We are in this together: How the presence of similarly stereotyped allies buffer against identity threat☆

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A B S T R A C T

Past research has demonstrated that ingroup experts buffer against the negative effects of identity threat on working memory as they are believed to be less likely to hold negative stereotypes about ingroup members. The present research examined, for the first time, whether the presence of a stigmatized outgroup expert whose stereotype content is similar to women's, but not a stigmatized outgroup experts whose stereotype content is dissimilar to women's, mitigates the cognitive interference stemming from identity threat for White women, and identifies a novel individual difference variable, stigma solidarity, which facilitates identification of such allies. Across six studies we demonstrated that White women perceived a Black male expert as less likely than White men to hold negative stereotypes about women's intelligence (Study 1, 2), especially if women were high in stigma solidarity (Study 3, 6), mitigating cognitive interference (Study 2, 4). Further, an outgroup expert who was not similarly stereotyped (i.e., Asian male) did not mitigate these identity threat effects (Study 5, 6). Thus, we contend that White women, especially those high in stigma solidarity, perceive similarly stereotyped out-group experts as less likely to hold negative stereotypes about their intelligence, buffering against identity threats in such settings. This adds to a growing literature identifying the conditions under which intraminority relations can serve to expand contextual cues that signal identity safety.

1. Introduction

Women experience numerous identity threat cues (e.g., low representation, negative stereotypes) in White, male dominated settings and fields such as science, technology, engineering, and mathematics (STEM). The accumulation of these identity threat cues signals a lack of fit in such settings for stigmatized individuals (Cheryan, Plaut, Davies, & Steele, 2009; Good, Rattan, & Dweck, 2012), undermining identification with these areas (Aronson, Fried, & Good, 2002; Young, Rudman, Buettner, & McLean, 2013), and diminishing motivation to pursue careers in such settings (Stout, Dasgupta, Hunsinger, & McManus, 2011). Critically, women are stereotyped as less intelligent than White men (Leslie, Cimpian, Meyer, & Freeland, 2015; Shapiro & Williams, 2012; Steele & Aronson, 1995) and thus, must contend with the threat of being viewed or judged through the lens of a negative ingroup stereotype (Steele, 1997; Steele & Aronson, 1995; Steele, Spencer, & Aronson, 2002). Such an identity threat can impede individuals' working memory (Jamieson & Harkins, 2007; Shapiro & Williams, 2012), caused in part by the additional cognitive effort spent

considering the potential for stereotype confirmation (Schmader & Johns, 2003), increased anxiety (Keller & Dauenheimer, 2003), and greater physiological arousal (Blascovich, Spencer, Quinn, & Steele, 2001; Croizet et al., 2004). Yet, the level of threat can vary across social settings (Major & O'Brien, 2005), and stigmatized individuals calibrate their level of identity threat, in part, on the possibility *and* the probability of being negatively stereotyped in the setting (Wout, Shih, Jackson, & Sellers, 2009).

As many White male dominated settings (e.g., professional settings, STEM fields) are framed as diagnostic of intelligence, the possibility of being negatively stereotyped in the workplace or on a purported measure of intelligence is high for women due to negative intelligence stereotypes (Inzlicht & Ben-Zeev, 2000; Spencer, Steele, & Quinn, 1999). However, there are various cues which can determine the probability of being negatively stereotyped, including the presence of other women (Emerson & Murphy, 2014; Inzlicht & Ben-Zeev, 2000), especially an ingroup role model or teacher (Marx & Roman, 2002; Stout et al., 2011).

Unfortunately, there is a lack of ingroup role models for women in

professional settings and STEM fields (Allen, Epps, Guillory, Suh, & Bonous-Hammarth, 2000; Beede et al., 2011) to reduce women's perceived probability of being negatively stereotyped in such settings. The present studies present a novel approach to reduce women's perceived probability of being negatively stereotyped and to buffer against the negative working memory effects associated with such threats by integrating research on identity threats (e.g., Steele & Aronson, 1995), the inoculation model (Dasgupta, 2011; Stout et al., 2011), and the cue transfers framework (Chaney & Sanchez, 2018; Chaney, Sanchez, & Remedios, 2016; Sanchez, Chaney, Manuel, Wilton, & Remedios, 2017). Across six studies, we examine the extent to which a *similarly stereotyped outgroup* expert (e.g., Black men face similar negative intelligence stereotypes as White women), can reduce White women's belief that they would be negatively stereotyped on a test of intelligence purportedly predictive of career success, and thus prevent cognitive interference. Further, we examine a novel individual difference variable which may facilitate perceptions of such similarly stereotyped outgroup allies. Specifically, we examine if White women high in stigma solidarity (i.e., those who believe women should form alliances with other oppressed groups to reduce prejudice) are especially likely to perceive a Black male expert as less likely than a White male expert to negatively stereotype them. Lastly, we explore the boundaries of such alliances by examining the perception of an Asian male expert, who does not share stereotype content with women (i.e., Asian men are stereotyped as intelligent), but is a stigmatized outgroup expert.

1.1. Inoculation model

The inoculation model proposes that increasing the presence of, and exposure to, female teachers, experts, and peers, may "inoculate" or protect women against the negative effects of gender stereotypes in such environments (Dasgupta, 2011). Indeed, exposure to successful female figures in male dominated fields enhances women's motivation to pursue careers in such fields, strengthens positive attitudes towards the fields, and promotes feelings of self-efficacy (Stout et al., 2011; Young et al., 2013). As such, the inoculation model focuses on how an environment can be changed to reduce the probability of identity threat in settings in which negative stereotypes about women are salient. Moreover, initial evidence has also suggested that the presence of other women in male-dominated settings can reduce negative cognitive effects as well. Critically, the presence of more women in a testing setting can counteract the effects of gender-related identity threats (Inzlicht & Ben-Zeev, 2000), such that women who completed a math exam with only other men in the room significantly underperformed in comparison with women who completed the exam with other women present (Inzlicht & Ben-Zeev, 2003; Sekaquaptewa & Thompson, 2003).

Further, minimal exposure to relatable ingroup experts may similarly serve as a buffer against identity threats. For example, the presence of a female test administrator buffers against the negative performance effects of identity threat (Marx & Roman, 2002), such that women under threat performed significantly better with a female, compared to a male, test administrator. Similarly, the presence of a Black male test administrator buffered against the negative performance effects of identity threats for Black test takers, due in part to a belief that the test administrator was less likely to endorse negative stereotypes (Wout et al., 2009). Specifically, individuals hold meta-perceptions of the test administrator's attitudes (i.e., beliefs about the test administrator's beliefs), including the extent to which the test administrator endorses stereotypes about the individual's ingroup (i.e. meta-stereotype endorsement; Vorauer, Hunter, Main, & Roy, 2000). Thus, past research has suggested that when the test administrator is an ingroup member, individuals are less likely to perceive meta-stereotype endorsement, and do not anticipate being negatively stereotyped by the test administrator, ultimately buffering against the negative cognitive effects associated with identity threats (Marx & Roman, 2002; Wout et al., 2009). Thus, research suggests that limited exposure to an ingroup member in the threatening context is sufficient to buffer against identity threats, due in part to less anticipated negative stereotyping.

Notably, high-status women remain underrepresented in a variety of domains including STEM (Allen et al., 2000; Beede et al., 2011), reducing the likelihood that women will be exposed to ingroup experts and peers. Therefore, if the group of people whose presence buffers against identity threats for women could be conceptualized more broadly (beyond solely ingroup members), there may be more ways in which role models and peers mitigate threat in White male dominated domains than previously realized. As the presence of an ingroup test administrator primarily serves to reduce identity threats due to meta-stereotypes (the extent to which an individual believes another endorses stereotypes; Sigelman & Tuch, 1997; Vorauer et al., 2000), the presence of any expert (not just an ingroup expert) who is perceived as *not* endorsing negative stereotypes about one's stigmatized identity may reduce or eliminate the probability of being negatively stereotyped and buffer against the negative cognitive outcomes of identity theat. As women and Blacks are similarly negatively stereotyped in intelligence domains (e.g., Wout et al., 2009), we propose that the presence of a Black male expert will mitigate identity threat concerns and negative cognitive outcomes for White women. Moreover, we propose that the presence of an Asian male expert will not mitigate such identity threat concerns, as, despite also being stigmatized minority group members, Asians are stereotyped as highly intelligent (e.g., Fiske, Xu, Cuddy, & Glick, 1999), and thus their stereotype content is incongruent with stereotypes about White women.

1.2. Cue transfers

Critically, the current hypothesis is supported by past research demonstrating that cues to both identity safety and identity threat *transfer* across group identities in a variety of domains. For example, cues that suggest an organization would be a safe place for Black employees (e.g., being named the best workplace for Black executives) also signal a culture that is less threatening to White women (Chaney et al., 2016). Moreover, outgroup threat cues (e.g., racist evaluators) transfer, such that White women anticipate greater gender stigma and more negative treatment due to their gender when interacting with a racist individual than with a non-racist individual (Sanchez et al., 2017). While past research on cue transfers has focused on the ideological assumptions made from diversity structures (e.g., Chaney et al., 2016), environmental cues (e.g., all-gender restrooms; Chaney & Sanchez, 2018), or individuals with known outgroup attitudes (Sanchez et al., 2017), the present research sought to expand the cue transfer framework by examining ideological assumptions (i.e., assumptions of stereotype endorsement) based on an individual's social identity. Specifically, we propose that the presence of a Black male expert can buffer against identity threats for White women in testing situations due to an assumption that members of one similarly stereotyped group are unlikely to endorse negative stereotypes about similarly stereotyped outgroup members. However, we propose that an Asian male expert will not serve similarly as a buffer. Notably, past research on cue transfers demonstrated that while, for example, Asian participants anticipated generalized racial bias from an individual with anti-Black attitudes (despite no stereotype content overlap between the Asian and Black groups), Asians did not anticipate the more specific American identity threat that they expected from an individual with anti-Latino attitudes (Sanchez, Chaney, Manuel, & Remedios, 2018) as Asians and Latinos, but not Asians and Blacks, are similarly associated with foreigner stereotype content (Zou & Cheryan, 2017). As such, specific stereotype-relevant threats appear to only transfer when stereotype content is congruent. As intelligence stereotypes about women and Asians are incongruent, we anticipate an Asian male expert will not buffer White women in testing situations against identity threat in the way that the identities of a Black male expert are expected to buffer against threat.

