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The Effect of Stereotype Threat on Stereotype Activation

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ABSTRACT

Stereotypes form due to repeated associations between concepts, thus allowing for less effortful processing of information. However, stereotypes must be activated before they can be applied to judgments or actions. The activation of stereotypes is automatic, requiring no conscious effort, and occurs in the presence of a stereotype object, but application of stereotypes is a separate process that can be interrupted. The current study evaluated whether stereotype threat—the anticipation that one could be stereotyped against by others—could act as a stereotype activator, and subsequently if cognitive busyness could interfere with the application of those stereotypes. Specifically, we investigated whether stereotype threat paired with cognitive busyness leads to increased activation of stereotypes regarding an outgroup. In order to activate stereotype threat for women regarding math performance when compared to men, participants were told either that prior test results did show sex differences, or that the results did not show sex differences, and then asked to complete a math exam. Following the math test, participants completed a set of word fragments that could either be completed to be racially-significant words or neutral words to examine stereotype activation. Additionally, cognitive load was activated in half the participants during this portion by asking participants to remember an eight-digit number while they completed the word fragments. We predicted that cognitive busyness paired with stereotype threat will lead to more stereotype activation than the other three conditions, namely stereotype threat/no cognitive load, no stereotype threat/no cognitive load, and no stereotype threat/cognitive load**.** Our results did not show any significant differences between conditions regarding the amount of stereotypic word completions. These results are inconclusive, however, due to the fact that our manipulation of stereotype threat in the first part of the study was unsuccessful. Further iterations of the study will be required to determine the true effects of stereotype threat on stereotype activation.

Keywords: Stereotype, stereotype threat, stereotype activation, cognitive load, exam.

INTRODUCTION

Psychological research has given much attention to the formation and usage of stereotypes. Stereotypes arise from the repeated association of two ideas and frequent recall from memory, just like any other automatically activated association. For instance, just as one can come to associate colder weather with warm soup and sweaters, one can also learn to associate types of people with traits, such as Asian individuals with math abilities. The associated ideas will be activated in the presence of a member of the target group. The activation of stereotypes is thought to be an automatic process, thus requiring little conscious effort. Further, activation of the stereotypes must take place before perception, judgement, or actions can be influenced by them (Devine, 1989). Additionally, Kunda and Spencer (2003) proposed that stereotype activation and application depend on the strength of one's self-enhancement goals and one's motivation to avoid prejudice. Kunda and Sinclair (2009) showed that the activation and application of stereotypes may be influenced by one's motivation to align information with preconceived impression of the individual. As stereotypes are an automatic process, they are considered a cognitive shortcut that allows judgments to be made with little cognitive effort (Rosch, 1978). Thus, it appears that the activation and application of stereotypes may be impacted by the amount of cognitive busyness an individual is experiencing.

In their work evaluating this question, Gilbert and Hixon (1991) found that when participants were made cognitively busy by being asked to rehearse an eight-digit number, stereotype activation was inhibited. However, when the researchers first allowed stereotype activation to occur by priming the participant with the stereotype object (i.e., by showing a picture of an Asian individual), the addition of cognitive busyness then led to an increase in *application* of stereotypes to perception and judgment. Thus, cognitive busyness can have differing effects on stereotyping depending on when it occurs during the task and which processes come first.

Additionally, Spencer, Fein, Wolfe, Fong, and Dunn (1998) examined another potential factor—negative feedback. Consistent with Gilbert and Hixon's (1991) findings, they found that cognitive busyness alone inhibited stereotype activation. However, stereotype activation emerged when cognitive busyness was paired with negative feedback. It was contended (Fein & Spencer, 1997) that negative feedback leads to self-image threat, which motivated participants to maintain their self-image, and they did this by stereotyping others. Thus, when paired with cognitive busyness, the impact of self-image threat overcame the impact on stereotype activation that cognitive busyness has alone. This led to an increase in stereotype application.

Many decades of research dedicated to evaluating another way in which stereotypes affect our daily lives began with the coining of the term "stereotype threat" by Steele and Aronson (1995). According to the authors, "stereotype threat is the risk of confirming, as self-characteristic, a negative stereotype about one's group (p.797)." Such a risk can inflict distraction, anxiety, narrowed attention, withdrawal of effort, self-consciousness, and over-effort, which can all negatively impact performance (Steel & Aronson, 1995). Stereotype threat has been shown to influence performance on various tasks for several groups of people, including African Americans with their test performance (Steele & Aronson, 1995), women and their math performance (Spencer, Steele, & Quinn, 1998), White men in math compared to Asians (Smith & White, 2002) and older adults and cognitive abilities (Barber, 2017). This negative effect on performance of stereotype threat can have disastrous consequences in high-stakes areas such as medicine or engineering. In such situations, mistakes such as incorrect dosage of medication, inaccurate diagnosis, or inattention to details in constructing tools or architecture, can hugely

impact the safety and health of individuals and thus any factors that may increase mistakes should be taken seriously and eradicated.

