Implicit vs Explicit Stereotype Threat Activation Effect on Performance Mindsets

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Abstract

Positive stereotypes, such as model minority stereotypes, can impact important academic outcomes for Asian American students. Building on prior research on implicit vs explicit forms of stereotype activation, this study examines whether and how much performance mindsets (i.e., motivation to succeed or avoid failure) affects task performance in a stereotyped domain for Asian American students, i.e., math ability. In a 1x3 between-subjects study, stereotype activation (implicit, explicit, none) was manipulated prior to performing a spatial rotation task that participants believed measured their math ability. We found no evidence that the manner of stereotype activation led to differences in task accuracy, nor did scores on an Achievement Goal Questionnaire (AGQ-R) predict task performance or mediate the effects of our manipulation. However, pre- and post-task measures revealed a significantly lower endorsement of performance-approach goals and diminished levels of racial centrality after the manipulation and task, compared to the participants' baseline. We also examined other factors relevant to stereotype threat in exploratory analyses that highlight avenues for future research in this area.

Keywords

Stereotype activation, model minority stereotype, achievement goal orientation, spatial rotation task, racial centrality

Introduction

The model minority myth perpetuates the narrative that Asian Americans are a uniformly successful racial minority, characterizing them as a group of hard-workers and high-achievers while simultaneously disregarding the heterogeneous and diverse nature of all of the individual ethnic groups. Exacerbated by the dominant and pervasive model minority portrayals in the US media that reinforce this myth, the reality of systemic racism and discrimination that Asian Americans face becomes invisible, and the struggles of less advantaged Asian individuals and communities are largely overlooked and ignored (Murphy-Shigematsu et al., 2012; Zhang, 2010). Although many model minority stereotypes are often framed as "positive," research suggests these stereotypes result in emotional distress and debilitating consequences by creating an unrelenting motivation and pressure to conform to high expectations (McGee, 2018).

The Model Minority Myth Paradox

Jennifer Lee coined the term “stereotype promise,” describing how positive stereotypes about Asian Americans often generate a self-fulfilling prophecy and enhance performance for previously lower-achieving students (S. J. Lee, 1994). While many students do benefit from this stereotype promise, these same stereotypes also result in unintended consequences — often leading to remarkably high levels of depression, stress, and preventing these students from seeking connections with others and receiving necessary academic attention (J. Lee & Zhou, 2014; S. J. Lee, 1994). Additionally, many Asian-identified students are also shown to experience elevated levels of anxiety, motivated by a sense of guilt and responsibility to their families and by the immense pressure to live up to the high expectations of their group (Covarrubias et al., 2021; S. J. Lee, 1994). This may be a result of cultural factors, as research has indicated that Asian cultures tend to be more collectivistic, defined by having norms that

emphasize group harmony and conformity in order to be connected with others (Kim & Markus, 1999).

The struggles and discrimination Asian students continually encounter often goes unseen because of their ostensibly higher academic motivation and achievement. Because of the pervasive assumptions surrounding the model minority myth, Asian American students feel immense social pressure to meet high expectations for their academic performance. This may come from their ingroup as well as from their experiences and interactions in educational settings — making this pressure loom large for an individual. While the pressure can increase motivation and academic success, it also prevents students from seeking necessary academic support when needed and shifts their goals away from self-directed learning toward avoiding looking incompetent or letting others down (S. J. Lee, 1994). Furthermore, model minority stereotypes have been linked to more bullying, peer exclusion from social networks, among many other detrimental effects (Zhang, 2010). This body of research shows how a seemingly positive stereotype about academic ability can result in negative performance and worse psychological outcomes for Asian American students who feel stifling external pressure to meet high expectations associated with their racial group.

Subtle vs Blatant Stereotype Activation

Stereotype threat occurs when an individual is concerned or worried that their behaviors or performance may be judged in light of a negative stereotype about a group with which the individual identifies, such as race or gender (Steele, 1997). Expanding on this research, many studies have shown that activating *positive* stereotypes can boost academic performance (Shih et al., 1999). For example, when it comes to academic achievement at school, Asian-American women performed better on a mathematics test when their ethnic identity was activated.

However, this was only the case following the subtle activation of Asian-related constructs, but not when stereotypes were blatantly activated (Cheryan & Bodenhausen, 2000; Shih et al., 1999, 2002). This work demonstrates that implicit and explicit stereotype activation often yield divergent effects. When a particular social identity was made salient at an implicit level, performance was altered in the direction predicted by the stereotype associated with the identity; yet if a stereotype had been activated explicitly, performance was impaired (Shih et al., 2015). These findings underscore the importance of considering the implicit and explicit messages in our environment, as they can shape how stereotypes manifest. More research is needed to unpack whether stereotype activation interferes with cognitive functioning directly, or prompts motivational shifts in goal orientations when stereotypes are made salient explicitly — which the present study aims to explore. Understanding the mechanisms behind these effects can inform approaches or interventions that seek to mitigate the pernicious effects of stereotypes in academic settings.

