= Stereotype threat =

Stereotype threat is a situational predicament in which people are or feel themselves to be at risk of conforming to stereotypes about their social group . Since its introduction into the academic literature , stereotype threat has become one of the most widely studied topics in the field of social psychology . Stereotype threat has been shown to reduce the performance of individuals who belong to negatively stereotyped groups . If negative stereotypes are present regarding a specific group , group members are likely to become anxious about their performance , which may hinder their ability to perform at their maximum level . For example , stereotype threat can lower the intellectual performance of African Americans taking the SAT test used for college entrance in the United States , due to the stereotype that African Americans are less intelligent than other groups . Importantly , the individual does not need to subscribe to the stereotype for it to be activated . The specific mechanism through which anxiety (induced by the activation of the stereotype) decreases performance is by depleting working memory (especially the phonological aspects of the working memory system) .

Stereotype threat is a potential contributing factor to long @-@ standing racial and gender gaps in academic performance . It may occur whenever an individual 's performance might confirm a negative stereotype because stereotype threat is thought to arise from a particular situation , rather than from an individual 's personality traits or characteristics . Since most people have at least one social identity which is negatively stereotyped , most people are vulnerable to stereotype threat if they encounter a situation in which the stereotype is relevant . Situational factors that increase stereotype threat can include the difficulty of the task , the belief that the task measures their abilities , and the relevance of the stereotype to the task . Individuals show higher degrees of stereotype threat on tasks they wish to perform well on and when they identify strongly with the stereotyped group . These effects are also increased when they expect discrimination due to their identification with a negatively stereotyped group . Repeated experiences of stereotype threat can lead to a vicious circle of diminished confidence , poor performance , and loss of interest in the relevant area of achievement .

Proponents of stereotype threat have been criticized for exaggerating its importance as an explanation of real @-@ world performance gaps and misrepresenting evidence as more conclusive than it is . One review has voiced concerns that the effect has been over @-@ estimated and that the field suffers from publication bias .

The opposite of stereotype threat is stereotype boost , which is when people perform better than they otherwise would have , because of exposure to positive stereotypes about their social group . A variant of stereotype boost is stereotype lift , which is people achieving better performance because of exposure to negative stereotypes about other social groups .

= = Original study = =

In 1995 , Claude Steele and Joshua Aronson performed the first experiments demonstrating that stereotype threat can undermine intellectual performance . They had African @-@ American and European @-@ American college students take a difficult verbal portion of the Graduate Record Examination test . As would be expected based on national averages , the African @-@ American students did not perform as well on the test . Steele and Aronson split students into three groups : stereotype @-@ threat (in which the test was described as being " diagnostic of intellectual ability ") , non @-@ stereotype threat (in which the test was described as " a laboratory problem @-@ solving task that was nondiagnostic of ability ") , and a third condition (in which the test was again described as nondiagnostic of ability , but participants were asked to view the difficult test as a challenge) . All three groups received the same test .

Adjusted for previous SAT scores , subjects in the non @-@ diagnostic @-@ challenge condition performed significantly better than those in the non @-@ diagnostic @-@ only condition and those in the diagnostic condition . In the first experiment , the race @-@ by @-@ condition interaction was marginally significant . However , the second study reported in the same paper found a significant

interaction effect of race and condition . This suggested that placement in the diagnostic condition significantly impacted African Americans compared with European Americans .

Steele and Aronson concluded that changing the instructions on the test could reduce African @-@ American students ' concern about confirming a negative stereotype about their group . Supporting this conclusion , they found that African @-@ American students who regarded the test as a measure of intelligence had more thoughts related to negative stereotypes of their group . Steele and Aronson measured this through a word completion task . They found that African Americans who thought the test measured intelligence were more likely to complete word fragments using words associated with relevant negative stereotypes (e.g. , completing " _ _ mb " as " dumb " rather than as " numb ") .

= = Further empirical studies = =

More than 300 published papers show the effects of stereotype threat on performance in a variety of domains . The strength of the stereotype threat that occurs depends on how the task is framed . If a task is framed to be neutral , stereotype threat is not likely to occur ; however , if tasks are framed in terms of active stereotypes , participants are likely to perform worse on the task . For example , a study on chess players revealed that female players performed more poorly than expected when they were told they would be playing against a male opponent . In contrast , women who were told that their opponent was female performed as would be predicted by past ratings of performance . Female participants who were made aware of the stereotype of females performing worse at chess than males performed worse in their chess games .