After various replications with different groups and situations made it clear that stereotype threat is a potentially serious and rampant problem, researchers began to examine conditions and nuances in its activation. Steele (1997) found that individuals were more vulnerable to stereotype threat when they identified more strongly with the domain in question. For example, women whose identity includes an association with math, such as an engineer, will be more susceptible to stereotype threat in math settings than women whose identity does not include math. Additionally, findings from Spencer, Steele, and Quinn (1998) found a conditional emergence of gender differences in math performance due to stereotype threat. When participants were told that there had been gender differences in math performance previously, gender differences emerged. Further, gender differences emerged when previous gender differences in performance were not mentioned at all, thus exposing participants to the natural stereotype threat of the situation. However, no gender differences in math performance emerged when participants were explicitly told there had been no gender differences in the past. Thus, when stereotype threat was eliminated, gender differences in performance disappeared. Taken together, prior research shows that stereotype threat is prevalent among many groups, has negative impacts on performance, and can be eliminated with explicit instruction. On an individual level, it has large implications for task performance. Less is known, however, about how stereotype threat may influence an individual's perceptions of others.

In the current study, we investigated whether stereotype threat can have the same effect on stereotype application as negative feedback when paired with cognitive busyness. In particular, prior research has mostly focused on examining the effects of stereotype threat on an individual's performance, but less research has focused on how stereotype threat might affect a person's perception of another individual or group of individuals. The current study investigated the relation between stereotype threat and activation of stereotypes regarding an outgroup, defined as a group that is different from the group with which an individual identifies (Tajfel, 1970). We examined whether stereotype threat can act as a primer for stereotype activation, and thus interact with cognitive load to increase stereotype application. We attempted to induce stereotype threat in individuals, then expose them to a situation in which stereotypes can be applied while they are cognitively busy, thus measuring the impact of stereotype threat and cognitive busyness on the application of stereotypes about others. The experiment used a 2 (threat vs. no threat) x 2 (high cognitive load vs. low cognitive load) factorial, between-subjects design, utilizing the stereotype threat felt by women in math settings. We expected that high cognitive busyness paired with stereotype threat will show an increased application of stereotypes toward an outgroup. However, it is also possible that the group which experienced nullification of stereotype threat could also still show increased stereotype application when experiencing cognitive busyness. This could occur if the discussion of stereotypes, regardless of whether they are supported or nullified, could act as a primer for stereotype activation.

We hypothesize that the high cognitive load/stereotype threat condition will show higher application of stereotypes than the low cognitive load/stereotype threat condition. If it is the case that nullification of the stereotype threat still acts as a primer for stereotype activation, we expect the high cognitive load/no stereotype threat condition be show similar levels of stereotype application as the high cognitive load/stereotype threat condition, and the low cognitive load/no stereotype threat conditions to be similar to the low cognitive load/stereotype threat condition. If it is the case that nullification prevents stereotype activation, we expect the two no stereotype threat conditions to both be lower than the two stereotype threat conditions.

Method

Participants

One-hundred and fifty-nine undergraduate students were recruited using the University of Utah's undergraduate psychology participant pool and were given course credit for participation in our study. Our sample consisted of 38 men, 120 women, and 1 gender non-conforming participant, with 74.21% identified as White, 16.35% as Hispanic, 13.21% as Asian, 2.52% as Other, 1.89% as African American, 1.26% as Native American, and 1.26% as Pacific Islander. Ages ranged from 18-45, with an average age of 20 years. All participants provided written informed consent with procedures approved by the University of Utah Institutional Review Board. No exclusions were applied for race or gender despite the content of the stereotype threat and stereotype activation measures. We included men in our sample, despite the target of the stereotype threat being women, because men could potentially feel stereotype threat compared to Asians in a math setting, which would manifest separately from the gender stereotype in the math setting (Smith & White, 2002). We included Asians in the sample, although Asian stereotypes are included in the stereotype activation portion, because Asian women have been shown to perform better in math when their racial identity is highlighted, and worse when their gender identity is highlighted. Thus, we expected Asian women to still feel the effect of stereotype threat in our math condition due to the highlighting of gender differences rather than racial differences (Shih, 1999). Asian men, however, can act as an interesting pseudo-control group as they potentially will not feel any stereotype threat in the math setting.

