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# **Social Support as a Moderator for Stereotype Threat's Effects on Working Memory**

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## Introduction

Stereotypes have been shown to pose physical, emotional, and psychological threats to marginalized groups in a variety of social and political contexts (Najdowski, Bottoms, & Goff, 2015; Johns, Inzlicht, & Schmader, 2008). Ethnic minorities may serve as an example of a group that is disproportionately subjected to the harmful effects of stereotype threat within the workplace and academia. Controlled studies looking at stereotype threat have been modeled after real-world situations to gain a better understanding of established performance disparities among ethnic minorities (Schmader & Johns, 2003; Steele & Aronson, 1995).

The term stereotype threat was introduced by Steele and Aronson (1995) who demonstrated that Black college students performed worse on the Graduate Record Exam than white students when their race was emphasized. However, when race was not emphasized, Black students performed just as well and sometimes better than white students. These results were the first of many to exhibit that academic performance can suffer when students are aware that their behavior might be subject to racial stereotyping. Following Steele and Aronson's (1995) evidence of this performance disparity, Steele and Claude (1995) posited that stereotype threat redirects a student's attention from performing well on a test to the devaluing stereotype. As the gap in academic success between ethnic minority and white students continues to be of concern in modern Western society, research has begun to focus on the role of social support in improving performance. Dennis, Phinney, and Chuateco (2005) demonstrated that a lack of social support is predictive of college outcomes in ethnic minority first-generation students.

## Stereotype Threat

Stereotypes are oversimplified images or ideas targeted at people who belong to a social group. According to Steele and Aronson (1995), stereotype threat refers to being at risk of confirming a negative stereotype about one's group through actions or behaviors. When ethnic minority students are faced with the pressure resulting from social comparisons—that are perceived as unfavorable—they have demonstrated performance decrements across a wide range of tasks. One account of this effect is that the cognitive pressure triggered by stereotype threats drains the same cognitive resources that are implicated in the respective task. The cognitive mechanisms that are associated with these performance decrements are not fully understood. However, there is converging evidence that stereotype threat interferes with academic performance, because it reduces an individual's working memory capacity (Schmader & Johns, 2003).

In 2013, the total college enrollment rate for white 18- to 24-year-olds in the US (42%) was higher than the rates for their Black and Hispanic peers (34%) (Musu-Gillette, Robinson, & McFarland, 2016). Many researchers have attributed this achievement gap to stereotypes

surrounding Black and Hispanic students having lower intellectual ability than their white peers. When a stereotype threat is present in an academic setting, it has been correlated with poor intellectual performance (Steele & Aronson 1995). Steele and Aronson (1995) originally found that they could induce stereotype threat in their study by simply having test-takers indicate their race on the test booklet, thus adversely affecting the performance of minority students on the Graduate Record Exam. Previous research confirms that stereotype threat offers a situational explanation for academic performance differences among various groups rather than inherent ability (Steele & Aronson, 1995). To contribute to the growing research on stereotype threat's effects and understanding of the cognitive mechanisms it targets within academic settings, we have explored working memory.

## Working Memory

Working memory is a cognitive system of short-term memory that is responsible for our ability to focus our attention on temporarily activated information of interest while simultaneously inhibiting information that is irrelevant to the task at hand. Working memory capacity includes both the temporary storage of information as well as an attentional capability (Kane, Bleckley, Conway, & Engle, 2001). Particularly relevant to the study of stereotype threat, cognitive resources that dictate working memory capacity may be compromised when an individual is under stress. This occurs because the mental resources and energy that normally contribute to successful working memory function are instead surpassed by negative thoughts and emotions that disrupt one's ability to complete tasks (Klein & Boals, 2001). An individual indicating their minority status prior to a task (through a demographic questionnaire prior to an exam) can adversely affect their attention and thus their performance (Steele & Aronson, 1995).