Researchers Vishal Gupta , Daniel Turban , and Nachiket Bhawe extended stereotype threat research to entrepreneurship , a traditionally male @-@ stereotyped profession . Their study revealed that stereotype threat can depress women 's entrepreneurial intentions while boosting men 's intentions . However , when entrepreneurship is presented as a gender @-@ neutral profession , men and women express a similar level of interest in becoming entrepreneurs . Another experiment involved a golf game which was described as a test of " natural athletic ability " or of " sports intelligence . " When it was described as a test of athletic ability , European @-@ American students performed worse , but when the description mentioned intelligence , African @-@ American students performed worse .

Other studies have demonstrated how stereotype threat can negatively affect the performance of European Americans in athletic situations as well as the performance of men who are being tested on their social sensitivity . Although the framing of a task can produce stereotype threat in most individuals , certain individuals appear to be more likely to experience stereotype threat than others . Individuals who highly identify with a particular group appear to be more vulnerable to experiencing stereotype threat than individuals who do not identify strongly with the stereotyped group .

The mere presence of other people can evoke stereotype threat . In one experiment , women who took a mathematics exam along with two other women got 70 % of the answers right , whereas women who took the same exam in the presence of two men got an average score of 55 % .

The goal of a study conducted by Desert , Preaux , and Jund in 2009 was to see if children from lower socioeconomic groups are affected by stereotype threat . The study compared children that were 6 ? 7 years old with children that were 8 ? 9 years old from multiple elementary schools . These children were presented with the Raven 's Matrices test , which is an intellectual ability test . Separate groups of children were given directions in an evaluative way and other groups were given directions in a non @-@ evaluative way . The " evaluative " group received instructions that are usually given with the Raven Matrices test , while the " non @-@ evaluative " group was given directions which made it seem as if the children were simply playing a game . The results showed that third graders performed better on the test than the first graders did , which was expected . However , the lower socioeconomic status children did worse on the test when they received directions in an evaluative way than the higher socioeconomic status children did when they received directions in an evaluative way . These results suggested that the framing of the directions given to the children may have a greater effect on performance than socioeconomic status . This

was shown by the differences in performance based on which type of instructions they received . This information can be useful in classroom settings to help improve the performance of students of lower socioeconomic status .

There have been studies on the effects of stereotype threat based on age . A study was done on 99 senior citizens ranging in age from 60 ? 75 years . These seniors were given multiple tests on certain factors and categories such as memory and physical abilities , and were also asked to evaluate how physically fit they believe themselves to be . Additionally , they were asked to read articles that contained both positive and negative outlooks about seniors , and they watched someone reading the same articles . The goal of this study was to see if priming the participants before the tests would affect performance . The results showed that the control group performed better than those that were primed with either negative or positive words prior to the tests . The control group seemed to feel more confident in their abilities than the other two groups .

= = Stereotype lift and stereotype boost = =

Stereotype threat concerns how stereotype cues can harm performance . However , in certain situations , stereotype activation can also lead to performance enhancement through stereotype lift or stereotype boost . Stereotype lift increases performance when people are exposed to negative stereotypes about another group . This enhanced performance has been attributed to increases in self @-@ efficacy and decreases in self @-@ doubt as a result of negative outgroup stereotypes . Stereotype boost suggests that positive stereotypes may enhance performance . Stereotype boost occurs when a positive aspect of an individual 's social identity is made salient in an identity @-@ relevant domain . Although stereotype boost is similar to stereotype lift in enhancing performance , stereotype lift is the result of a negative outgroup stereotype , whereas stereotype boost occurs due to activation of a positive ingroup stereotype .

Consistent with the positive racial stereotype concerning their superior quantitative skills , Asian American women performed better on a math test when their Asian identity was primed compared to a control condition where no social identity was primed . Conversely , these participants did worse on the math test when instead their gender identity ? which is associated with stereotypes of inferior quantitative skills ? was made salient , which is consistent with stereotype threat .

