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The threat of sexism in a STEM educational setting: the moderating impacts of ethnicity and legitimacy beliefs on test performance

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Abstract   Social identity threat has negative consequences for women in science, technology, engineering, and mathematics (STEM) fields. The present study examined whether legitimacy beliefs—beliefs that status differences between men and women in STEM fields are fair—put women at risk for experiencing social identity threat and poorer performance on a difficult logic test. Legitimacy beliefs served as a risk factor for both women from ethnic groups that are overrepresented in STEM (e.g., Asian Americans and European Americans) and from ethnic groups that are underrepresented in STEM (African Americans and Latina Americans), albeit under different conditions. Among women from overrepresented ethnic groups, legitimacy beliefs were negatively related to test performance when explicit cues to sexism were present. However, among women from underrepresented ethnic groups, legitimacy beliefs were negatively related to test performance when explicit cues to sexism were absent. The present research points to the need for inclusion of ethnic diversity in studies of women in STEM.

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1 Introduction

Compared to men, women in the US tend to be underrepresented in fields related to science, technology, engineering, and mathematics (STEM; Ceci and Williams 2007; Hill et al. 2010). The size of the gender gap, however, varies greatly across contexts. For example, the gender gap is greater at more elite levels of STEM participation; that is, the underrepresentation of women is greater among tenured faculty than among graduate students and greater among graduate students than undergraduate students (Hill et al. 2010; NSF 2013). In addition, the gender gap is greater in some STEM fields (e.g., computer science) than other STEM fields (e.g., mathematics, NSF 2013). Finally, the gender gap is greater among European Americans and Asian Americans than among African Americans (Hill et al. 2010; O'Brien et al. 2015). The variation in the magnitude of the gender gap across different social contexts has led many researchers to examine the contextual factors that influence women's and men's participation and performance in STEM fields.

A key factor that contributes to the underrepresentation and underperformance of women in STEM is social identity threat, or the fear of being devalued, negatively stereotyped, or discriminated against on the basis of one's social group (Major and O'Brien 2005). There are a myriad of pathways through which social identity threat can harm women and contribute to their underrepresentation and underperformance in STEM fields. Negative stereotypes about women's abilities in scientific domains, coupled with the presence of subtle sexism, can create educational and professional environments that are threatening and unsupportive for women (e.g., Cheryan et al. 2009; Moss-Racusin et al. 2012; Murphy et al. 2007). Threatening environments can inhibit women's ability to perform up to their true potential and can lead to disengagement (Holleran et al. 2011; Kiefer and Sekaquaptewa 2007; Shapiro and Williams 2012; Stout et al. 2011).

In the present paper, we sought to extend research on social identity threat in two key ways. First, we test the hypothesis that legitimacy beliefs (e.g., Levin et al. 1998)—the belief that differences in outcomes between men and women in STEM fields are fair—serve as a risk factor for experiencing social identity threat and performance decrements in the presence of an allegedly sexist instructor. Second, whereas past research on social identity threat among women has primarily focused on the experiences of European American women, we also examined how social identity threat affects women from other ethnic backgrounds. More specifically, we sought to examine whether the impact of legitimacy beliefs and social identity threat on test performance is similar for women from ethnic groups that are overrepresented in STEM (European Americans and Asian Americans) and women from ethnic groups that are underrepresented in STEM (African Americans and Latina Americans).

1.1 Social identity threat

Women in STEM fields may encounter a variety of threats to their social identity, including fears of being a target of sexism, fears of confirming negative stereotypes

about women's abilities in STEM fields, and concerns about fitting in and being a numerical minority (e.g., Cheryan et al. 2009; Inzlicht and Ben-Zeev 2000; Murphy et al. 2007). Social identity threat can lead to a cascade of negative effects including decreases in working memory capacity and self-regulation and increases in physiological stress responses and vigilance (Inzlicht and Kang 2010; Schmader et al. 2008). Social identity threat can also interfere with the ability to perform difficult tasks and can lead women to underperform on difficult tests (Walton and Spencer 2009).

The most commonly studied form of social identity threat facing women in STEM fields is stereotype threat. Stereotype threat occurs when people encounter situations where they have the potential to confirm a negative stereotype about their group (Steele et al. 2002). In a seminal paper on stereotype threat, Spencer et al. (1999) demonstrated in a series of three experiments that when negative stereotypes about women's math abilities were salient, women performed more poorly on a math exam relative to conditions where stereotypes were explicitly refuted. Since the initial publication of the Spencer et al. (1999) paper, the negative impact of stereotype threat on women's math performance has been replicated numerous times (see Nguyen and Ryan 2008 for a meta-analysis).

