White women's automatic attentional adhesion to sexism in the face of racism☆

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ABSTRACT

Past research has demonstrated members of marginalized groups employ increased attentional bias to ingroup threats following situational exposure to ingroup prejudice (e.g., women's attention bias to sexism when anticipating sexism). Yet, prejudices towards similarly stigmatized groups are perceived to co-occur, such that racism imbues anticipated sexism for White women. The present research examined if White women demonstrate increased automatic attentional adhesion to ingroup threats following situational exposure to outgroup prejudice. Across five studies, White women demonstrated greater automatic attentional adhesion to sexism (Studies 1–2), but not racism (Studies 3a-3b), when anticipating interacting with a racist or sexist evaluator compared to a neutral evaluator. Yet, exposure to a similarly stigmatized expert decreased automatic attentional adhesion to sexism in a threatening context for White women (Study 4). These findings suggest a broad set of contexts that may elicit attentional bias to threat and demonstrate that identity safety cues inhibit an automatic stigma response.

Individuals with stigmatized identities (e.g., women, racial minorities, sexual minorities) experience identity threats, concerns that one's social identity may be devalued or stigmatized by others (Crocker & Major, 1989; Kahn & Money, 2022; Major & O'Brien, 2005), in numerous settings, ranging from interpersonal interactions, classrooms, standardized testing, and organizations. In anticipation of facing prejudice, members of stigmatized groups may scan environments to detect *identity threat cues,* cues which signal to individuals they should anticipate being devalued for one of their social identities, and thus serve as indicators of prejudice expectations. Indeed, past research has demonstrated some members of marginalized groups high in rejection sensitivity (e.g., London, Downey, Romero-Canyas, Rattan, & Tyson, 2012) or stigma consciousness (e.g., Kaiser, Vick, & Major, 2006) may be more prone to attending to identity threat cues. Moreover, such heightened attentional bias is not limited just to individual variability, but also situational variability. That is, when in an interaction with someone who has expressed negative attitudes towards the ingroup (Kaiser et al., 2006) or in a context in which the ingroup is often devalued (Hall, Schmader, Aday, Inness, & Croft, 2018; Murphy, Steele, & Gross, 2007), members of stigmatized groups demonstrate greater attentional bias to

identity threat cues. Research has therefore characterized automatic attentional bias to identity threats as an involuntary stigma response motivated by the desire to anticipate and avoid future discrimination (e.g., Major & O'Brien, 2005).

Yet, identity cues towards similarly stigmatized outgroups may also be perceived as indicative of attitudes towards one's own stigmatized ingroup (Chaney, Sanchez, & Remedios, 2016; Sanchez, Chaney, Manuel, Wilton, & Remedios, 2017). That is, past research has argued that, for example, someone who expresses anti-Black attitudes is presumed to also express sexist attitudes, leading to anticipated stigma among White women (Sanchez et al., 2017). Thus, members of stigmatized groups may demonstrate automatic attentional bias to identity threat cues more frequently than previously theorized. While past research has focused on automatic attentional bias to ingroup threat following situational exposure to ingroup prejudice, the present research sought to determine if members of stigmatized groups demonstrate automatic attentional bias to ingroup identity threat cues following situational exposure to outgroup prejudice. Specifically, we sought to examine among samples of White women if exposure to a racist evaluator or threat would create automatic attentional adhesion to sexism cues. Automatic attentional

adhesion is a type of attentional bias in which people are less efficient at shifting their attention *away* from threatening stimuli and is associated with self-protective motives to "stick" to threat cues (Fox, Russo, Bowles, & Dutton, 2001). Moreover, as attentional adhesion should only occur for ingroup relevant cues (i.e., sexism), we sought to demonstrate that White women would *not* demonstrate automatic attentional adhesion to racism cues.

1. Automatic attentional bias to identity cues

Identity cues serve as indicators of prejudice expectations, and individuals who anticipate greater prejudice demonstrate increased attention for further cues of potential devaluation (Casad, Petzel, & Ingalls, 2019; Feinstein, 2020; Kaiser et al., 2006; Major, Quinton, & McCoy, 2002; Miller & Kaiser, 2001; Steele, Spencer, & Aronson, 2002). Despite being characterized as an involuntary stigma response motivated by the desire to anticipate and avoid future discrimination (Feinstein, 2020; Major & O'Brien, 2005), frequently attended to identity cues can increase stress, placing individuals at a greater risk for negative health outcomes (Chae et al., 2021; Clark, Benkert, & Flack, 2006; Hicken, Lee, Ailshire, Burgard, & Williams, 2013; Himmelstein, Young, Sanchez, & Jackson, 2015; Pichardo, Molina, Rosas, Uriostegui, & Sanchez-Johnsen, 2021). Moreover, attention requires cognitive resources and thus utilizes working memory, a limited resource that is critical for performance (see Major & O'Brien, 2005; Ozier, Taylor, & Murphy, 2019; Paolini, Giacomantonio, van Beest, Baiocco, & Salvati, 2020). As such, attentional bias to identity cues has implications for individuals' well-being and cognitive resources.

While research on identity cues has frequently employed self-reports, attentional bias is perhaps more appropriately assessed via cognitive measures (e.g., emotional Stroop task or dot-probe paradigms; Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van Ijzendoorn, 2007; Chaney, 2022; Price et al., 2016; Williams, Mathews, & MacLeod, 1996), removing self-presentation concerns and providing insight into automaticity. Research examining increased automatic attentional bias to threat cues among anxious individuals has demonstrated that they are more likely to direct their attention to locations of potential threat - such as towards the direction of a fearful gaze - compared to non-anxious individuals (Evans, Walukevich, & Britton, 2016; Fox, Mathews, Calder, & Yiend, 2007; Mathews, Fox, Yiend, & Calder, 2003). Indeed, research has found that self-protective motives lead attention to "stick" to threat cues, making people less efficient at shifting their attention *away* from threatening stimuli (i.e., attentional adhesion or delayed disengagement; Fox et al., 2001). This attentional adhesion to threat cues is the primary focus in the present research due to its association with self-protective motives. That is, attentional adhesion as a self-protective function most closely mirrors social psychological definitions of attentional bias as an adaptive stigma response to detect threats in order to ultimately avoid such threats (e.g., Major & O'Brien, 2005; Mogg, Bradley, Miles, & Dixon, 2004).

Notably, experimental research on cognitive attention to *identity* threat cues has found that women demonstrated greater attentional bias to gender stereotype words after viewing gender stereotypical commercials (Davies, Spencer, Quinn, & Gerhardstein, 2002; Davies, Spencer, & Steele, 2005). Moreover, when anticipating interacting with a sexist man, women demonstrated greater preconscious attention to sexism words (i.e., words that were presented subliminally, for 15 ms) than non-sexism threatening words (e.g., cancer; Kaiser et al., 2006; Experiment 2). As such, past research has found that members of stigmatized groups may automatically attend to identity threat cues. Yet, previously employed methods (e.g., emotional Stroop) assess attentional bias broadly and do not clearly assess attentional adhesion, an attentional bias process related with self-protective motives (Fox et al., 2001).