= = Mechanisms = =

Although numerous studies demonstrate the effects of stereotype threat on performance , questions remain as to the specific cognitive factors that underlie these effects . Steele and Aronson originally speculated that attempts to suppress stereotype @-@ related thoughts lead to anxiety and the narrowing of attention . This could contribute to the observed deficits in performance . In 2008 , Toni Schmader , Michael Johns , and Chad Forbes published an integrated model of stereotype threat that focused on three interrelated factors :
stress arousal ;
performance monitoring , which narrows attention ; and ,
efforts to suppress negative thoughts and emotions .
Schmader et al. suggest that these three factors summarize the pattern of evidence that has been accumulated by past experiments on stereotype threat . For example , stereotype threat has been shown to disrupt working memory and executive function , increase arousal , increase self @-@ consciousness about one 's performance , and cause individuals to try to suppress negative thoughts as well as negative emotions such as anxiety . People have a limited amount of cognitive resources available . When a large portion of these resources are spent focusing on anxiety and performance pressure , the individual is likely to perform worse on the task at hand .

A number of studies looking at physiological and neurological responses support Schmader and colleagues ' integrated model of the processes that produce stereotype threat . Supporting an explanation in terms of stress arousal , one study found that African Americans under stereotype threat exhibit larger increases in arterial blood pressure . One study found increased cardiovascular

activation amongst women who watched a video in which men outnumbered women at a math and science conference . Other studies have similarly found that individuals under stereotype threat display increased heart rates . Stereotype threat may also activate a neuroendocrine stress response , as measured by increased levels of cortisol while under threat . The physiological reactions that are induced by stereotype threat can often be subconscious , and can distract and interrupt cognitive focus from the task .

With regard to performance monitoring and vigilance , studies of brain activity have supported the idea that stereotype threat increases both of these processes . Forbes and colleagues recorded electroencephalogram (EEG) signals that measure electrical activity along the scalp , and found that individuals experiencing stereotype threat were more vigilant for performance @-@ related stimuli .

Another study used functional magnetic resonance imaging (fMRI) to investigate brain activity associated with stereotype threat . The researchers found that women experiencing stereotype threat while taking a math test showed heightened activation in the ventral stream of the anterior cingulate cortex (ACC) , a neural region thought to be associated with social and emotional processing . Wraga and colleagues found that women under stereotype threat showed increased activation in the ventral ACC and that the amount of this activation predicted performance decrements on the task . When individuals were made aware of performance @-@ related stimuli , they were more likely to experience stereotype threat .

A study conducted by Boucher , Rydell , Loo , and Rydell has shown that stereotype threat not only affects performance , but can also affect the ability to learn new information . In the study , undergraduate men and women had a session of learning followed by an assessment of what they learned . Some participants were given information intended to induce stereotype threat , and some of these participants were later given " gender fair " information , which it was predicted would reduce or remove stereotype threat . As a result , participants were split into four separate conditions : control group , stereotype threat only , stereotype threat removed before learning , and stereotype threat removed after learning . The results of the study showed that the women who were presented with the " gender fair " information performed better on the math related test than the women who were not presented with this information . This study also showed that it was more beneficial to women for the " gender fair " information to be presented prior to learning rather than after learning . These results suggest that eliminating stereotype threat prior to taking mathematical tests can help women perform better , and that eliminating stereotype threat prior to mathematical learning can help women learn better .

= = Factors that affect threat perception = =

= = = Prototypicality = = =

Prototypicality is the degree to which an individual fits the prototype of a group they could be categorized within . Prototypicality relates to threat perception in that the more prototypical an individual looks , specifically focusing on blacks , the more others who associate blacks with they stereotype of dangerousness will perceive them as threatening . Prototypic black targets display physical traits stereotypically associated with Blacks (broad nose , large lips , coarse hair , darker skin tone) . Prototypicality affected prejudice ; it was shown to impact judgments about an individual 's characteristics . For example , a study by Ma & Corell (2011) showed that individuals are more biased and prejudiced against more prototypic black targets than less prototypic targets .