Goal Orientation

Similar to how the specific activation of stereotypes may lead to differing outcomes, prior research on academic goals has indicated that the type of motivation a person adopts towards a goal may lead to both positive and negative outcomes as well. Under the performance-mastery dichotomy, Elliot & Church (1997) proposed an achievement goal framework where performance goals are separated into *performance-approach* — motivation oriented towards achieving a positive outcome — versus *performance-avoidance* — motivation oriented towards avoiding negative events or failure (Elliot & Church, 1997). Investigating study strategies and exam performance using this framework has revealed that mastery goals and performance-approach goals were positive predictors of persistence and effort, while

performance-avoidance goals often impaired deep processing and hurt exam performance (Elliot et al., 1999). Later studies have indicated that the anticipation of evaluation, such as grades, engender performance-avoidance goals, suggesting that it may be difficult for a student in a highly competitive, grade-driven environment to have an performance-approach orientation (Pulfrey et al., 2011). However, research on cultural differences highlight that for students high in collectivism, performance-avoidance goals were adopted more often and were sometimes even associated with more favorable outcomes (i.e., higher levels of cognitive strategy use, intrinsic motivation). This evidence suggests that avoidance may not always be maladaptive for Asian students that identify as more collectivist (Zusho et al., 2005; King, 2016). Collectivist students may be especially motivated to live up to social expectations by adopting performance-avoidance goals — but at the expense of higher levels of anxiety (Zusho et al., 2005). Additional research with women under stereotype threat found that performance-avoidance goals and worry mediated the negative effect of stereotype threat on math test performance (Brodish & Devine, 2009). This highlights how motivational frameworks can act as underlying mechanisms linking stereotype activation to achievement outcomes.

Present Research

The goal of this study was twofold: first, to replicate findings from previous studies (Cheryan & Bodenhausen, 2000; Shih et al., 2015) and examine whether the manner of stereotype activation (i.e., implicit vs explicit) of the Asian identity facilitates or impedes performance; and second, to explore whether performance (i.e., task accuracy) is mediated by the adoption of different performance goal mindsets. Additionally, we conducted exploratory analyses to investigate potential correlations between task accuracy and measures of anxiety, race identity threat, and feelings of belonging. In pilot testing, we observed that racial centrality

moderates the impact of our manipulations on task performance, which we further examined in this study. We hypothesized that (1) participants in the implicit (subtle) stereotype condition will perform better and (2) participants in the explicit (blatant) stereotype condition will perform worse than those in the control condition. Furthermore, (3) participants in the explicit condition will report higher performance-avoidance goals than participants in the implicit and control conditions, which will mediate worse accuracy on the task.

Methods

Participants

Shih et al.'s 2015 study revealed a moderately large effect size, $F(4, 64) = 4.76$, $p = .001$, $\eta^2 = .23$, which translates to $f = 0.55$. However, recent meta-analyses of stereotype threat studies suggest effect sizes are overestimated (Ryan & Nguyen, 2017; Zigerell, 2017). Thus, we conducted an a priori power analysis to detect a medium-sized effect $f = 0.25$ with $\alpha = .05$ and *power* = 0.80, which required 159 participants for our primary analysis. Following our preregistration, we decided to recruit participants until we obtained at least 260 completed responses to be sufficiently powered for our mediation analyses.

After receiving IRB approval, a total of 260 Asian American (i.e., East Asian, South Asian, South East Asian) students currently enrolled in 2-year or 4-year colleges and universities were recruited from Prolific (www.prolific.co) to complete a pre-screen survey as the initial phase of our research. Only those who completed Part 1 were granted access to the subsequent main portion (Part 2) of the study. The attrition rate from Part 1 was approximately 3%, as analyses were conducted solely on individuals who finished Part 2 within a week. Participants failing to pass the manipulation check and flagged as poor quality responses from Qualtrics were also excluded, resulting in a sample size of 210 participants that was used for analyses. This final

sample comprised of 37% men, 60% women, and 2% identifying as non-binary, ranging in age from 18 to 48 years ($M = 23.72$, $SD = 5.07$).