2. Identity cue transfer

Research on *identity cue transfer* reveals that individuals, on average, hold a lay theory of generalized prejudice, i.e., they perceive multiple prejudices (e.g., racism and sexism) as stemming from a common ideology and thus, co-occurring. As such, Black and Latino men anticipated negative race-based treatment from a White man who endorsed sexist statements, and White women anticipated gender stigma from a White man who endorsed anti-Black statements (Sanchez et al., 2017). Just as identity threat cues transfer, so do identity safety cues, cues that signal one should *not* anticipate being devalued in a context. For example, when a company's website had gender diversity awards, Black and Latino men reported greater anticipated belonging at the company compared to a company with no diversity related awards (Chaney et al., 2016). Similarly, cis-gender people of color anticipated more equitable racial treatment at an organization with a gender inclusive bathroom sign compared to a company with a traditional, binary bathroom sign (Chaney & Sanchez, 2018). Thus, due to identity cue transfer, identity cues have a broad impact, signaling inclusion to not only the target group, but also other similarly stigmatized groups (for review, see Chaney, Sanchez, & Maimon, 2019).

Identity cue transfer occurs, in part, due to perceptions of multiple prejudices stemming from the shared ideological stance of the prejudiced perpetrators, namely Social Dominance Orientation (SDO; Sidanius & Pratto, 1999; Pratto, Sidanius, Stallworth, & Malle, 1994). SDO is defined as a preference for ingroup dominance and social inequalities, is predictive of sexist and anti-Black attitudes, and has been identified as an ideology underlying competition-based prejudices (Duckitt & Sibley, 2007). Indeed, research on identity cue transfer has identified the perceived SDO of an entity (e.g., perpetrator, managers at a company) as a key mechanism through which identity cues transfer (Chaney et al., 2016; Chaney & Sanchez, 2018; Sanchez et al., 2017). As such, perceived SDO has been identified as an explicit set of beliefs by which identity cues transfer. Yet, there may also be an implicit method by which identity cues transfer. Specifically, we sought to demonstrate that what may initially occur as a deliberative process in which, for example, sexism is inferred from racism, this association between prejudices becomes automatic.

Notably, past research has contended that identity cue transfers occur because outgroup cues (for White women, racism) signal information about ingroup value (for White women, sexism). For example, we do not contend that racism is inherently threatening for White women; rather, racism signals the threat of sexism, and sexism is threatening for White women. Indeed, White women may benefit from anti-Black racism as members of the White, privileged racial community and do not report anticipating racial stigma from an anti-Black perpetrator (Sanchez et al., 2017). Instead, we propose identity cues transfer because outgroup prejudices evoke concerns about prejudice directed at the ingroup in evaluative contexts.

While self-reports make this distinction difficult to discern, employing a measure of attentional bias offers a careful testing of the hypothesis. Specifically, attentional *adhesion* occurs towards self-relevant threats (e.g., Bar-Haim et al., 2007; Maner & Miller, 2013). As racism itself should not inherently be threatening to White women, they should not demonstrate automatic attentional adhesion to racism. Indeed, demonstration of attentional adhesion towards sexism, but *not* racism, when anticipating an evaluation from an anti-Black perpetrator would indicate that White women's stigma response identified in the identity threat transfer literature is due to a threat of sexism. To demonstrate the automaticity of identity cue transfers and to discern the process, the present research examined automatic attentional adhesion to sexism and racism following exposure to an anticipated interaction with a racist or sexist evaluator among five samples of White women.

3. Current research

Integrating literature on identity cue transfer and automatic attentional adhesion (i.e., AAA), we sought to examine if outgroup identity threat would similarly engender increased AAA to ingroup identity threat cues. Specifically, we proposed that White women anticipating being evaluated by a sexist or anti-Black White man would demonstrate significantly greater AAA to sexism cues compared to women not exposed to sexism or anti-black prejudice (Studies 1–2). Demonstrating AAA to sexism in response to an anticipated interaction with a racist perpetrator would indicate that identity cue transfer also operates at an automatic, implicit level and would provide initial evidence of an automatic association between ingroup and outgroup threat cues, e.g., an automatic index of a lay theory of generalized prejudice. Moreover, such findings would suggest that members of marginalized groups demonstrate AAA to ingroup bias in a broader set of contexts than previously theorized, as such AAA would occur in response to anticipated ingroup prejudice *or prejudice directed towards* a similarly marginalized outgroup.

We also sought to demonstrate that while racism might automatically cue a threat of sexism for White women, this would *not* lead to greater attentional adhesion to racism cues (Study 3). That is, we sought to demonstrate that marginalized groups do not demonstrate AAA to outgroup threat cues, rather, outgroup prejudice signals ingroup prejudice. While attentional bias has frequently been theoretically considered in models of discrimination's impact on marginalized groups (e.g., Feinstein, 2020; Major & O'Brien, 2005; Ozier et al., 2019), little research has measured automatic attentional bias. As such, the present research aims to revitalize research examining cognitive attentional adhesion as a mechanism by which identity threat cues negatively impact marginalized group members' experiences.

All studies were conducted with institutional IRB approval, all data and materials are available: https://osf.io/dqg6w/?view_only=771c591ff5fc455c9512528fc111720c. For each study, all manipulations, measures, and exclusions are reported. Studies were not pre-registered.

4. Study 1

Study 1 examined if White women who anticipate interacting with a racist evaluator would demonstrate increased AAA to sexism cues. Moreover, Study 1 sought to conceptually replicate past work in which White women demonstrated increased AAA to sexism cues when anticipating sexism (Kaiser et al., 2006) with a new attentional task to discern attentional adhesion. As past research on identity cue transfer at times finds people are more sensitive to ingroup cues than outgroup cues, and at other times finds no significant difference between ingroup and outgroup cues (Chaney et al., 2016; Sanchez et al., 2017), we did not have specific hypotheses about the extent to which White women would differ in AAA to sexism when anticipating sexism or racism.

4.1. Method

4.1.1. Participants

An a priori power analysis in G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) for a one-way ANOVA with 3 cells and 80% power indicated a data collection stop point of 159 for a medium effect size based on past identity-threat transfer effects (Sanchez et al., 2017). Anticipating exclusions, 188 participants who identified as White women during a large prescreen completed the in-lab study in exchange for partial course credit. However, participants were excluded for not

identifying as White during the study (8), failing an instructional attention check item (7), and for low accuracy on the AAA task (20; below 50% accuracy; as in Richeson & Trawalter, 2008),[1] leaving a final analytic sample of 153 participants (M_{age} = 18.76, SE = 1.35, range = 18–29). Exclusions included 13 from the sexism condition, 11 from the neutral condition, and 11 from the racism condition. A sensitivity power analysis indicated that the analytic sample was sufficient to capture a medium effect ($d = 0.50$).