Materials

Stereotype Threat Measure. We chose to activate the stereotype threat experienced in math settings for women when compared to men, as has been studied over the years (e.g., Smith & White, 2002; Spencer, Steele, & Quinn, 1998). Stereotype threat was manipulated using the design proposed by Spencer, Steele, and Quinn (1998). A general math exam was modeled after the general quantitative Graduate Record Exam (GRE; Educational Testing Service, 2017). A copy of the math test can be found in Appendix A. In the stereotype threat condition, participants were told that the test had previously shown gender differences in performance, and in the non-stereotype threat condition they were told that the test had not shown any gender differences. The method of explicitly nullifying the stereotype was chosen based on work by Smith and White (2002), which found that in a stereotype threat-inducing situation, the explicit stereotype threat condition (stereotype explicitly addressed and affirmed) and the implicit stereotype condition (no mention of stereotype) both showed test scores lower than the nullified stereotype condition (stereotype addressed but refuted). Thus, it appears the stereotype must be explicitly negated, rather than just not addressed, in order to create a non-stereotype threat condition.

Cognitive Load Measure. Cognitive load was manipulated by employing the technique created by Gilbert and Hixon (1991), involving the recall of an eight-digit number while completing word stems (the high-cognitive load condition). The low-cognitive load condition involved being asked to recall a two-digit number while completing the word stems, as two digits is well below the range of typical working memory capacity (Miller, 1956). Thus, participants would still be experiencing cognitive load, as opposed to none if not asked to recall a number at all, but the load was considerably less than that in the high-cognitive load condition. The 8- and 2-digit numbers were randomly generated and consistent for all participants.

Stereotype Application Measure. Participants completed a word completion task, which entails adding letters to a word fragment to create complete words. The blank spaces could be filled with letters to make the word stereotype-consistent or with different letters to make it a neutral word. For example, from the Black stems, participants would be presented with the letters "LA_ _" and asked to fill in the additional letters. Completing the word to be "LAZY"

would reflect a stereotype-consistent response whereas completing the word to be anything else (e.g. LAMP, LAND) would reflect a stereotype-inconsistent response. We employed the word stems used by Gilbert and Hixon (1991) reflecting Asian stereotypes (e.g., polite, short) and the word stems used by Spencer, Fein, Wolfe, Fong, and Dunn (1998) reflecting Black stereotypes (e.g., lazy, poor). We also included stems used by Steele & Aronson (1995) that reflect self-doubt (e.g. weak, shame). These were included to act as an extra manipulation check. The completion of these stems with self-doubt words will allude to the proper application of stereotype threat with the math exam. The Black, Asian, and self-doubt stems were mixed so that no two consecutive stems were of the same group, and interspersed with additional filler stems, which can only be filled with letters to create a neutral word. A copy of the list of word stems can be found in Appendix B.

Domain Identification. Prior research has suggested that individuals who are most identified with the domain are more vulnerable and most strongly affected by stereotype threat in that domain (e.g., Steele, 1997). We employed the Domain Identification Measure (DIM) (Smith & White, 2001) to determine how strongly the participants identified with and care about the domain measured (i.e. math). Items included questions such as, "How much is Math to the sense of who you are?" and "How important is it to you to be good at Math?" A copy of the Domain Identification Measure used can be found in Appendix C.

Manipulation Checks. For stereotype threat exposure, participants were asked to recall what information was told to them regarding gender differences in math performance. For cognitive load, participants were asked to recall the eight-digit number (if in the "high cognitive load" condition) or the two-digit number (if in the "low cognitive load condition) given to them before the verbal task.

Procedures

Participants completed the experiment on a desktop computer. They were seated and given a consent form. They provided written informed consent before beginning the study. They began by answering the DIM and demographic survey. Participants were told that they would be completing two components; a math test meant to determine their math ability, followed by a verbal activity. Participants were then asked to read a false article claiming gender differences in math performance. Individuals in the "stereotype threat" condition were then told that the math test they were about to take had also shown gender differences in performance in the past in favor of men. In the "no stereotype threat" condition participants were told that the current test had not shown gender differences in the past. Participants were then given scratch paper and a pencil and completed two practice problems before beginning the real test. The participants were given 10 minutes to complete the 10 questions of the real test.