Stereotype threat situations have been observed to disrupt working memory function by interrupting the targeted individual's ability to focus on the task at hand. According to Schmader and Johns (2003), stereotype threat can be conceptualized as a stressor when a negative social stereotype that is primed in a performance situation poses a threat to one's social identity. Researchers have identified *stereotype threats* as the biggest barriers to ethnic minorities' *academic success* (Robin, 2013). Therefore, understanding the nature of the cognitive disruption that stereotype threat causes—specifically the effects of stereotype threat on working memory capacity—is crucial.

The working memory system aids in the conceptualization of words and the ability to remember words for comprehension, contributing to areas such as reading achievement (Baddeley, 2003). In addition to reading, working memory performance has been connected with benefits in mathematics. Specifically, working memory is associated with the ability to retrieve arithmetic facts from long-term memory and maintain numerical representations

(Raghubar, Barnes, & Hecht, 2010). Therefore, prior research has established a connection between working memory and academic achievement.

The urgency to further understand stereotype threat is illustrated by prior research that repeatedly legitimizes the cognitive and emotional deficits one experiences when being exposed to stereotype threat. However, less is known about how to mitigate these negative effects. Research efforts to establish interventions that may reduce stereotype threat have investigated individual differences, mindfulness exercises (Weger, Hooper, Meier, & Hoptrow, 2012) and even retraining attitudes and stereotypes (Forbes & Schmader 2010). However, there remains a discrepancy between understanding an individual's response to stereotype threat and systematically alleviating stereotype threat.

## **Social Support**

Perceived availability of social support resources may play a moderating role against the negative outcomes of stereotype threat on ethnic minority students. Previous research has consistently shown a positive relationship between social support and well-being, suggesting that social support acts as a buffer for life stress. Dennis, Phinney, and Chauteco (2005) investigated the role of peer support in the success of ethnic minority, first generation college students—a population that is traditionally subject to stereotypes about academic performance—and found that peer support was a strong predictor of academic achievement (2005).

Some of the most current research reveals a clearer picture of how social support works to reduce psychological stress that stereotype threat elicits. Hornstein and Eisenberger (2017) suggest that social support inhibits the formation of fear associations for other cues, allowing close relationships to override the activation of a fear response and allow optimal cognitive function to take place. This mechanism therefore has the potential to resist the deleterious effects of stereotype threat on working memory. Therefore, the demonstrated positive effects of social support may lead research in revealing its moderating effects on the working memory deficits of stereotype threat.

## **The Present Study**

The present study seeks to investigate the relationship of a stereotype threat and race interaction with working memory on the campus of Seattle University, in addition to social support as a potential moderator for stereotype's negative cognitive effects. Our study aims to replicate past work to demonstrate the prevalence of stereotype threat at Seattle University and to then indicate a way to combat its effects through social support. Given a growing body of research we hypothesize, first, that ethnic minority students in a stereotype threat condition will do poorer on a working memory test than white students in a stereotype threat condition.

Furthermore, we hypothesize that there will be no significant difference in the working memory scores among ethnic minority and white students in the stereotype threat condition when high levels of social support are indicated.

## Method

Participants in this study were undergraduate college students. Surveys were distributed to approximately 2,000 individuals on Facebook and 68 individuals in Seattle University classrooms. Each survey included a consent form inviting recipients to participate in the study, a demographic questionnaire, social support measure, and a working memory test. The study procedures were approved by the Department of Psychology Human Subjects Review Committee. Of the surveys distributed, 93 agreed to participate online (4.7% of those approached) and 68 (100%) agreed to participate in class. Of the potential participants, 14 were ineligible because they failed to complete the survey. The survey return rate was 7.1% (147 completed surveys divided by the number of surveys distributed, and excluding participants who did not complete the survey).

Demographic and descriptive information for the 147 survey respondents included in the current analyses are presented in Table 1. The current sample consists of 28 men (19%), 111 women (75.5%), and eight non-binary individuals (5.4%). The average age of our sample is 20.69 ( $SD = 2.53$ ). The sample includes 1 American Indian or Alaska Native (0.7%), 28 Asian (19%), 3 Black or African American (2%), 7 Native Hawaiian or Pacific Islander (4.8%), 77 White (52.4%), and 31 participants who were multiracial (21.1%).