1.3. Stigma solidarity

Past research has suggested that when low status group members perceive discrimination against their ingroup, a "common fate" or a shared identity of "disadvantage" (Schmitt, Spears, & Branscombe, 2003) among stigmatized individuals can be activated, which may result in more positive intraminority intergroup outcomes (Hornsey, van Leeuwen, & Van Santen, 2003). While this outcome is most common among groups who share a stigmatized identity within a social category (e.g., race; Craig & Richeson, 2012), such *stigma solidarity* can be achieved across categories (e.g., race and sexual orientation; Cortland et al., 2017). Further, the extent to which people hold a belief that individuals from different oppressed or stigmatized groups should work together and support one another varies (Subašić, Schmitt, & Reynolds, 2011). Indeed, when stigma solidarity is activated, individuals report greater collective action intentions in support of other stigmatized groups (Subašić et al., 2011). Thus, stigma solidarity may facilitate seeing other minorities as allies and part of a broader common "minority" ingroup. Thus, we propose that White women who are high in stigma solidarity are more likely to perceive a similarly stereotyped outgroup expert (i.e., Black male) as unlikely to endorse negative stereotypes about women and to create a biased test compared to a nonstigmatized expert (i.e., White man), or a stigmatized outgroup expert whose stereotype content is dissimilar from women's (i.e., Asian male).

1.4. Current research

Integrating past research on identity threats, the inoculation model, and intraminority relations, we propose a novel buffer against identity threat for White women in a diagnostic setting. Specifically, we hypothesize that for White women, the presence of an expert who does not hold a shared stigmatized identity (i.e., is not a woman) but is similarly stereotyped in the domain (i.e., Blacks are also stereotyped as unintelligent) will act as a buffer against identity threat, including the cognitive interference. Specifically, we propose that White women will perceive an outgroup expert who is similarly negatively stereotyped as less likely to endorse negative stereotypes about women (Studies 1–4, 6), and thus will be less likely to experience identity threat, minimizing the cognitive interference associated with such threats (Studies 2, 4). Moreover, we propose that White women who are high in stigma solidarity will be significantly more likely to perceive a stigmatized outgroup member as a potential ally, facilitating identity safety (Studies 3, 4, & 6). Further, we propose that stereotype congruence facilitates the identity threat buffer, such than an Asian man, whose stereotype content is incongruent with White women, but who holds a stigmatized identity, would still be perceived as endorsing negative stereotypes about women's intelligence (Study 5), except among participants who are high in stigma solidarity (Study 6). Thus, the present research proposes a novel approach to mitigating identity threat experienced by stigmatized individuals in a testing setting by expanding the pool of potential inoculators and identifying an individual difference variable which facilitates such inoculation. All measures, manipulations, and exclusions are reported for these studies and no analyses were conducted until data collection for each study was completed.

2. Study 1

Study 1 sought to demonstrate that White women in an identity threatening context perceive a White female *and* a Black male expert as less likely to negatively endorse negative stereotypes about women's intelligence and less likely to create a test that produces gender bias compared to a White male expert. In all studies, we examine a test creator who is presented as an expert in measurements of intelligence.

3. Method

3.1. Participants

Two hundred and one White women were recruited to take place in a study on cognition via Amazon Mechanical Turk in exchange for $0.50 and were identified by a demographic prescreen completed directly before the present study. Twenty-four participants were excluded from analyses for failing instructional attention check items (e.g., "select 7 for this item"), while an additional 37 participants were excluded for incorrectly responding to manipulation check questions regarding the test creator's race and/or gender which were asked at the end of the study, leaving a final analytic sample of 140 (M_{age} = 37.19, SD = 11.58, range: 20–66).[1] An a priori power analysis in G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) for a one-way ANOVA with 3 conditions, for a medium effect size with 80% power indicated a data collection stop point of 160. In anticipation of a relatively high rate of data exclusion we set our data collection stop point at 200. A sensitivity power analysis in G*Power indicated the final sample size was sufficient to capture a medium effect size (d = 0.50).

3.2. Procedure

After providing consent, participants were presented with information "about the creator of a new test measuring spatial ability and intelligence which is predictive of career success." Following Wout et al. (2009), all participants were then threatened via an identity threat cue, which included informing them that, "There has been some controversy about whether there are gender differences in math and spatial ability. Previous research has demonstrated that gender differences exist on some tests, but not on others." Participants were told they would review the information about the test creator, and then complete the test. Participants were randomly assigned to learn about either a White male, a White female, or a Black male test creator. This information included an image of the test creator, their university, and research area. Images had been pretested with a separate sample (N = 21) of undergraduate students (77.3% female; M_{age} = 21.14, SD = 1.91). The images selected did not significantly vary on attractiveness, $F(2,20)$ = 0.84, p = .44, d = 0.41, perceived intelligence, $F(2,20)$ = 0.43, p = .66, d = 0.29, or perceived friendliness, $F(2,20)$ = 1.14, p = .34, d = 0.46.

Next, participants completed items regarding the extent to which they believed the test creator endorsed gender stereotypes (meta-stereotype endorsement), the likelihood the test creator would create a test on which women performed worse than men, and how much they would like the test creator.[2] Participants were then asked to recall the test creator's race and gender before learning that there would be no task and being debriefed.

3.3. Materials

3.3.1. Meta-stereotype endorsement

Participants answered three questions regarding the test creator's endorsement of stereotypes regarding women's intelligence. On a scale from 1 (*Not at all likely*) to 7 (*Extremely likely*) participants responded to, "To what extent do you believe [test creator] believes women are intelligent?," "How likely is it that [test creator] believes women are smart?" and "How likely is it that [test creator] endorses the stereotype that women are not competent?" The first two items were reverse coded so that the composite measure would indicate greater negative

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[1] There was a significant difference by condition, $\chi^2(2)$ = 17.36, p < .001 (White man = 30; Black man = 23; White woman = 8).

[2] Before completing the liking measure, participants completed a measure of perceived SDO of the test creator. Analysis presented in the Supplement.

stereotype endorsement with greater scores ($\alpha = 0.70$). These items were selected as we anticipated that a Black male expert would serve as an identity threat buffer due to the shared stereotype content of low intelligence between Black men and women. Moreover, the supposed test was presented as a measure of intelligence broadly, and women are stereotyped as less brilliant than men (e.g., Leslie et al., 2015).

3.3.2. Anticipated test bias

Participants answered two questions regarding how likely it would be that the test creator created a test that would produce gender differences. Items included, "How likely is it that [test creator] made a test that produces gender differences, in which women perform worse than men?" and "How likely is it that [test creator] made a test that men perform better on than women?" Items were responded to on a scale from 1 (*Not at all*) to 10 (*Very Likely*), and the items were highly correlated $r(140) = 0.88$, $p < .001$.

3.3.3. Liking

Participants responded to three items regarding how much they would like the test creator on a scale from 1 (*Not at all*) to 7 (*Very much*). Items included, "Would you enjoy chatting with [test creator]?," "Would you enjoy an interaction with [test creator]?," and "Would you find a conversation with [test creator] enjoyable?" ($\alpha = 0.98$). Liking was included to ensure that cue transfers were not simply due to a liking bonus for White women or racial minorities or due to a liking penalty for White men.

4. Results

A one-way ANOVA was conducted for liking, but revealed no effect of condition, $F(2,135) = 1.66$, $p = .19$, $d = 0.29$.[3] Participants did not report differentially liking the White male test creator ($M = 4.36$, $SE = 0.24$), the White female test creator ($M = 4.83$, $SE = 0.19$), or the Black male test creator ($M = 4.38$, $SE = 0.22$. As such, we did not include liking as a covariate in the following analyses.

4.1. Meta-stereotype endorsement

The one-way ANOVA for meta-stereotype endorsement revealed a significant main effect of condition, $F(2,137) = 15.34$, $p < .001$, $d = 0.94$. LSD post hoc comparisons revealed that participants anticipated the White man would endorse negative stereotypes about women's intelligence ($M = 2.52$, $SE = 0.13$) more than the White woman ($M = 1.61$, $SE = 0.10$), $p < .001$, $d = 1.15$, 95% CI = [0.58, 1.12], and more than the Black man ($M = 2.09$, $SE = 0.12$), $p = .02$, $d = 0.53$, 95% CI = [0.09, 0.78]. Participants anticipated the Black man would endorse these negative stereotypes more than the White woman, $p = .003$, $d = 0.62$, 95% CI = [0.17, 0.79].

