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Stereotype Threat: Causes, Effects, and Remedies

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Abstract

It is critical to understand stereotype threat because it not only influences performance decrements but ultimately may impact major life decisions (i.e., choice of major and profession; Davies et al., 2002). This ARP Information Sheet and Literature Review define and describe *stereotype threat*, a situational predicament that affects individuals when they are at risk of confirming and being personally reduced to a negative group stereotype, which may serve to disrupt and undermine performance and aspirations (Davies, Spencer, Quinn, & Gerhardtstein, 2002; Steele & Davies, 2003). For example, women are vulnerable to stereotype threat in domains where stereotypes allege a sex-based inability (e.g., math test). Therefore, when a woman finds herself in a situation where stereotypes provide a plausible explanation for her behavior (e.g., taking a math exam), the risk of being judged by, or treated in terms of, those negative stereotypes can inhibit her performance on that exam. The added burden of stereotype threat can undermine an individual's performance and aspirations in any stereotype-relevant domain. Research has confirmed that eliminating the situational factors that give rise to stereotype threat can reduce underperformance among stigmatized groups in these targeted domains. In short, removing vulnerability to stereotype threat enables stigmatized individuals to perform to their full potential (Davies, Spencer, Steele, 2005; Spencer, Steele, & Quinn, 1999; Steele & Aronson, 1995).

In the ARP Information Sheet, we present an illustration of stereotype threat that might occur for Lauren, a 10th grader who is enrolled in an advanced math class but is underperforming on her examinations. This illustration is intended to show how stereotype threat might be induced, experienced, and remediated. In the ARP Literature Overview, we review the empirical research on stereotype threat, which suggests that stereotype threat is mediated by mechanisms

Abstract

such as anxiety, arousal, and working memory (Schmader & Johns, 2003; Spencer, Steele, & Quinn, 1999; Steele, 1997). We also discuss strategies that successfully remediate stereotype threat (i.e., de-emphasizing threatened identities, providing examples of stereotyped individuals who have succeeded within the domain; Danaher & Crandall, 2008; Marx & Roman, 2002).

Recommended Reading List:

Davies, P. G., Spencer, S. J., Quinn, D. M., & Gerhardstein, R. (2002). Consuming images: How television commercials that elicit stereotype threat can restrain women academically and professionally. *Personality and Social Psychology Bulletin*, *28*, 1615–1628.

Shapiro, J. R., & Neuberg, S. L. (2007). From stereotype threat to stereotype threats: Implications of a multi-threat framework for causes, moderators, mediators, consequences, and interventions. *Personality and Social Psychology Review*, *11*, 107–130.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, *52*, 613-629.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African-Americans. *Journal of Personality and Social Psychology*, *69*, 797–811.

Information Sheet

Stereotype Threat in the Classroom

Lauren is a bright and energetic 10th grader who enrolled in an academic track that allowed her to take advanced courses in English and mathematics. She excelled in her English class but her math teacher noted that she did poorly on important tests and that her PSAT scores were much lower than expected. She seems to get very nervous and often runs out of time during her math exams, particularly when some of her male peers jeer her and remind her that girls often do worse than boys do in mathematics.

Lauren's experience is not unique and unfortunately is illustrative of the experiences that some young girls face. One explanation for Lauren's poor test performance may be *stereotype threat*, which occurs when individuals are faced with situations in which they risk being personally reduced to a stereotype targeting their group. Specifically, Lauren is made aware by some of her peers of the stereotype suggesting that girls do worse in math than boys. Because of this awareness, it is possible that Lauren also fears being personally reduced to this stereotype during her math and science exams. Subsequently, rather than focusing on answering each item on the exam, Lauren becomes distracted by her fears of not doing well and may second guess her answers, which ultimately may impair her performance.

Effects of Stereotype Threat

As researchers continue to show the negative effects of stereotype threat in experimental and real-world settings, educators can benefit from becoming aware of stereotype threat and the mechanisms behind it (O'Brien & Crandall, 2003; Schmader & Johns, 2003; Steele & Aronson, 1995). As with many psychological phenomena, identification and understanding are the first steps in remediation. Researchers have identified many potential mechanisms of stereotype

threat, which may include anxiety, psychological arousal, domain identification (i.e., a belief that a particular subject area is important to your self-concept), overcompensation (i.e., putting in detrimental amounts of effort), and/or other affective (i.e., emotional) and cognitive responses. So, for instance, Lauren may have experienced increased arousal about performing as well as the boys in her class and performed more poorly as a result of this increased arousal. Ironically, it is the added effort to disprove the stereotype that leads to underperformance on difficult tests that are already pushing the cognitive limits of the test taker. Thus, Lauren's knowledge of the gender stereotypes related to mathematics may have led her to spend more time on the task as a result of second guessing herself, double- and triple-checking her answers, and changing correct answers to incorrect ones.

In addition to decreased performance on science, technology, engineering, and math (STEM) related tasks, stereotype threat has other outcomes as well. Importantly, stereotype threat may be related to the decreased presence of female (versus male) students who pursue STEM-related majors and ultimately, stereotype threat may contribute to women's underrepresentation in STEM-related majors as well as career fields.