In daily life , individuals are more likely to encounter white people as the default race within the United States as opposed to Black individuals . When encountering atypical whites (white people with features associated with Blackness) , individuals ultimately settle on a White response (the general response to typical white targets is to decide not to shoot quicker and more frequently than in trials with black targets) , in contrast to encountering Blacks with atypical features where Black cues appear to be more dominant and elicit a Black (to decide to shoot quicker and more frequently

than trials with white targets) due to a misplaced threat perception . Lay people are more racially biased , on average , than trained individuals such as police officers . Prototypicality is shown to moderate racial bias which has been shown to be linked to a perceived threat as black people specifically are predisposed to being viewed as more threatening . Police officers show a reduced racial bias in comparison to members of the community ; however , police officers were no better than community members in their sensitivity to prototypic targets providing evidence that prototypicality is directly linked to stereotypes and threat perception which ultimately perpetuates stereotype threat . Members of the same category (race) become harder to distinguish from other members of the same category the more they look like a prototypical representation of their category . (Young , Hugenberg , Bernstein , Sacco 2009) .

= = = = Racial ambiguity defies prototypicality = = = =

 Racial ambiguity is linked to prototypicality in that racially ambiguous individuals walk a line of not always looking prototypical of either group they represent , but being a blend of the various groups . This can leave blurred lines in terms of threat perception in having difficulty categorizing a racially ambiguous individual and determining what perception is more accurate : a more threatening perception in line with black stereotypes or a less threatening perception akin to white stereotypes . (Young , Hugenberg , Bernstein , & Sacco 2009) . Racially ambiguous faces get more racial bias than white faces and less racial bias than black faces , acting as an intermediate , on average . There is evidence for the implicit associations of slight differences in facial features . The degree to which racially ambiguous faces appeared most in line with the prototypical representation of a race , either black or white , directly activated and impacted the evaluations of participants associated with the respective group . This then bolstered stereotypes and the predisposition of individuals to be judges and evaluated based on stereotypes . This also has potential to breed stereotype threat into a marginalized population . In a white @-@ only context , racially ambiguous individuals are viewed as more prototypically Black , and thus more threatening , whereas in a Black @-@ only context , racially ambiguous individuals are viewed as less prototypically black . Facial features matter when associating a racially ambiguous individual with an evaluative association of a respective group .
 Perceptions of threat based on stereotypes associated with one ? s physicality can certainly promote stereotype threat , as a person ? s physicality that often associates them with a race @-@ based stereotype is not easily changed . Hypodescent is a phenomenon that is present in a racially @-@ ambiguous individuals being categorized into the racial group associated with their more ? socially @-@ subordinate heritage . ? This concept is a demonstration of a way in which the categorization of racially ambiguous individuals can influence the longevity of a stereotype by supporting a subordinate heritage of any individual based on race . However more difficult to categorize individuals who tend to look more similar to the prototypical representation of their dominant race (for example : 90 @-@ 10 Black : White) than it is to distinguish a more racially ambiguous individual (60 @-@ 40 Black : White) which is very ironic in that one might think the more prototypical you look , the easier it would be to assign you to a racial category to assess your perceived threat . Perceptions of racially ambiguous faces can be impacted by racial labeling and the context in which the faces are presented (white @-@ only vs. black @-@ only environment) . (Ito , Willadsen @-@ Jensen , Kaye , & Park 2011) .

= = = = Categorization = = = =

 Categorization of individuals as a tool for evaluating them reduces an individual to being associated with the streotypical representation of that group . Once stereotypical associations are made , this gives rise to individuals assessing the level of threat an individual exhibits if a threatening connotation is associated with the stereotype of that group . Research suggests that things are identified by comparing its traits to an association of similar items / processes stored in their memory . When categorizing and making connections of an individual to a stereotype equating their perception of threat to the degree to which that categorized individual aligns with the stereotype can

lead to stereotype threat falling on the categorized person . Lasting effects of race category activation on judgment , evaluation , and behavior that can have serious outcomes , such as biases in criminal sentences . Individuals vary in the extent to which stereotypes are associated with social categories . Strength of stereotype association impacts stereotype effect . Categorization was thought to be inevitable , a result of the perception of others ... however it is avoidable and its avoidance can hopefully reduce prejudice , reduce unjust threat perceptions , and counteract stereotype threat .