4.2. Anticipated test bias

The one-way ANOVA for anticipated test bias revealed a significant main effect of condition, $F(2,137) = 4.20$, $p = .017$, $d = 0.51$. LSD post hoc comparisons revealed that participants anticipated greater test gender-bias from the White man ($M = 4.20$, $SE = 0.30$) than the White woman ($M = 3.21$, $SE = 0.24$), $p = .01$, $d = 0.54$, 95% CI = [0.24, 1.74], and compared to the Black man ($M = 3.18$, $SE = 0.27$), $p = .01$, $d = 0.59$, 95% CI = [0.23, 1.82]. Participants did not anticipate a significant difference in test bias between the Black man and the White woman, $p = .92$, $d = 0.02$, 95% CI = [−0.67, 0.75].

4.3. Mediation

Employing the PROCESS macro (Hayes, 2012), a 10,000 bootstrapped sample mediation model of the effect of condition on anticipated test bias via meta-stereotype endorsement was conducted. Condition (−1 = White man, 1 = Black man) significantly predicted meta-stereotype endorsement, $B = -0.22$, $SE = 0.09$, $p = .02$, 95% CI = [−0.40, −0.04], and meta-stereotype endorsement significantly predicted anticipated test bias, $B = 1.09$, $SE = 0.21$, $p < .001$, 95% CI = [0.68, 1.50]. Moreover, the indirect effect of condition on anticipated test bias was significant, $B = -0.24$, $SE = 0.11$, 95% CI = [−0.48, −0.04], such that participants reported lower meta-stereotyped endorsement from the Black male, compared to the White male, test creator, which was predictive of less anticipated test bias.

5. Discussion

Consistent with hypotheses, White women were significantly less likely to anticipate gender stereotype endorsement and thus anticipated less test gender-bias from a Black male expert compared to a White male expert. Moreover, Study 1 replicated past research demonstrating that women perceive other women as less likely to endorse negative stereotypes regarding women's intelligence and less likely to promote test gender-bias compared to a White man (Marx & Roman, 2002).

6. Study 2

In Study 2, we sought to replicate these effects and demonstrate that the presence of a similarly stereotyped expert (e.g., Black male) would also buffer against the negative cognitive effects of identity threatening situations for White women. We employed a brief version of the antisaccade task (Roberts, Hager, & Heron, 1994) which has been used in past research as an indicator of working memory (e.g., Kane, Bleckley, Conway, & Engle, 2001) in the stereotype threat literature (Jamieson & Harkins, 2007), as performance deficits are argued to derive, in part, from depleted working memory (Schmader & Johns, 2003). The antisaccade task requires participants to inhibit a prepotent (automatic) response in order to respond quickly, and thus participants under identity threat typically present significantly slower responses than participants not under stereotype threat.

7. Method

7.1. Participants

In all, 149 participants who identified as White women during a brief demographic prescreen completed the study via Amazon Mechanical Turk in exchange for $0.50. Twelve participants who failed manipulation checks regarding the test creator's race and/or gender at the end of the survey were excluded from analyses, and 2 participants were excluded for incorrectly responding to attention checks, leaving a final analytic sample of 135 ($M_{age} = 39.22$, $SD_{age} = 12.91$, range = 19–67).[4] An a priori power analysis for a one-way ANOVA for the smallest effect size in Study 1 ($d = 0.51$) to achieve 80% power, indicated a data collection stop point of 110. As we again anticipated high rates of exclusions, we aimed to collect 145 participants. A sensitivity power analysis again indicated that the final sample was sufficient to capture a medium effect ($d = 0.54$).

7.2. Procedure

The study design was identical to Study 1 with three exceptions.

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[3] Two participants did not respond to the liking items.

[4] There was a significant effect of condition, $\chi^2(2) = 10.25$, $p = .006$ (White man = 10, Black man = 3, White woman = 1).

Specifically, participants completed an antisaccade task after responding to the self-report items of meta-stereotype endorsement and anticipated test bias,[5] participants were only randomly assigned to the two critical conditions (Black male, White male test creator), and participants did not complete a measure of liking.

7.3. Materials

Participants completed the same measure of meta-stereotype endorsement ($\alpha = 0.87$) and a slightly adjusted measure of anticipated test bias, $r(135) = 0.33$, $p < .01$. The two items on anticipated test bias were, "How likely is it that the test creator, X, made a test that…" "produces gender differences in which women underperform compared to men" and "women perform just as well on as men" (reverse coded).

7.3.1. Antisaccade task

The antisaccade task consisted of a 3-trial practice block followed by an 80 trial antisaccade block. Each trial began with a fixation cross presented in the middle of the screen for 2000 ms, followed by a cue (white square) which appeared on either the left or right side of the screen for 400 ms, and which was immediately replaced by a target arrow, pointing either up, left, or right on the opposite side of the screen for 150 ms before being removed. After the disappearance of the target arrow, participants had 1500 ms to indicate the direction the arrow was pointing before the next trial began. Feedback was provided on practice trials only.

Participants were instructed that they *should not* look towards the cue when it appeared, and the target arrow always appeared on the opposite side of the screen as the cue. The prepotent response to look towards the cue on antisaccade trials is incorrect, and thus antisaccade trials require working memory to inhibit this prepotent response to more quickly (and accurately) identify the direction of the arrow. Reaction time and responses were recorded for all trials. Design and instructions matched that of previous research employing the antisaccade task (Jamieson & Harkins, 2007). The reaction time measures were collected via QRTEngine which was integrated into the Qualtrics survey and has previously been demonstrated to collect reliable reaction time data (Barnhoorn, Haasnoot, Bocanegra, & van Steenbergen, 2015).

8. Results

8.1. Meta-stereotype endorsement

The ANOVA revealed a significant main effect of test creator, $F(2,131) = 14.36$, $p < .001$ $d = 0.94$.[6] LSD post hoc analyses revealed that participants perceived the White male test creator as endorsing more negative stereotypes about women's intelligence ($M = 2.74$, $SE = 0.15$) than the White female test creator ($M = 1.69$, $SE = 0.13$), $p < .001$, $d = 1.12$, 95% CI = [0.66, 1.45], and marginally more than the Black male test creator ($M = 2.36$, $SE = 0.16$), $p = .08$, $d = 0.35$, 95% CI = [−0.05, 0.81]. The White woman was perceived as endorsing these negative stereotypes significantly less than the Black man, $p = .001$, $d = 0.75$, 95% CI = [0.27, 1.08].

8.2. Anticipated test bias

The ANOVA revealed a significant effect of test creator, $F(2,132) = 3.60$, $p = .03$, $d = 0.47$. LSD post hoc analyses revealed that

participants perceived the White male test creator as creating a marginally more gender-biased test ($M = 3.84$, $SE = 0.29$) than the White female test creator ($M = 3.16$, $SE = 0.25$), $p = .07$, $d = 0.38$, 95% CI = [−0.07, 1.43]. The Black male test creator ($M = 4.14$, $SE = 0.29$) was seen as more likely to create a gender-biased test than the White female test creator, $p = .01$, $d = 0.56$, 95% CI = [0.22, 1.74], and there was no significant difference between the White male and Black male test creator, $p = .47$, $d = 0.16$, 95% CI = [−1.10, 0.51].

8.3. Antisaccade task

Reaction times on incorrect trials were removed, as were reaction times under 200 ms and 3*SD* above the mean (10%). Further, participants' whose accuracy was below 75% on the antisaccade block were removed from these analyses ($n = 8$; Derakshan, Ansari, Hansard, Shoker, & Eysenck, 2009; Bialystok, Craik, & Ryan, 2006), and 14 were unable to complete the task due to technological problems, leaving an analytic sample of 113.

The ANOVA on antisaccade reaction times revealed a significant main effect of test creator, $F(2,110) = 4.54$, $p = .013$, $d = 0.57$. LSD post hoc analyses revealed that participants were significantly slower in the White male test creator condition ($M = 552.85$, $SE = 21.52$) than the White female condition ($M = 471.00$, $SE = 17.30$), $p = .004$, $d = 0.71$, 95% CI = [27.13, 136.56], and the Black male condition ($M = 489.98$, $SE = 20.55$), $p = .037$, $d = 0.50$, 95% CI = [3.90, 121.85]. There was no significant difference between the White female condition and the Black male condition, $p = .48$, $d = 0.16$, 95% CI = [−34.26, 72.20].

8.4. Mediation

A 10,000 bootstrapped sample serial mediation model was conducted in PROCESS examining the indirect effect of condition (−1 = White male, 1 = Black male test creator) on anti-saccade RTs via meta-stereotype endorsement and anticipated test bias. The analyses revealed that while condition significantly predicted meta-stereotype endorsement, $B = −0.28$, $SE = 0.07$, $p < .001$, 95% $CI = [−0.42, −0.15]$, and meta-stereotype endorsement significantly predicted anticipated test bias, $B = 0.68$, $SE = 0.16$, $p < .001$, 95% CI = [0.36, 1.00], anticipated test bias did not significantly predict anti-saccade RTs, $B = 6.94$, $SE = 7.21$, $p = .24$, 95% CI = [−7.34, 21.21], and the indirect effect through meta-stereotype endorsement and anticipated test bias was not significant, $B = −1.35$, $SE = 1.47$, 95% BC CI = [−5.31, 0.83]. Moreover, a model examining just meta-stereotype endorsement as a mediator did not reveal a significant indirect effect, $B = 4.62$, $SE = 3.90$, 95% BC CI = [−1.94, 13.79], nor did a model examining just anticipated test bias as a mediator, $B = −0.27$, $SE = 1.09$, 95% BC CI = [−4.30, 0.95]. Notably, as in Study 1, a mediation model demonstrated that the indirect effect of test creator (−1 = White male, 1 = Black male) on anticipated test bias via meta-stereotype endorsement was significant, $B = −0.25$, $SE = 0.07$, 95% BC CI = [−0.42, −0.14], such that the Black male test creator was associated with significantly lower meta-stereotype endorsement, which was predictive of significantly less anticipated test-gender bias compared to the White male test creator.

