see also Sherman et al. 2013).

Creating identity-safe environments. Although methods that intervene with the target are successful in reducing and even eliminating performance decrements, they allow the threatening environment to remain. In contrast, a third way to restore targets' performance is to alter the environment to make it identity safe. One means of doing this involves assuring individuals that their stigmatized social identities are not a barrier to success in targeted domains (Davies et al. 2005). Researchers, however, have generally created identity-safe environments by altering the interpersonal environment. This can be done by facilitating positive contact with members of the majority group (Abrams et al. 2006, Walton et al. 2014). It can also be accomplished using members of the targeted group—by providing role models of successful group members (Drury et al. 2011; McIntyre et al. 2003, 2005; Shaffer et al. 2013) or by having group members administer the test (Marx & Goff 2005, McGlone et al. 2006). Interpersonal interventions can also be employed in real-world settings. For example, a field study done with middle-school girls working in same-gender groups did not show the stereotype-threat effect on performance on a diagnostic test, and the girls' performance was mediated by accessibility of positive role models—high-performing female classmates (Pascal & Régner 2007). Another field study (Picho & Stephens 2012), found

that female students in Ugandan coed schools were susceptible to traditional stereotype-threat effects, whereas Ugandan females in all-girl schools were not vulnerable to stereotype threat.

More recently, Walton and colleagues (2014) have used self-affirmation to convince male engineers that their female colleagues have latent ability. This intervention has successfully increased the male engineers' respect for a female colleague, a female teaching assistant, and a female research assistant who interviewed them.

IMPLICATIONS

The responsibility for counteracting stereotype threat does not rest solely on the targets' shoulders; rather, educators, researchers, and policymakers need to start taking proactive steps to remove the threat in the air.

Implications for Researchers

The study of stereotype threat to date has been a prototypical example of a scientific approach to the explication of an important social problem. Social psychologists began by identifying a social problem—the underperformance of stigmatized groups—and developing a theory to explain it. They then generated hypotheses, and through testing these hypotheses, they advanced the understanding of stereotype threat and its mechanisms and consequences. In doing so, social psychologists have developed a promising set of interventions that have been shown in the lab and in the field to reduce the negative consequences of stereotype threat.

We propose a next step, one that social scientists do not often consider: developing effective, broadly tested interventions that can provide a compelling rationale for real-world change. We believe that research on stereotype threat has reached a point that such broad-based interventions are justified. If such interventions were to hold up under widespread testing, then a compelling case could be made that changing environments to reduce stereotype threat in both educational and occupational settings is also justified.

We suggest applying the testing process used in medical research to the social sciences. In medicine, ideas are initially tested with highly controlled low-risk studies, which is analogous to our laboratory studies in the social sciences. Medical researchers take the most promising results and further test them in small clinical trials, analogous to our field interventions. In a final step, medical interventions are tested in large-scale representative clinical trials, from which conclusions can be drawn about the effectiveness, generalizability, and risks of a new treatment. We suggest that this is the step that must be added to the stereotype-threat literature. If stereotype-threat interventions are shown to be successful and low risk on a large representative sample, then policymakers will have the evidence they need to incorporate these interventions into educational curricula and testing procedures.

Implications for Policymakers

Taken together, findings on stereotype threat suggest that many of the benchmarks used to make decisions about admissions and hiring may be biased. That is, they systematically underestimate the true ability and potential of people from groups that are negatively stereotyped in intellectual settings (for a review, see Walton & Spencer 2009). To illustrate, Walton and colleagues (2013) conservatively estimate that the SAT-Math test underestimates the math ability of women by 19 to 21 points and that the SAT-Math and SAT-Reading tests underestimate the intellectual ability of African and Latino Americans by a total of 39 to 41 points for each group. Given this

bias, Walton and colleagues (2013) argue that these measures, as they are, cannot be the basis for meritocratic admissions or hiring decisions. Instead, institutions must take affirmative steps to create a meritocracy. Such affirmative meritocracy first requires institutions to create identity-safe environments. Not only will reducing stereotype threat improve the performance of members of stereotyped groups, but it will do so by also unlocking latent ability that was previously hidden. Unlocking this ability will allow institutions and society as a whole to tap into unrecognized potential. Simply put, organizations that create identity-safe environments will be more productive and efficient than those that do not.