label	variable	value
HighestDegree	Associate	25 (11.90%)
	Bachelor	73 (34.76%)
	Doctorate	4 (1.90%)
	HS/GED	87 (41.43%)
	Master	21 (10.00%)
STEMMajor	Not STEM	78 (37.14%)
	STEM	132 (62.86%)
First-gen student	No	73 (34.76%)
	Yes	137 (65.24%)
First-gen immigrant	No	148 (70.48%)
	Yes	62 (29.52%)
Second-gen immigrant	No	15 (10.14%)
	Yes	133 (89.86%)
GPA	Min / Max	2.00 / 4.18
	Med [IQR]	3.73 [3.48;3.90]
	Mean (std)	3.62 (0.38)
	N (NA)	210 (0)
Performance Approach	Min / Max	1.00 / 5.00
	Med [IQR]	4.00 [3.33;4.33]
	Mean (std)	3.76 (0.86)
	N (NA)	210 (0)
Performance Avoidance	Min / Max	1.00 / 5.00
	Med [IQR]	4.00 [3.00;4.33]
	Mean (std)	3.68 (0.98)
	N (NA)	210 (0)
Math Identification	Min / Max	1.00 / 5.00
	Med [IQR]	3.50 [2.67;4.17]
	Mean (std)	3.39 (0.96)
	N (NA)	210 (0)
Reading Identification	Min / Max	1.17 / 5.00
	Med [IQR]	3.58 [3.00;4.00]
	Mean (std)	3.55 (0.74)
	N (NA)	210 (0)
Gender Identification	Min / Max	1.00 / 5.00
	Med [IQR]	3.67 [2.75;4.00]
	Mean (std)	3.44 (0.99)
	N (NA)	210 (0)
Racial Centrality	Min / Max	1.00 / 5.00
	Med [IQR]	3.67 [3.00;4.00]
	Mean (std)	3.46 (0.98)
	N (NA)	210 (0)

Table 1. Demographic characteristics and baseline measures collected from Part 1

Participants were compensated $2 for completing Part 1 and $4 for also completing Part 2 within 7 days of completing Part 1. Participants who completed the task, all survey items, and answered all the manipulation and attention check questions correctly on their first attempt were also eligible to enter a lottery to receive a $100 electronic gift card. Gift cards were randomly given to 2 participants out of those who were deemed eligible.

Procedure

Participants were first recruited to complete Part 1 of our study, a Qualtrics survey that asked them to respond to items about their racial and ethnic background, general motivation to perform well in school, their sense of racial and academic identity, as well as their demographics. After completing this survey, they were directed to sign up for the second session, which took place between 1 day and 1 week from completion of Part 1. For the main portion of the study, participants were told that we were interested in how college students feel and think about assessments used to measure student performance. They were first asked to complete several questionnaires about their thoughts and feelings and then a spatial rotation task — which we told them was diagnostic of math ability — containing 5 practice items followed by 15 items that were scored. In this task, they were asked to judge and indicate whether two mental rotation stimuli (3D blocks) briefly presented on screen match or not. Manipulation check questions included asking what task they just completed (spatial rotation task), if the task was a diagnostic of math ability (yes), and if it was predictive of performance in math (yes). If participants answered any of these questions incorrectly, instructions were shown again. Those who answered all 3 of these questions incorrectly were excluded from the study (n = 8).

Prior to the spatial rotation task, we randomly assigned participants to 1 of the following 3 conditions — Control, Implicit, or Explicit — all adapted from Shih et al., 2015. In the Control condition, participants rated their awareness and endorsement of 5 stereotypes about young adults (e.g., “young adults are carefree”, “young adults are rowdy”) on a 5-point Likert scale. In the Implicit condition, participants responded to items about their ethnic heritage and background to elicit stereotypes about Asian people (e.g., “Do your parents or grandparents speak any languages other than English? If so, please indicate what language(s).”, “What

languages (besides English) do you know?"). In the Explicit condition, participants rated 6 items about their awareness and endorsement of common stereotypes about Asian people (e.g., "Asian Americans are respectful", "Asian Americans are quiet") on a 5-point Likert scale. Performance goal orientation, a critical component of performance, was also assessed before the task, on the assumption that mindset should orient one towards an outcome, thus boosting performance. Additional measures were also collected, described in detail below.

Measures

Our key dependent variable was performance on the spatial rotation task (Ganis & Kievit, 2015), measured by *task accuracy* where total score ranged from 0 to 15, with higher scores reflecting better performance. Previous studies have demonstrated links between identity salience and spatial reasoning abilities, suggesting that the spatial rotation task may have a comparable impact to a conventional math assessment (McGlone & Aronson, 2006). Moreover, research has indicated that variations in spatial rotation skills are associated with other academically relevant abilities (Hegarty & Waller, 2005). As such, we deemed this spatial task diagnostic of math ability and therefore a suitable measure to potentially induce stereotype effects related to the stereotype about Asian Americans' good quantitative skills. We assessed performance goal mindsets using the revised version of the Achievement Goal Questionnaire (AGQ-R; Elliot & Murayama, 2008), a 6 item 5-point Likert scale specifically targeting the *performance-approach* (e.g., "My aim is to perform well relative to other students.") and *performance-avoidance* items (e.g., "My aim is to avoid doing worse than other students."). We also collected other measures to get a better understanding of how other variables may be related to stereotype activation, task accuracy, or goal mindsets. Although these variables were not part

of our primary analysis, they were included in exploratory analyses to examine whether they were affected by the manipulation or influenced task performance. These included the following:

Stress and anxiety — Anxiety was measured using the Spielberger State-Trait Anxiety Inventory (STAI) on a 6 item 5-point Likert scale (Marteau & Bekker, 1992). This was administered both right before and after the spatial rotation task. Participants rated how stressful they found the task to be (1 = Not stressful at all, 5 = Extremely stressful).

Expected performance — Following the completion of 5 practice questions and prior to starting the task, we asked participants for their anticipated score out of 15. Similarly, we posed the same question after the task, thus gathering both pre-test and post-test expectations. Subsequently, participants were requested to rate the extent to which they agreed that they performed as well as they could and also asked to indicate quantile range within which they anticipated their performance on the task would rank compared to other participants in the study (e.g., 10th, 25th, 50th, 75th, 90th percentile).

Opinion — On a 5-point Likert scale, we asked participants if they thought spatial reasoning ability is predictive of math performance (1 = Not at all diagnostic , 5 = Extremely diagnostic) and if they viewed the task as a good way to either showcase or measure their math abilities (1 = Not at all, 5 = A great deal).

Race Identity Threat — A 6 item 5-point Likert scale (1 = Not at all, 5 = A great deal) adapted from Sellers et al., 1997 measured how much participants worry about being seen negatively in

school because of their ethnicity (e.g., “I worry that people at my school will judge my racial group based on the behavior or performance of other people my race.”).

Belonging — A 3-item 5-point belonging uncertainty scale (1 = Does not describe me at all, 5 = Describes me extremely well) adapted from Walton & Cohen, 2007 was used to measure perceived belonging at school (e.g., “Sometimes I feel that I belong at my university, and sometimes I feel that I don’t belong.”).

Racial Centrality — Three racial centrality items were adapted from Sellers et al., 1997 and Luhtanen & Crocker, 1992 to measure the importance individuals ascribe to race in their personal identity (e.g., “I have a strong attachment to other people of my race.”). Participants rated on a 3-item 5-point scale (1 = Not at all, 5 = A great deal). In pilot testing, we found that racial centrality moderates the effects of our manipulations on task performance, and we tested that in this study as well.

The demographic variables collected in the Part 1 survey included the following: *gender, age, race*, *first-gen status* (e.g., “Do either of your parents have a 4-year college/university (bachelor’s) degree?”, *US first-gen status* (e.g., “Did your parent(s) complete their education in a country outside of the United States?”), *immigrant status* (e.g., “Are you a first-generation immigrant?”, “How old were you when you first came to this country?”, “Are you a second-generation immigrant?”), *highest degree earned*, *major*, and *GPA*.

Results

Primary analyses

A one-way, between-groups ANOVA was designed to examine how each of the 3 stereotype activation conditions (Control vs Implicit vs Explicit) relate to task performance (i.e., Score). We did not find a significant effect of Condition on Score at the $p < .05$ level, $F(2, 207) = 1.16$, $p = .315$.