In addition to the impact of negative stereotypes on performance, more general concerns about being the victim of sexism can also lead to decrements in performance. For example, Adams and colleagues introduced female participants to a male instructor who gave a tutorial on how to solve logic problems (Adams et al. 2006). While the instructor briefly stepped out of the room, a female confederate told the participant that the instructor "seemed kind of sexist". Compared to women who did not hear a comment about the instructor seeming sexist, women who heard the comment performed more poorly on a difficult logic test even though the instructor was unaware of the comment.

1.2 Legitimacy beliefs

Evidence that social identity threat contributes to women's underrepresentation and underperformance in STEM fields is abundant. However, there are other explanations for gender differences in STEM (see Ceci et al. 2009; Halpern et al. 2007 for reviews). For example, some people have argued that women's underrepresentation in STEM fields is influenced by biological differences (Ceci et al. 2009, p. 220) or differences in intrinsic aptitude (e.g., Summers 2005, para. 6). Other researchers have pointed to sociocultural explanations and gendered socialization practices as the primary forces that lead to the underrepresentation of women in STEM (e.g., Eccles 2011; Else-Quest et al. 2010). Lay theories about gender differences in STEM fields that are prevalent in many Westernized cultures, however, tend to essentialize gender differences and emphasize biological determinism as an explanation for existing differences (Morton et al. 2009). Moreover, essentialist explanations for gender difference that emphasize biological determinism increase both men's and women's acceptance of inequality (Morton et al. 2009). Depending upon how one explains gender differences in STEM fields, individuals may appraise

the differences between men and women in participation and performance in STEM fields as more or less legitimate.

Why might women endorse the belief that differences between men and women in STEM are legitimate when such beliefs appear to be contrary to their group's interest (Tajfel and Turner 1986)? First, stereotypes about women's abilities in STEM are ubiquitous and endorsed by men and women alike (Blanton et al. 2002; Schmader et al. 2004). If women believe that women have less ability than men, then they may believe that men deserve higher status STEM jobs or that women choose to pursue other fields more suited to their abilities. Consistent with this notion, Schmader et al. (2004, Study 1) found that stereotypes about gender differences in math ability were correlated with the belief that status differences between women and men in society are fair. Second, people are often motivated to believe that the social system is fair and that status differences between groups are legitimate (Jost and Banaji 1994; Sidanius and Pratto 1999). Beliefs that status differences are legitimate are endorsed by members of low status and high status groups alike (Levin et al. 1998). Thus, even though legitimacy beliefs may go against the best interests of their gender group, some women may nonetheless have a tendency to endorse them.

In the present paper, we sought to build upon past research by examining whether the belief that status differences between men and women in STEM are legitimate puts women at risk for experiencing social identity threat and its negative consequences. More specifically, we investigated whether legitimacy beliefs would lead to decrements in test performance when women encountered an allegedly sexist instructor (see Adams et al. 2006). Compared to women who reject status legitimizing ideologies, women who endorse status legitimizing ideologies tend to be more threatened when they encounter prejudice, in part because it violates their view that the world is a fair and just place (Foster and Tsarfati 2005; Foster et al. 2006; Major et al. 2007). When women had to interact with a sexist man, endorsement of status legitimizing ideologies was associated with greater threat as assessed by cardiovascular indices and more anxious behavior (Townsend et al. 2010). Furthermore, among women who endorse status legitimizing ideologies, perceived discrimination is positively correlated with resting blood pressure (Eliezer et al. 2011). Thus, there is considerable evidence that women who endorse legitimizing ideologies are particularly vulnerable to experiencing threat when faced with sexism.

1.3 Multiple stigmas

Women are not the only underrepresented group in STEM fields—African Americans, Latino/a Americans, and Native Americans are also underrepresented in STEM (NSF 2013). Collectively, these three groups constituted approximately 30 % of the US population in 2010. Yet, in the same year they earned <20 % of STEM bachelors' degrees and <10 % of STEM doctoral degrees (NSF 2013). Whereas women face social identity threat and negative stereotypes about their intellectual abilities in STEM, people from underrepresented ethnic groups face social identity threat and negative stereotypes about their intellectual abilities in

most academic domains more generally (Syed and Chemers 2011). Social identity threat can lead to underperformance on academic tests and disengagement from academics (Gonzales et al. 2002; Major et al. 1998; Schmader and Johns 2003; Steele et al. 2002).