After completing the math test, participants were told they would then complete a verbal component. Participants in the "high cognitive load" condition were shown an eight-digit number to remember as they completed the word stems. Participants in the "low cognitive load" condition were shown a 2-digit number to recall while they perform the verbal test. Participants in both conditions were given one minute to rehearse the number in their head. Participants then began the word completion task. They were given 10 minutes to complete 50 word stems. Following the word completion task, the participants were asked to recall the eight- or two-digit number to the best of their ability. They were then given a post-exam questionnaire, debriefed, and excused.

Results

The stereotype threat we attempted to activate was that of females performing worse than males in math. Thus, we analyzed the results for the female participants only (N=120). The data were analyzed using a 2(stereotype threat: present vs. absent) x 2(cognitive load: high vs. low)

Analysis of Variance (ANOVA) with post-hoc test (Tukey HSD) to check for any significant differences, unless noted otherwise.

For the manipulation check of stereotype threat exposure, participants were asked, "What were you told regarding factors related to math ability during the study?" with the options of "No gender differences", "Males are "better" at math", and "Females are "better" at math." Responses were observed to determine whether participants accurately recalled what they were told regarding gender differences in math. The Threat conditions were told that men had shown reliably superior ability to women in math. The No Threat conditions were told that no differences in math ability between genders had been observed. Using a one-way Analysis of Variance (ANOVA), we observed a significant difference between in the groups in the rate of correct responses ($F(3, 167) = 65.924$, $p = .000$). As can be seen in Table 1, while we were successful in getting participants to remember the stereotype information in the threat conditions (i.e., responding that "Males are 'better'"), more than 70% of the participants in the No Threat conditions selected this response, even though they were told there were no gender differences on our exam.

	No gender differences	Males are "better"	Females are "better"
Threat + High Load	2.44%	97.56%	0.00%
Threat + Low Load	16.67%	83.33%	0.00%
No Threat + High Load	25.00%	70.45%	4.55%
No Threat + Low Load	11.36%	86.36%	2.27%

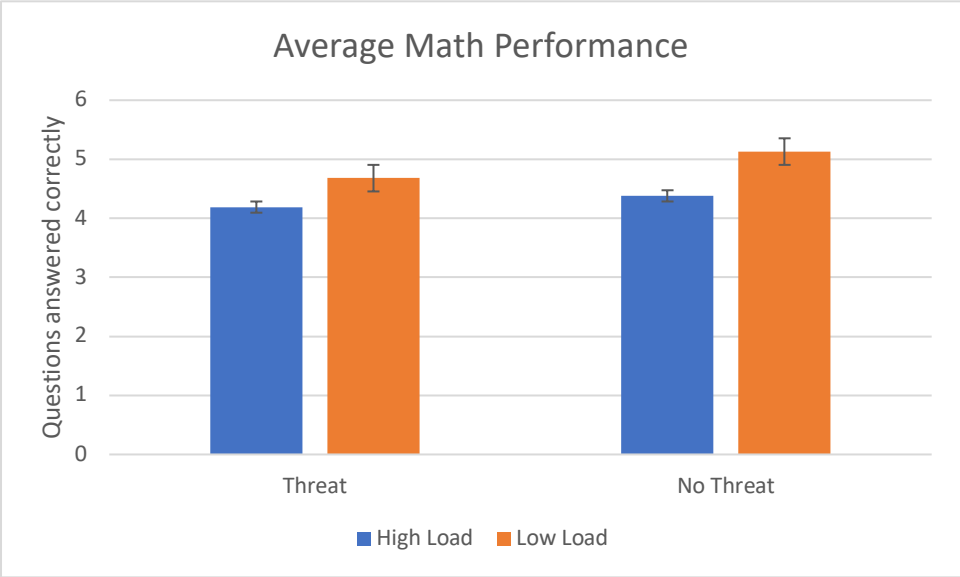
Table 1: Accurate recall of the stereotype information presented

For the manipulation check of cognitive load, we calculated the percentage who recalled their number correctly at the end of the study. The percentage of participants in the high load conditions that successfully remembered the full 8-digit number they were given was 65.88%. This can be compared to the 97.67% of participants in the low load conditions who successfully recalled the two-digit number given to them (see Table 2 for the breakdown of each condition).