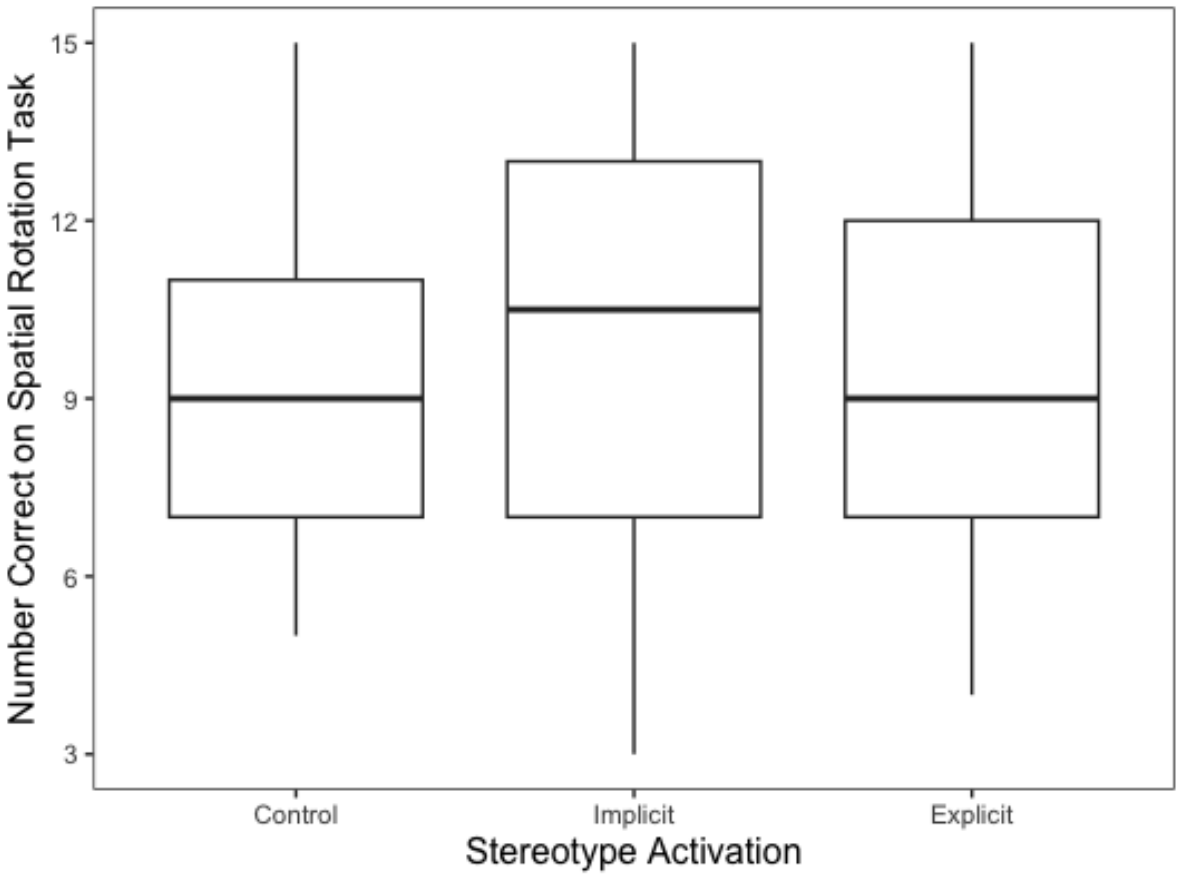

Figure 1. Asian American participants' performance on a spatial rotation test as a function of irrelevant stereotype salient (control), implicit stereotype salient, or explicit stereotype salient manipulations.

We also conducted contrast analyses to potentially discover more precise and specific differences among our conditions (Table 2). Contrary to our hypotheses, we did not find any evidence that participants in either the Implicit condition (M = 10.10, SD = 3.12) performed significantly better than Control (M = 9.55, SD = 2.63), d = -0.20, *95% CI* [-0.56, 0.14], $t(207)$ = -1.14, p = .254. Those in the Explicit condition (M = 9.41, SD = 2.72) did not perform significantly worse than Control either, d = 0.05, *95% CI* [-0.26, 0.36], $t(207)$ = 0.29, p = .769.

Dependent Variable	Comparison	*df*	*t*	*p*	*d*	95% CI
	Control - Explicit	207	0.29	.769	0.05	[-0.26, 0.36]
Score	Control - Implicit	207	-1.14	.254	-0.20	[-0.56, 0.14]
	Explicit - Implicit	207	-1.45	.148	-0.24	[-0.60, 0.08]

Table 2. Planned contrasts comparing task accuracy (i.e., Score) in the Control, Implicit, and Explicit stereotype activation conditions.

Relating to performance goal mindsets, we found a significant negative relationship between performance-approach and task accuracy, such that participants who reported having stronger performance-approach goals tended to achieve lower accuracy on the spatial rotation task, $r(208)$ = -0.16, p = .023. While performance-avoidance goals were also negatively associated with lower performance, this relationship was only marginally significant, $r(208)$ = -0.12, p = .096. These negative correlations between the AGQ-R measures and task performance were slightly more pronounced for participants who identified themselves as STEM (Science, Technology, Engineering, and Mathematics) majors (Approach: $r(208)$ = -0.21, p = .016; Avoidance: $r(208)$ = -0.21, p = .016); however the correlations were not significantly different from each other (p =

.6). We also found no significant differences among the conditions in their AGQ-R responses (Approach: $F(2, 207) = 0.865$, $p = .422$; Avoidance: $F(2, 207) = 1.156$, $p = .317$). Our results did reveal a strong correlation between the two achievement goal indices, $r(208) = 0.60$, $p < .001$.