4.1.2. Procedure

After providing consent, participants learned that they would be randomly assigned a partner who was another participant in a room down the hall. After exchanging responses on psychological profile items to get to know each other, participants were told that one of them would be randomly assigned the role of the evaluator, and the other the presenter, and that the presenter would have to complete an upcoming speech task in front of the evaluator. The psychological profile manipulations and evaluator paradigm were based on past research (Sanchez et al., 2017). The psychological profiles included basic demographics (i.e., age, gender, race) as well as filler items, specifically personality inventories (i.e., Big Five inventory). These were the only items participants who were randomly assigned to the neutral condition completed. However, participants randomly assigned to the racism condition also completed the Modern Racism Scale and the Old-Fashioned Racism Scale (McConahay, 1986). Participants randomly assigned to the sexism condition also completed the Old Fashioned and Modern Sexism Scale (Swim, Aikin, Hall, & Hunter, 1995).

After completing these items, participants received a profile packet that was completed by their partner. The demographic information always presented their partner as a 20-year-old White man and filler items were filled out with moderate responses. In the racism condition, the racism scale indicated that the partner held moderately racist attitudes towards Black Americans, and in the sexism condition, the sexist scale indicated that the partner held moderately sexist attitudes. Next, participants learned that they were randomly assigned to the role of the presenter and would engage in a mock interview with their partner, the evaluator. Participants were informed that while the evaluator received instructions and the next room was set up, they would complete a few unrelated measures. While waiting, participants were instructed to complete a measure of AAA to sexism, described as an unrelated task, followed by measures of perceived SDO and intergroup attitudes of the evaluator (in this order; Sanchez et al., 2017) before learning there would be no speech task and being debriefed.

4.2. Materials

4.2.1. Automatic attentional adhesion task

Participants completed a modified dot-probe task that was loosely based on the emotional Stroop task of preconscious attention in Kaiser et al. (2006). Specifically, participants were informed that, "During this task you will be required to identify the side of the screen an arrow appears on while ignoring distractors. Your task is to focus on a central fixation cross ("+"), after which distractor words and non-words will appear on both the right and left side of the screen. After the distractors, an arrow will appear behind either the right or left distractor." Participants then learned the keys they should press if the arrow appeared on the left or right side of the screen and were informed that they should respond as quickly as possible. The arrow was randomly pointing up, left, right, or down. Participants completed six practice trials during which they received accuracy feedback followed by 180 test trials with

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[1] If accuracy requirements are increased to 75%, only three additional participants are included in Study 1's analytic sample and no additional participants are included in Studies 2–4. Inclusion of these three additional Study 1 participants does not significantly change results.

no feedback.

Each trial began with a fixation cross (1000 ms) which was followed by the presentation of two words, one to the left of the screen and the other to the right of the screen (40 ms). These words were replaced by masks (10 ms) which were either novel words or random letter strings. These masks were then removed, and an arrow appeared on either the left or the right side of the screen for 150 ms, and participants' task was simply to indicate, with a corresponding key, which side of the screen the arrow had appeared on. Participants had 1500 ms to respond (see Fig. 1 for sample trial). Critically, half of the trials (90) were neutral trials, i.e., both of the words were non-sexist, threatening cues (e.g., virus), while the other half of the trials (90) were critical trials, as one of the words was a sexist cue (e.g., sexism), and the other a non-sexist, threatening cue. On the critical sexism trials, the arrow always appeared on the opposite side of the screen as the sexist cue (antisaccade sexism threat trial),[2] while on neutral trials the side of the screen the arrow appeared on was random. Note, however, that the arrow was presented on the left and right side of the screen equally across the task and trial types. This design ensured assessment of attentional adhesion (as in Maner, Gailliot, Rouby, & Miller, 2007). The masks included randomly generated 5–6 letter strings and neutral words (e.g., circle). The sexism and non-sexism, health threat words were adapted from Kaiser et al. (2006) and pre-tested in a separate sample of 30 White women on MTurk (see Supplement for details).

Following other dot-probe data cleaning practices, reaction times for incorrect response trials were removed from analyses (e.g., Kaiser et al., 2006). Mean reaction times were computed for all correct antisaccade sexism threat trials and all correct neutral trials. An index of attention adhesion was calculated by subtracting the average latency on antisaccade neutral trials from the average latency on sexism trials, such that greater scores indicate that it took participants longer to shift their attention away from the sexism threat word, indicating greater AAA (Maner et al., 2007). The task was completed in Inquisit 6 (Inquisit 6, 2015).

4.2.2. Perceived SDO

Participants completed the 8-item SDO scale (Ho et al., 2015) as they believed the evaluator would complete it (Sanchez et al., 2017) on a scale from 1 (*Strongly oppose*) to 7 (*Strongly favor*). The scale was reliable ($\alpha = 0.91$; $M = 4.67$, $SD = 1.46$).

4.2.3. Perceived sexism

Participants completed a 5-item measure of perceived sexism of the evaluator (Sanchez et al., 2017) on a scale from 1 (*Very slightly or not at all*) to 5 (*Extremely or a lot*), which included items such as, "How likely is this person to discriminate based on gender?". This scale was reliable ($\alpha = 0.95$; $M = 3.09$, $SD = 1.32$).

4.3. Results

A one-way ANOVA (3-cell, Evaluator: Neutral, Racist, Sexist) for AAA to sexism revealed a significant effect of condition, $F(2, 148) = 6.45$, $p = .002$, $d = 0.59$.[3] Consistent with hypotheses, LSD post-hoc analyses revealed that participants demonstrated significantly greater AAA to sexism cues in the racist evaluator condition ($M = 8.22$, $SE = 3.40$) than the neutral evaluator condition ($M = -6.20$, $SE = 3.27$), $p = .003$, $d = 0.64$, 95% CI$_{meandiff}$ [5.11, 23.73]. Additionally, participants in the sexist evaluator condition demonstrated greater AAA to sexism cues ($M = 8.50$, $SE = 3.40$) than participants in the neutral evaluator condition, $p = .002$, $d = 0.63$, 95% CI$_{meandiff}$ [5.39, 24.01], and there was no

significant difference between the sexist and racist evaluator conditions, $p = .952$, $d = 0.01$, 95% CI$_{meandiff}$ [−9.21, 9.77].[4] See Fig. 2.

Moreover, a one-way ANOVA for perceived SDO revealed a significant effect of condition, $F(2, 150) = 85.66$, $p < .001$, $d = 2.12$. LSD post-hoc analyses revealed that participants perceived the racist evaluator ($M = 5.71$, $SE = 0.14$) as significantly higher in SDO than the sexist evaluator ($M = 5.17$, $SE = 0.14$), $p = .009$, $d = 0.52$, 95% CI$_{meandiff}$ [0.13, 0.93], and the neutral evaluator ($M = 3.25$, $SE = 0.14$), $p < .001$, $d = 2.58$, 95% CI$_{meandiff}$ [2.06, 2.85]. The sexist evaluator was rated as significantly higher in SDO than the neutral evaluator, $p < .001$, $d = 1.87$, 95% CI$_{meandiff}$ [1.53, 2.31].