	High Load	Low Load
Threat	70.73%	95.24%
No Threat	61.36%	100.00%

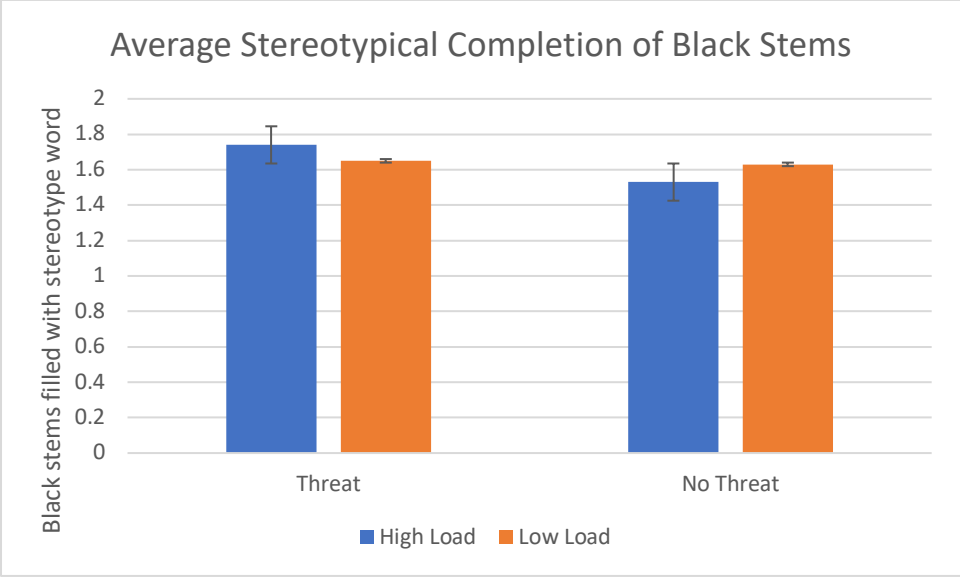
Table 2: Successful recall of cognitive load number

To assess performance on the math test, we looked at the total number correct on the exam out of the ten problems (68.55% of participants attempted all ten problems). We expected a main effect of stereotype threat only, given that the cognitive load manipulation was not given until after the math test. However, there were no significant differences between the threat and no threat conditions in the number of math questions answered correctly $F(1, 116) = 1.004$, $\eta_p^2 = .009$, $p = .318$. We found a trend toward a significant main effect of cognitive load on math performance ($F(1, 116) = 3.766$ $\eta_p^2 = .031$, $p = .055$). This is surprising as the cognitive load manipulation was not introduced until after the math exam had been completed. Participants in low cognitive load condition tended to perform better ($M = 4.90$) than those in the high cognitive load condition ($M = 4.29$) on the math test. There was no significant interaction of threat and cognitive load $F(1, 116) = .171$, $\eta_p^2 = .001$, $p = .680$). Differences in average math performance between groups can be observed in Graph 1.



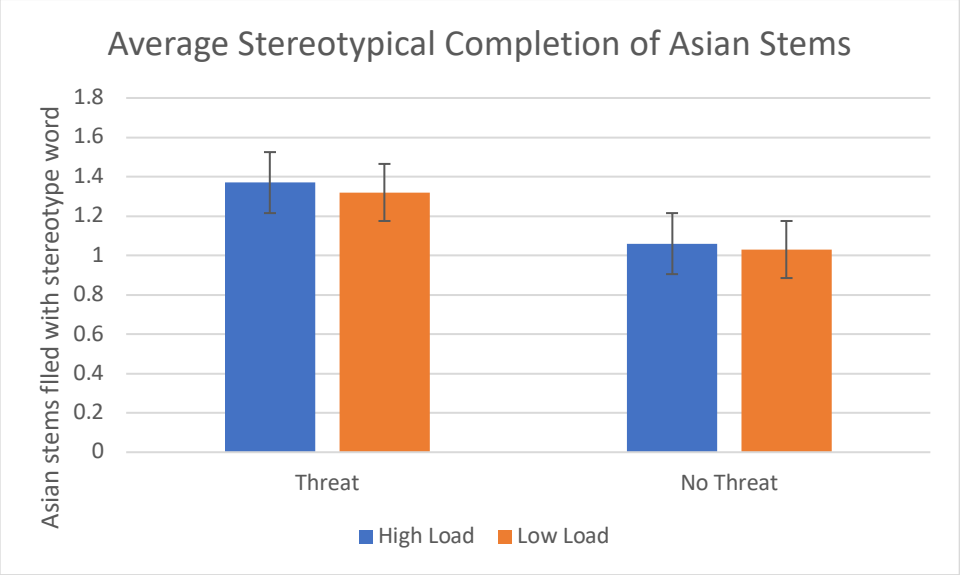
Graph 1: Average math performance as a function of cognitive load. Error bars represent standard error of the mean.