Only a handful of studies have examined whether holding multiple stigmatized identities affects the magnitude of test performance decrements in response to social identity threat (Gonzales et al. 2002; Harrison et al. 2006; Tine and Gotlieb 2013). Moreover, the results of these studies have been inconsistent. Some research suggests that possessing two stigmatized identities puts one at increased risk for experiencing performance decrements relative to possessing one stigmatized identity (Gonzales et al. 2002), whereas other research suggested that possessing two stigmatized identities does not put one at increased risk (Harrison et al. 2006; Tine and Gotlieb 2013).

Research on multiple identities and intersectionality has grown over the past decade (e.g., Cole 2009; Purdie-Vaughns and Eibach 2008). However, we know of no studies that have examined whether legitimizing ideologies or the threat of having to interact with an allegedly sexist instructor have a similar impact on women from ethnic groups that are overrepresented in STEM contexts (e.g., European American and Asian American women) as compared to women from ethnic groups that are underrepresented in STEM contexts (e.g., African American and Latina American women). The current study included women from ethnic groups that are both overrepresented and underrepresented in STEM in order to address this issue.

1.4 Overview and hypotheses

In the current study, we recruited women from a variety of ethnic groups to listen to a logic tutorial presented by a man. Women were recruited via emails, flyers, and an online software used by students to sign-up for for psychology studies. We assessed legitimacy beliefs during an online pretest session prior to the experimental session. We randomly assigned women either to a condition in which a confederate mentioned that the tutor seemed sexist or to a control condition in which a confederate did not mention that the tutor seemed sexist (see Adams et al. 2006). After the tutorial, women took a difficult logic test. The primary hypothesis was that legitimacy beliefs would serve as a risk factor for experiencing social identity threat when women were threatened with sexism. That is, we predicted that legitimacy beliefs would interact with the sexism manipulation, such that legitimacy beliefs would be associated with poorer performance only when women were threatened with explicit cues to sexism (versus the control condition in which concerns about sexism were less salient).

We also examined whether the threat of sexism and legitimacy beliefs impact women from ethnic groups that are underrepresented in STEM in a similar manner as women from ethnic groups that are overrepresented in STEM. While most research has implicitly assumed that women from different ethnic backgrounds will respond to gender-related identity threat in a similar fashion, we sought to test this assumption directly. Alternate theoretical perspectives suggest different hypotheses

about how ethnicity would moderate the impact of the manipulation on test performance. On the one hand, women from underrepresented ethnic groups may be less likely to have alternative, positive self-relevant stereotypes to draw on (based on ethnicity) and therefore may be more vulnerable than women from overrepresented ethnic groups to the negative effects of sexism (e.g., Rydell et al. 2009). This "double-jeopardy" hypothesis (e.g., Beale 1970) suggests that ethnicity will interact with the threat manipulation such that women from underrepresented ethnic groups will be more affected by the sexism threat manipulation than women from overrepresented ethnic groups. On the other hand, ethnic identity is generally a more salient social identity than gender identity for women from underrepresented ethnic groups (e.g., Levin et al. 2002). According to this perspective, being a member of an underrepresented ethnic group may provide women with an alternate identity that buffers them from the negative effects of the threat of sexism. This intersectionality hypothesis suggests that women from underrepresented ethnic groups will be less affected by the threat manipulation than women from overrepresented ethnic groups.

2 Method

2.1 Participants

Participants consisted of 267 women attending one of three universities: a private Primarily White Institution (PWI) in the South (N = 119), a private Historically Black College/University (HBCU) in the South (N = 48), or a public, ethnically diverse university in the West (N = 100).[1] Out of the original sample, 10 participants were removed for suspicion and 16 participants were removed for various other reasons including computer malfunction and experimenter error. Of the remaining 241 participants, 103 identified as Caucasian/European American, 50 identified as Black/African American, 47 identified as Hispanic/Latina, 17 identified as Asian/Asian American, and 24 identified as other or multiple ethnicities. We categorized participants who identified as Asian American, European American, or both Asian and European American as being from an overrepresented ethnic group (N = 122). We categorized all remaining participants as being from an underrepresented ethnic group (N = 119). Participants' reported age ranged from 16 to 49 years of age (M = 20.44, SD 3.83).