A one-way ANOVA for perceived sexism revealed a significant effect of condition, $F(2, 150) = 89.23$, $p < .001$, $d = 2.17$. LSD post-hoc analyses revealed that participants perceived the racist evaluator ($M = 3.40$, $SE = 0.13$) as significantly more sexist than the neutral evaluator ($M = 1.84$, $SE = 0.12$), $p < .001$, $d = 1.88$, 95% CI$_{meandiff}$ [1.21, 1.91], but significantly less sexist than the sexist evaluator ($M = 4.14$, $SE = 0.13$), $p < .001$, $d = 0.78$, 95% CI$_{meandiff}$ [0.38, 1.10]. Lastly, the sexist evaluator was rated as more sexist than the neutral evaluator, $p < .001$, $d = 2.51$, 95% CI$_{meandiff}$ [1.95, 2.65].

Examination of correlations indicated AAA to sexism was positively, significantly correlated with perceived SDO, $r(151) = 0.287$, $p < .001$, and perceived sexism, $r(151) = 0.307$, $p < .001$. Perceived sexism and SDO were also positively, significantly correlated, $r(151) = 0.672$, $p < .001$.[5]

4.4. Discussion

Study 1 is the first study to demonstrate that White women engaged in significantly greater AAA to sexism threat cues when anticipating an evaluation by a racist or sexist White man compared to a White man whose intergroup attitudes were unknown, and AAA to sexism was significantly, positively associated with perceived SDO and perceived sexism. These findings suggest that a lay theory of generalized prejudice may operate at an automatic level. Further, Study 1 replicates past work on a lay theory of generalized prejudice, demonstrating that White women anticipated both a racist and sexist evaluator to more strongly endorse SDO and sexism relative to a neutral evaluator (Sanchez et al., 2017).

5. Study 2

Study 2 aimed to replicate Study 1 findings.[6]

5.1. Method

5.1.1. Participants

Based on the effect size for AAA in Study 1 ($d = 0.59$), an a priori power analysis was conducted and indicated a desired sample size of 149 for a 3-cell between-subjects ANCOVA with one covariate and 90% power. However, we aimed to recruit 170 participants in case of a smaller effect size. Note, as this study was conducted entirely online and required participants to download Inquisit Web files to complete the AAA task, we anticipated high levels of dropout. Thus, we recruited and checked the sample size of participants who completed all parts of the study bi-weekly and ended collection once the desired sample of 170 was collected.

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[2] Antisaccade indicates eye movement in the direction oppose of the target stimuli (here, the arrow).

[3] Data on the attentional bias task for two participants was lost due to experimenter error.

[4] See Supplement for Study 1 exploratory mediation models.

[5] Results for perceived SDO and intergroup attitudes of evaluator are presented in manuscript for Study 1 and the Supplement for remaining studies (Studies 2–3) for brevity as the effects consistently replicate past research (Chaney et al., 2018; Sanchez et al., 2017) and Study 1.

[6] Study 2 was conducted in Spring 2022. All other studies were conducted prior to March 2020.
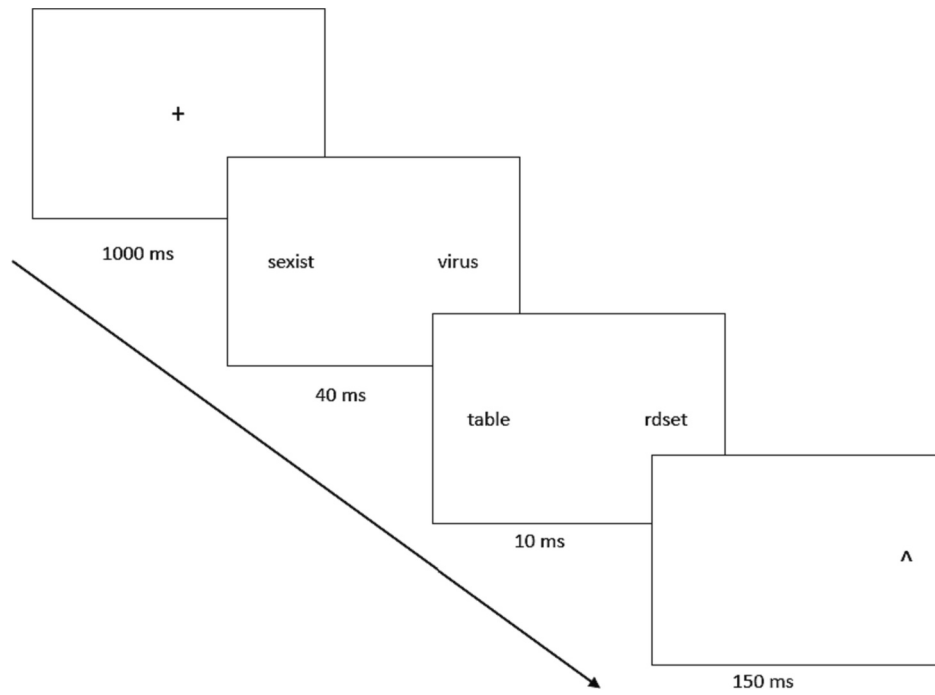
Fig. 1. Sample sexism trial in automatic attentional adhesion to sexism task.
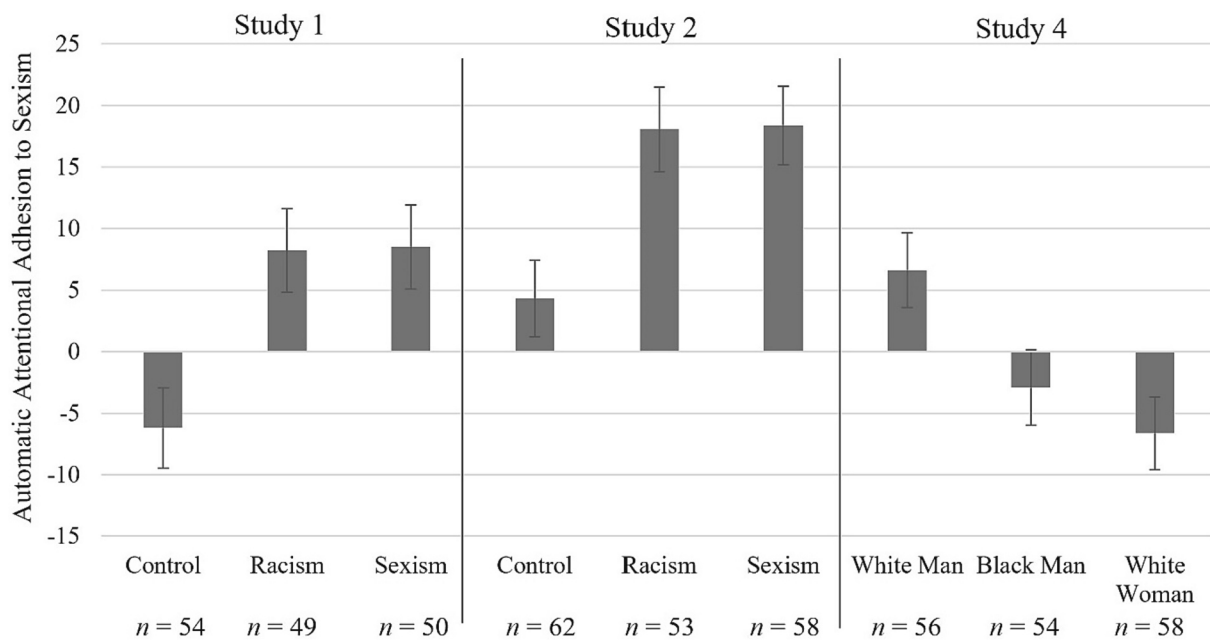

Fig. 2. AAA to sexism by condition, Studies 1–2 and Study 4. Error bars represent standard errors. *N*'s denote condition sample size.