9. Discussion

Study 2 thus demonstrated that the presence of either an ingroup or similarly stereotyped outgroup expert buffers against the negative cognitive effects associated with identity threat that were experienced when the expert was a White man. While the meta-stereotype endorsement effect was replicated from Study 1, this was not the case for the anticipated test bias effect, perhaps due to the low correlation between the two items, although the mediation analyses revealed that meta-stereotype endorsement significantly predicted anticipated test

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[5] Lastly, participants completed a measure of perceived SDO. Results are presented in the Supplement.

[6] One outlier was removed from analyses for reporting a meta-stereotype endorsement 3 *SD*s above the mean. Retaining this participant does not significantly alter the reported findings.

bias. Lastly, working memory was not significantly predicted by either of the two self-report measures.

10. Study 3

In Study 3, we sought to determine whether stigma solidarity moderated the effect of a Black male expert on White women's perceived meta-stereotype endorsement and anticipated test bias when under identity threat. As perceived discrimination against the ingroup can activate a "common fate" or a shared identity of "disadvantage" among stigmatized individuals (Schmitt et al., 2003), which may result in more positive intraminority intergroup outcomes (e.g., Cortland et al., 2017), we examined if individuals who are higher in stigma solidarity are more likely than those low in stigma solidarity to perceive a similarly stereotyped outgroup expert as unlikely to endorse negative stereotypes about the ingroup and to create a biased test.[7] Notably, the present study again focuses only on the critical conditions: White male test creator and similarly stereotyped outgroup test creator as we did not expect stigma solidarity to be relevant to the identity safety provided by ingroup members given that stigma solidarity is an intraminority, rather than an ingroup, phenomenon.

11. Method

11.1. Participants

In all, 182 White women who identified as such during the survey's demographic prescreen completed the study via MTurk in exchange for $0.50. Twenty-four participants who failed manipulation checks regarding the test creator's race and/or gender at the end of the survey were excluded from analyses, leaving a final analytic sample of 158 (M_{age} = 40.06, SD = 13.22, range = 20–77).[8] An a priori power analysis for the proposed moderation analysis and 80% power indicated a data collection stop point of 130, but we again anticipated high data exclusion rates and aimed to collect data from 180 participants. A sensitivity power analysis again indicated the final sample size was sufficient to capture a small effect (d = 0.14).

11.2. Procedure

The study design followed that of Study 1, except participants were only randomly assigned to either the White male or Black male test creator condition and did not complete a measure of liking. Participants completed the same meta-stereotype endorsement and anticipated test bias measures from Study 1, as well as a new measure of stigma solidarity before being debriefed.

11.3. Materials

The meta-stereotype endorsement measure was again found to be reliable (α = 0.87) and the anticipated test bias items were highly correlated, $r(160)$ = 0.84, p < .001. The stigma solidarity measure was completed on a scale from 1 (*Strongly disagree*) to 7 (*Strongly agree*) and included three items from the oppressed minority subscale of the Multidimensional Inventory of Black Identity (MIBI; Sellers, Rowley, Chavous, Shelton, & Smith, 1997) and one novel item. These items were adjusted for women and included, "Women should try to become friends with people from other oppressed groups," "Women should treat other oppressed people as allies," and "Women will be more successful

in achieving their goals if they form coalitions with other oppressed groups." The novel item was "People from different oppressed groups should band together to pursue equality," and these four items created a reliable scale (α = 0.92). These items were selected as they focus on motivation to perceive stigmatized outgroup members as allies, and we proposed that stigma solidarity would promote perceptions of similarly stigmatized outgroup experts allies who would be less likely than non-stigmatized experts and dissimilarly stigmatized outgroup experts to endorse negative stereotypes.

12. Results

An ANOVA for stigma solidarity revealed no effect of condition, F (1,156) = 0.83, p = .36, d = 0.20. Participants' reported stigma solidarity did not significantly vary between the White male condition (M = 4.80, SE = 0.15) and the Black male condition (M = 5.00, SE = 0.16). Thus, we were able to continue to test the hypothesized moderation effect.

12.1. Stigma solidarity moderations

A hierarchical linear regression with a standardized measure of stigma solidarity and with condition effects coded (-1 = White male, 1 = Black male) entered in Step 1 and their interaction term entered in Step 2 was conducted for meta-stereotype endorsement. In Step 1, stigma solidarity marginally predicted meta-stereotype endorsement, B = -0.15, SE = 0.09, p = .09, 95% CI = [-0.33, 0.02], and test creator condition marginally predicted meta-stereotype endorsement, B = -0.15, SE = 0.09, p = .09, 95% CI = [-0.32, 0.03], but this was qualified by a significant condition x stigma solidarity interaction in Step 2, B = -0.18, SE = 0.09, p = .04, 95% CI = [-0.36, -0.01]. While the conditional effect of test creator on meta-stereotype endorsement was not significant for participants low in stigma solidarity (-1 SD), B = 0.04, SE = 0.13, p = .78, 95% CI = [-0.21, 0.28], the effect was significant among participants high in stigma solidarity ($+1$ SD), B = -0.33, SE = 0.13, p = .009, 95% CI = [-0.58, -0.09]. Participants high in stigma solidarity perceived the Black male test creator as endorsing significantly fewer negative stereotypes about women's intelligence than the White male test creator (see Fig. 1). Simple slope analyses also revealed that while there was no effect of stigma solidarity on meta-stereotype endorsement for participants in the White male condition, p = .79, 95% CI = [-0.20, 0.27], there was an effect for participants in the Black male condition, p = .01, 95% CI = [-0.59, -0.08], such that participants high in stigma solidarity perceived the Black male test creator as significantly less likely to endorse negative stereotypes about women's intelligence compared to participants low in stigma solidarity.

An identical hierarchical linear regression was conducted for anticipated test bias. In Step 1, stigma solidarity did not significantly predict anticipated test bias, B = 0.03, SE = 0.14, p = .95, 95% CI = [-0.26, 0.31], and test creator condition marginally predicted anticipated test bias, B = -0.24, SE = 0.14, p = .09, 95% CI = [-0.53, 0.04], but this was qualified by a significant condition x stigma solidarity interaction at Step 2, B = -0.46, SE = 0.14, p = .002, 95% CI = [-0.75, -0.18]. While the conditional effect of test creator on anticipated test bias was not significant for participants low in stigma solidarity (-1 SD), B = 0.22, SE = 0.21, p = .28, 95% CI = [-0.18, 0.63], the effect was significant among participants high in stigma solidarity ($+1$ SD), B = -0.71, SE = 0.20, p < .001, 95% CI = [-1.11, -0.31]. Participants high in stigma solidarity anticipated significantly less test bias from the Black male test creator than from the White male test creator (see Fig. 1). Simple slope analyses also revealed that there was a significant effect of stigma solidarity on anticipated test bias for participants in the White male condition, p = .01, 95% CI = [0.11, 0.88], such that participants high in stigma solidarity anticipated the White male test creator to make a significantly more

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[7] The measure of perceived SDO was removed from Studies 3 and 4 as past research has demonstrated that completing the measure of perceived SDO may amplify transfer effects (Sanchez et al., 2017).

[8] There was no effect of condition, $\chi^2(1)$ = 0.41, p = .50 (White man = 10; Black man = 14).
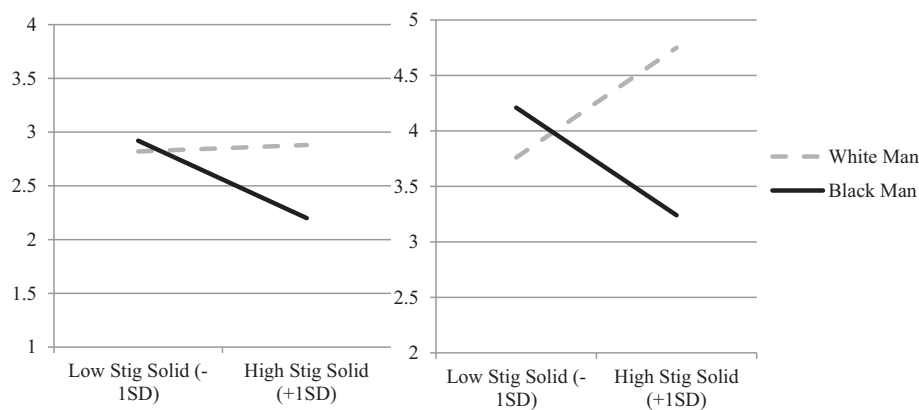
Fig. 1. Study 3, stigma solidarity moderation of the effect of test creator on meta-stereotype endorsement (left) and anticipated test bias (right).

gender-biased test than participants low in stigma solidarity. Additionally, there was the opposite effect of stigma solidarity on anticipated test bias for participants in the Black male condition, $p = .04$, 95% CI = [-0.86, -0.02]) such that participants high in stigma solidarity perceived the Black male test creator as significantly less likely create a gender-biased test compared to participants low in stigma solidarity.