Preventing Stereotype Threat

Research also has identified ways in which stereotype threat might be reduced (Aronson, Quinn, & Spencer, 1998; Davies et al., 2005; Martens, Johns, Greenberg, & Schimel, 2005; Marx, & Roman, 2002; Spencer et al., 1999). Such strategies include:

- Providing examples of role models who succeed in STEM;
- Reframing tasks so that individuals do not believe there are group differences;
- Enabling threatened individuals to affirm their talents in other domains; and
- Providing alternative explanations for experiencing nervousness or anxiety.

So, for instance, providing Lauren with examples of girls and women who have performed successfully in the area of math (either through face-to-face contact or even just reading a short biography about an individual) might reduce the impact of stereotype threat on Lauren's performance (Marx, & Roman, 2002). This easy manipulation serves as a practical and feasible way for educators to aid in the reduction of stereotype threat and work toward equalizing the gender playing field. Another strategy might be to provide Lauren with an alternative explanation for her arousal on the test (i.e., an external rather than internal attribution; Ben-Zeev, Fein, & Inzlicht, 2005). An example of this may involve explaining to Lauren that the anxiety she may feel while working on the exam is directly related to her knowledge of the negative stereotypes and not a reflection of her ability to perform well on the exam (Johns, Schmader, & Martens, 2005). This provides Lauren with an external attribution explanation that may enhance her attention on completing the task and decrease her stress-related arousal.

In short, there are a number of ways in which to reduce the negative effects of stereotype threat. These strategies are critical to diffusing threatening situations, resulting performance differences, and the uneven distribution of majors and careers that exist between male and female students in STEM-related fields (NSF, 2000).

Citations

- Aronson, J., Quinn, D. M., & Spencer, S. J. (1998). Stereotype threat and the academic underperformance of minorities and women. In J. K. Swim & C. Stangor (Eds.), *Prejudice: The target's perspective* (pp. 83–103). San Diego, CA: Academic Press.
- Ben-Zeev, T., Fein, S., & Inzlicht, M. (2005). Arousal and stereotype threat. *Journal of Experimental Social Psychology, 41*, 174–181.

- Davies, P. G., Spencer, S. J., & Steele, C. M. (2005). Clearing the air: Identity safety moderates the effects of stereotype threat on women's leadership aspirations. *Journal of Personality and Social Psychology*.
- Johns, M., Schmader, T., & Martens, A. (2005). Knowing is half the battle: Teaching stereotype threat as a means of improving women's math performance. *Psychological Science*, *16*, 175–179.
- Martens, A., Johns, M., Greenberg, J., & Schimel (2006). Combating stereotype threat: The effect of self-affirmation on women's intellectual performance. *Journal of Experimental Social Psychology*, *42*, 236–243.
- Marx, D. M., & Roman, J. S. (2002). Female role models: Protecting women's math test performance. *Personality and Social Psychology Bulletin*, *28*, 1183–1193.
- National Science Foundation (NSF). *Women, minorities, and persons with disabilities in Science and Engineering: 2000* (NSF 00-327). Arlington, VA.
- O'Brien, L. T., & Crandall, C. S. (2003). Stereotype threat and arousal: Effects on women's math performance. *Personality and Social Psychology Bulletin*, *29*, 782–789.
- Quinn, D. M., & Spencer, S. J. (2001). The Interference of stereotype threat with women's generation of mathematical problem-solving strategies. *Journal of Social Issues*, *57*, 55–71.
- Schmader, T., & Johns, M. (2003). Converging evidence that stereotype threat reduces working memory capacity. *Journal of Personality and Social Psychology*, *85*, 440–452.
- Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype threat and women's math performance. *Journal of Experimental Social Psychology*, *35*, 4–28.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African-Americans. *Journal of Personality and Social Psychology*, 69, 797.

Literature Overview

I. Concise Overview of the Literature

People are often judged or stereotyped according to their group membership(s). Group membership can include (but is not limited to) ethnicity, race, gender, age, and religious affiliation. Stereotypes about an individual's group, which can be shaped as either positive or negative, elicit a variety of emotions. Negative stereotypes often cause negative responses, which can manifest themselves in the stereotyped individual's reactions, performance on a task, motivation, and self-esteem. Research has shown that the threat of being evaluated, judged by, or treated in terms of a negative stereotype can cause individuals to perform worse in a domain in which negative stereotypes exist about a group of which they are a member. Imagine taking a difficult math test that is at the upper limits of your ability. If you are a male and you find yourself having difficulty, you may begin to worry about failing the test. If you are a female, however, you may worry about failing the test and reinforcing the math-inferiority stereotype. Therefore, struggling with a math test becomes doubly threatening, as you begin to worry not only about failing the test, but also about being personally reduced to a negative stereotype targeting your group in that domain. This phenomenon has been termed *stereotype threat* (Spencer, Steele, & Quinn, 1999; Steele & Aronson, 1995).

Research suggests that the negative effects of stereotype threat on performance are mediated by psychological and physiological mechanisms such as anxiety, arousal (i.e., readiness to respond to specified stimuli), and working memory (Schmader & Johns, 2003; Spencer et al., 1999; Steele, 1997). Individual differences such as the extent to which a person identifies with their group (e.g., gender) or a particular domain (e.g., math) also seems to influence the impact that stereotype threat has on individuals' performance. Stereotype threat not

only creates performance decrements but ultimately may also impact major life decisions (i.e., choice of profession) and prevent individuals from reaching their full potential within a threatened domain (Gupta & Bhawe, 2007). As a result of such short- and long-term negative effects, researchers have begun to look at ways to remediate stereotype threat. Effective remediation strategies include de-emphasizing threatened identities and providing examples of stereotyped individuals who have succeeded with the domain (Danaher & Crandall, 2008; Marx & Roman, 2002).