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[1] Because ethnicity is confounded with institution (e.g., only Black/African American women attended the HBCU) it is impossible to completely disentangle the effects of ethnicity and institution. We conducted a hierarchical regression analyses predicting logic test performance in which the main effects of institution (dummy-coded), the sexism manipulation, and legitimacy beliefs were entered on Step 1, the two-way interactions were entered on Step 2, and the three-way interactions were entered on Step 3. Step 1 was significant, $R^2 = .35$, $F (4, 236) = 31.50$, $p < .001$. Compared to the participants at the PWI (M = 10.93), participants at both the HBCU (M = 7.27), $\beta = -.32$, $p < .001$, and the ethnically diverse public university (M = 5.34), $\beta = -.61$, $p < .001$, performed more poorly on the logic test. The main effects of the manipulation and legitimacy beliefs were not significant. Moreover, the addition of the two-way interactions at Step 2, and the three-way interactions at Step 3 were not significant.

2.2 Procedure

Prior to arrival at the laboratory, participants completed online pretest measures including the measure of legitimacy beliefs about gender differences. After completing the pretest measure, participants were individually scheduled to come into the laboratory for a 1-h session. The laboratory session procedures were modified and adapted from Adams et al. (2006). Upon arrival at the laboratory, an experimenter greeted participants and explained that the study was about determining what types of teaching strategies are most effective. The experimenter told participants that they would be assigned to a tutorial strategy and then asked to complete a logic test.[2] Furthermore, the experimenter explained that the previous participant had arrived late, was finishing up, and that the participant should go ahead and walk into the testing room.

When the participant walked into the testing room, the male tutor was seated with a female confederate who was posing as the previous participant. The tutor told the participant to have a seat and then he left the room, allegedly to get a form for the confederate to sign. At this point, the confederate engaged in scripted small talk with the participant. In the Sexist Instructor condition, the confederate stated that the study was not bad and then said, in reference to the tutor, "I think I actually learned something even if he did seem sexist". In the Control condition, the confederate made the same comment except that she omitted the reference to the tutor seeming sexist. At this point, the confederate sent a text message to the tutor to let him know that the manipulation was complete. In this way, the tutor was kept blind to the experimental condition.

Next, the tutor returned to the room with a form for the confederate to sign and then dismissed the confederate. Then, the tutor proceeded to deliver a scripted tutorial on how to complete logic problems. The tutorial consisted of two sample problems taken directly from older versions of the Graduate Management Admission Test (GMAT). The length of the tutorial was approximately 10 min (see Adams et al. 2006, for additional details). Once the tutorial was complete, the tutor reintroduced the experimenter who carried out the remainder of the study. The experimenter told the participant that she would have 25 min to complete the logic test on the computer. After the logic test was complete, the experimenter asked the participant to fill out some additional measures. Once the participant completed all forms, the experimenter carefully debriefed participants and probed them for suspicion.

The ethnicity of the experimental staff (i.e., the experimenter, tutor, and confederate) matched the demographics of each respective campus. Thus, the experimental staff at the PWI was European American, the experimental staff at the HBCU was African American, and the experimental staff at the ethnically diverse public university included European American, African American, and Latino/a

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[2] In addition, participants were randomly assigned to one of three conditions in which they were told that the logic test was indicative of ability in the fields of physics, biology, or English. However, this manipulation of academic domain did not have a significant effect, nor did it interact with any of the other variables. In debriefing, many participants expressed skepticism about the validity of this information.

individuals. The ethnicity of the experimental staff is an important theoretical and procedural issue to which we return in the discussion.

2.3 Measures

The primary measures in the present study were participants' legitimacy beliefs and their logic test performance. In addition, participants rated the competence of the tutor and their experience of the test setting, which we included for purposes of comparison with past research that found participants who interacted with an allegedly sexist instructor rated him as less competent and rated their experience of the instructional setting more negatively (Adams et al. 2006).

2.3.1 Legitimacy beliefs

Participants' beliefs about the legitimacy of gender differences in STEM was assessed with five items: *Negative treatment of women in scientific fields is justifiable; Status differences between men and women in math and science are fair; The salary gap between men and women in scientific careers is the result of different life choices*; *It is unfair that men have greater access to high-status scientific careers than women;* and *There is a good reason that men are more respected in fields related to science, technology, engineering, and mathematics*. Items were adapted from Levin et al. (1998). Participants indicated their agreement with each statement on a 0–6 Likert type scale where 0 was labeled *strongly disagree* and 6 was labeled *strongly agree*. The scale demonstrated acceptable reliability ($\alpha = .74$).