12.2. Moderated mediation

A moderated-mediation model was then tested examining the indirect effect of condition X stigma solidarity on anticipated test bias via meta-stereotype endorsement (PROCESS model 7). The condition x stigma solidarity interaction term significantly predicted meta-stereotype endorsement, $B = -0.18$, $SE = 0.09$, $p = .04$, 95% CI = [-0.36, -0.09], and meta-stereotype endorsement significantly predicted anticipated test bias, $B = 0.57$, $SE = 0.12$, $p < .001$, 95% CI = [0.33, 0.82]. Moreover, while the indirect effect of condition on anticipated test bias was not significant among participants low in stigma solidarity, $B = 0.02$, $SE = 0.09$, 95% BC CI = [-0.13, 0.21], the indirect effect was significant among participants high in stigma solidarity, $B = -0.19$, $SE = 0.09$, 95% BC CI = [-0.45, -0.05].

13. Discussion

Study 3 demonstrated that White women high in stigma solidarity were less likely to anticipate test bias and negative stereotype endorsement from the Black male expert than the White male expert, and compared to participants low in stigma solidarity.

14. Study 4

Study 4 sought to expand Study 3 by examining whether stigma solidarity also moderated the effect of a similarly stereotyped outgroup expert on working memory.

15. Method

15.1. Participants

In all, 133 undergraduate participants who identified as White women during a large prescreen survey completed the study; however, four did not identify as White during the in-lab session and 10 had an accuracy below 75% on the antisaccade task and thus were excluded from all analyses leaving a final analytic sample of 119 participants.[9]

An a priori power analysis for the proposed moderation analysis with a medium effect size and 90% power indicated a data collection stop point of 90 participants. A sensitivity power analysis indicated the final sample size was sufficient to capture a small effect size ($d = 0.17$).

15.2. Procedure

Participants completed an in-lab session conducted by a male RA in a room with other participants (ranging from 0 to 4 White men) at individual cubicles.[10] Participants were randomly assigned to either the White male or Black male test creator condition, but in the present study this was manipulated via prerecorded videos of either a White or Black man. During the brief videos, the test creators merely introduced themselves and said,

> "Hi, I'm Professor Williams [Walters]. I have been a professor at Columbia University for three years after receiving my PhD in Cognitive Psychology. My research generally focuses on creating a new measure of cognitive ability and intelligence that better predicts applied intelligence than current IQ tests. My newest task is a measure that predicts career success. It is in its late stages of testing, and so far has been highly predictive of future career success. Thank you for taking part in today's study to help me finish up this project."
> (See supplement for link to videos).

After viewing the videos, participants read the same threat paradigm used in the previous studies, completed the measures of stereotype endorsement and anticipated test bias from Study 1, as well as the measure of liking from Study 1. The liking measure was again employed as we expected the more interpersonally-oriented video manipulation to create greater variance in liking compared to the profiles presented in previous studies which gave little information about the expert beyond their race. Next, participants completed the same antisaccade task from Study 2 which was presented as the measure of cognitive ability predictive of career success developed by the individual in the video. Data were collected via Inquisit (Millisecond Software, 2000) in the present study. Lastly, participants completed the measure of stigma solidarity from Study 4, provided demographic information, and were debriefed.

15.3. Materials

The measures of meta-stereotype endorsement ($\alpha = 0.75$), liking ($\alpha = 0.98$), and stigma solidarity ($\alpha = 0.90$) were reliable, and the two items from the anticipated test bias measure were significantly correlated, $r(119) = 0.86$, $p < .01$.

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[9] There was no effect of condition, $\chi^2(1) = 0.27$, $p = .40$ (White man = 5; Black man = 9).

[10] Reported results do not significantly vary when controlling for the number of men present.

16. Results

An initial independent samples *t*-test indicated a significant effect of condition on liking of the test creator, $t(117) = 2.31$, $p = .023$, $d = 0.43$, 95% CI = [0.09, 1.16], such that participants reported liking the White male test creator ($M = 4.67$, $SE = 0.18$) significantly more than the Black male test creator ($M = 4.04$, $SE = 0.20$). As such, we controlled for liking in analyses. Additionally, because there was no effect of condition on participants' stigma solidarity, $F(1,115) = 0.27$, $p = .60$, $d = 0.09$, ($M = 4.54$, $SE = 0.12$) we went forward with the planned moderation analyses.[11] Specifically, all analyses were conducted as hierarchical linear regressions with liking of the test creator, a standardized measure of stigma solidarity and condition effects coded (-1 = White male, 1 = Black male) entered in Step 1 and the stigma solidarity x condition interaction term entered in Step 2.

16.1. Moderation analyses

As in Study 2, reaction times for incorrect trials on the antisaccade task were removed, as were reaction times under 200 and 3*SD* above the mean (4%). The hierarchical regression for the antisaccade task revealed no effect of condition, $B = -2.87$, $SE = 3.87$, $p = .46$, 95% CI = [-10.53, 4.78], and no effect of stigma solidarity, $B = 2.19$, $SE = 3.87$, $p = .57$, 95% CI = [-5.48, 9.86], though the predicted interaction was significant, $B = -9.06$, $SE = 3.82$, $p = .02$, 95% CI = [-16.64, -1.49]. Conditional effects revealed that while there was no significant effect by test creator among participants low in stigma solidarity (-1 *SD*), $B = 6.19$, $SE = 5.42$, $p = .26$, 95% CI = [-4.54, 16.92], there was a significant effect among participants high in stigma solidarity ($+1$ *SD*), $B = -11.94$, $SE = 5.46$, $p = .03$, 95% CI = [-22.75, -1.13], such that participants in the Black male test creator condition were significantly faster on antisaccade trials than participants in the White male test creator condition (see Fig. 2). Simple slope analyses revealed that while among participants in the Black male test creator condition, there was no significant difference in antisaccade RTs for participants based on stigma solidarity, $p = .22$, 95% CI = [-18.13, 4.37], there was a significant difference in antisaccade RTs for participants based on stigma solidarity for participants in the White male test creator condition, $p = .03$, 95% CI = [0.96, 21.54], such that those high in stigma solidarity responded significantly slower than those low in stigma solidarity.

Notably, the hierarchical regression for meta-stereotype endorsement revealed no effect of condition, $B = 0.05$, $SE = 0.10$, $p = .60$, 95% CI = [-0.14, 0.24], a significant effect of stigma solidarity, $B = -0.21$, $SE = 0.10$, $p = .03$, 95% CI = [-0.40, -0.02], and no interaction, $B = -0.07$, $SE = 0.10$, $p = .48$, 95% CI = [-0.26, 0.12]. Similarly, the hierarchical linear regression for anticipated test gender revealed no effect of condition, $B = 0.05$, $SE = 0.17$, $p = .79$, 95% CI = [-0.29, 0.38], no effect of stigma solidarity, $B = -0.16$, $SE = 0.17$, $p = .34$, 95% CI = [-0.50, 0.17], and the predicted interaction term was not significant, $B = -0.16$, $SE = 0.17$, $p = .33$, 95% CI = [-0.49, 0.17]. As such, we did not conduct mediation analyses.

17. Discussion

While Study 4 demonstrated that White women's working memory was improved when participants who were high in stigma solidarity completed a task ostensibly created by a Black man compared to a White man, the present study did not replicate the previously demonstrated effects of expert race on perceived stereotype endorsement or anticipated test bias. Notably, Study 4 was the first study to examine these effects on an undergraduate sample and was the first to employ a video manipulation, and as such it is unclear why the condition effects
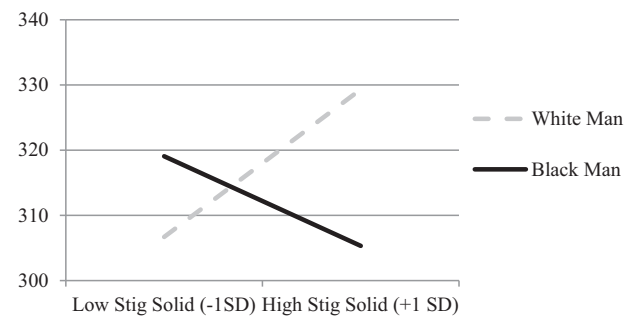
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[11] One participant did not complete the stigma solidarity items.

Fig. 2. Study 4, stigma solidarity moderation of the effect of test creator on antisaccade reaction times (ms).

and stigma solidarity effect on the self-report measures did not replicate. A post-hoc test of the videos on an independent sample revealed that the White male was perceived as more attractive, kind, and genuine than the Black male, perhaps contributing to these unexpected findings.[12] Moreover, Study 2 mediation analyses did not demonstrate a link between the self-reported outcomes and working memory, suggesting the present self-report outcomes are not capturing the mechanism through which the similarly stereotyped outgroup expert buffers against the negative effects of identity threat on women's working memory. Indeed, past work has suggested that women's implicit attitude towards and identification with STEM fields can shift in the presence of an ingroup expert despite explicit reports remaining fixed (Stout et al., 2011), suggesting that subtle identity safety cues, such as the presence of a similarly stereotyped outgroup expert, may buffer against identity threat, at times, at a more automatic level. Importantly, however, the present study extended the working memory effect demonstrated in Study 2 and the moderating effect of stigma solidarity from Study 3. Indeed, the buffering effect of a Black male expert for White women's working memory was greatest among White women who report a greater importance and interest in intraminority solidarity. While this was driven by differences in the White male condition, we return to this point in the general discussion.