Implications for Educators

Educators can play a role in fostering identity-safe environments by applying successful interventions in their classrooms. They can teach students about stereotype threat and the illegitimacy of stereotypes alleging minorities' and women's inferior ability (Johns et al. 2005). They can encourage students to see intelligence as malleable rather than fixed (Aronson et al. 2002). Through diverse examples in class discussions, they can provide students with role models (McIntyre et al. 2003, 2005). They can communicate to their students that they are welcomed, supported, and valued, whatever their background (Davies et al. 2005). When providing critical feedback to minority students, they can emphasize their high standards and assure students that they can meet these high standards (Cohen et al. 1999).

Implications for Students

The young men described in this article's introduction were aware that they faced struggles because of negative stereotypes and were searching for tools they could use to overcome stereotype threat. In providing advice to them and to other targets, one difficulty is that many tools seem to function best without participation or awareness of the targets themselves. For example, self-affirmation, which has been shown to reduce stereotype-threat decrements in multiple studies, is not effective at restoring self-integrity among people who expect it to have such an effect (Sherman et al. 2013).

There are some active steps, however, that targets themselves can take. They can practice difficult problems so that they do not deplete as much working memory during testing situations (Beilock et al. 2007). When they feel anxious during testing situations, they can substitute an affirming or even neutral thought to aid with the suppression of concerns (Logel et al. 2009a). Evidence also suggests that some targets develop their own strategies to cope with stereotype threat. One such coping strategy is "situational disengagement" (Nussbaum & Steele 2007), in which targets temporarily disengage their self-worth from performance feedback in a particular situation, which allows them to persist longer in the domain without risking further damage to their self-worth.

SUMMARY

People experience stereotype threat when they are at risk of being judged or treated in light of a negative stereotype about one of their social identities. The extra pressure to avoid confirming the stereotype has been shown to undermine performance in negatively stereotyped domains. Stereotype threat helps explain the underperformance effect—the finding that minority students and women, as compared to their nonstereotyped counterparts, tend to receive lower grades than their SAT scores would predict.

Stereotype threat can be triggered by any cue indicating that the stereotype might be applied in a given situation. In the lab, researchers most often manipulate stereotype threat by reducing it for half of the participants, commonly by instructing participants that a test is not diagnostic of the stereotyped ability or does not show group differences.

Stereotype threat affects performance through multiple mechanisms. The extra pressure to succeed on high-threat tasks can undermine performance by potentiating the prepotent response, which is often incorrect on difficult tasks such as academic tests. Stereotype threat depletes working memory capacity, which is needed to solve difficult questions. Stereotype threat can negatively impact performance by leading people to pay conscious attention to automatic skills. Performance decrements can also be explained by actions taken to protect self-integrity (such as self-handicapping).

A series of meta-analyses show that stereotype threat undermines performance across diverse manipulations, test types, and groups, and may explain 50% to 82% of the gender gap on the SAT-Math test and 17% to 41% of the gap between non-Asian minorities and Whites on the SAT. Effects are not limited to performance, however. Stereotype threat can also lead to belonging uncertainty and withdrawal from the negatively stereotyped domain, and it may have long-term consequences for well-being.

Social psychological interventions can be effective at reducing the negative effects of stereotype threat. They may do so by guiding targets to reconstrue threatening situations as nonthreatening, providing targets with a way to cope with the threat, or ideally by changing the environment to reduce the threat itself. We recommend expanding the most effective interventions into large-scale representative clinical trials, from which policy recommendations can be made. In the meantime, we recommend organizations adopt a policy of affirmative meritocracy, in which they first create an identity-safe environment and then take performance decrements due to psychological threat into account when making selection and admission decisions.

SUMMARY POINTS

1. Stereotype threat describes the experience of being in a situation in which there is a negative stereotype targeting an individual's group, and the individual is concerned about being judged or treated negatively based on that stereotype.
2. The extra pressure to avoid confirming a negative stereotype has been shown to undermine performance in stereotype-targeted domains.
3. Stereotype threat helps explain the underperformance effect—the finding that minority students and women in mathematics, in comparison with their nonstereotyped counterparts, tend to receive lower grades than their SAT scores would predict.
4. Stereotype threat undermines performance through multiple mechanisms.
5. Beyond performance decrements, stereotype threat can also lead to belonging uncertainty and withdrawal from the negatively stereotyped domain, and it may have long-term consequences for well-being.
6. Social psychological interventions can be effective at reducing the negative effects of stereotype threat.
7. Interventions that lower stereotype threat can lead to improved performance by members of stereotyped groups.

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