## Measures

### Demographic information

The demographic questionnaire assessed the following demographic variables: age, gender, education level, and ethnicity. We prompted the participants to indicate their racial identity given eight categories: American Indian/Alaska Native, Black or African American, Hawaiian, Hispanic, Caucasian, other, or decline to answer. Participants who selected multiple categories were assigned to the group, “more than one race.”

### Social Support Inventory

Survey respondents were administered a 12-statement inventory from the shortened version of the Interpersonal Support Evaluation List (Cohen, Mermelstein, Kamarck, & Hoberman, 1985). The Interpersonal Support Evaluation List has demonstrated high levels of internal consistency (*Cronbach's alpha* = 0.76). Participants were asked to identify how true each of the statements was for them on a 4-point scale, with 1 = “definitely false” and 4 = “definitely true.” This questionnaire consisted of three different subscales—Appraisal Support, Belonging Support, and Tangible Support—used to measure three dimensions of perceived social

support. All scores were kept continuous and the scale score was summed up to yield the total social support score for each participant.

**Table 1** *Demographic and Descriptive Information for Participants (n = 147).*

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<u>Gender</u>	
Man	28 (72.4)
Woman	111 (75.5)
Non-binary	8 (8.4)
<u>Age (yr) (mean ± SD)</u>	20.69 ±2.53 (range: 18-42)
<u>Ethnic group (%)</u>	
American Indian or Alaska Native	1 (0.7)
Asian	28 (19)
Black or African American	3 (2)
Native Hawaiian or Pacific Islander	7 (2.8)
White	77 (52.4)
Multiracial	31 (21.1)
<u>Education (%) (highest level)</u>	
Some high school	1 (0.7)
High school graduate or GED	3 (2)
Some college	134 (91.2)
College graduate	9 (6.1)

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Stereotype Threat Manipulation

Participants were randomly assigned a stereotype threat or control condition on the Qualtrics survey and in class. Participants in the stereotype threat condition saw the statement: “You will now be asked to complete a short survey before taking a test that will determine the differences of working memory capacity between ethnic minority and white undergraduate students” prior to attempting the working memory test. Participants in the control, or no stereotype threat condition, saw the statement: “You will now be asked to complete a short survey before taking a test that will determine the working memory capacity of undergraduate students.” The purpose of the stereotype threat statement was to raise concerns about possibly confirming negative stereotypes about the ethnic minority student group by increasing the salience of the stereotyped group identity. Because previous studies prompt students to indicate demographic information prior to the task, the collection of demographic information before eliciting the stereotype threat manipulation served as a countermeasure for ethnic minorities in the no stereotype threat condition (Steele & Aronson, 1995).

### Working Memory Test

Participants had one minute to look at a list consisting of 25 words that were either projected on the screen of each classroom or on the page of the survey electronically, and were instructed to try to remember as many as they could. They then had one minute to list—on paper or electronically—as many words as they could recall. All scores were kept continuous and the sum of correct words recalled yielded the total working memory score for each participant. When investigating the deleterious effects of stereotype threat on memory, Schmader and Johns (2003) emphasized accounting for attentional capacity and storage or recall to test working memory. Therefore, our working memory test was informed by their prior research.