18. Study 5

Study 5 sought to examine a stigmatized outgroup expert whose intelligence stereotypes differ from intelligence stereotypes about White women, specifically an Asian man. As Asian men are stereotyped as highly intelligent, which is incongruent with negative intelligence stereotypes of women, we propose that an Asian male expert would not buffer against identity threat for White women. We did not anticipate a significant difference between the White man and Asian man expert conditions.

19. Method

19.1. Participants

In all, 153 White women who identified as such during the survey's demographic prescreen completed the study via MTurk in exchange for $0.40. Eighteen participants who failed manipulation checks regarding the test creator's race and/or gender at the end of the survey were excluded from analyses, leaving a final analytic sample of 135 ($M_{age} = 37.87$, $SD = 13.13$, range = 18–82).[13] An a priori power analysis for the proposed analyses with 80% power to capture a medium effect size indicated a data collection stop point of 158. A sensitivity

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[12] See supplement for analyses.
[13] There was no effect of condition, $\chi^2(2) = 0.76$, $p = .68$ (White man = 8; Asian man = 4; White woman = 6).

power analyses again indicated the final sample size was sufficient to capture a small effect ($d = 0.27$).

19.2. Procedure

The study design followed that of Study 1, except participants were randomly assigned to the White male, White female, or a new Asian male test creator condition. Participants completed the same meta-stereotype endorsement, anticipated test bias, and liking measures from Study 1 before being debriefed.[14] The Asian male condition presented an image of an Asian adult male, and a separate sample of undergraduate raters ($N = 25$) indicated the images of the Asian male, White male, and White female did not significantly differ on attractiveness, $F(2,48) = 1.84$, $p = .17$, $d = 0.55$.

19.3. Materials

The measures of meta-stereotype endorsement ($\alpha = 0.83$) and liking ($\alpha = 0.96$) were reliable, and the two items from the anticipated test bias measure were significantly correlated, $r(134) = 0.92, p < .01$.

20. Results

A one-way ANOVA for liking revealed a significant main effect of condition, $F(2,132) = 5.90$, $p = .004$, $d = 0.60$. Post-hoc analyses revealed that participants liked the White female test creator ($M = 5.09$, $SE = 0.22$) significantly more than both the White male ($M = 4.15$, $SE = 0.21$), $p = .006$, $d = 0.64$, 95% CI = [0.21, 1.66], and the Asian male test creator ($M = 4.23$, $SE = 0.22$), $p = .02$, $d = 0.61$, 95% CI = [0.11, 1.61]. There was no significant difference between the Asian and White men, $p > .99$, $d = 0.06$, 95% CI = [−0.82, 0.66]. As such, we controlled for liking throughout our primary analyses.

20.1. Meta-stereotype endorsement

The one-way ANCOVA revealed a significant main effect of condition, $F(2,131) = 16.05$, $p < .001$, $d = 0.99$. Post-hoc analyses revealed that as hypothesized, the White woman was seen as significantly less likely to endorse negative stereotypes about women's intelligence ($M = 1.79$, $SE = 0.17$) than both the White man ($M = 2.59$, $SE = 0.16$), $p = .004$, $d = 0.67$, 95% CI = [−1.39, −0.21], and the Asian man ($M = 3.20$, $SE = 0.18$), $p < .001$, $d = 1.38$, 95% CI = [−2.01, −0.80]. Notably, the Asian male test creator was seen as more likely to endorse negative stereotypes about women's intelligence than the White male test creator, $p = .037$, $d = 0.53$, 95% CI = [−1.18, −0.03].

20.2. Anticipated test bias

The ANCOVA revealed a significant main effect of condition, $F(2,131) = 5.49$, $p = .005$, $d = 0.58$, such that the White woman was seen as significantly less likely to create a gender-biased test ($M = 3.45$, $SE = 0.34$) than both the White man ($M = 4.72$, $SE = 0.32$), $p = .02$, $d = 0.57$, 95% CI = [−2.42, −0.14], and the Asian man ($M = 4.92$, $SE = 0.34$), $p = .008$, $d = 0.60$, 95% CI = [−2.65, −0.30]. There was no significant difference between the Asian and White male test creator conditions, $p > .99$, $d = 0.10$, 95% CI = [−1.32, 0.93].

20.3. Mediation

Condition (−1 = White man, 1 = Asian man) significantly predicted meta-stereotype endorsement, $B = 0.30$, $SE = 0.12$, $p = .01$,

95% CI = [0.06, 0.54], and meta-stereotype endorsement significantly predicted anticipated test bias, $B = 0.53$, $SE = 0.17$, $p = .003$, 95% CI = [0.19, 0.88]. Moreover, the indirect effect of condition on anticipated test bias was significant, $B = 0.16$, $SE = 0.07$, 95% BC CI = [0.05, 0.35].

21. Discussion

Study 5 demonstrated that a stigmatized outgroup expert who is not similarly stereotyped did not promote identity safety for White women. Though unexpected, White women perceived an Asian male expert as more likely than a White male expert to endorse negative stereotypes about women's intelligence, which predicted anticipation of a more biased test. Moreover, the White female expert was seen as lower in stereotype endorsement, and gender-biased test intentions than both an Asian male and White male expert.

22. Study 6

Study 6 sought to replicate the findings from Study 5, namely that Asian male experts do not signal identity safety for White women, and sought to examine the role of stigma solidarity on perceptions of an Asian male expert. Specifically, we proposed that participants who are high in stigma solidarity may experience some identity safety from an Asian male expert compared to a White male expert, as, replicating findings from Studies 3 and 4, stigma solidarity should increase perceptions of a White male's bias and may promote identification with members of other, even dissimilarly, stigmatized groups. Moreover, the present study employed three conditions, a White male, Asian male, and a Black male test creator, to allow a direct test of stigmatized outgroup experts whose stereotype content is either similar to women's (i.e., Black men) or not similar to women's (i.e., Asian men).

23. Method

23.1. Participants

In all, 302 White women who identified as such during the survey's demographic prescreen completed the study via Amazon Mechanical Turk in exchange for $0.40. Thirty-four participants who failed instructional attention check questions during the survey were excluded from analyses, leaving a final analytic sample of 268 ($M_{age} = 40.26$, $SD = 13.18$, range = 20–75).[15] An a priori power analysis for a small effect size with the proposed moderation analyses and 80% power indicated a data collection stop point of 244, but we again anticipated high data exclusion rates and aimed to collect data from 300 participants. A sensitivity power analyses again indicated the final sample size was sufficient to capture a small effect ($d = 0.08$).

23.2. Procedure

The study design followed that of Study 3, except participants were randomly assigned to the White male, the Black male, or the Asian male test creator condition. After viewing the test creator information, participants had to correctly respond to manipulation check questions regarding the test creator's race and gender, as well as filler questions about the new test before continuing. Participants then completed the same meta-stereotype endorsement, anticipated test bias, liking, and stigma solidarity measures from Studies 1 and 3, in that order, before being debriefed.

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[14] Perceived SDO was measured after anticipated test bias, as in Study 1. Analyses are reported in Supplement.

[15] There was no effect of condition, $\chi^2(2) = 0.04$, $p = .98$ (White man = 10, Black man = 12, Asian man = 12).

23.3. Materials

The measures of meta-stereotype endorsement (α = 0.85), liking (α = 0.97), and stigma solidarity (α = 0.92) were reliable, and the two items from the anticipated test bias measure were significantly correlated, $r(267) = 0.86$, $p < .01$.

24. Results

A one-way ANOVA revealed a significant main effect of condition on liking, $F(2,265) = 3.31$, $p = .04$, $d = 0.31$. Post-hoc analyses revealed that participants liked the Black male test creator ($M = 4.56$, $SE = 0.15$) significantly more than the White male test creator ($M = 4.01$, $SE = 0.16$), $p = .03$, $d = 0.38$, 95% CI = [0.03, 1.07]. Reported liking of the Asian male test creator ($M = 4.34$, $SE = 0.15$) did not significantly differ from the White male, $p = .38$, $d = 0.24$, 95% CI = [−0.19, 0.85], or Black male test creator, $p = .87$, $d = 0.15$, 95% CI = [−0.73, 0.28]. As such, liking was included as a covariate in the following analyses. One-way ANCOVAS for all variables are presented in the supplement. Notably, the Black male test creator was perceived as less likely to endorse negative stereotypes about women's intelligence than both the White male and Asian male test creators, and less likely to create a gender-biased test than the Asian male test creator.

24.1. Stigma solidarity moderation analyses

As there was no effect of condition on stigma solidarity, $F(2,263) = 0.91$, $p = .41$, $d = 0.17$, (Grand $M = 4.4$, $SE = 0.10$), we were able to move forward with the planned moderation analyses. Analyses were conducted in PROCESS Model 1, employing a multi-categorical independent variable with two effects coded contrasts (−1 = Black male, 1 = White male; −1 = Black male, 1 = Asian male). The tested moderator, stigma solidarity, was standardized and liking was included as a covariate in the moderation analyses.