2.3.2 Logic test performance

The logic test consisted of four scenarios with six items each for a total of 24 multiple choice items (see Adams et al. 2006). For each question, participants chose the correct answer out of 5 possible answers. The logic test was originally adapted from the analytical sections of past GMAT exams. A typical administration allows participants 35 min to complete the items; however, participants were only given 25 min to complete it in order to increase the difficulty of the test. Participants received one point for each item they answered correct and had 1/5th of a point deducted for each question they attempted but answered incorrectly (see Spencer et al. 1999). In this way, participants' score on the logic test corrects for guessing.

2.3.3 Tutor competence

Participants were asked *To what extent do you think the tutorial instructor was competent?* Participants responded on a 0–6 scale where 0 was labeled *Not at all* and 6 was labeled *Extremely*.

2.3.4 Experience of setting

Participants used a 0–6 Likert type scale to rate their experience of the instructional setting for the tutorial on four items: *friendly, comfortable, instructive,* and *hurried* (reverse scored). This measure had adequate reliability ($\alpha = .60$).

3 Results

3.1 Analysis strategy

We mean centered legitimacy beliefs prior to conducting analyses. There was no significant difference in legitimacy beliefs of women from overrepresented and underrepresented ethnic groups, $F < 1$. For each dependent variable, we conducted hierarchical regression analyses. We entered the main effects of the sexism manipulation (control = −.5; sexism = .5), ethnicity (underrepresented = −.5 and overrepresented = .5), and legitimacy beliefs on Step 1; all possible two-way interactions on Step 2; and the three-way interaction on Step 3. See Table 1 for means and standard deviations on all study measures.

3.2 Logic test performance

Step 1 of the regression analysis was significant, $R^2 = .20$, $F (3, 237) = 19.52$, $p < .001$ (see Table 2). Participants from overrepresented ethnic groups performed better than participants from underrepresented ethnic groups, B = 3.78, $p < .001$. The main effects of the sexism manipulation and legitimacy beliefs were both nonsignificant, $ps > .16$. Step 2 of the regression analysis was nonsignificant, $\Delta R^2 = .01$, $F < 1$. However, Step 3 of the regression analysis was significant, $\Delta R^2 = .04$, $F (1, 233) = 10.67$, $p < .01$, indicating a three-way interaction between the sexism manipulation, ethnicity, and legitimacy beliefs, B = −3.23, $p < .01$ (see Fig. 1).

To interpret this interaction, we conducted simple slopes analyses for participants from the overrepresented ethnic groups and the underrepresented ethnic groups separately. Among participants from overrepresented ethnic groups, the sexism manipulation by legitimacy beliefs interaction was significant, B = −1.67, $p < .05$. Consistent with the primary hypothesis, there was a negative relationship between legitimacy beliefs and performance that was evident only in the Sexist Instructor condition, B = 1.50, $p < .01$. There was no relationship between legitimacy beliefs and performance in the Control condition, B = .17, $p = .74$. That is, legitimacy

Table 1 Means and SD for study variables		M	SD
	Legitimacy beliefs	1.41	1.05
	Logic performance	8.24	4.40
	Instructor competence	4.51	1.28
	Experience of setting	3.95	1.06

Table 2 The effect of ethnicity, legitimacy beliefs, and the sexism manipulation on logic test performance

	B	SE	β
Step 1: $\Delta R^2 = .20$, $F (3, 237) = 19.52$, $p < .001$			
(Constant)	8.23	.26	
Ethnicity	3.78	.51	.43***
Legitimacy beliefs	−.34	.25	−.08
Sexism manipulation	.61	.52	.07
Step 2: $\Delta R^2 = .01$, $F < 1$			
(Constant)	8.21	.26	
Ethnicity	3.75	.52	.43***
Legitimacy beliefs	−.36	.25	−.09
Sexism manipulation	.65	.52	.07
Ethnic X legitimacy	−.45	.50	−.05
Ethnic X sexism	−1.41	1.04	−.08
Legitimacy X sexism	.23	.50	.03
Step 3: $\Delta R^2 = .04$, $F (1, 233) = 10.67$, $p < .01$			
(Constant)	8.26	.25	
Ethnicity	3.54	.51	.40***
Legitimacy beliefs	−.44	.25	−.11
Sexism manipulation	.53	.51	.06
Ethnic X legitimacy	−.44	.49	−.05
Ethnic X sexism	−1.41	1.02	−.08
Legitimacy X sexism	−.05	.49	−.01
Ethnic X legitimacy X sexism	−3.23	.99	−.19**

* $p < .05$, ** $p < .01$, *** $p < .001$

beliefs increased the risk of experiencing performance decrements in the presence of an allegedly sexist instructor among women from overrepresented ethnic groups.