To assess stereotype activation, we counted the number of stereotypic words used to complete the word stems for Black and for Asian related word fragments. We predicted a main effect of stereotype threat, a main effect of cognitive load, and an interaction between stereotype threat and cognitive load, such that the effect of stereotype threat will be stronger in the high cognitive load condition. For the Black stems, there were 11 possible words to complete. There was no significant main effect of threat for completion of Black stereotypic words $F(1, 116) = .301$, $\eta_p^2 = .003$, $p = .585$. There was also no main effect of cognitive load $F(1, 116) = .000$, $\eta_p^2 = .000$, $p = .987$. Finally, there was no interaction effect of threat and cognitive load $F(1, 116) = .240$, $\eta_p^2 = .002$, $p = .625$. The differences between averages can be observed in Graph 2.



Graph 2: Average stereotypic completion of Black stems. Error bars represent standard error of the mean.

For the Asian stems, there were 5 possible words to complete. There was a marginal main effect of threat on the completion of the Asian stems $F(1, 116) = 3.031$, $\eta_p^2 = .025$, $p = .084$. Participants in the Threat condition tended to put more Asian stereotypic words ($M = 1.34$) than participants in the No Threat condition ($M = 1.05$). There was no main effect for cognitive load $F(1, 116) = .050$, $\eta_p^2 = .000$, $p = .823$, nor a significant interaction for threat and cognitive load $F(1,116) = .003$, $\eta_p^2 = .000$, $p = .957$. Average differences in completion of Asian stems with stereotype words can be observed in Graph 3.



Graph 3: Average stereotypic completion of Asian stems. Error bars represent standard error of the mean.

Discussion

Past research on stereotype activation and application has shown that stereotype activation and application are separate but sequential processes that can be affected cognitive resources and motivation (Devine, 1989; Gilbert & Hixon, 1991; Kunda & Sinclair, 2009; Kunda & Spencer, 2003; Spencer et al., 1998). The primary goal of this project was to investigate whether exposure to stereotypes through stereotype threat situations could lead to a similar application of general stereotypes about other groups. This would be stronger especially under circumstances when cognitive resources may be reduced (e.g., Gilbert & Hixon, 1991). In particular, we expected that participants who were under a stereotype threat of not performing well in math would underperform on a math quiz, and this same group would demonstrate stereotype application by completing word fragments with words associated with Asian (Gilbert & Hixon, 1991) and Black (Spencer et al., 1998) stereotypes.

However, on the math performance, our results did not show significant effects for threat. There may be two explanations for this finding. First, the results of our manipulation check for threat exposure points to the issue that the participants who should have not felt threatened may have still been affected by the negative stereotype. That is, 90.36% of participants in the threat

conditions recalled what they were told about gender differences in math performance, but only 18.18% of participants in the no threat conditions accurately recalled what they were told during the study. This suggests that the nullify manipulation of stereotype threat was ineffective. This could be due to either the natural stereotype threat felt in this math setting or the information from the fabricated article superseding the nullification presented to them by the researchers.

Additionally, our results showed a significant main effect of cognitive load on performance on the math exam. However, this suggests a randomization failure as cognitive load was not introduced until the word completion task, which occurred after the math exam. This suggests that our samples may not have been equal and representative.

Second, it appears that we may have gotten a floor effect for the math test, such that the average amount of correctly answered math questions was around five out of ten for all conditions. This may be due to the lack of the nullification manipulation working for those participants, but also may suggest that the math test was too difficult (perhaps also due to the time restraint of ten minutes to complete ten questions) to show differences between groups for the presence of stereotype threat.

Due to these issues with stereotype exposure, accurate results regarding stereotype activation and application may be hard to ascertain in that portion of the experiment. We expected the high load/stereotype threat condition to have the largest amount of stereotypic word completions. However, we observed mixed results in the amount of Black and Asian stems that were completed with stereotypic words. While we found no effects of threat, cognitive load, or the expected interaction of them for Black stems, along with no cognitive load or interaction effects for the Asian stems, there was a marginal effect of threat for Asian stems. Given the possibility that most participants felt under threat, and the domain was mathematics, in which there are stereotypes of Asian and Asian Americans performing well (e.g. Shih et al., 1999) we cannot rule out that there was an application of the stereotype as a result of stereotype threat exposure. In addition, this activation may have been sufficient enough to play a role in participants' responses, regardless of the cognitive load. Future directions in this work could test these possibilities.

We also noticed a potential issue with the inclusion of both the Asian and Black stems in the same completion task. One of the Asian stems, POLI_E, which was meant to be filled in as "polite" for the Asian stereotypic word, was consistently completed as "police" instead. Given the current climate of the police force and the Black Lives Matter movement, it is possible that this completion of the stem could be considered a Black stereotypic word. However, we did not count these completions as such, as the stem was presented as an Asian stem, and thus these potentially stereotypic completions were considered non-stereotypic for the Asian stem.