Baseline vs post-manipulation measures

Since Part 1 of our study was completed at least 24 hours before the main Part 2, we considered the measures (i.e., Table 1) as the participants' baseline levels. This allowed us to compare each participant's baseline scores and ratings with the same measures obtained after the manipulation and task in the latter part of the study. A paired t-test comparing baseline and pre-task performance-approach goals revealed a statistically significant difference in means: participants, on average, reported higher performance-approach goals in Part 1 compared to the same achievement goal questionnaire right before the task, $t(209) = 3.34$, $p < .001$. On the other hand, the differences between performance-avoidance goals did not differ significantly between the baseline and Part 2, $t(209) = -0.55$, $p = .584$. Among the 3 conditions, the largest within-condition differences for performance-approach goals were observed in the Control group ($M = 0.19$), followed by the Implicit ($M = 0.15$), and smallest for the Explicit stereotype activation condition ($M = 0.07$). Nevertheless, these differences across conditions were not statistically significant, $F(2, 207) = 0.74$, $p = .478$. Additionally, the findings indicate a statistically significant difference between the baseline and post-task means for racial centrality, $t(209) = 5.51$, $p < .001$. Specifically, participants' levels of racial centrality decreased significantly after undergoing the manipulation and completing the spatial rotation task compared to their baseline levels.

label	variable	Condition		
		Control	Implicit	Explicit
Score	Min / Max	5.00 / 15.00	3.00 / 15.00	4.00 / 15.00
	Med [IQR]	9.00 [7.00;11.00]	10.50 [7.00;13.00]	9.00 [7.00;12.00]
	Mean (std)	9.55 (2.63)	10.10 (3.12)	9.41 (2.72)
	N (NA)	69 (0)	68 (0)	73 (0)
Performance Approach	Min / Max	1.00 / 5.00	1.67 / 5.00	2.00 / 5.00
	Med [IQR]	3.67 [3.00;4.33]	3.67 [3.00;4.00]	3.67 [3.33;4.33]
	Mean (std)	3.57 (1.04)	3.55 (0.87)	3.73 (0.81)
	N (NA)	69 (0)	68 (0)	73 (0)
Performance Avoidance	Min / Max	1.00 / 5.00	1.33 / 5.00	1.67 / 5.00
	Med [IQR]	3.67 [3.00;4.00]	4.00 [3.00;4.33]	4.00 [3.33;4.33]
	Mean (std)	3.58 (1.04)	3.71 (0.92)	3.82 (0.82)
	N (NA)	69 (0)	68 (0)	73 (0)
Pre-Task Expectation	Min / Max	0 / 13.00	1.00 / 15.00	0 / 15.00
	Med [IQR]	8.00 [6.00;10.00]	8.00 [5.75;10.00]	6.00 [4.00;10.00]
	Mean (std)	8.07 (3.31)	8.06 (3.27)	7.14 (3.86)
	N (NA)	69 (0)	68 (0)	73 (0)
Pre-Task Anxiety	Min / Max	1.67 / 3.17	1.67 / 3.50	1.67 / 3.33
	Med [IQR]	2.50 [2.17;2.67]	2.58 [2.33;2.83]	2.50 [2.17;2.83]
	Mean (std)	2.45 (0.36)	2.59 (0.35)	2.49 (0.37)
	N (NA)	69 (0)	68 (0)	73 (0)
Racial Identity Threat	Min / Max	1.33 / 4.67	1.33 / 4.33	1.33 / 4.33
	Med [IQR]	2.83 [2.33;3.50]	2.67 [2.33;3.21]	3.00 [2.33;3.50]
	Mean (std)	2.87 (0.78)	2.81 (0.71)	2.89 (0.77)
	N (NA)	69 (0)	68 (0)	73 (0)
Belonging	Min / Max	1.33 / 5.00	1.00 / 4.67	1.00 / 5.00
	Med [IQR]	2.67 [2.33;3.33]	2.67 [2.33;3.33]	3.00 [2.33;3.33]
	Mean (std)	2.83 (0.88)	2.75 (0.80)	2.93 (0.79)
	N (NA)	69 (0)	68 (0)	73 (0)
Racial Centrality	Min / Max	1.00 / 5.00	1.00 / 5.00	1.00 / 5.00
	Med [IQR]	3.00 [2.33;3.67]	3.50 [3.00;4.33]	3.00 [2.67;4.00]
	Mean (std)	3.10 (1.00)	3.43 (1.08)	3.20 (1.04)
	N (NA)	69 (0)	68 (0)	73 (0)

Table 3. Within-condition means and standard deviations for the key measures collected in Part 2

Exploratory analyses

In addition to our primary hypotheses, we also measured and tested if the following variables were correlated with task accuracy: racial centrality, pre- and post-task performance expectations, pre- and post-task anxiety, race identity threat, belonging, and participants' demographics. Out of these covariates, only pre-task expectations ($r(208) = 0.20$, $p = .004$),

post-task expectations ($r(208) = 0.31$, $p < .001$), and pre-test anxiety were significantly associated with performance ($r(208) = -0.13$, $p = .05$). In other words, participants who had higher performance expectations tended to perform better on the task, whereas those reporting higher levels of test anxiety prior to the task performed worse.