II. Synthesis of Findings

Stereotype threat is a psychological phenomenon that has been shown to negatively impact the performance of a variety of groups (e.g., racial/ethnic minorities, women, people with low socioeconomic status). Two groups that are most often studied are African Americans and women (Davies et al., 2005; Marx & Goff, 2005; O'Brien & Crandall, 2003; Spencer et al., 1999; Steele & Aronson, 1995). Studies have shown that African Americans suffer from stereotype threat in situations where cognitive ability is being tested (Blascovich, Spencer, Quinn, & Steele, 2001; Steele & Aronson, 1995). Many (although not all) studies concerning the impact of stereotype threat on women examine this phenomenon within the math domain (Good, Aronson, & Harder, 2008; Brown & Pinel, 2003; Keller & Dauenheimer, 2003; Davies et al., 2002; Marx & Roman, 2002; Schmader, 2002; Brown & Josephs, 1999; Spencer et al., 1999). Individuals (both children and adults) are exposed to negative stereotypes through various media outlets (e.g., commercials, television shows, magazines) and socialization. At a young age, female students are exposed to stereotypes about their performance in mathematics and science-related tasks. As a result, female students are faced with the challenge of disproving (or not confirming) the negative stereotype. Performance decrements have been seen in girls as early as

elementary school (Neuville & Croizet, 2007; Ambady, Shih, Kim & Pittinsky, 2001). For example, one study showed that the activation of gender relevant stereotypes negatively impacted performance on a math test for girls but not boys ages 5-7 and 11-13 (Ambady et al., 2001).

Research continues to show that stereotype threat often leads to a decrement in performance. As research in this area continues to grow, so does an interest in understanding the mechanisms that link stereotype threat to performance. That is, what factors are responsible for the relation between stereotype threat and performance? This question has sparked an investigation of stereotype threat beyond its consequential impacts on performance.

From the first seminal studies conducted on stereotype threat, researchers have suggested that stereotype activation plays a major role in the impact of stereotype threat on performance (Davies et al., 2002; Steele & Aronson, 1995). Stereotype activation in this context simply involves making one's membership in a group salient. For example, stereotype activation of gender stereotypes may be inducted in a variety of ways, for instance by having individuals interact with a male mathematics or science professor (Bell, Spenser, Iserman, & Logel, 2003), watch videos involving men and women in stereotypical roles (Davies, Spencer, Quinn, & Gerhardtstein, 2002). Activating stereotypic beliefs related to stereotype threat may involve telling women that an assessment they are about to take assesses mathematics or science ability. Given the widely held belief regarding women's underperformance compared to that of men in such domains, simply mentioning that the task involves gender differences and that it involves these particular domains is enough to activate gender stereotypes and therefore induce stereotype threat. Recent research reveals that stereotype activation is an important component for activating stereotype threat. For instance, Schmader and Johns (2003) conducted a study

examining the influence of stereotype threat on working memory capacity in women. The results showed that stereotype activation lead to a reduction of working memory capacity for women who were in a stereotype threat condition but not women in a control condition or men in either condition. In a follow-up experiment, the researchers found that a reduction in working memory capacity mediated the effect of stereotype threat on math performance for women.

Previous researchers have posited that anxiety may be responsible for the decreased performance that arises on stereotype-related tasks as a result of experiencing stereotype threat. For example, Spencer, Steele, and Quinn (1999) found evidence that showed that women reported less anxiety when taking a math test when the test was perceived as gender fair than gender biased. The results of this study also showed a relationship between anxiety and test performance; however, there was inconclusive evidence as to whether anxiety was a mediator between stereotype threat and performance.

Although the results of studies examining anxiety have yet to provide strong support that anxiety itself mediates the relationship between stereotype threat and performance, research on psychological and physiological arousal has been more successful (Jordan & Lovett, 2007; Ben-Zeev, Fein, & Inzlicht, 2005; O'Brien & Crandall, 2003). In a study examining the impact of arousal on performance in a situation where stereotype threat is induced, O'Brien and Crandall (2003) found that under stereotype threat, women's performance on a difficult math test decreased; however, women's performance on an easy math test increased. Men's performance was not significantly affected by either test difficulty or stereotype threat. A study conducted by Ben-Zeev, Fein, and Inzlicht (2005) yielded similar results based on test difficulty under stereotype threat. This line of research confirms that the added burden of stereotype threat interferes with performance only on difficult tests that are already pushing the participants'

ability to the maximum. With an easy test, which is well within the individual's ability, the added pressure of stereotype threat will actually improve performance. That is, the individual's added motivation and effort to disprove the stereotype will improve his or her performance on an easy task, but it will undermine performance on a difficult task that is already taxing all of the individual's cognitive resources.

In a follow-up study Ben-Zeev and colleagues (2005), showed that misattribution of arousal may attenuate underperformance. Specifically, participants were told they would be subjected to subliminal noise while taking a math test, and that this exposure has potential side effects including increased arousal. As a result of the manipulation, participants misattributed their arousal to an external factor, and this misattribution resulted in better performance for women faced with stereotype threat than those not faced with stereotype threat. Another study found that when stereotype threat was induced, there was an increase in blood pressure in African American participants taking an academic test (Blascovich et al., 2001). These results offer insight into the role of arousal on performance under conditions of stereotype threat.