## **Results**

### Preliminary Analyses

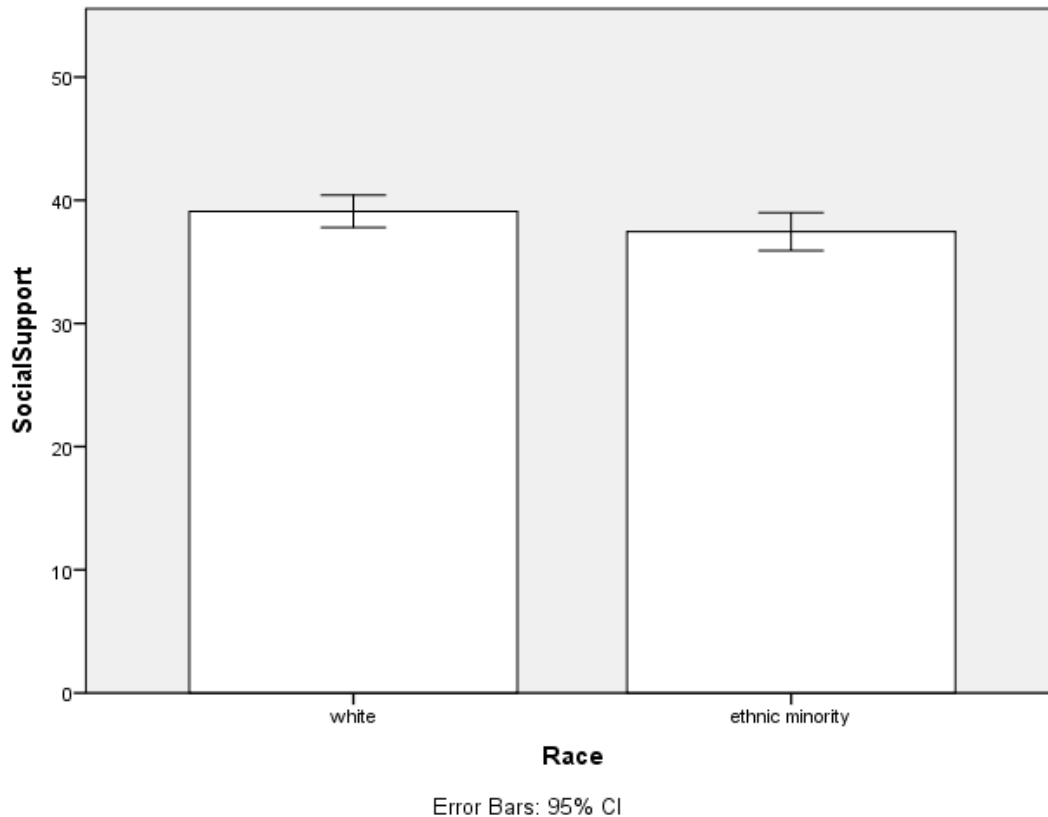
Preliminary analyses included checking for necessary assumptions for our main analyses and checking for possible control variables. The necessary assumptions to run the ANOVA and ANCOVA to examine the differences between white and ethnic minority students' working memory when exposed to stereotype threat as well as while controlling for perceived levels of social support include: homogeneity of variance; that for each independent variable, the relationship between the dependent variable ( $y$ ) and the covariate ( $x$ ) is linear; homogeneity of regression slopes; and the covariate is independent of the treatment effects. Results of the point biserial correlation analyses revealed a non-significant relationship between race and social support ( $r_{pb} = -.13, p > .05$ ); see Figure 1. Additionally, there was a non-significant relationship between race and working memory ( $r = 0.05, p > 0.05$ ). However, a bivariate correlation analysis evidenced a significant relationship between social support and working memory ( $r = 0.19, p < 0.05$ ). Therefore, social support was controlled for in subsequent ANCOVA analyses.

### Hypothesis 1

A two-way ANOVA was conducted to examine the interaction between stereotype threat and race on working memory capacity. The results of the ANOVA are presented in Table 2. Preliminary checks were conducted to ensure that there were no violations of normality, linearity, or homogeneity of variances. The ANOVA revealed a non-significant interaction between stereotype threat exposure and race on working memory ability,  $F(1, 143) = 0.11, p = 0.74$ .



Mean differences in social support between white and ethnic minority students:



**Figure 1** Results of the point biserial correlation analyses revealed a non-significant relationship between race and social support.

a. Pearson r correlation revealed no significant difference in the levels of social support participants reported based on their race ( $r = -0.13, p > 0.05$ ).

## Hypothesis 2

A two-way between-groups analysis of covariance was conducted to examine the impact of social support on the relationship between stereotype threat and working memory. The independent variables were stereotype threat and race, and the dependent variable consisted of working memory capacity. Participants' social support scores were included as the covariate in this analysis.