For meta-stereotype endorsement, stigma solidarity, $B = 0.02$, $SE = 0.07$, $p = .75$, 95% CI = [−0.11, 0.15], the Black vs Asian male contrast, $B = −0.02$, $SE = 0.09$, $p = .81$, 95% CI = [−0.20, 0.15], and the Black vs White male contrast, $B = 0.16$, $SE = 0.09$, $p = .08$, 95% CI = [−0.02, 0.35] were not significant predictors. While the Black vs Asian male X stigma solidarity interaction was not significant, $B = −0.14$, $SE = 0.09$, $p = .18$, 95% CI = [−0.31, 0.03], the Black vs White male X stigma solidarity interaction was a significant predictor, $B = 0.24$, $SE = 0.10$, $p = .01$, 95% CI = [0.05, 0.43]. Though there was no effect of condition (Black vs White male condition) for participants low in stigma solidarity (−1 SD), $B = −0.07$, $SE = 0.14$, $p = .60$, 95% CI = [−0.34, 0.20], there was a significant effect of condition for participants high in stigma solidarity (+1 SD), $B = 0.40$, $SE = 0.13$, $p = .002$, 95% CI = [0.14, 0.66], such that high stigma solidarity women anticipated significantly less negative stereotype endorsement from the Black male test creator compared to the While male test creator (see Fig. 3). Simple slope analyses revealed that among participants in the Black male test creator condition, there was no significant difference in meta-stereotype endorsement for participants based on stigma solidarity, $p = .40$, 95% CI = [−0.30, 0.12]. However, in the White male test creator condition, there was a significant difference in meta-stereotype endorsement for participants based on stigma solidarity, $p = .02$, 95% CI = [0.33, 0.48], such that those high in stigma solidarity reported significantly greater meta-stereotype endorsement than those low in stigma solidarity.

For anticipated test bias, stigma solidarity, $B = 0.17$, $SE = 0.12$, $p = .18$, 95% CI = [−0.08, 0.41], the Black male vs Asian male contrast, $B = 0.11$, $SE = 0.17$, $p = .50$, 95% CI = [−0.21, 0.44], and the Black male vs White male contrast, $B = 0.13$, $SE = 0.18$, $p = .47$, 95% CI = [−0.22, 0.48] were not significant predictors. While the Black vs Asian male X stigma solidarity interaction, $B = −0.18$, $SE = 0.16$,
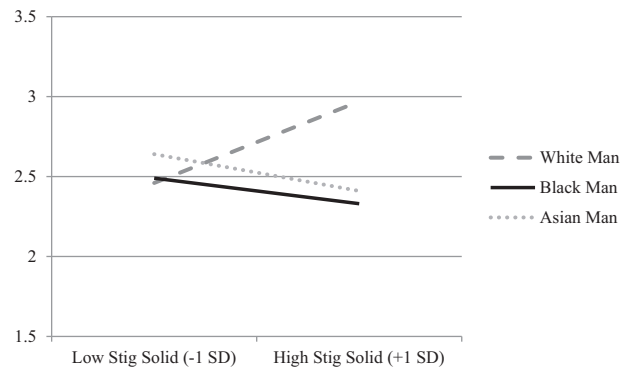

Fig. 3. Study 6, stigma solidarity moderation of the effect of condition on meta-stereotype endorsement.

$p = .27$, 95% CI = [−0.50, 0.14], was not significant, the Black vs White male X stigma solidarity interaction was a marginally significant predictor, $B = 0.35$, $SE = 0.18$, $p = .055$, 95% CI = [−0.01, 0.70]. We further explored the Black vs White male X stigma solidarity interaction for thoroughness and based on the Study 3 effect. Although there was no effect of condition among participants low in stigma solidarity (−1 SD), $B = −0.22$, $SE = 0.26$, $p = .40$, 95% CI = [−0.73, 0.29], there was a marginally significant effect of condition among participants high in stigma solidarity (+1 SD), $B = 0.47$, $SE = 0.24$, $p = .053$, 95% CI = [−0.01, 0.96], such that participants perceived the Black male test creator as marginally less likely to create a biased test than the White male test creator (see Fig. 4). Simple slope analyses revealed that among participants in the Black male test creator condition, there was no significant difference in anticipated test bias for participants based on stigma solidarity, $p = .71$, 95% CI = [−0.46, 0.32]. In the White male test creator condition, there was a significant difference in anticipated test bias for participants based on stigma solidarity, $p = .02$, 95% CI = [0.09, 0.94], such that those high in stigma solidarity reported significantly greater anticipated test bias than those low in stigma solidarity.

24.1.1. Asian vs White male test creator moderation

Notably, as we anticipated that participants high in stigma solidarity would perceive the Asian male test creator as significantly less likely to endorse negative stereotypes about White women and significantly less likely to make a gender biased test compared to a White male, we conducted a separate moderation analyses in PROCESS Model 1, with these two conditions (−1 = Asian male, 1 = White male) as the independent variable, stigma solidarity (standardized) as the moderator, and liking included as a covariate. For meta-stereotype endorsement, stigma solidarity, $B = 0.07$, $SE = 0.08$, $p = .39$, 95% CI = [−0.09, 0.24], and condition, $B = −0.03$, $SE = 0.08$, $p = .073$,
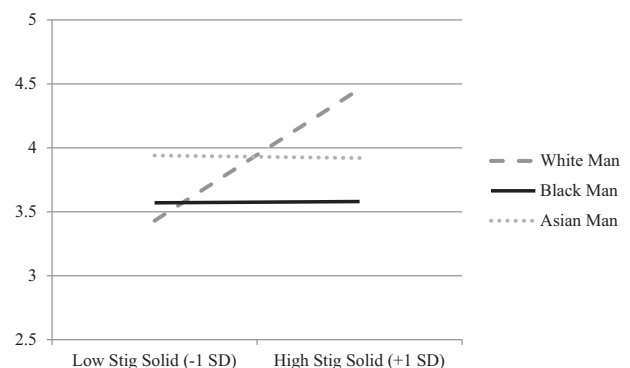

Fig. 4. Study 6, stigma solidarity moderation of the effect of condition on anticipated test bias.

95% CI = [−0.19, 0.14], were not significant predictors. However, the interaction term was a significant predictor, $B = -0.19$, $SE = 0.08$, $p = .027$, 95% CI = [−0.35, −0.02]. While there was no effect of condition for participants low in stigma solidarity (-1 SD), $B = 0.15$, $SE = 0.12$, $p = .20$, 95% CI = [−0.08, 0.39], there was a marginally significant effect of condition for participants high in stigma solidarity ($+1$ SD), $B = -0.22$, $SE = 0.12$, $p = .062$, 95% CI = [−0.46, 0.01], such that high stigma solidarity women anticipated marginally less negative stereotype endorsement from the Asian male test creator compared to the While male test creator (see Fig. 3). Simple slope analyses revealed that among participants in the Asian male test creator condition, there was no significant difference in meta-stereotype endorsement for participants based on stigma solidarity, $p = .30$, 95% CI = [−0.33, 0.10]. However, in the White male test creator condition, there was a significant difference in meta-stereotype endorsement for participants based on stigma solidarity, $p = .04$, 95% CI = [0.01, 0.51], such that those high in stigma solidarity reported significantly greater meta-stereotype endorsement than those low in stigma solidarity.

For anticipated test bias, neither stigma solidarity, $B = 0.27$, $SE = 0.15$, $p = .08$, 95% CI = [−0.03, 0.58], nor condition were a significant predictor, $B = 0.08$, $SE = 0.15$, $p = .62$, 95% CI = [−0.23, 0.38]. Moreover, the interaction term was not a significant predictor, $B = -0.24$, $SE = 0.11$, $p = .12$, 95% CI = [−0.54, 0.07].

24.2. Moderated mediation

As in Study 3, we examined the indirect effect of the condition × stigma solidarity interaction term on anticipated test bias via meta-stereotype endorsement for participants in the White male vs Black male test creator conditions. The interaction term significantly predicted meta-stereotype endorsement, $B = -0.17$, $SE = 0.08$, $p = .026$, 95% CI = [−0.33, −0.02], and meta-stereotype endorsement significantly predicted anticipated test bias, $B = 0.94$, $SE = 0.12$, $p < .001$, 95% CI = [0.69, 1.18]. Moreover, while the indirect effect of condition on anticipated test bias was not significant for participants low in stigma solidarity, $B = -0.04$, $SE = 0.11$, 95% CI = [−0.27, 0.18], the indirect effect was significant among participants high in stigma solidarity, $B = -0.35$, $SE = 0.12$, 95% CI = [−0.62, −0.14].

25. Discussion

Study 6 thus replicated findings from Study 3, such that participants perceived a Black male expert as an ally, especially when participants were high in stigma solidarity, as demonstrated by the moderation analyses and moderated mediation analyses. Notably, while Study 5 found that an Asian male expert was perceived as significantly *more likely* than a White male expert to endorse negative stereotypes about women's intelligence, that effect was not replicated in the present study. However, the present findings found that an Asian male expert was perceived as just as likely as a White male expert to endorse these negative stereotypes and to create a gender-biased test, and was significantly more likely than a Black male expert to do so. As such, the present findings are in-line with our hypothesis that Asian men would not be seen as outgroup allies due to the incongruence between intelligence stereotypes about White women and Asians. Lastly, while Asian men were seen as marginally less likely than White men to endorse negative stereotypes about women's intelligence when White women were high in stigma solidarity, this effect, as demonstrated by the simple slope analyses, was primarily driven by perceptions of White men as more likely to endorse such stereotypes.