In an attempt to understand how stereotype threat differentially impacts performance in people, some researchers have examined individual differences such as domain or group identification (Gupta & Bawe, 2007; Brown & Pinel, 2003; Schmader, 2002; Steele, 1997). Early on, Steele (1997) suggested that stereotype threat affects individuals who identify with the relevant domain (e.g., women who identify with math) more than it impacts individuals who do not identify with that domain. Steele suggested that those who do not identify with the domain will likely underperform whether or not stereotype threat is present; therefore, it is the individuals who do identify with the domain who are most at risk for allowing stereotype threat to undermine their performance. One study found that stereotype threat can even influence

groups that are not typically stigmatized when they identify highly with the domain and are faced with stereotype threat (Aronson et al., 1999). This study showed that White men who identified highly with math performed worse on a math test than those in a non-stereotype threat condition when faced with the threat that Asians perform better in math than do any other group.

Other research suggests that domain identification is not the only type of identification that plays a role in how stereotype threat influences individuals. Schmader (2002) found that group identification may also play a role in the extent to which stereotype threat impacts individuals. Specifically, Schmader (2002) found that gender identification (i.e., the importance placed on gender identity) moderates the effects of stereotype threat on women's performance. Women with higher levels of gender identification were influenced more by stereotype threat and consequently performed worse than men on math tests; however, women with lower levels of gender identification performed just as well as men. These results suggest that women with lower gender identification feel less pressure from stereotype threat because they may not feel that gender stereotypes (good or bad) are as applicable to them. Another individual difference that has been shown to influence the relationship between stereotype threat and performance is stigma consciousness (Brown & Pinel, 2003). Stigma consciousness refers to the self-awareness that an individual has concerning his or her stigmatized status based on a group membership. Brown and Pinel (2003) found that women high in stigma consciousness were more negatively impacted by stereotype threat than were women low in stigma consciousness.

Recently, some researchers have proposed that it is an integration of several mechanisms that causes stereotype threat to impact performance (Schmader, Johns, & Forbes, 2008). Schmader and colleagues (2008) suggest that a combination of physiological, affective, and cognitive processes all lead to the negative consequences that stereotype threat has on

performance. This theory proposes that: 1) a physiological stress response created by a situation of stereotype threat leads to a decrement in working memory; 2) stereotype threat causes people to monitor themselves and their performance consciously, which leads to less efficient behavior on the task at hand; and 3) stereotype threat causes people to engage in more self-regulation tactics such as suppressing negative thoughts and emotions. The combination of all of these mechanisms working together causes individuals to use more cognitive resources (or working memory) to focus on the risks associated with the stereotype threat as well as ways to combat the threat, thereby leaving fewer resources to efficiently perform.

IIa. Impact of Stereotype threat on students in STEM. We will next discuss research that examines the negative outcomes of stereotype threat, focusing on the impact of stereotype threat on students in STEM (science, technology, engineering, and mathematics). A number of outcomes are associated with the experience of stereotype threat. Most research examining stereotype threat has focused on examining performance decrements on tasks for which there is a stereotype regarding performance in the domain (e.g., women performing lower on mathematics related tasks or tests; women performing lower on science related tasks). In addition to impaired performance, stereotype threat has a number of additional consequences including decreased intentions to study math and science-related fields in college, and influence on an individual's intentions to pursue certain types of job (Davies et al., 2002, 2005).

The experience of stereotype threat can impair performance in any domain for which there is a widely held stereotype. For instance, previous research reveals that when racial minorities are told that they will be taking a test that measures cognitive ability, subsequent performance is decreased (Steele & Aronson, 1995). Mirroring these results, when female students are told that a test assesses mathematical ability, performance on the subsequent test is

impaired (Spencer et al., 1999). Stereotype threat has also been shown to negatively impact women's performance in the domain of engineering (Bell, Spencer, Iserman, & Logel, 2003). Specifically, women perform noticeably worse than men when engineering exams are viewed as diagnostic as opposed to non-diagnostic or gender-fair. Similarly, when women are told that a task involves negotiation (and evokes the common stereotype that women are worse at negotiation than are men), women perform more poorly (Kray, Galinsky, & Thompson, 2002). Thus, stereotype threat can negatively impact performance on a number of tasks (either educational or non-academic related task) and for a variety of individuals. This impaired performance hinders women's ability to enter into such domains (e.g., engineering profession) and may partially explain the underrepresentation of women in science, technology, engineering, and mathematics.

In addition to affecting performance, experiencing stereotype threat may also affect an individual's choice of a college major and entry into male-typed professions (Gupta & Bhawe, 2007). For instance, when women are shown television advertisements that endorse gender stereotypes, they report being less interested in majoring in or pursuing careers involving quantitative or leadership skills (Davies et al., 2002, 2005). Similarly, research has shown that female students who report high levels of stereotype threat in male-dominated majors are more likely to consider changing their majors than women in fields not dominated by men (Steele, James, & Barnett, 2002). Thus, women in science, technology, engineering, and math related majors may be more likely to change their majors than other women, particularly if they experience stereotype threat.