As our manipulation of stereotype threat was unsuccessful in this attempt, future directions of this study should first establish a sound manipulation of stereotype threat in order to accurately assess the effect of stereotype threat and cognitive load on stereotype activation. It would also be informative to evaluate whether the effect differs depending on whether the stereotypes activated in the activation portion are in the same domain as the stereotypes implied in the stereotype threat portion. That is, for example, whether the results would have been different if the word completion task contained gender-stereotypic stems rather than race stems. Alternatively, it is an open question whether the Black and Asian stems would be filled with stereotypic words more often if the stereotype threat condition highlighted Black or Asian stereotypes regarding math performance rather than gender stereotypes.

It would also be illuminating to replicate the results of Gilbert and Hixon (1991) in that cognitive load had differing effects on stereotype activation depending on when it was presented during the process. Specifically, future studies could evaluate whether stereotype activation is

inhibited rather than amplified, as it was in Gilbert and Hixon (1991), when cognitive load is instilled before the stereotype object is presented, namely before stereotype threat is activated.

The findings of the current study and other related works can help to build a broad picture of how stereotyping may or may not affect performance on different tasks based on different types of parameters. Understanding these nuances is important for informing ways in which society can hope to ameliorate the negative effects of stereotyping. While stereotypes in general are considered shortcuts for the brain to process large amounts of information, and are thus not in and of themselves a negative occurrence, more complicated issues can arise when such shortcuts are applied perceptions of human persons. Overuse of stereotypes regarding different groups can lead to prejudice, discrimination, and self-fulfilling prophecies (Fiske, 1998). The undertaking of the current study was prompted by the presence of societal costs of stereotyping, and the drive to reduce the negative effects of such processes. If it is the case that being stereotyped against makes one more likely to stereotype others, dismantling stereotypes will be very difficult as they will follow a circular pattern. It will take a conscious effort to break the cycle in order to hinder the negative effects of stereotypes in varying domains. Knowing the impact of stereotype threat and cognitive load on stereotype activation can help focus our efforts on reducing stereotype threat in order to reduce the greater presence of stereotypes.

The data from the current study suggested that there was no relation between stereotype threat and cognitive load in the application of stereotypes with this particular sample. However, the failure of the manipulation checks—both on performance on the math exam and the recall of what stereotype information was presented—suggest inconclusive results. The marginal impact of threat on the stereotypic completion of the Asian stems hint at a potential significant effect. However, correction of the study design to produce a successful manipulation of stereotype threat would be required to accurately evaluate the interaction of stereotype threat and cognitive load in stereotype application.

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Appendix A

Directions: Each of the Questions 1-10 has five answer choices. For each of these questions, select the best of the answer choices given.

1. $3 \times \frac{2}{2} =$

(A) $\frac{1}{3}$ (B) 1 (C) 3 (D) 6 (E) $6\frac{1}{2}$

2. If k = 15, then $\frac{(k-2)180}{k} =$

(A) 156 (B) 23 (C) –23 (D) –204 (E) -360

3. In the figure above, the area of square PQRS is 64. What is the area of $\triangle$QRT?

(A) 48 (B) 32 (C) 24 (D) 16 (E) 8

4. If *x* equals 25 percent of a number, then 125 percent of the number is

(A) $\frac{x}{1.25}$ (B) $\frac{x}{4}$ (C) 1.25x (D) 4x (E) 5x

5. If the cost of a collect phone call is *c* cents for the first minute and $\frac{2}{3}c$ cents for each additional minute, what is the cost, in cents, of a 10-minute call of this type?

(A) $\frac{5}{3}c$ (B) 6*c* (C) $\frac{20}{3}c$ (D) 7*c* (E) $\frac{23}{3}c$

6. In a certain apartment building exactly $\frac{1}{3}$ of the apartments have two bedrooms and exactly $\frac{1}{7}$ of the two bedroom apartments are front apartments. Which of the following could be the total number of apartments in the building

(A) 42 (B) 50 (C) 51 (D) 56 (E) 57

7. Which of the following could be the area of an isosceles triangle with perimeter 18 and one side of length 8?

(A) 6 (B) 12 (C) 14 (D) 16 (E) 18

8. When a certain number is divided by 7, the remainder is 0. If the remainder is <u>not</u> 0 when the number is divided by 14, then the remainder must be
(A) 1 (B) 2 (C) 4 (D) 6 (E) 7

9. If $x > 0$ and $2x-1 = \frac{1}{2x+1}$, then $x =$

(A) $\frac{1}{2}$

(B) $\frac{\sqrt{2}}{2}$

(C) 1

(D) $\sqrt{2}$

(E) $\sqrt{2} + 1$

10. If the radius of a circle is decreased by 30 percent, by what percent will the area of the circular region be decreased?