26. Internal meta-analysis

Due to some inconsistency in effects for meta-stereotype endorsement and anticipated test bias across studies (i.e., no effect of condition on anticipated test bias in Studies 2 and 6, and no effect of condition on

meta-stereotype endorsement and anticipated test bias in Study 4), we conducted an internal meta-analysis to test the robustness of the hypotheses across the five studies which examined a similarly stereotyped outgroup test expert, comparing the two critical conditions: White male and similarly stereotyped outgroup expert (Black male in Studies 1–4, 6). We employed an inverse-variance-weighted-mean meta-analytic approach (Lee, Cook, Lee, & Han, 2016), revealing that across these five studies, the Black male expert was perceived as significantly lower in meta-stereotype endorsement, $z = 4.09$, $d = 0.33$, $p < .001$, 95% CI = [0.17, 0.49], and anticipated test bias, $z = 3.33$, $d = 0.27$, $p < .001$, 95% CI = [0.11, 0.43], than the White male expert.

27. General discussion

Across six studies we demonstrate the benefit of a similarly stereotyped outgroup expert's presence for White women in an identity threatening context. Critically, White women perceived a Black male expert as less likely than a White male expert to endorse negative stereotypes about women's intelligence (Studies 1, 2, 3, 6) and thus were less likely to develop a test that would produce gender differences (Studies 1, 3, 6). Moreover, a Black male expert promoted greater working memory for White women (Study 2), especially among women high in stigma solidarity (Study 4). However, a stigmatized outgroup expert who was not similarly stereotyped did not provide the same buffer against identity threat, as an Asian male expert was seen as more (Study 5) or just as likely as a White male expert to endorse negative stereotypes about women (Study 6), and thus to create a gender-biased test (Studies 5, 6). The effect of a similarly stereotyped outgroup expert was greatest when White women endorsed stigma solidarity (Studies 3, 4, 6) and a dissimilarly stereotyped outgroup expert was seen as marginally less likely to endorse negative stereotypes about women than a White male expert when White women were high in stigma solidarity (Study 6).

The present studies thus integrated past research on identity threats (e.g., Steele, 1997), the stereotype inoculation model (Stout et al., 2011), the cue transfers framework (e.g., Chaney et al., 2016), and research on intraminority relations (e.g., Craig & Richeson, 2012) to demonstrate a novel pathway to improving the experience of women in settings in which they are typically negatively stereotyped. As women are underrepresented in these settings (Beede et al., 2011), it may be useful for them to look for individuals outside of the ingroup whose presence in the stigmatized domain, similar to the presence of an ingroup member, may alleviate the negative effects of identity threats. While Black male experts are also underrepresented in these settings that place a high value on "intelligence" and "brilliance" (Allen et al., 2000), the present research suggests that other similarly stereotyped individuals may serve as buffers as well (e.g., Latino men, etc.) and suggests that Black and Latino men may benefit from the presence of White women, expanding the pool of "inoculators." Critically, the present findings are based on the assumption that members of similarly stereotyped groups do not endorse negative stereotypes about the ingroup, but this may at times be an inaccurate assumption. As such, we encourage future research to examine outcomes when these assumptions are ultimately untrue, such as examining White women's perceptions of Black men who are ultimately revealed to be sexist.

As the field on intraminority relations has begun to explore, positive intergroup attitudes and policy support among minority groups, within and across identity dimensions, can be fostered, providing a potentially broad group of allies in society (Cortland et al., 2017; Craig & Richeson, 2012; Subašić et al., 2011). The present work adds to this literature on intraminority relations by demonstrating that lay perceptions of intraminority solidarity can facilitate positive outcomes for stigmatized individuals. Indeed, in the present research, White women who were high in stigma solidarity were least likely to anticipate negative stereotyping (Study 3, 6) and demonstrated greater working memory (Study 4) with a similarly stereotyped outgroup test creator compared

to White women low in stigma solidarity. Thus, we encourage future research to examine not only other stigmatized groups who could serve as outgroup role models, but also strategies to promote stigma solidarity via interventions (e.g., similarity mindsets; Cortland et al., 2017). Notably, while we proposed that stigma solidarity would facilitate perceptions of a stigmatized outgroup expert (especially a similarly stereotyped expert) as an ally (as in meta-stereotype endorsement, Study 3), the present studies also demonstrated that stigma solidarity at times may promote distrust or increased vigilance of potential perpetrators such as White men. Specifically, White women high in stigma solidarity perceived White men as significantly more likely to create a gender-biased test (Studies 3, 6), to endorse negative stereotypes about women (Study 6), and demonstrated greater working memory in the White male expert condition (Study 4) compared to White women low in stigma solidarity in the White male expert condition, and this served as the primary pathway through which the stigmatized outgroup test creator buffered against identity threat. As such, stigma solidarity may serve to promote ally-ship with stigmatized outgroup members by, at times, increasing women's identification with stigmatized outgroup members, as well as by increasing women's vigilance for perspective perpetrators. We encourage future research to further explore the ways in which stigma solidarity shifts women's perceptions and identifications.

Critically, the present research included a measure of working memory in only Studies 2 and 4. While Study 2 demonstrated that the presence of a Black male test creator improved working memory for women under identity threat compared to a White male test creator, Study 4 demonstrated this effect was greatest for participants high in stigma solidarity. As such, we encourage future research to examine these effects among novel samples, including undergraduate women in STEM, and to examine if similarly stereotyped outgroup role models may be successful in attracting and retaining students with stigmatized identities in typically threatening environments. Indeed, we propose that the presence of similarly stereotyped outgroup role models or professors may serve the most benefit for stigmatized individuals when they are first entering the field, but should continue to serve as positive buffers and potential allies throughout their career. For example, entering a STEM field may be the most difficult for White women when the field is made of, primarily, White men as they differ from White men on the critical stereotype content (i.e., intelligence) and the critical identity dimension (i.e., gender). However, for White women, having someone who is judged according to similar critical stereotype content (e.g., Black men) or who is similar on the critical identity dimension (e.g., Black women) could signal that others have found an entrance to the setting, are seeking to excel, and may be welcoming to similarly stigmatized outgroup members. Indeed, Black women report greater anticipated comfort in a STEM setting when a Black man or woman is present compared to a White woman, though the presence of White women who acknowledges the importance of diversity, especially the intersections of diversity, does improve Black women's anticipated comfort in the environment (Pietri, Johnson, & Ozgumus, 2018). As such, the presence of similarly stereotyped outgroup role models should signal to stigmatized individuals that the setting is safe to enter (Pietri et al., 2018). Notably, as a White woman's expressed commitment to diversity can promote Black women's trust, we similarly propose that White or Asian men who acknowledge and express a commitment to diversity and inclusion may similarly serve to ameliorate identity threat for women.

The present research employed a past stereotype threat activation strategy of making individuals aware of past gender differences on similar tests (Wout et al., 2009). However, as we did not include a no-threat condition, we cannot say absolutely that the present research demonstrates a buffer against identity threats, though the present findings indicate more positive outcomes in the presence of a similarly stereotyped outgroup member than a White man. Critically, while White women anticipated more negative stereotypes and test bias from

the White and Asian male test creators compared to the other conditions, it is unclear if these perceptions would be significantly greater than a White male test creator condition in which no threat was employed. While we encourage future research to employ a broader design (including no threat conditions), we believe the present studies still demonstrate the positive effects of a similarly stereotyped experts for stigmatized individuals. Specifically, even absent a strong identity threat cue, the present findings demonstrate the benefits of a similarly stereotyped outgroup test creator, an effect we expect would be amplified when the threat is more salient.

In past research examining the breadth of outgroup identity safety or threat cues, the attitudes of a company (e.g., via diversity missions; Chaney et al., 2016; Chaney & Sanchez, 2018) or an individual (via personality profile responses; Sanchez et al., 2017) were manipulated, while in the present study the demographics of the test creator were manipulated. Further, past outgroup cues research has focused on interpersonal treatment, while the present research focused on specific environmental attitudes (women's intelligence), task specific behavior (test creation bias), and cognitive outcomes (working memory). As such, the present research provides a novel extension of past research on the cue transfer framework by demonstrating that White women in a threatening environment are sensitive to, and benefit from, similarly stereotyped outgroup identity safety cues, especially when White women are high in stigma solidarity. Moreover, while the present research employed a test creator as an expert, we propose that other types of experts, such as role models, teachers, etc., who are similarly stereotyped would also inoculate White women in identity threatening contexts. Indeed, test creators for STEM classes are often the professor or teacher, and thus their identity is known, while the identity of a proctor for a standardized test may similarly be perceived as an expert. As such, we propose the present findings do not apply merely to test creators as meta-stereotype endorsement mediated the effects of experts' identity on anticipated test bias, but to experts broadly, though we encourage future research to examine this.

Across six studies we find support for the buffering effects of a similarly stereotyped outgroup expert, such that White women under identity threat anticipated that a Black male expert was less likely to negatively stereotype women's intelligence and less likely to create a gender biased test than a White male expert (Studies 1, 2) especially when high in stigma solidarity (Study 4, 6), ultimately promoting White women's working memory (Study 2, 4). Further, White women did not experience the same level of identity safety from a stigmatized outgroup test creator who was not similarly stereotyped (i.e., Asian; Studies 5), except when high in stigma solidarity (Study 6). Thus, the present research demonstrates a novel pathway to buffer against identity threat concerns and improve working memory for women, adding to a growing literature identifying the conditions under which identity safety and threat cues may transfer due to metaperceptions and the perceived nature of intraminority relations.

Open practices

The experiments in this article earned Open Materials and Open Data badges for transparent practices. Materials and data for these experiments are available at https://osf.io/a9fmd/.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jesp.2018.09.005.

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