In sum, stereotype threat has a number of outcomes, many of which are negative in nature. Stereotype threat has the potential to impair not only performance, but may actually

hinder individuals from pursuing certain majors and careers. With respect to mathematics and science, stereotype threat may partially explain gender bias as well as the underrepresentation of women and minorities in these fields. Thus, it is imperative for practitioners (i.e., teachers, administrators) to have knowledge about this phenomenon so they may work to lessen the negative impacts.

Iib. Implications for Practitioners. It is important for practitioners to understand stereotype threat for several reasons. First, stereotype threat is pervasive. Although stereotype threat effects have traditionally been studied in women and ethnic minorities, members of other groups may be impacted by stereotype threat as well. For example, previous research also has found that when elderly individuals are told that a task assesses memory, subsequent performance is impaired (Levy, 1996). Similar effects have been found for non-stigmatized groups as well. Specifically, when White men are told that a task assesses athletic ability, their performance on a subsequent task is also impaired compared to Black men (Stone, Lynch, Sjomering, & Darley, 1999; Stone & McWhinnie, 2008).

Second, stereotype threat is related to a number of negative outcomes such as impaired performance (i.e., women's lowered performance on math and science related tasks). As such, stereotype threat may be partially responsible for women's underrepresentation in mathematics and science related majors. Furthermore, stereotype threat may negatively impact girls beyond the classroom; its damaging effects have been noted for women in the employment context, leadership context, and entrepreneurial arenas (Gupta & Bhawe, 2007; Bergeron, Block, & Echtenkamp, 2006; Davies et al., 2002, 2005). Practitioners can use this knowledge to make a concerted effort to encourage girls to challenge themselves and pursue academic and professional goals that are related to domains in which they may feel threatened. For example,

teachers can encourage girls to submit projects to the school science fair or join the engineering club. Likewise, teachers and administrators should work together to develop initiatives geared toward female students that promote women exploring and embracing quantitative fields.

Third, all individuals have knowledge of various stereotypes, and it is likely that stereotypes are often unintentionally reinforced by educators themselves. For instance, educators may inadvertently call upon boys more than girls when answering math and science-related questions. In addition, school counselors may more readily recommend liberal arts and humanities (e.g., home economics, English literature) electives to girls rather than math and science based classes (e.g., advanced math classes, engineering, computer science classes). Thus, it is important for practitioners to be fully aware of stereotype threat, its causes, and effects. Such knowledge will enable educators to avoid engaging in behaviors that may reinforce domain-related stereotypes, which may in turn decrease the negative outcomes that are related to stereotype threat. For example, teachers and administrators must convey to female students that they have high expectations for them, and that they expect them to perform at least as well as the male students in the domains of math and science.

III. Research-Tested Remedies or Interventions

Because stereotype threat has a number of negative implications that range from reduced performance on the task at hand to decreased likelihood for pursuing certain professions, researchers have begun to identify ways in which stereotype threat can be remediated. Previous research has revealed that there are a variety of ways in which to reduce stereotype threat. These methods vary with respect to the extent to which they can be applied in real-world settings. Potential methods for remediating the negative effects of stereotype threat include: reframing the task, deemphasizing threatened social identities, providing role models, having the test

administered by a member of the stigmatized group, providing external attributions for difficulty, and assuring individuals that they are capable. We will next discuss each of these methods in greater detail.

Reframing the task simply refers to using different language to describe the task or test. One method for doing so might include modifying task descriptions or instructions so that stereotypes are not invoked. Changing the description can eliminate stereotype threat because the stereotypes are not primed. For instance, women who are preparing to take a math test might be told that the test does not show gender differences or is gender fair (Good et al., 2008; Quinn & Spencer, 2001; Spencer et al., 1999). Because individuals are assured that the test does not show any gender differences, women are likely to perform as well as their male counterparts and there is no fear of confirming the stereotype that women do not perform as well as men on mathematics tests. Simply including a brief statement regarding the fairness of the test is enough to curb the negative effects of stereotype threat. Thus, reframing the task is a simple and effective way in which to reduce the negative effects of stereotype threat.

A second method for reducing stereotype threat consists of deemphasizing threatened social identities. Previous research has found that simply removing or changing the location of demographic questions can reduce the occurrence of stereotype threat. For instance, having individuals indicate their gender after the test is finished, rather than at the beginning, has been shown to increase performance on the test (Danaher & Crandall, 2008; Stricker & Ward, 2004). This is useful because group memberships are not primed. Deemphasizing threatened social identities may be particularly useful for high-stakes standardized testing.

A third method for reducing stereotype threat includes providing examples of individuals that have performed successfully in the domain (i.e., providing role models). For instance, when

female students are exposed to women that have performed successfully in mathematics and science related fields, they perform better than female students who do not have examples of women with such performance (Blanton, Crocker, & Miller, 2000; Marx & Roman, 2002; Marx, Stapel, & Muller, 2005). Similarly, research has shown that simply reading essays about women that have been successful can reduce the negative effects of stereotype threat (McIntyre, Lord, Gresky, Ten Eyck, Frye, & Bond Jr., 2005). Thus, direct and indirect exposure to women that have successfully navigated the field can be enough to reduce the negative impacts of stereotype threat for female students.