= = = Stereotypes = = =

A stereotype can be defined as the association of a group with a trait (ex : Blacks being linked to dangerousness or criminality) . In the United States individuals are more likely to encounter white people as the default race as opposed to Black individuals . In a White majority , perceptual systems may be more sensitive to , and also more biased toward Black features which can automatically activate stereotypes that link to threat perception . Event Related Potentials (ERPs) demonstrate attention is preferentially directed toward Black targets showing that there is a tendency to attend to potential threats , which black individuals have been stereotypically associated with . Descriptions of stereotypical Black behavior are more likely to be attributed to photographs of individuals who appear to be more Afrocentric .

The Quadruple Process Model involves a stimulus (ex : Black male) activating an association (ex : threat) in which the strength of the association (stereotype) prompts a behavior (ex : shoot response) . To survive , evolutionarily , humans must be to reliably identify threats . The stimulus , association , stereotype , behavior system prompts the identification of a threat and initiates a response to the stimulus . Threat relevant associates are emotionally saturate and essential for survival . Not only can threat perception be influenced by emotionally salient factors , cultural stereotypes , and their strength combine to disadvantage blacks to be perceived as more threatening . Recent stereotypes suggest that Blacks , even when unarmed , may be perceived as threatening . Shooter bias is a tendency to shoot armed Blacks quicker and more frequently than armed Whites , but deciding not to shoot unarmed Whites quicker and more frequently than unarmed Blacks . Individuals with greater knowledge of this cultural stereotype or a predisposition to link Blacks to violence displayed more extreme shooter bias and especially biased threat perceptions that led to especially biased behavior .

There are two race effects that lead to Blacks being incorrectly shot at more than Whites :

Perceptual sensitivity : guns are less distinguishable when held by Blacks

Response bias : objects held by Blacks are more likely to be treated as guns .

After being tasked to shoot individuals who held guns , and not to shoot if they were carrying any other object , race should technically be irrelevant to the decision to shoot or not shoot because the correct response solely depends on the object being held . Even as a nondiagnostic component to the evaluation of one ? s perceived threat value race was still factored in to the overall judgment of threat perception . The only information the participants were obligated to attend to was the identification of a weapon or non @-@ weapon . Racial cues promote biased behavior as well as false threat perception . Any cue that implies danger , not just race , may create a predisposition to shoot , however race and the stereotype associated with it lead to a higher evaluation of threat perception , which impacted biased responses .

Stereotypes have the potential to create associations with positive or negative aspects of the group it is generalizing . Research shows there is general negativity / prejudice toward Blacks leading highly prejudice individuals to link Blacks to negativity that is or is not relevant to the Black stereotype (ex : linking Blacks to words like poison or cancer) . Black danger association and stereotypes predict that Black faces capture and hold attention faster and longer than white faces because threatening stimuli captures and holds attention faster and for longer intervals than neutral stimuli (in this case black faces) . The perception of the level of threat posed by a black face significantly biases attention allocation due to an unjust stereotype leading to inaccurate threat perceptions . This also suggests that as fear conditioned stimuli , individuals are taught to have a

pre @-@ established instinct to associate the threat perception of a black individual as more dangerous . Attention has been shown to be biased as a result of societal stereotypes of Blacks in association with danger stereotypes of Blacks in association with danger that leads Black faces to b seen as fear conditioned stimuli . Stereotypes can be gate keepers , they can be self @-@ perpetuating by directing attention towards expected information or as an efficient information processing device that directs attention towards new information that may potentially undermine the stereotype and is dependent upon the individuals use of the stereotype . The individual use of the stereotype is also what unfairly moderates the perceived threat of blacks by way of conditioning longstanding stereotypes .