Preliminary checks were conducted to ensure that there were no violations of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate. Running an ANCOVA model revealed homogeneity of regression slopes, indicating there was no significant interaction between the covariate, social support, and the independent variables, race and stereotype threat exposure,  $F(1) = 0.12, p = 0.74$ . Additionally, an independent sample t-test revealed no statistically

significant difference in the mean scores on the working memory measure for white ( $M = 10.36$ ,  $SD = 4.2$ ) and ethnic minority participants [ $(M = 10.73$ ,  $SD = 3.88$ ,  $t(145) = -0.54$ ,  $p > 0.05$ )] Levene's test for Equality of Variances indicated equal variances ( $F = 0.20$ ,  $p = 0.65$ ). There was also no statistically significant difference on the social support measure for white and ethnic minority students [ $(M = 39.1$ ,  $SD = 5.1$ ,  $t(145) = 1.65$ ,  $p > 0.05$ )] Levene's Test for Equality of Variances indicated equal variances ( $F = 1.76$  and  $p = 0.19$ ).

After adjusting for social support scores, there was no main effect of stereotype threat on total working memory scores,  $F(1, 142) = 1.30$ ,  $p = 0.26$ , partial eta squared = 0.01. There was also no main effect of race on total working memory scores,  $F(1, 142) = 0.51$ ,  $p = 0.48$ , partial eta squared = 0. Lastly, the race and stereotype threat interaction did not reveal a significant effect on working memory,  $F(1, 142) = 0.12$ ,  $p = 0.74$ . The results of the ANOVA are presented in Table 3. The covariate of social support, however, was significant,  $p = 0.02$ , but only explained 3.9% of the variance in the dependent variable, partial eta squared = 0.04. Because our results yielded a significant interaction between social support and working memory scores, we ran a Pearson r correlation that revealed a statistically significant positive correlation ( $r = 0.19$ ,  $p = 0.02$ ). Thus, this positive correlation indicates that higher levels of social support among our participants correlated with higher scores on the working memory test.

**Table 2** ANOVA results for the effects of race and social support on working memory capacity of white and ethnic minorities. The ANOVA revealed a non-significant interaction between stereotype threat exposure and race on working memory ability ( $n = 147$ ).

Source	<i>df</i>	SS	MS	F
Intercept	1	16203.98	16103.98	972.51
Race	1	2.33	2.33	0.14
Social Support	1	25.25	25.25	1.53
Race * Social Support	1	1.81	1.81	0.109

a. R Squared = 0.45 (Adjusted R Squared = 0.2)

**Table 3** ANCOVA results for social support, race, and working memory interaction. \*Results show a significant interaction between social support and working memory ( $n=147$ ).

Source	<i>df</i>	SS	MS	F
Intercept	1	112.10	112.10	6.99
Social Support Total	1	93.13	5.81	5.81*
Stereotype Threat	1	20.87	20.87	1.30
Race	1	8.12	8.12	0.51
Stereotype Threat * Race	1	1.81	1.81	0.12

\* Significant at  $p < 0.05$

## Discussion

Our first hypothesis was that ethnic minority students in the stereotype threat condition would do poorer on the working memory test than white students in the stereotype threat condition. In addition, we expected no significant difference in the working memory scores among ethnic minority and white students in the stereotype threat condition when high levels of social support were indicated. While the first hypothesis of the study was not found to be significant, we found a significant correlation between the social support scores and working memory scores of participants (the second hypothesis).

An ANOVA revealed that the race and stereotype threat interaction did not significantly affect working memory capacity. Our ANCOVA revealed that after adjusting for social support scores, there was no main effect of stereotype threat on working memory scores among ethnic minority and white students. These findings are not congruent with prior research that demonstrates the negative effects of stereotype threat on cognitive tasks. Limitations of our study include our small sample size ( $n=147$ ) and the low strength of our stereotype threat manipulation. Therefore, the non-significant interaction between stereotype threat exposure and working memory capacity could be due to the low strength and salience of our stereotype threat manipulation. Stereotype threat's strength is increased when the stereotype is relevant in the environment (Aronson, Fried, & Good, 2002). Aronson, Fried, & Good (2002) found that when students are encouraged to view intelligence as malleable rather than fixed, they obtained higher grade point averages than their counterparts in two control groups.