Related to the above method, research has confirmed that having the test administered by a member of the stigmatized group can reduce stereotype threat. For example, women will experience less stereotype threat on a math test if the test is administered by a female teacher, just as African Americans will experience less stereotype threat if the test is administered by an African American teacher (Marx & Goff, 2005). This research underscores the importance of having a diverse teaching and administrative staff.

A fifth method for remediating the negative impacts of stereotype threat involves self-affirmation (Martens, Johns, Greenberg, & Schimel, 2005). Self-affirmation involves priming aspects of the self that are not related to the threatened domain (McGlone & Aronson, 2006). Individuals often belong to many different groups and often share values with both in-group and out-group members. Self-affirmation consists of having individuals think about aspects of themselves that they value or believe are important aspects of their esteem. For example, rather than priming gender related traits, stereotype threat can be reduced by having individuals think about aspects of the self that are related to their status as a student, or other traits that are common across genders. Recent research has revealed that having students self-affirm has

longitudinal effects and results in improved performance at the end of a semester (Cohen, Garcia, Apfel, & Master, 2006).

A sixth method for reducing stereotype threat involves providing individuals with external attributions for any anxiety or difficulty that is associated with the test or task. For instance, a study by Johns, Schmader, and Marten (2005) told students explicit information about the negative impact of stereotype threat. Specifically, students were told that any anxiety they felt is likely to be related to the negative stereotypes that exist about women's performance on mathematics tests. In addition, students were also told that the anxiety is not an indication of their ability to perform well on the task at hand. Having external attributions for difficulty (in this case, anxiety) reduced gender differences that typically arise on mathematics tests as a result of stereotype threat. Additional research has found similar results (Ben-Zeev et al., 2005; Good, Aronson, & Inzlicht, 2003). Rather than focusing attention on why they are feeling anxious, individuals can re-direct their attention to the task at hand. Giving individuals an external attribution for the anxiety they feel reduces stereotype threat and results in performance that is at the level of the non-threatened group. In these examples, female students perform just as well as male students on mathematics tests.

IV. Implications and Recommendations for Practitioners

As seen in the previous section, there are a number of other methods for reducing stereotype threat. The strategies vary with respect to their practicality and usability in real-world settings. One strategy that teachers may implement in the classroom is taking time out to ensure all students that poor grades are not a reflection of negative stereotypes attached to group membership prior to giving out exams (Jordan & Lovett, 2007). Teachers may explain that poor grades are related to things such as lack of preparation and poor study habits, which are things

that all students may work on and improve. This may be discussed at the beginning of the school year, and then re-emphasized before exams. This strategy may help to deactivate negative stereotypes and also allow minority students the opportunity to perceive testing and grading as fair and not biased. In addition, teachers may also emphasize that intelligence is malleable (or adaptable), and therefore can improve (Good et al., 2003). This may encourage students to view a bad grade not as an indication of their overall inferior intelligence, but as an indication of an area in which they can improve and excel.

Another strategy that may be effective is educating students about women and minorities who have successfully navigated domains where minority members are often negatively stereotyped (Blanton et al., 2000; Marx & Roman, 2002; Marx et al., 2005). For example, finding women who are successful in the fields of engineering, technology, mathematics, and science may help to boost the confidence of female students in these areas. Teachers may invite a successful woman to visit the class as a guest presenter or present narratives of successful women to students. Knowing that there are other women that have successes in the field may increase the students' beliefs that they may also be able to be effective in mathematics and science related fields (McIntyre et al., 2005). This intervention could be done at any education level.

Having teachers and administrators that belong to underrepresented groups will also be an effective means of reducing stereotype threat (Marx & Goff, 2005). For example, having female math and science teachers will attenuate the amount of stereotype threat the female students experience in the classroom. These teachers will not only be role models for the female students, but they will also convey to the students that there will be no negative stereotypes

targeting their gender in that classroom. Hopefully, these teachers will also explicitly convey to the students their high expectations.

A strategy that might be particularly useful for high-stakes situations consists of providing individuals with alternative explanations for discomfort (Johns et al., 2005; Good et al., 2003). Specifically, the intervention would consist of reminding students (particularly female students and racial minorities) that their anxiety may arise as a result of their knowledge of the negative stereotypes about women (or other group membership), and that feeling anxious is not indicative of how well they will perform on the test. It may perhaps be beneficial to openly discuss what stereotype threat is with students so that students have an outlet which they can contribute feelings of anxiety to during the test. Some research has shown that this type of discussion is helpful in alleviating some performance anxiety and perhaps even decreasing the effects of stereotype threat (Johns et al., 2005).

Educators should also give students information concerning how high-stakes tests are scored. For example, educators can inform students that scoring is reliable and objective. Educators can also assure students that although they are asked to supply demographic information (i.e., race, gender); scorers usually do not have access to this information (Jordan & Lovett, 2007). Students may ask why this information is required, and educators should respond to students concerns and inform them that this information is used for statistical purposes after all scoring is complete to help educators understand how diverse students are performing. Providing students with this information decreases the likelihood that students will have false beliefs regarding how the tests are scored (e.g., that women and/or minorities are scored differently than individuals in other groups). For more information concerning how high-stakes

tests are scored and why demographic information is collected, educators should contact someone from the testing center (e.g., Educational Testing Service).