= = = Neuronal activity = = =

With the increasing strength of a stereotype , cognitively the associations we have attached to that stereotype , such as a higher rated threat perception of blacks , will be analyzed with more ease . Because people are motivated to use as little cognitive resources as possible stereotypes and the connotations attached to them , such as threat perceptions of blacks , last as the most readily available and most easily comprehensible explanation . In a White majority , the perceptual system may be more sensitive to Black faces , and more biased as well . ERPs demonstrate that attention is preferentially directed toward black targets . Participants were more biased / prejudice against prototypic Black targets that less prototypic black targets shown through fMRI and being presented with more or less prototypic individuals . Non @-@ prototypic individuals (ex : dark skinned white males) caused greater amygdala activation (akin to fear response) than did light skinned white males . The amygdala is associated with fear , threat and emotion processing .
Stereotypes and other expectations act as filters that increase the ease with which expectancy @-@ consistent information can be processed . People are motivated to use as little cognitive resources as possible giving the most attention to the easiest comprehensible material (expectancy @-@ consistent information) . As stereotype strength increases , so should the ease of processing stereotype @-@ consistent information . Attention will shift from stereotype @-@ consistent information to stereotype @-@ inconsistent information . Unexpected information is processed more extensively because it is more difficult to comprehend while consistent information can be coded as generic examples of the expectancy but inconsistent information must be uniquely coded as new information that is not aligned with expectancy .

= = = Environment / context = = =

The environment or context through which information is received impacts the threat associated with it . For example , if a man is wearing a hoodie and walking rather fast towards you in the morning , in a rich neighborhood , on a crowded street , while it is raining , threat perception is lower than encountering that same individual after dark , in a poverty stricken neighborhood with no rain on an empty street . Although this could have no threatening intentions at all , the context in which you encounter that person will dictate the level of threat associated with them . Ecological contamination hypothesis states : environment taints perceptions . Those who are in dangerous neighborhood seem more dangerous (ex : police use more force in poverty stricken neighborhoods that have high crime rates and greater proportions of minorities) . When the background appeared to be safe , racial bias was present (armed Blacks were shot quicker and more frequently than armed whites) , vs. when the background was threatening , racial bias was reduced (demonstrated by a tendency to increase the rate at which White targets were shot increasing) . Blacks were still treated hostile in dangerous and non dangerous contexts . Dangerous contexts proved to reduce racial bias in the decision to shoot in that Whites were treated in a similar , hostile fashion to Blacks , not that Blacks were treated with similar regard or restraint as Whites . There is an increasing racial bias from white people , racially ambiguous individuals , and Black faces . Racially ambiguous faces get more racial bias than white faces and less racial bias than black faces , acting as an intermediate , on average . In a white @-@ only context , racially ambiguous individuals are viewed

as more prototypically Black , whereas in a Black @-@ only context , racially ambiguous individuals are viewed as less prototypically black . Perceptions of racially ambiguous faces can be impacted by direct @-@ racial labeling and the context in which the faces are presented (White only vs Black only environments) . Mixed contexts lead to a more mild bias than segregated situation .

Signal detection theory (SDT) involves a bias and reduces ability to distinguish tools from weapons after a Black prime even in situations when race was incidental (nondiagnostic) . The only cue the participants were obligated to attend to was the presence of a weapon or non @-@ weapon . However , unable to sever blacks from their stereotype and its related factors , unjust heightened threat perception persists .

= = = Strategies for change = = =

The bias toward threat perception evaluation of black people , caused by stereotypes , can be lessened with access to diagnostic cues (ex : presence or absence of a weapon) and motivation . Lay people are more racially biased , on average , than trained police officers . Target prototypicality is shown to moderate racial bias . Police officers show a reduced racial bias in comparison to members of the community , however police officers were no better than community members in their sensitivity to prototypic targets . Exposing people to stimuli where race is unrelated to the stereotype may eliminate racial bias . Initial responses were racially biased but research shows that extensive practice with race being unrelated to the task at hand worked to eliminate racial bias . As counter @-@ stereotypical information is aggregated form multiple sources , it may force a change in the stereotype decreasing its strength or negating it entirely . Exposure to counter stereotypic stimuli can reduce racial bias , making race non @-@ diagnostic and unhelpful for the decision process ; the characteristic (violence) is unrelated to the group (race) . Critical characteristics (weapon possession) is statistically unrelated to race therefore paying attention to race may hinder your judgment because it is non @-@ diagnostic (unessential) to the task at hand . It may be beneficial to expose individuals to counter stereotypic information and stereotypic stimuli to change the nature of category based responses . Racial bias appeared to be significantly reduced (for the parameters of the study) with training indicating that change can be made . A stereotype can be a gatekeeper , perpetuating itself by directing attention toward expected information , or as an efficient information @-@ processing device that facilitates the extraction of novel information with the potential to undermine itself .