Participants who identified as White women during a large pre-screen survey were recruited from an undergraduate psychology participant pool in exchange for partial course credit. In all, 271 participants began the study but only 179 completed the entire study. Of the 179, six performed poorly on the measure of AAA (i.e., less than 50% accuracy) and were excluded (two from each condition), leaving an analytic sample of 173 White women ($M_{age} = 18.81$, $SD = 0.84$; range: 18–23). Of participants who did not complete the entire study, 95% dropped out at the stage that required the Inquisit file download. Note, AAA were not recorded for four additional participants due to technological issues. A sensitivity power analysis indicated that the analytic sample was sufficient to capture a medium effect ($d = 0.48$).

5.1.2. Procedure & materials

The study was identical to Study 1 except participants completed additional self-report measures (anticipated stigma, anticipated negative gender-based treatment),[7] as well as a measure assessing how much they liked the evaluator (all measures adapted from Sanchez et al., 2017), followed by attention checks confirming the race and gender of the evaluator. Importantly, Study 2 was conducted entirely online and participants did not complete the personality profile packet themselves.

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[7] These outcomes, assessed in Studies 2 and 3, are reported in the Supplement for brevity as they replicate past research (Sanchez et al., 2017).

As such, participants were told the personality profile packet they reviewed came from a previous participant who we would connect them with if they wanted for future research studies (see Sanchez et al., 2017 for similar online protocol). Additionally, the AAA measure was completed on Inquisit Web (Inquisit Web, 2015), requiring participants to download the program and complete it on their own computer.

5.2. Results

The ANOVA for AAA to sexism revealed a main effect of condition, F (2,166) = 6.36, p = .001, d = 0.51. Participants demonstrated significantly greater AAA to sexism in the racism (M = 18.05, SE = 3.45), p = .004, d = 0.56, 95% $CI_{meandiff}$ [4.56, 22.91], and the sexism conditions (M = 18.39, SE = 3.20), p = .002, d = 0.58, 95% $CI_{meandiff}$ [5.25, 22.89], compared to the control condition (M = 4.32, SE = 3.12). Participants AAA to sexism did not significantly differ between the sexism and racism condition, p = .942, d = 0.01, 95% $CI_{meandiff}$ [−8.94, 9.62].[8]

5.3. Discussion

Replicating Study 1, White women demonstrated greater AAA to sexism when anticipating an evaluation with *either* a racist or sexist White male evaluator compared to a neutral evaluator. These effects remained even when participants did not themselves first complete a personality profile packet, potentially making salient sexism from completing themselves a measure of modern sexism. As such, Study 2 suggests participants' AAA to sexism in response to either a racist or sexist evaluator is driven by a lay theory of generalized prejudice, not mere salience caused by the completion of measures of participants own intergroup attitudes.

6. Study 3

Studies 1–2 demonstrated that identity cue transfers activate AAA for ingroup threats. Yet, this does not preclude the possibility that identity cue transfers active AAA for outgroup threats. As such, Studies 3a-3b sought to examine White women's AAA to racism when anticipating an interaction with a racist or sexist perpetrator relative to a neutral perpetrator. Critically, we hypothesized that White women would *not* demonstrate greater AAA to racism in response to a racist or sexist evaluator (i.e., hypothesized a null effect of condition). First, White Americans make fewer attributions to racial discrimination than do marginalized racial groups, which suggests less attention to racism (e.g., Johnson, Simmons, Trawalter, Ferguson, & Reed, 2003; Operario & Fiske, 2001). Further, AAA typically occurs towards self-relevant threats (e.g., Bar-Haim et al., 2007). While research on a lay theory of generalized prejudice contends that, for example, racism signals sexism, this theory does not inherently contend that racism is threatening for White women; Rather, racism signals sexism, and sexism is threatening for White women. Thus, Study 3 exposed White women to a neutral, anti-Black, or sexist White male evaluator and examined AAA to racism.[9]

6.1. Method

6.1.1. Study 3a participants

While Studies 1–2 found medium-large effects of condition on AAA, and we hypothesized a null effect of condition, we anticipated that if AAA to racism were to occur, it would be smaller and thus conducted an a priori power analysis for a 3-cell between-subjects ANCOVA with one covariate for a medium effect (d = 0.50 and 80% power), which indicated a desired sample size of 158. However, in anticipation of data exclusion and a smaller effect, we recruited through the course of a semester which resulted in a sample of 213 undergraduate participants who identified as White women during a large pre-screen. Participants received partial course credit for completing the in-lab study. Ultimately, 19 participants (6 racism, 6 sexism, 7 neutral condition) were excluded for poor performance on the AAA measure (below 50% accuracy) leaving an analytic sample of 194 (M_{age} = 18.77, SD = 1.83; range: 18–40). A sensitivity power analysis indicated that the analytic sample was sufficient to capture a medium effect (d = 0.44).

6.1.2. Study 3b participants

An a priori power analysis for an independent-samples *t*-test indicated a desired sample size of 128 to detect a medium effect (d = 0.50) with 80% power. As such, a data collection stop point was set at 135 to account for exclusions. However, 15 were excluded from analyses due to poor performance on the AAA measure (below 50% accuracy; 8 in racism condition), leaving an analytic sample of 120 undergraduate White women (M_{age} = 18.52, SD = 0.98, range: 18–23) who received partial course credit for completing an in-lab study. A sensitivity power analysis indicated that the analytic sample was sufficient to capture a medium effect (d = 0.50).

6.1.3. Procedure & materials

In Study 3a procedure was identical to Study 2 (randomly assigned to racist, sexist, or neutral evaluator) except for a change to the measure of automatic attention. Instead of sexism threat words, anti-Black racism threat words were included. These words were pretested in a sample of MTurk workers (see Supplement for details). After completing the measure of AAA, participants completed self-report measure of stigma and liking of the evaluator (see Supplement).

In Study 3b, participants completed the same profile manipulations as Study 2, but were randomly assigned to either the control condition or the anti-Black racism condition. After learning they would be evaluated, they completed only the Study 3a measure of AAA to racism.[10]

6.2. Study 3a Results

The ANOVA for AAA to racism did not reveal a main effect of condition, F(2,191) = 1.51, p = .223, d = 0.25. Participants generally demonstrated no AAA to racism across conditions ($M_{control}$ = −3.24, SE = 3.46; M_{racism} = −9.91, SE = 3.54; M_{sexism} = −1.72, SE = 3.57). See Fig. 3.