When possible, practitioners should consider reframing the task or moving demographic information to the end of the test (Good et al., 2008; Quinn & Spencer, 2001). In addition, educators may try to have students engage in self-affirmation strategies. The feasibility of using these strategies will vary. However, it may be beneficial to employ more than one strategy when preparing students for or designing tests. While teachers will be very instrumental in the implementation of many strategies, it is important that other school officials such as administrators, guidance counselors, and school psychologists are knowledgeable about stereotype threat, its negative effects, and ways to remediate these effects.

V. State of Current Research and Further Avenues of Study

Stereotype threat is a pervasive phenomenon that has the ability to impact a variety of individuals in a number of ways. Current research offers us insight as to what stereotype threat is, how it impacts individuals, what mechanisms drive the relationship between stereotype threat and performance, and how we can begin to remediate some of the damaging impacts of this threat. While researchers have begun to delve into the intricacies as to how stereotype threat causes decreases in performance and other negative effects, there is still much research that needs to be conducted in order to completely understand the mechanisms that underlie the performance deficits that occur as a result of stereotype threat. Though much research has examined the constructs, there is still no definitive answer. Researchers agree, however, that there are a number of individual difference variables and situational factors that interact to determine whether or not individuals will be negatively impacted by stereotype threat. Though the construct is not fully understood, previous researchers have been able to examine some

promising remediation strategies. Future research should continue to examine such strategies, and seek to find ways to incorporate such strategies in not only classroom situations but in high-stakes testing situations as well.

Another area of future study that impacts students in K-12 is the number of studies examining stereotype threat within these population groups. While there are some studies examining stereotype threat in elementary, middle, and high school students (for example see, Kellow & Jones, 2008; Neuville & Croizet, 2007; Mckown & Weinstein, 2003; Ambady, Shih, Kim & Pittinsky, 2001), a disproportionate number of current studies regarding this area involve college-aged populations (Jordan & Lovett, 2007). While studies involving older populations give us some insight as to the various facets of stereotype threat, it is unclear as to whether the effects are as strong in younger populations, and whether there are other mechanisms that may be influencing the impact of stereotype threat on performance in younger students. Based on the plethora of current research regarding college-aged students as well as the dearth of current research regarding younger populations, we believe that stereotype threat does impact students of all ages. It is imperative, however, that future research explicitly explores the many components of stereotype threat in younger populations.

VI. Citations

Ambady, N., Shih, M., Kim, A., & Pittinsky, T. L. (2001). Stereotype susceptibility in children:

Effects of identity activation on quantitative performance. *Psychological Science, 12*, 385–390.

Aronson, J., Lustina, M. J., Good, C., Keough, K., Steele, C. M., & Brown, J. (1999). When

white men can't do math: Necessary and sufficient factors in stereotype threat. *Journal of Experimental Social Psychology, 35*, 29–46.

Aronson, J., Quinn, D. M., & Spencer, S. J. (1998). Stereotype threat and the academic

underperformance of minorities and women. In J. K. Swim & C. Stangor (Eds.),

Prejudice: The target's perspective (pp. 83–103). San Diego, CA: Academic Press.

Bell, A. E., Spenser, S.J., Iserman, E., & Logel, C. E. R. (2003). Stereotype threat and women's

performance in engineering. *Journal of Engineering Education, 92*, 307-312.

Bergeron, D. M., Block, C. J., & Echtenkamp, B. A. (2006). Disabling the able: Stereotype threat

and women's work performance. *Human Performance, 19*, 133–158.

Ben-Zeev, T., Fein, S., & Inzlicht, M. (2005). Arousal and stereotype threat. *Journal of*

Experimental Social Psychology, 41, 174–181.

Blanton, H., Crocker, J., & Miller, D. T. (2000). The effects of in-group versus out-group social

comparison on self-esteem in the context of a negative stereotype. *Journal of*

Experimental Social Psychology, 36, 519–530.

Blascovich, J., Spencer, S. J., Quinn, D. M., & Steele, C. M. (2001). African-Americans and high

blood pressure: The role of stereotype threat. *Psychological Science, 12*, 225–229.

- Brown, R. P., & Josephs, R. A. (1999). A burden of proof: Stereotype relevance and gender differences in math performance. *Journal of Personality and Social Psychology, 76*, 246–257.
- Brown, R. P., & Pinel, E. C. (2003). Stigma on my mind: Individual differences in the experience of stereotype threat. *Journal of Experimental Social Psychology, 39*, 626–633.
- Cohen, G. L., Garcia, J., Apfel, N., & Master, A. (2006). Reducing the racial achievement gap: A social-psychological intervention. *Science, 313*, 1307–1310.
- Danaher, K., & Crandall, C. S. (2008). Stereotype threat in applied settings re-examined. *Journal of Applied Social Psychology, 38*, 1639–1655.
- Davies, P. G., Spencer, S. J., Quinn, D. M., & Gerhardstein, R. (2002). Consuming images: How television commercials that elicit stereotype threat can restrain women academically and professionally. *Personality and Social Psychology Bulletin, 28*, 1615–1628.
- Davies, P. G., Spencer, S. J., & Steele, C. M. (2005). Clearing the air: Identity safety moderates the effects of stereotype threat on women's leadership aspirations. *Journal of Personality and Social Psychology, 88*, 276–287.
- Good, C., Aronson, J., & Harder, J. A. (2008). Problems in the pipeline: Stereotype threat and women's achievement in high-level math courses. *Journal of Applied Developmental Psychology, 29*, 17–28.
- Good, C., Aronson, J., & Inzlicht, M. (2003). Improving adolescents' standardized test performance: An intervention to reduce the effects of stereotype threat. *Journal of Applied Developmental Psychology, 24*, 645–662.