= = Long @-@ term and other consequences = =

Decreased performance is the most recognized consequence of stereotype threat . However , research has also shown that stereotype threat can cause individuals to blame themselves for perceived failures , self @-@ handicap , discount the value and validity of performance tasks , distance themselves from negatively stereotyped groups , and disengage from situations that are perceived as threatening .

In the long run , the chronic experience of stereotype threat may lead individuals to disidentify with the stereotyped group . For example , a woman may stop seeing herself as " a math person " after experiencing a series of situations in which she experienced stereotype threat . This disidentification is thought to be a psychological coping strategy to maintain self @-@ esteem in the face of failure . Repeated exposure to anxiety and nervousness can lead individuals to choose to distance themselves from the stereotyped group .

Although much of the research on stereotype threat has examined the effects of coping with negative stereotype on academic performance , recently there has been an emphasis on how coping with stereotype threat could " spillover " to dampen self @-@ control and thereby affect a much broader category of behaviors , even in non @-@ stereotyped domains . Research by Michael Inzlicht and colleagues suggest that , when women cope with negative stereotype about their math ability , they perform worse on math tests , and that , after completing the math test , women may continue to show deficits even in unrelated domains . For example , women might overeat , be more

aggressive , make more risky decisions , and show less endurance during physical exercise .

The perceived discrimination associated with stereotype threat can also have negative long @-@ term consequences on individuals ' mental health . Perceived discrimination has been extensively investigated in terms of its effects on mental health , with a particular emphasis on depression . Cross @-@ sectional studies involving diverse minority groups have found that individuals who experience more perceived discrimination are more likely to exhibit depressive symptoms . Additionally , perceived discrimination has also been found to predict depressive symptoms in children and adolescents . Other negative mental health outcomes associated with perceived discrimination include a reduced general well @-@ being , post @-@ traumatic stress disorder , anxiety , and rebellious behavior . A meta @-@ analysis conducted by Pascoe and Smart Richman has shown that the strong link between perceived discrimination and negative mental health persists even after controlling for factors such as education , socioeconomic status , and employment .

= = Mitigation = =

Additional research seeks ways to boost the test scores and academic achievement of students in negatively stereotyped groups . In one study , teaching college women about stereotype threat and its effects on performance was sufficient to eliminate the predicted gender gap on a difficult math test . Making people aware of the fact that they will not necessarily perform worse despite the existence of a stereotype can boost their performance .

However , other research has found the opposite effect . In one study , women were given a text " summarizing an experiment in which stereotypes , and not biological differences , were shown to be the cause of women 's underperformance in math " , and then they performed a math exercise . It was found that " women who properly understood the meaning of the information provided , and thus became knowledgeable about stereotype threat , performed significantly worse at a calculus task " .

Another approach involves persuading participants that intelligence is malleable and can be increased through effort . If people believe that they can improve their performance based on effort , they are more likely to believe that they can overcome negative stereotypes and perform well .

A third type of intervention involves having participants engage in self @-@ affirmation , which is a process in which participants write about a value that is important to them . In 2006 , researchers Geoffrey L. Cohen , Julio Garcia , Nancy Apfel , and Allison Master found that a self @-@ affirmation exercise (in the form of a brief in @-@ class writing assignment) significantly improved the grades of African @-@ American middle @-@ school students , and reduced the racial achievement gap by 40 % . Cohen et al. have suggested that the racial achievement gap could be at least partially ameliorated by brief and targeted social @-@ psychological interventions . One such intervention was attempted with UK medical students , who were given a written assignment and a clinical assessment . For the written assignment group , white students performed worse than minority students . For the clinical assessment , both groups improved their performance maintaining the racial difference . Allowing participants to think about a positive value or attribute about themselves prior to completing the task seemed to make them less susceptible to stereotype threat .

A fourth intervention for stereotype threat involves increasing participants ' feelings of social belonging within the academic world . Greg Walton and Geoffrey Cohen were able to boost the grades of African @-@ American college students , as well as eliminate the racial achievement gap over the first year of college , by telling participants that concerns about social belonging tend to lessen over time . Allowing individuals to feel as though they are welcomed into a desirable group makes them more likely to ignore stereotypes . If minority college students are welcomed into the world of academia , they are less likely to be influenced by the negative stereotypes of poor minority performance on academic tasks .