While our primary objective was to examine whether the method of stereotype activation influenced task performance, Figure 2 showcases the impact of our manipulation on other variables relevant to stereotype threat. Despite the lack of statistical significance in the differences among conditions for racial centrality, racial identity threat, and pre-task anxiety scores, the implicit condition reported the highest median racial centrality (A) and the lowest median racial identity threat (B) relative to the other conditions.

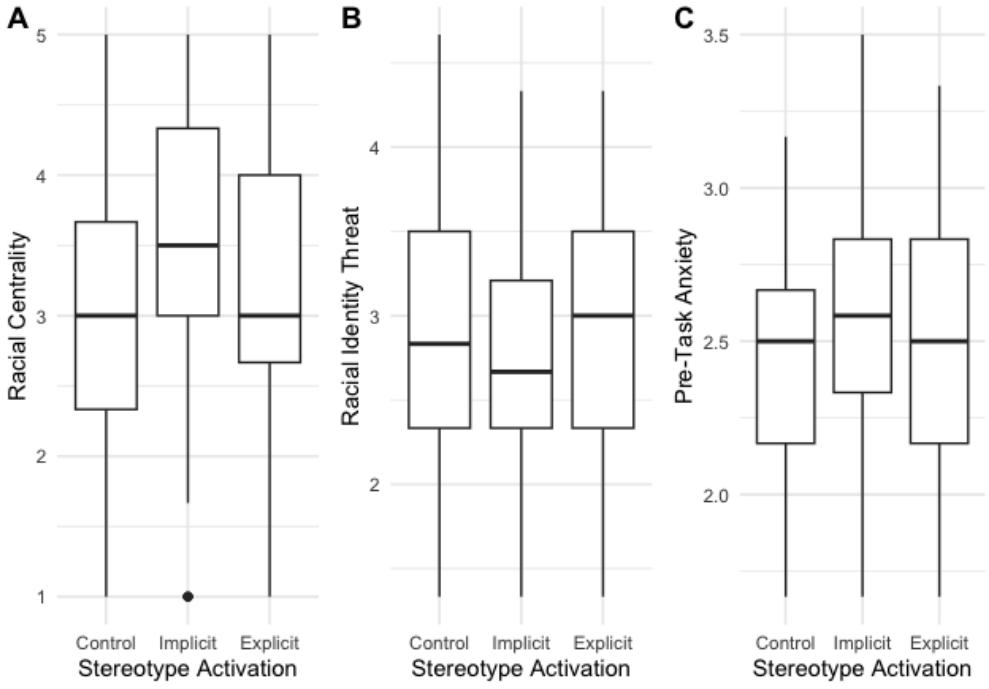

Figure 2. Between-condition differences in racial centrality, racial identity threat, and pre-task anxiety.

Discussion

Participants completed either an irrelevant questionnaire or one of two brief questionnaires consisting of several probe questions designed to implicitly or explicitly remind a person about a culturally held stereotype to trigger stereotype threat. Overall, we found no evidence that the manner of stereotype activation led to differences in task accuracy on a spatial rotation task, nor did scores on an Achievement Goal Questionnaire (AGQ-R) predict task performance. The primary aim of this study was to investigate how different methods of stereotype activation — implicit vs explicit — influence Asian American students' performance on a spatial rotation task. Contrary to our hypotheses and previous findings, we did not find any significant differences in task performance across the three conditions, though they were trending in the hypothesized direction. In other words, our results failed to replicate previous studies that found positive stereotypes related to Asian Americans boost performance when activated implicitly but not explicitly (Cheryan & Bodenhausen, 2000; Shih et al., 2015).

One potential explanation is that the stereotype activation manipulations, although based on established methods, may not have been sufficiently potent or relevant to elicit performance effects in the current sample. Additionally, it is reasonable to assume there have been shifts in attitudes and awareness about stereotypes in recent years, such that manipulations from over a decade ago may not affect participants in the same way; although previous studies have demonstrated medium effect sizes, it is possible our study was underpowered to detect a smaller effect. Furthermore, the online setting where participants completed the task may not have made their stereotyped identity sufficiently salient. Performing the task in a laboratory or classroom environment with in-person observers could heighten identity salience and increase susceptibility to stereotype threat effects compared to the online context used in our study. Another key

difference is that our study used a spatial rotation task diagnostic of math ability, rather than an actual math test like many of the previous stereotype threat studies (Shih et al., 1999). It is possible the link between this visuospatial task and the stereotypes about math abilities was not clear or strong enough to trigger stereotype threat or boost effects.