Seattle University's consistent efforts to advocate for racial equity among its student body, through support groups for ethnic minority students and visible representation

throughout the campus, could have moderated the stereotype threat and race interaction. Thus, given the diverse demographics and inclusive culture of Seattle University, stereotype threat may not pose an immediate risk to the ethnic minority students surveyed. In addition to the Seattle University campus, the Pacific Northwest is also a politically liberal region that has advocated for minority populations in social and political contexts. In a region that may be more conservative, less accepting of ethnic minorities, or more prone to the perpetuation of stereotypes, the threat may be exacerbated.

Furthermore, because our results yielded a significant interaction between social support and working memory scores, as well as a significant correlation ( $r = 0.19$ ,  $p = 0.02$ ), we conclude that there are potential cognitive benefits implied with higher levels of social support among students regardless of race. In addition, Dennis, Phinney, and Chauteco (2005) found a stronger significant correlation,  $r = 0.35$ , between social support and academic achievement. These results may indicate that the social support resources available on the Seattle University campus, such as our Counseling and Psychological Services and clubs run for students identifying as specific ethnic minorities, are beneficial to the cognitive ability of the students.

While stereotype threat poses a unique risk to ethnic minorities, other groups are also subject to these effects. Further research could explore these other groups. Stereotypes about gender continue to hinder women's ability to succeed in male-dominated fields. In 2015, less than 10% of all US fund managers were women, and women exclusively ran about 2% of the industry's assets (Lutton & Davis, 2015). Prior research has investigated these disparities and demonstrated that the extent to which women, who hold positions in the sector of finance, experience stereotype threat in their work environment, they report diminished well-being at work and are less likely to recommend their field to other women (Hippel, Sekaquaptewa, & McFarlane, 2015).

Furthermore, stereotype threat may not require a history of stigmatization (Stone, 2002; Aronson, Lustina, Good, & Keough, 1998). Aronson, Lustina, Good, & Keough (1998) found that stereotypes can be induced by invoking comparisons between math-proficient white males and Asians—a group stereotyped to excel at math. In their experiment, Aronson, Lustina, Good, & Keough (1998) explicitly confronted white males who were taking a standardized math test with the stereotype that Asians outperform white people in math. After controlling for a non-stereotype threat condition, they found white males in the stereotype threat condition got fewer problems correct. Thus, belonging to a minority group may not be necessary, but merely a sufficient factor in academic underperformance. However, it is important to recognize the difference in effect of such a stereotype threat. While minorities are directly targeted at stereotypes of intellectual inferiority—“women are not as good at math as men,” “African American students are less intelligent than white students”—the white males in the study are affected indirectly. Their stereotype refers to them by means of comparison to

a directly stereotyped target—Asian Americans. This is congruent with Western cultural norms that imply that white males are the “norm from which direct stereotype targets are viewed as deviating” (Aronson, Lustina, Good, & Keough, 1998) (Miller, Taylor, & Buck, 1991).

Research should continue to focus on the nuances of stereotype threat’s effect on cognitive processes. Incorporating a situationist view of stereotype threat can offer an encouraging perspective because it positions the phenomenon within social circumstances. Therefore, altering the circumstances that give rise to stereotype threat may have positive effects on performance. Future research should investigate how the sociopolitical culture of a region or the prevalence of racial tensions and stereotypes may impact stereotype threat and race interaction on working memory. There should also be a continued effort to examine social support’s effects on cognitive tasks. On college campuses where stereotype threat may be more salient, increasing social support resources may benefit the academic achievement of ethnic minority students. In an effort to provide an academic setting where all students can perform to their full potential—without the cognitive and emotional deficits stereotype threat elicits—further understanding on how to moderate stereotype threat’s effects are worthwhile and necessary.

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