Next, we examined women from underrepresented ethnic groups. The sexism manipulation by legitimacy beliefs interaction was significant, B = 1.56, $p < .05$. In the Control condition, there was an unpredicted negative relationship between legitimacy beliefs and performance, B = −1.00, $p < .01$, such that the more legitimate participants thought gender differences were, the worse their performance. However, in the Sexist Instructor condition, this relationship was not significant, B = .56, $p = .18$. Thus, unlike women from overrepresented ethnic groups, legitimacy beliefs did not increase the risk of poor performance in the presence of an allegedly sexist male instructor among women from underrepresented ethnic groups. Instead, legitimacy beliefs increased the risk of poor performance in the presence of a male instructor in the Control condition when there were no explicit cues to sexism.

3.3 Experimenter competence

Step 1 of the regression analysis was significant, $R^2 = .05$, $F (3, 237) = 3.71$, $p < .05$ (see Table 3). Consistent with previous research (Adams et al. 2006),
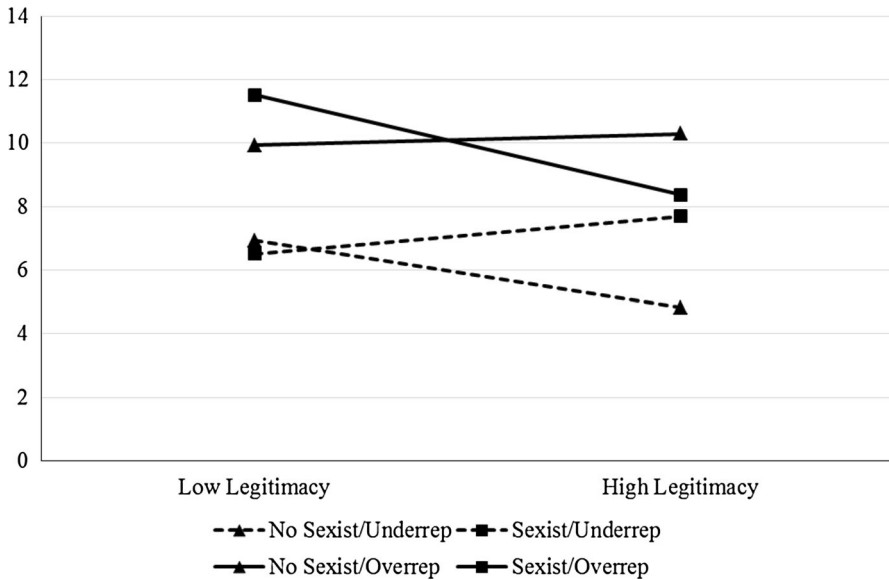
Fig. 1 The relationship between legitimacy beliefs and test performance as a function of experimental condition for women from ethnic groups that are overrepresented or underrepresented in STEM

participants in the Sexist Instructor condition rated the instructor as less competent than participants in the Control condition, B = −.36, $p < .05$. In addition, there was an unanticipated effect of ethnicity, B = −.42, $p < .05$, such that participants from underrepresented ethnic groups rated the instructor as more competent than participants from overrepresented ethnic groups. The effect of legitimacy beliefs was not significant, B = −.07, $p = .38$. Neither Step 2 nor Step 3 was significant, ps > .80.

3.4 Experience of setting

Step 1 of the regression analysis was significant, $R^2 = .04$, $F (3, 237) = 3.18$, $p < .05$ (see Table 4). Consistent with Adams et al. (2006), participants in the Sexist Instructor condition experienced the setting less positively than participants

Table 3 The effect of ethnicity, legitimacy beliefs, and the sexism manipulation on experimenter competence

	B	SE	β
Step 1: $\Delta R^2 = .05$, $F (3, 237) = 3.71$, $p < .05$			
(Constant)	4.51	.08	
Ethnicity	−.42	.16	−.17*
Legitimacy beliefs	−.07	.08	−.06
Sexism manipulation	−.36	.16	−.14*

The results of Steps 2 and 3 were both nonsignificant and thus are not included in the table

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4 The effect of ethnicity, legitimacy beliefs, and the sexism manipulation on experience of setting