6.3. Study 3b Results

An independent-samples *t*-test revealed no effect of condition on participants' AAA to racism, t(116) = 0.93, p = .355, d = 0.17 (Control: M = 10.40, SE = 6.77; Racism: M = 19.28, SE = 6.77).[11]

7. Discussion

Study 3 findings suggest that while racism threats may automatically cue attention to sexism, a self-relevant threat for White women (Studies 1–2), racism, an indirect, distal threat, does not automatically cue attention to racism for White women. That is, because racism is not directly a threat to White women, they did not demonstrate greater AAA to racism. As such, Studies 3 suggests that identity cue transfers do not occur because outgroup threats themselves are inherently threatening as

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[8] Pattern of results do not significantly change when controlling for liking in Study 2 or Study 3a (see Supplement). Liking was not assessed in Studies 3b or 4.

[9] The sexist White male evaluator condition was dropped from Study 3b to preserve statistical power.

[10] After completing the AAA task, participants completed an attribution to discrimination measure, presented in the Supplement, before being debriefed.

[11] Data on the AAA measure was not recorded for two participants due to technology issues.
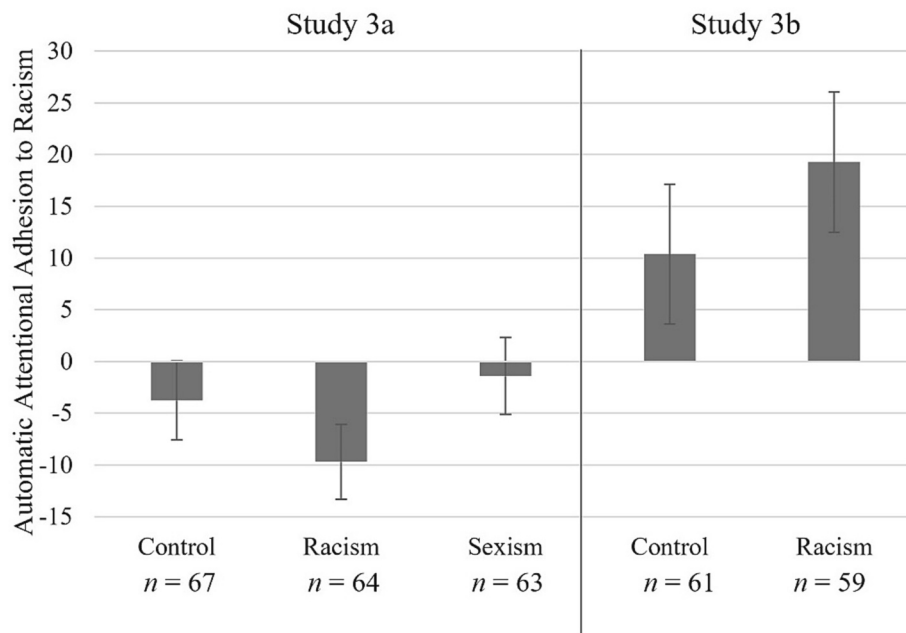
Fig. 3. AAA to racism by condition, Study 3. Error bars represent standard errors. *N*'s denote condition sample size.
Note. Study 3a was recruited in Fall 2018 and Study 3b was recruited in Spring 2020.

White women did not demonstrate greater AAA to racism following a racist identity threat, and further supports our theoretical model that racism results in anticipated stigma for White women because it cues sexism, *not* because White women inherently find anti-Black racism threatening. We return to a discussion of these null findings in the general discussion.

8. Study 4

While Studies 1–3 demonstrated greater AAA to sexism, but not racism, following identity threat cues, Study 4 examined if identity safety cues, cues signaling that one should *not* expect to face prejudice in the context (for review, see Kruk & Matsick, 2021), could decrease AAA to sexism. Past research has found that White women perceived both a White woman and Black man as less likely to endorse negative stereotypes about women's intelligence and demonstrated greater working memory when they believed a test was developed by either a White woman or Black man compared to a White man (Chaney, Sanchez, & Remedios, 2018). As such we proposed that in Study 3, White women would demonstrate significantly *less* AAA to sexism and employ less social distancing in the White woman or Black male expert conditions compared to the White male expert condition.

Further, integrating research on the vigilance-avoidance hypothesis, which argues that people are automatically attending to threats in order to ultimately avoid those threats (Mogg et al., 2004), Study 4 sought to examine avoidance as a downstream outcome of AAA to sexism. Avoidance in response to identity threat cues has been found in past research assessed via measures such as interest in attending a conference (Murphy et al., 2007) and avoidance of math items (Davies et al., 2002). Moreover, past research has found that White women anticipating facing sexism demonstrate greater attentional bias to rejection cues, which is in turn predictive of desired social distance from the threat (Chaney, 2022). Termed "proxemics" (Hall, 1963), measures of social distancing capture automatic, less conscious attitudes as they are often associated with implicit (Amodio & Devine, 2006), but not explicit, measures of attitudes (Dotsch & Wigboldus, 2008; McCall, Blascovich, Young, & Persky, 2009). As such, Study 4 assessed avoidance as an outcome of AAA to sexism, and operationalized avoidance as desired social distancing.

8.1. Method

8.1.1. Participants

An a priori power analysis for a 3-cell between-subjects ANOVA with 95% power to capture the effect size of Study 1's AAA measure ($d = 0.59$) indicated a sample of 177. Based on rates of data exclusion in Study 1, we sought to collect data from 200 participants who identified as White women in the prescreen. In all, 202 undergraduate participants who identified as White women during a large prescreen survey completed an in-lab study. However, participants were excluded for not identifying as White (5) or as a woman (1) during the study, for performing with less than 50% accuracy on the AAA task (27), and for incorrectly identifying the test creator's race (2), leaving an analytic sample of 167 White women ($M_{age} = 19.00$, $SD = 2.16$; range: 18–38). Of excluded participants, 11 were excluded from the White woman condition, 11 from the Black man condition, and 13 from the neutral condition. A sensitivity power analysis indicated that the final sample was sufficient to capture a small effect ($d = 0.24$).

8.1.2. 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 Chaney et al. (2018), 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 were previously pretested with a separate sample and did not significantly differ in perceived intelligence, attractiveness, or friendliness (reported in Supplement).

After reviewing the information, participants were asked to recall the test creator's race and gender among other filler items. Next, participants were told that while the new test was being set up in another room, they were to complete a task for another, unrelated study. This task was the

AAA task from Study 1. After completing the task, participants completed a virtual seating task (as in Chaney, 2022; reported in Supplement).[12] After, participants learned that they would not complete the purported test and were debriefed.

8.2. Materials

Participants completed a modified version of past seat selection paradigms (Amodio & Devine, 2006; Goff, Steele, & Davies, 2008; Macrae, Bodenhausen, Milne, & Jetten, 1994). An image of a conference table and seats with the name of the test creator at the head of the table was presented with seven seats spaced evenly apart down one side of the table and labeled 1–7 with 1 being the seat closest to the professor (see Chaney, 2022). Participants were instructed to consider that they were enrolled in a class with the test-creator and were asked to select their seat.