- Gupta, V. K., & Bhawe, N. M. (2007). The influence of proactive personality and stereotype threat on women's entrepreneurial intentions. *Journal of Leadership and Organizational Studies, 13*, 73–85.
- Gupta, V. K., & Bhawe, N. M. (2007). The influence of proactive personality and stereotype threat on women's entrepreneurial intentions. *Journal of Leadership and Organizational Studies, 13*, 73–85.
- Johns, M., Schmader, T., & Martens, A. (2005). Knowing is half the battle: Teaching stereotype threat as a means of improving women's math performance. *Psychological Science, 16*, 175–179.
- Jordan, A. H., & Lovett, B. J. (2007). Stereotype threat and test performance: A primer for school psychologists. *Journal of School Psychology, 45*, 45–59.
- Kellow, J. T., & Jones, B. D. (2008). The effects of stereotypes on the achievement gap: Reexamining the academic performance of African American high school students. *Journal of Black Psychology, 34*, 94–120.
- Kray, L. J., Galinsky, A. D., & Thompson, L. (2002). Reversing the gender gap in negotiations: An exploration of stereotype regeneration. *Organizational Behavior and Human Decision Processes, 87*, 386–409.
- Lesko, A. C., & Corpus, J. H. (2006). Discounting the difficult: How high math identified women respond to stereotype threat. *Sex Roles, 54*, 113–125.
- Levy, B. (1996). Improving memory in old age through implicit self stereotyping. *Journal of Personality and Social Psychology, 71*, 1092–1107.

- Martens, A., Johns, M., Greenberg, J., & Schimel (2006). Combating stereotype threat: The effect of self-affirmation on women's intellectual performance. *Journal of Experimental Social Psychology, 42*, 236–243.
- Marx, D. M., & Goff, P. A. (2005). Clearing the air: The effect of experimenter race on target's test performance and subjective experience. *British Journal Social Psychology, 44*, 645–657.
- Marx, D. M., & Roman, J. S. (2002). Female role models: Protecting women's math test performance. *Personality and Social Psychology Bulletin, 28*, 1183–1193.
- Marx, D. M., Stapel, D. A., & Muller, D. (2005). We can do it: The interplay of construal orientation and social comparison under threat. *Journal of Personality and Social Psychology, 88*, 432–446.
- McGlone, M. S., & Aronson, J. (2006). Stereotype threat, identity salience, and spatial reasoning. *Journal of Applied Developmental Psychology, 27*, 486–493.
- McIntyre, R. B., Lord, C. G., Gresky, D. M., Ten Eyck, L. L., Frye, G. D. J., & Bond Jr., C. F. (2005). A social impact trend in the effects of role models on alleviating women's mathematics stereotype threat. *Current Research in Social Psychology, 10*, 116–136.
- McKown, C., & Weinstein, R. S. (2003). The development and consequences of stereotype consciousness in middle childhood. *Child Development, 74*, 498–515.
- Neuville, E., & Croizet, J. (2007). Can salience of gender identity impair math performance among 7-8 years old girls? The moderating role of task difficulty. *European Journal of Psychology of Education, 22*, 307–316.
- O'Brien, L. T., & Crandall, C. S. (2003). Stereotype threat and arousal: Effects on women's math performance. *Personality and Social Psychology Bulletin, 29*, 782–789.

- Quinn, D. M., & Spencer, S. J. (2001). The interference of stereotype threat with women's generation of mathematical problem-solving strategies. *Journal of Social Issues, 57*, 55–71.
- Schmader, T. (2002). Gender identification moderates stereotype threat effects on women's math performance. *Journal of Experimental Social Psychology, 38*, 194–201.
- Schmader, T., & Johns, M. (2003). Converging evidence that stereotype threat reduces working memory capacity. *Journal of Personality and Social Psychology, 85*, 440–452.
- Schmader, T., Johns, M., & Forbes, C. (2008). An integrated process model of stereotype threat effects on performance. *Psychological Review, 115*, 336–356.
- Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype threat and women's math performance. *Journal of Experimental Social Psychology, 35*, 4–28.
- Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist, 52*, 613–629.
- Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African-Americans. *Journal of Personality and Social Psychology, 69*, 797–811.
- Steele, C. M., & Davies, P. G. (2003). Stereotype threat and employment testing: A commentary. *Human Performance, 16*, 311–326.
- Steele, J., James, J. B., & Barnett, R. (2002). Learning in a man's world: Examining the perceptions of undergraduate women in male-dominated academic areas. *Psychology of Women Quarterly, 26*, 46–50.
- Stone, J., Lynch, C. I., Sjomeling, M., & Darley, J. M. (1999). Stereotype threat effects on black and white athletic performance. *Journal of Personality and Social Psychology, 77*, 1213–1227.

- Stone, J., & McWhinnie, C. (2008). Evidence that blatant versus subtle stereotype threat cues impact performance through dual processes. *Journal of Experimental Social Psychology*, *44*, 445–452.
- Stricker, L. J., & Ward, W. C. (2004). Stereotype threat, inquiring about test takers' ethnicity and gender, and standardized test performance. *Journal of Applied Social Psychology*, *34*, 665–693.