= = Criticism = =

The stereotype threat explanation of achievement gaps has attracted criticism . According to Paul R. Sackett , Chaitra M. Hardison , and Michael J. Cullen , both the media and scholarly literature have wrongly concluded that eliminating stereotype threat could completely eliminate differences in test performance between European Americans and African Americans . Sackett et al. have pointed out that , in Steele and Aronson 's (1995) experiments where stereotype threat was removed , an achievement gap of approximately one standard deviation remained between the groups , which is very close in size to that routinely reported between African American and European Americans ' average scores on large @-@ scale standardized tests such as the SAT . In subsequent correspondence between Sackett et al. and Steele and Aronson , Sackett et al. wrote that " They [Steele and Aronson] agree that it is a misinterpretation of the Steele and Aronson (1995) results to conclude that eliminating stereotype threat eliminates the African American @-@ White test @-@ score gap . "

Arthur R. Jensen criticised stereotype threat theory on the basis that it invokes an additional mechanism to explain effects which could be , according to him , explained by other , well @-@ known , and well @-@ established theories , such as test anxiety and especially the Yerkes ? Dodson law . In Jensen 's view , the effects which are attributed to stereotype threat may simply reflect " the interaction of ability level with test anxiety as a function of test complexity " .

In 2009 , Wei examined real @-@ world testing over a broad population (rather than lab assessments with questionable external validity) , and found the opposite of stereotype threat : randomly assigned gendered questions actually raised female students ' scores by 0 @.@ 05 standard deviations . The lack of stereotype threat replicates an earlier large experiment with Advanced Placement exams which found no stereotype threat .

Gijsbert Stoet and David C. Geary reviewed the evidence for the stereotype threat explanation of the achievement gap in mathematics between men and women . They concluded that the relevant stereotype threat research has many methodological problems , such as not having a control group , and that the stereotype threat literature on this topic misrepresents itself as " well established " . They concluded that the evidence is in fact very weak .

Failures to replicate and publication bias

Whether the effect occurs at all has also been questioned , with researchers failing to replicate the finding . Flore and Wicherts concluded the reported effect is small , but also that the field is inflated by publication bias . They argue that , correcting for this , the most likely true effect size is near zero (see meta @-@ analytic plot , highlighting both the restriction of large effect to low @-@ powered studies , and the plot asymmetry which occurs when publication bias is active) .

Earlier meta @-@ analyses reached similar conclusions . For instance , Ganley et al . (2013) examined stereotype threat on mathematics test performance . They report a series of 3 studies , with a total sample of 931 students . These included both childhood and adolescent subjects and three activation methods , ranging from implicit to explicit . While they found some evidence of gender differences in math , these occurred regardless of stereotype threat . Importantly , they found " no evidence that the mathematics performance of school @-@ age girls was impacted by stereotype threat " . In addition , they report that evidence for stereotype threat in children appears to be subject to publication bias . The literature may reflect selective publication of false @-@ positive effects in underpowered studies , where large , well @-@ controlled studies find smaller or non @-@ significant effects :

nonsignificant findings were almost always reported in an article along with some significant stereotype threat effects found either at another age (Ambady et al . , 2001 ; Muzzatti & Agnoli , 2007) , only with certain students (Keller , 2007) , on certain items (Keller , 2007 ; Neuville & Croizet , 2007) , or in certain contexts (Huguet & Regner , 2007 , Study 2 ; Picho & Stephens , 2012 ; Tomasetto et al . , 2011) . Importantly , none of the three unpublished dissertations showed a stereotype threat effect . This observation suggests the possibility that publication bias is occurring . Publication bias refers to the fact that studies with null results are often not written up for publication or accepted for publication (Begg , 1994) . This bias is a serious concern , especially if

these results are being used to make recommendations for interventions .

 In a study designed to see whether incentives could overcome stereotype threat in mathematics tests , Fryer Levitt and List (2008) could not replicate the stereotype threat , finding instead a modest facilitation effect of threat for males and females .