8.3. Results

A one-way ANOVA (Condition: White man, White woman, Black man) for AAA revealed a significant main effect of condition, $F(2, 164) = 5.13$, $p = .007$, $d = 0.50$. Consistent with hypotheses, LSD post-hoc analyses revealed that participants demonstrated significantly greater AAA to sexism cues in the White male test creator condition ($M = 6.62$, $SE = 3.04$) than in the Black male test creator condition ($M = -2.93$, $SE = 3.07$), $p = .029$, $d = 0.41$, 95% CI$_{meandiff}$ [1.01, 18.09], and the White female test creator condition ($M = -6.63$, $SE = 2.96$), $p = .002$, $d = 0.47$, 95% CI$_{meandiff}$ [4.86, 21.64]. There was no significant difference between the White woman and Black male expert conditions, $p = .388$, $d = 0.14$, 95% CI$_{meandiff}$ [−4.73, 12.13].[13]

An ANOVA for the virtual seating task revealed there was a significant main effect of condition, $F(2,164) = 10.29$, $p < .001$, $d = 0.71$. LSD post-hoc tests revealed that participants indicated they would sit significantly closer to the White woman expert ($M = 3.62$, $SE = 0.15$) than the White male expert ($M = 4.38$, $SE = 0.15$), $p < .001$, $d = 0.62$, 95% CI$_{meandiff}$ [0.35, 1.16], and significantly closer to the Black male expert ($M = 3.51$, $SE = 0.15$) than the White male expert, $p < .001$, $d = 0.74$, 95% CI$_{meandiff}$ [0.45, 1.28]. There was no significant difference in seat choice between the Black male and the White woman expert conditions, $p = .662$, $d = 0.09$, 95% CI$_{meandiff}$ [−0.30, 0.52]

8.4. Mediation

A mediation analysis examining the effect of condition (Contrast 1: 0 = White man, 1 = Black man; Contrast 2: 0 = White man, 1 = White woman) on seat choice via AAA to sexism was conducted. Contrast 1, $B = -11.32$, $SE = 4.41$, $p = .011$, 95% CI [−20.02, −2.61], and Contrast 2, $B = -13.25$, $SE = 4.33$, $p = .003$, 95% CI [−21.80, −4.70], significantly predicted AAA to sexism, which in turn significantly predicted seat choice, $B = 0.01$, $SE = 0.004$, $p = .023$, 95% CI [0.001, 0.02]. The indirect effect of condition on social distancing was significant via Contrast 1, $B = -0.10$, $SE = 0.06$, 95% CI$_{Boot}$ [−0.23, −0.01], and Contrast 2, $B = -0.11$, $SE = 0.06$, 95% CI$_{Boot}$ [−0.26, −0.01].

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[12] Participants also completed a self-report measure of meta-stereotype endorsement, reported in Supplement as it replicates Chaney et al. (2018).

[13] Note, the post-hoc comparison between White and Black male expert is not significant, $p = .086$, 95% CI$_{meandiff}$ [−0.91, 20.01] when a Bonferroni correction is employed. However, as Study 4 contains only three dependent variables, this correction may be overly conservative. No other effects across Studies 1–4 significantly change when employing a Bonferroni correction. We encourage future studies to recruit larger sample sizes to determine the replicability of this effect.

8.5. Discussion

Study 4 was the first study to demonstrate that exposure to an ingroup or similarly stereotyped outgroup expert significantly reduced White women's AAA to sexism compared to exposure to a White male expert, indicating that AAA to sexism can be ameliorated upon exposure to an identity safety cue. These findings further extend work demonstrating that identity safety cues may transfer (Chaney et al., 2018), such that AAA to sexism was also reduced when an incongruent identity safety cue (here, a Black male expert) was present. Moreover, Study 4 demonstrated that AAA to sexism was related to avoidance, assessed via social distancing, such that greater AAA to sexism predicted greater avoidance of the threat. Critically, these effects occur without explicit mention of racism or sexism in the context.

Importantly, in demonstrating the amelioration of AAA to sexism from an identity safety cue relative to no identity safety cue in a threatening context, the present findings support Studies 1–2 findings in demonstrating that AAA to sexism occurs when anticipating sexism. Together, Studies 1–2, 4 demonstrate that in contexts of anticipated gender stigma (STEM classroom with White male instructor, sexist or racist White male evaluator) White women demonstrate AAA to sexism. The effect of identity threat on AAA to sexism is ameliorated in the face of an identity safety cue.

9. General discussion

Past research has found that women demonstrate greater attentional bias to sexism when anticipating sexism or when high in stigma consciousness (Kaiser et al., 2006). Such attentional bias to threat is associated with depleted performance (Forbes & Leitner, 2014) and greater risk for negative health outcomes (e.g., Clark et al., 2006; Himmelstein et al., 2015). Attentional bias is a stigma response that aims to detect threats in order to ultimately avoid such threats (e.g., Major & O'Brien, 2005; Mogg et al., 2004) and is considered an adaptive response to stigma (Major & O'Brien, 2005). Indeed, automatic attentional adhesion (AAA), a component of attentional bias related to difficulty disengaging from a target, is associated with self-protective motives (Fox et al., 2001). Critically, the present research contends that members of stigmatized groups, here, White women, demonstrate AAA to sexism when exposed to not only sexist environments and sexist perpetrators (e.g., Davies et al., 2002; Kaiser et al., 2006), but also in response to interactions with a racist perpetrator. Integrating research on a lay theory of generalized prejudice (Chaney et al., 2019), the present research examined White women's AAA to sexism (Studies 1–2, 4) and racism (Study 3), an index of AAA to ingroup and outgroup prejudice, respectively, when White women were anticipating an interaction with a sexist or racist perpetrator (Studies 1–3) and when in a gender-threatening testing context (Study 4).

In Studies 1–2, White women demonstrated greater AAA to sexism when anticipating an interaction with *either* a racist or sexist White male evaluator compared to a neutral White male evaluator, demonstrating that White women employ AAA to sexism in response to both ingroup and outgroup threats. Together, these studies suggested that White women employed AAA to sexism when anticipating sexism from either a racist or sexist evaluator, a broader set of contexts that could elicit attentional bias than previously theorized.

Moreover, Studies 3a-3b demonstrated that AAA for White women is limited to sexism. That is, White women did not demonstrate AAA to racism, even when interacting with a racist perpetrator and reporting that a racist evaluator would be sexist and mistreat them because of their gender. These findings suggest that marginalized group members are unlikely having difficulty disengaging attention from bias towards other marginalized groups in such evaluative paradigms. Rather, outgroup prejudices (here, anti-Black racism) signals an ingroup threat, creating AAA to ingroup threats only.

Lastly, Study 4 found that White women similarly demonstrated

greater AAA to sexism when anticipating completing an intelligence test developed by a White man (a threatening context for women; see Chaney et al., 2018) compared to when the test was developed by either a White women or Black man. As such, Study 4 suggested that AAA to sexism can be decreased in traditionally threatening contexts when an identity safety cue is present (here, an ingroup or similarly stigmatized outgroup exemplar). These findings suggest that identity safety cues inhibit an automatic stigma response. While the effect was larger and more robust when the identity safety cue was congruent with participants' stigmatized identities (White women), the effect also emerged for an incongruent identity safety cue (Black man), providing initial evidence that identity cue transfers may inhibit AAA.