(A) 15%
(B) 49%
(C) 51%
(D) 60%
(E) 90%

Appendix B

1. R _ SH
2. _ _ IDE
3. RI_ E (RICE)
4. _ IS _
5. _ _ O R (POOR)
6. _ EA _
7. W _ _ T
8. N_ P (NIP)
9. C L _ S _ (CLASS)
10. UP_ _ _
11. T O _ _ _ (TOKEN)
12. POLI_ E (POLITE)
13. _ _ FE
14. _ _ O _ P
15. L A _ _ (LAZY)
16. _ _NG
17. _ ONE
18. _ _ AR
19. C O _ _ _ (COLOR)
20. MO _ _
21. _ EAM
22. _ _ USE
23. M I _ _ _ _ _ _ (MINORITY)
24. JO _
25. S _ _ L
26. S _ ORT (SHORT)
27. L_ _ K
28. W E L _ _ _ _ (WELFARE)
29. _ _ P
30. QU _ _ E
31. DE _ _
32. _ _ _ T E (WHITE)
33. S _ _ _ _ ISED
34. S_ Y (SHY, SOY)
35. SCH _ _ _
36. B R _ _ _ _ _ (BROTHER)
37. COM_ _ _ _
38. V _ _ E
39. _ _ A C K (BLACK)
40. _ _ TION
41. TH_ _ _
42. _ _ C E (RACE)
43. NE_ _

Appendix C

PLEASE COMPLETE THE FOLLOWING INFORMATION ABOUT YOURSELF (For statistical use only):

AGE: _____

GENDER: _____

ETHNICITY:

- ☐ African American
- ☐ Asian or Asian American
- ☐ Hispanic/Latinx
- ☐ Native American/Indigenous
- ☐ Pacific Islander
- ☐ White (non-Hispanic/Latinx origin)
- ☐ Other_____

HOME STATE (COUNTRY): _____

ACADEMIC MAJOR: _____

Academic Background

Your current or anticipate major:_____

How certain are you that you will keep this major until graduation (circle one)?

1 2 3 4 5

Not at all Somewhat Very much

How many years of math did you take in high school? _____

Were there advanced classes available? YES NO (circle one)

If yes, how many advanced classes did you take? _____

How many years of English did you take in high school? _____

Were there advanced classes available? YES NO (circle one)

If yes, how many advanced classes did you take? _____

How many years of science did you take in high school? _____

Were there advanced classes available? YES NO (circle one)

If yes, how many advanced classes did you take? _____

How many math classes have you taken in college? _____

When did you last take a math class? _____

How likely is it that you will take any additional classes in math? (circle one)

1 2 3 4 5

Not at all Somewhat Very much

How many English classes have you taken in college? _____

When did you last take an English class? _____

How likely is it that you will take any additional classes in English? (circle one)

1 2 3 4 5

Not at all Somewhat Very much

How many science classes have you taken in college? _____
When did you last take a science class? _____
How likely is it that you will take any additional classes in science? (circle one)

1	2	3	4	5
Not at all		Somewhat		Very much

Using the following scale, please indicate the number that best describes how much you agree with each of the statements below.

1 = Strongly Disagree
2 = Moderately Disagree
3 = Neither disagree or agree
4 = Moderately Agree
5 = Strongly Agree

_____ **Math is one of my best subjects**
_____ **I have always done well in Math**
_____ **I get good grades in Math**
_____ **I do badly in tests of Math**
_____ **English is one of my best subjects**
_____ **I have always done well in English**
_____ **I get good grades in English**
_____ **I do badly in tests of English**

Please indicate the number that best describes you for each of the statements below:

1	2	3	4	5
Not at all		Somewhat		Very much

_____ How much do you enjoy Math-related subjects?
_____ How likely would you be to take a job in a Math-related field?
_____ How much is Math to the sense of who you are?
_____ How important is it to you to be good at Math?

Compared to other students, how good are you at Math?

1. Very Poor
2. Poor
3. About the same
4. Better than average
5. Excellent

_____ How much do you enjoy English-related subjects?
_____ How likely would you be to take a job in a English-related field?
_____ How much is English to the sense of who you are?
_____ How important is it to you to be good at English?

Compared to other students, how good are you at English?

1. Very Poor
2. Poor
3. About the same
4. Better than average
5. Excellent