	B	SE	β
Step 1: $\Delta R^2 = .04$, $F (3, 237) = 3.18$, $p < .05$			
(Constant)	3.95	.07	
Ethnicity	−.36	.14	−.17**
Legitimacy beliefs	−.04	.07	−.04
Sexism manipulation	−.24	.14	−.11

The results of Steps 2 and 3 were both nonsignificant and thus are not included in the table

* $p < .05$, ** $p < .01$, *** $p < .001$

in the Control condition, B = −.24, $p = .08$, although this difference was only marginally significant. In addition, there was an unpredicted significant effect of ethnicity, B = −.36, $p < .05$, such that participants from underrepresented ethnic groups experienced the setting more positively than participants from overrepresented ethnic groups. The effect of legitimacy beliefs was not significant, B = −.04, $p = .57$. Neither Step 2 nor Step 3 was significant, $ps > .41$.

3.5 General discussion

There are large status differences between women and men in STEM fields. Compared to men, women are less likely to hold positions as tenured professors in STEM fields, are more likely targeted by negative stereotypes about their scientific abilities, and are more likely to be treated negatively or ignored (e.g., Hill et al. 2010; Moss-Racusin et al. 2012; Nosek et al. 2009). The present research examined whether believing that these status differences between men and women in STEM fields are legitimate put women at risk for experiencing social identity threat. More specifically, the present study tested the hypothesis that legitimacy beliefs would put women at risk for poor performance on a logic test after interacting with a male instructor who another woman described as sexist.

Among women from overrepresented ethnic groups, there was strong support for the hypothesis. That is, among European and Asian American women, endorsement of legitimacy beliefs was negatively related to test performance when another woman remarked that their instructor seemed sexist. However, this relationship between legitimacy beliefs and test performance disappeared in the control condition when women had no explicit cue that their instructor was sexist. Thus, if the present study had only included women from overrepresented ethnic groups, the data would have provided unambiguous support for the hypothesis.

The pattern of results among women from underrepresented ethnic groups, however, was markedly different and did not support the hypotheses. Among African and Latina American women, endorsement of legitimacy beliefs was negatively related to test performance under control conditions where a male instructor was present, but there was no explicit threat of sexism. However, this relationship between legitimacy beliefs and performance disappeared when another woman remarked that the instructor seemed sexist.

There are a number of potential explanations for differences in the relationships between legitimacy beliefs and test performance among women from underrepresented ethnic groups as compared to women from overrepresented ethnic groups. Legitimacy beliefs about gender differences in STEM may mean something very different to these two groups of women. Past research that has focused primarily on European American women suggests that women who endorse legitimacy beliefs think that sexism is rare and do not expect to personally encounter sexism. When they do encounter explicit evidence of sexism, however, they react with threat (Eliezer et al. 2011; Foster and Tsarfati 2005; Major et al. 2007; Townsend et al. 2010).

Whereas the reactions of women from overrepresented ethnic groups to the threat of sexism fit neatly into existing theoretical frameworks (e.g., Adams et al. 2006; Eliezer et al. 2011; Foster and Tsarfati 2005; Townsend et al. 2010), the reactions of women from underrepresented ethnic groups are more puzzling. It is possible that, in contrast to women from overrepresented ethnic groups, women from underrepresented ethnic groups who endorse legitimacy beliefs may not necessarily view sexism as rare. In fact, it is possible that they have more chronic concerns about being a victim of sexism which are activated in the presence of a male instructor even if there is not an explicit indication that he is sexist (e.g., see Kiefer and Sekaquaptewa 2007, for a similar argument).

If women from underrepresented minority groups are more likely to have chronic concerns about sexism, hearing another women refer to an instructor as sexist may not violate their expectations. In fact, labeling the instructor as sexist could reduce the ambiguity of the situation, provide an external attribution in the event of a poor performance, or shift the focus away from their ethnic identity to their gender identity (e.g., Major et al. 2002). Ultimately, however, the reasons for the different response to the explicit threat of sexism among women from overrepresented as compared to underrepresented ethnic groups are unclear. The present research points to the need for the development of theories that can account for varied responses to sexism among women from different ethnic background groups (see also Cole 2009; Purdie-Vaughns and Eibach 2008).