9.1. Automatic attentional bias expanded

The present work is the first, to our knowledge, to demonstrate that identity safety cues may operate on an automatic level by *impeding* AAA to ingroup prejudice (Study 4). While the automaticity of identity safety cues has been suggested from research demonstrating identity safety cues can buffer against cognitive performance impairments caused by identity threats (e.g., Chaney et al., 2018; Davies et al., 2002), the present findings suggest a mechanism for this effect: identity safety cues may free up cognitive resources due to decreased attentional adhesion to threat, though future research is needed. As such, the present findings highlight that identity safety cues, here, stigmatized experts, diminish identity threat at an automatic level.

Moreover, the present findings are the first to suggest that identity threat transfer operates at an automatic level (Studies 1–2), demonstrating that White women employ AAA to sexism when sexism *or* racism is salient. As such, White women may be attending to sexism more frequently (i.e., demonstrating disengagement difficulty) than previously theorized. Notably, these studies were limited to samples of White women and focused on how anti-Black racism may signal sexism, limiting theorizing regarding automatic processes for other marginalized groups. Yet, much research on attention to threat cues has focused on marginalized racial groups' attentional bias to ingroup prejudice (e. g., Hicken et al., 2013), and thus it is likely that, for example, Black men would demonstrate AAA to racism in response to a sexist threat. Importantly, while these findings suggest that White women are demonstrating attentional bias to sexism in the face of sexism and racism, it is likely that Black women, for example, would demonstrate heightened AAA to *both* racism and sexism in response to only one. Indeed, past research has found that Black and Latina women anticipated facing both racism and sexism when only one prejudice is made salient (Chaney, Sanchez, & Remedios, 2021; Pham, Chaney, & Sanchez, 2023). As such, people with multiply stigmatized identities may demonstrate not only AAA in response to various prejudices, but such attentional bias may be compounded due to AAA towards prejudice directed at their multiple stigmatized identities. That is, for example, Black women may experience "double jeopardy" attentional adhesion, resulting in increased stressors for their health and cognitive performance. Lastly, it is critical to examine identity safety cues that may ameliorate AAA to racism and sexism for women of color. For example, past research has found that some identity safety cues for Black women may need to be explicitly focused on racial inclusion or allyship to promote belonging (e.g., Black women expert; White woman endorsed as an ally by a Black woman; Johnson & Pietri, 2022, Johnson, Pietri, Fullilove, & Mowrer, 2019; Pietri, Johnson, & Ozgumus, 2018), while other work has suggested that gender identity safety cues (e.g., White woman expert; While male stating allyship with women; Chaney et al., 2018; Chaney, Sanchez, & Remedios, 2021) may mitigate concerns about racial stigma for Black women. Yet, this past work has relied on explicit reports of identity safety, and thus it will be important to discern which of these identity safety cues (i.e., cues explicitly focusing on gender or racial inclusion or allyship) also decrease attentional adhesion to threat cues.

Lastly, the present research employed a novel, modified dot-probe task to assess AAA to prejudice. This measure was based on past widely used measures of attentional bias towards rejection (e.g., Chaney, 2022; Mogg et al., 2004) and affords an examination of attentional adhesion to threat words via latencies of key presses, much like preconscious Stroop based tasks (e.g., Kaiser et al., 2006). Yet, while threat words are presented at a rate intended to be subliminal, this task can be tedious for participants and can be cognitively taxing. As such, future research should examine attentional bias to identity threats using more unobtrusive measures such as eye-tracking (e.g., Bögels & Mansell, 2004), in which saccades (eye movements) are detected directly, rather than indirectly via key press latencies. Advances in eye-tracking can ensure more involved paradigms that assess, for example, attentional bias to threats in a physical environment (e.g., Cheryan, Plaut, Davies, & Steele, 2009) or during group interactions.

9.2. Lay theory of generalized prejudice

Many reported outcomes of identity cue transfers have relied on self-report outcomes (Sanchez et al., 2017; Sanchez, Chaney, Manuel, & Remedios, 2018), in line with theorizing that a lay theory of generalized prejudice occurs as a deliberative process. That is, for example, a White woman learns an evaluator endorses anti-Black attitudes, deliberatively infers that person might also endorse a sexist attitude, and thus is a potential target of prejudice. Yet, other work has found that such identity cue transfer can evoke psychobiological reactions such as cardiovascular responses among White women who strongly endorse a lay theory of generalized prejudice (Chaney, Sanchez, Himmelstein, & Manuel, 2021), suggesting a more automatic process by which intergroup attitudes are inferred from outgroup identity cues. Such automaticity raises key questions about *how* identity cue transfer occurs.

Past research has employed mediation models to suggest that racism cues sexism which in turn engenders stigma (e.g., Sanchez et al., 2017), and endorsement of a lay theory of generalized prejudice as an individual difference variable to contend that this lay theory facilitates or hinders the anticipation of ingroup prejudice from outgroup prejudice (Chaney, Sanchez, Himmelstein, & Manuel, 2021; Sanchez et al., 2018). Yet, past research has not demonstrated concretely why an outgroup prejudice cue results in anticipated prejudice. The present research suggests that identity cue transfers can occur at an automatic level, such that an outgroup prejudice threat automatically activates attentional bias to ingroup threats. Indeed, Study 3 demonstrates that White women do not demonstrate AAA to racism, even though racism is an indicator of sexism. Notably, AAA to racism was measured in studies where AAA to sexism was not assessed. While this decision was made to not overtax participants and avoid potential order effects of assessing these two outcomes, the interpretation of the null effects of Studies 3a-3b requires caution due to this methodological limitation. As such, we encourage future research to consider assessing AAA to racism and sexism within a sample (e.g., with eye-tracking) to ensure robustness of the present findings. Nevertheless, the present findings offer critical advances in understanding how a lay theory of generalized prejudice operates and supports past findings that a lay theory of generalized prejudice appears to primarily operate to protect the self and the ingroup (e.g., Chaney & Forbes, 2023).

10. Conclusion

Across five experimental studies with White women, the present research finds that White women employ AAA to sexism when anticipating either sexism or racism (Studies 1–2) and AAA to sexism is reduced in the presence of an identity safety cue, resulting in decreased avoidance of threat (Study 4). Moreover, White women do not demonstrate AAA to racism when anticipating an evaluation by either a racist or sexist White man, demonstrating that AAA is limited to ingroup threats (Study 3). Together, these findings demonstrate that members of

marginalized groups may employ attentional bias for ingroup bias more frequently than previously theorized and demonstrates an automatic process by which a lay theory of generalized prejudice produces identity cue transfer.

Open practices

All data and materials are available and can be found at: https://osf.io/dqg6w/?view_only=771c591ff5fc455c9512528fc111720c.

The authors have no sources of funding to report.

Data can be found at: https://osf.io/dqg6w/?view_only=dfcb9426979a46db8069085c72ec7247

Declaration of Competing Interest

The authors have no conflicts of interest, including financial, personal, or other relationships with other people or organizations to report.

Data availability

Data can be found at: https://osf.io/dqg6w/?view_only=dfcb9426979a46db8069085c72ec7247

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jesp.2023.104540.

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