In addition to this primary analysis, we hypothesized that participants' performance-approach and avoidance mindset would mediate their performance on the task, with those in the Explicit condition reporting higher performance-avoidance goals and thus resulting in the lowest performance. However, given that we found no direct effect of the manipulation on performance, there was no need to test for mediation effects. Instead, we explored whether an individual's performance mindset, independently of the manipulation, correlated with their accuracy on the spatial rotation task. Interestingly, we found a negative correlation between performance-approach goals and task accuracy, especially among STEM majors. Although this was unexpected, this finding aligns with some prior research indicating that the overall pattern of effects for performance goals has been mixed — as some of this heterogeneity may trace back to differences in how performance-approach goals are defined (Hulleman et al., 2010; Senko & Dawson, 2017). Along these lines, a potential limitation of our study is that the Achievement Goal Questionnaire-Revised (AGQ-R) measure we used only taps into the normative, peer comparison aspect of performance goals and fails to capture the appearance or ability-demonstration component, which could have impacted the patterns of results observed (Elliot & Murayama, 2008). Furthermore, research indicates the effects of performance goals can be moderated by various individual differences. Bruno et al. (2019) showed that performance-avoidance goals negatively impacted achievement only for high-achieving students from lower-class backgrounds. Collectivism has also emerged as a moderator, such that for

highly collectivistic students, performance-avoidance goals were actually associated with greater use of learning strategies and intrinsic motivation (King, 2016). Given the mixed evidence, more research is still needed to clarify under what conditions different types of performance goals may facilitate or hinder achievement across subgroups — and how this may ultimately influence the effect of stereotype threat.

Our exploratory analyses also examined several other variables that may be related to task performance and stereotype threat processes. We found that pre-task performance expectations, post-task expectations, and pre-test anxiety levels were significantly associated with participants' accuracy on the spatial rotation task. Specifically, higher performance expectations predicted better task performance, while greater pre-test anxiety was linked to lower performance. These findings align with previous research demonstrating the detrimental effect of test anxiety and influential roles of expectancy beliefs in academic settings (Nie et al., 2011; Wigfield & Cambria, 2010). Our findings also revealed how participants' racial centrality decreased from baseline to post-task, suggesting the evaluation context may have temporarily diminished the importance individuals ascribe to race in their identity. Furthermore, performance-approach goals decreased while performance-avoidance goals remained relatively stable. While these post-manipulation shifts in mindsets were not significantly different across conditions, these patterns suggest that when it is actually time to perform, participants may start to doubt themselves or become more cognizant of the evaluative context, altering their motivational frameworks.

Based on our results, it seems like stereotype threat might be working more directly on variables like racial centrality, performance expectations, and anxiety, which could then subsequently influence performance mindsets and actual task performance. This potentially

points to a more specific model to explore in future work, where stereotype activation shapes psychological threat processes and emotional experiences first, which then go on to alter motivational frameworks and ultimately undermine or facilitate performance. Tracing this mediational chain could provide a more nuanced understanding of the underlying mechanisms driving stereotype threat and boost effects. Directly targeting the more emotional and identity-related reactions may also suggest promising intervention points to prevent negative consequences triggered by stereotype cues in evaluative situations.

Furthermore, this work highlights the importance of considering individual differences or heterogeneity. Individuals for whom math performance carries greater significance or have greater concerns about their math abilities could be more likely to experience pronounced stereotype threat effects. This differs from those with a strong math identity or those who do not necessarily require proficiency for their educational or professional careers. However, if proficiency in math is necessary — or if explicit expectations regarding these abilities exist — the effects could be more potent and potentially detrimental, particularly when individuals adopt a mindset of needing to outperform others. This emphasizes the necessity for future research to help mitigate stereotype threat for Asian American students, as it could trigger mindsets linked to underperformance relative to peers unaffected by such threats.

Conclusion

In our study, we examined if stereotypes about Asian Americans, whether activated implicitly or explicitly, could impact important outcomes for this student population. We also investigated how experiencing stereotypes relates to individuals' beliefs and mindsets surrounding performance—specifically, their orientation toward achieving success or avoiding failure. Although neither the method of stereotype activation nor performance goal orientation

significantly influenced task performance in our results, the observed patterns suggest stereotypes may still exert effects by shaping identity processes, expectancy effects, and emotional states like anxiety—known barriers to learning and performance. Continued research investigating these mediating mechanisms is needed to understand *when* and *how* positive stereotypes can lead to negative consequences for students. Such work can inform future interventions aimed at promoting adaptive educational experiences across minority groups and the broader student population.

Open Science Statement 

All predictions, analysis plans, and exclusion criteria were preregistered at AsPredicted.org. Preregisteration and other materials used in this research are open source and are archived in the Open Science Framework (https://osf.io/kbjye/). Detailed code and supplementary resources (e.g., RShiny data visualization tool) can be found in the following Github repository: https://github.com/amorai1202/Senior-Thesis.

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