The present research extends past research on the psychological ramifications of interacting with an allegedly sexist instructor which has important implications for educational settings (Adams et al. 2006). First, whereas past research focused on demonstrating that interacting with a male instructor who is suspected of sexism can harm test performance, the present study suggests that factors such as one's ethnicity and endorsement of legitimacy beliefs can moderate this effect. Second, the present study showed that, regardless of ethnicity and legitimacy beliefs, women viewed the instructor as less competent and had a less positive experience in the instructional setting when they were led to believe their instructor was sexist. Given that sexism by faculty in STEM fields remains a problem with serious ramifications for women (e.g., Moss-Racusin et al. 2012), it is important to gain a comprehensive understanding of women's reactions when they believe their instructor is sexist.

3.6 Limitations and future directions

Legitimacy beliefs about gender differences between men and women in STEM fields predicted decrements in performance, although the contexts under which this relationship emerged were different for women from overrepresented ethnic groups as compared to underrepresented ethnic groups. It is important to note that endorsement of legitimacy beliefs was generally very low. That is, on average women tended to reject the belief that gender differences between men and women in STEM fields are legitimate. We assessed legitimacy beliefs about gender differences in STEM in a manner consistent with how past researchers have measured and conceptualized legitimacy beliefs (e.g., Eliezer et al. 2011; Levin et al. 1998; Townsend et al. 2010). However, given that endorsement of legitimacy beliefs was weak, it may be more accurate to conceptualize *rejection* of legitimacy beliefs as a source of resilience as compared to conceptualizing *endorsement* of legitimacy beliefs as a risk factor. Given the different patterns of results for women from underrepresented and overrepresented ethnic groups, the present research also points to a need for research assessing measurement equivalence and whether legitimacy beliefs about gender differences in STEM have the same meaning for women from different ethnic backgrounds.

A key goal of the present research was to recruit an ethnically diverse sample of women in order to examine whether being a member of an overrepresented or underrepresented ethnic group moderates women's reactions to interacting with a sexist male. We chose to compare the responses of women from overrepresented ethnic groups to underrepresented ethnic groups because women from underrepresented ethnic groups face multiple stigmas in STEM domains which may alter their qualitative experience of gender discrimination (e.g., Cole 2009; Hill et al. 2010; Hurtado et al. 2011; Purdie-Vaughns and Eibach 2008; Shih et al. 2002; Syed and Chemers 2011). That is not to say, however, that there are not important differences in the experiences of women from different overrepresented ethnic groups (e.g., Asian American vs. European American) and from different underrepresented ethnic groups (e.g., African Americans vs. Latina Americans). In an ideal world, we would have recruited enough women from each ethnic group to also test for differences within the overrepresented and underrepresented groups separately. The present study points to the need to recruit even more ethnically diverse samples in order to fully understand women's responses to the threat of sexism.

In the present study, we made a decision to match the ethnicity of experimental staff (i.e., the experimenter, instructor, and confederate) to the ethnicity of the respective campuses. One could argue that, in an ideal experiment, the ethnicity of the experimenter, tutor, and confederate would all match the ethnicity of the participant in order to ensure that ethnic identity was minimally salient. However, this was not feasible in the context of a study being conducted across three separate campuses with varying degrees of ethnic diversity. In addition, in some cases, this would have raised a high degree of suspicion among participants (e.g., an Asian participant on a primarily White campus would likely have been suspicious if they encountered an Asian experimenter, confederate, and tutor in the experiment). For

these reasons, we decided to match the ethnicity of the experimenter, tutor, and confederate to the demographics of the respective campuses. Although this procedural decision may have introduced additional noise into the data, it is important to note that ethnicity of the experimental staff mimicked the real world conditions that participants experience on a daily basis. An important question for future research will be to examine whether the threat of sexism has a different impact on women when interacting with men from the same or a different ethnic background.

4 Conclusion

Despite advances in some key areas, women continue to have lower status than men in STEM fields. Moreover, some individuals believe that these status differences between women and men have some legitimacy. While overall endorsement of legitimacy beliefs is low, the present research suggests that legitimacy beliefs can put women at risk for experiencing social identity threat in educational settings with a male instructor. Importantly, however, the negative relationship between legitimacy beliefs and social identity threat only emerged in some contexts and was moderated by both cues to sexism in the educational setting and whether women were from overrepresented or underrepresented ethnic groups. The results of the current study serve as a cautionary tale against generalizing the results of research on the threat of sexism conducted with predominantly European American samples to women from underrepresented ethnic groups. The present research points to the need for the development of theoretical perspectives that can account for the ways that sexism is experienced by women from different backgrounds.

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