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Girls' and Women's Preferred Methods of Coping with Gender Bias in STEM

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ABSTRACT
Although gender bias is likely to present challenges for some girls and women in STEM fields, little is known about the coping methods that girls and women prefer to utilize when confronted with such bias. This merits additional study, given that coping responses have been linked to career-related outcomes. Hence, the current research was designed to examine the extent to which girls and women endorse various coping strategies in response to gender bias in STEM. Predictors of active versus passive coping strategies were also assessed. Participants included 328 girls and women who aspired to obtain STEM degrees. They were presented with a vignette describing gender bias that occurred within a STEM context. After seeing the vignette, participants rated their likelihood of utilizing eight forms of active and passive coping. Results indicated that active coping strategies (e.g., seeking support) were preferred to passive coping strategies (e.g., denial). Results also showed that coping varied on the basis of participant background characteristics, features of the educational context, and STEM-related beliefs. For instance, participants who were Asian American, Latina, or low in STEM value were especially likely to endorse passive coping strategies. Discussion focuses on implications for coping research and intervention.

KEYWORDS
coping; sexism; STEM; adolescence; emerging adulthood; gender

Girls' and Women's Preferred Methods of Coping with Gender Bias in STEM

For many years, women in the United States were under-represented in the general workforce and in a variety of specific occupations. Although women have made inroads in recent years into some male-dominated fields, such as law and medicine, they remain under-represented in many fields related to science, technology, engineering, and math (STEM; AAUW, 2010; NSF, 2012). Potential causes of the gender imbalance in STEM include gendered socialization practices, stereotype threat, work–family conflict, and gender bias (i.e., negative attitudes and treatment directed at girls and women in STEM). The current study focuses on gender bias, while acknowledging that gender disparities in STEM most likely originate from a variety of interrelated factors (for a review, see Halpern et al., 2007).

Although evidence suggests that gender bias presents challenges for at least some girls and women in the STEM fields (e.g., Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012), little is known about the coping strategies that girls and women prefer to utilize after experiencing gender bias. This merits additional study because coping strategies have been linked to wellbeing and career-related outcomes such as productivity and retention (Chan, Lam, Chow & Cheung, 2008; Folkman, Lazarus, Dunkel-Schetter, DeLongis & Gruen, 1986). In particular, active coping (e.g., seeking support) tends to be associated with more positive outcomes, whereas passive coping (e.g., denial) tends to be associated with more negative outcomes. Accordingly, girls and women who utilize passive coping methods after experiencing gender bias in STEM may be susceptible to reduced academic performance or attrition, whereas their counterparts who utilize active coping methods may be protected from these outcomes.

The current study had two main goals, which were assessed in a sample of girls and women who aspired to pursue careers in STEM fields. The first goal was to shed light on the extent to which participants endorse various forms of active and passive coping in response to gender bias in STEM. The second goal was to identify variables that are associated with girls' and women's likelihood of endorsing active versus passive coping responses. Specifically, predictor variables considered in the present study include background characteristics (e.g., ethnicity), features of the educational context (e.g., field of study), and STEM-related beliefs (e.g., valuing of STEM). The rationale for considering these predictors is described in more detail below.

BACKGROUND

Gender Bias in STEM: An Overview of the Evidence

Most researchers agree that gender bias was once pervasive in STEM fields. Although the prevalence of gender bias in STEM has likely declined in recent decades, research suggests that it has yet to be fully eradicated (Leaper & Brown, 2008; Moss-Racusin et al., 2012). Notably, evidence of gender bias in STEM can be found in both qualitative and quantitative research, and it has also been

documented across disparate samples and educational contexts. For example, in survey-based research carried out with adolescents, Leaper and Brown (2008) found that the majority of girls in their sample had experienced gender bias in STEM at least once. In addition, qualitative research that focuses on undergraduate and graduate students illustrates that some women who pursue STEM degrees face barriers that can be directly traced to their gender and other background characteristics that interact with gender (Carlone & Johnson, 2007; Herzig, 2004). Lastly, a recent experimental study demonstrated that faculty members in STEM departments differentially evaluated women's and men's applications for a lab manager position, such that the men were evaluated as more hirable than the women even though the job candidates had identical résumés (Moss-Racusin et al., 2012). Collectively, these convergent findings provide a counterpoint to the argument that evidence of gender bias in STEM can be attributed to methodological artifacts or idiosyncratic samples (e.g., Ceci, Ginther, Kahn & Williams, 2014).

The Importance of Coping

Experiencing discrimination is associated with negative consequences for health as well as with poorer academic and career outcomes (Chan et al., 2008; Folkman et al., 1986). For instance, a meta-analysis carried out by Chan and colleagues (2008) illustrated that experiencing harassment is associated with both psychological and physical ailments; in addition, findings showed that women who experienced harassment at work had lower levels of commitment to their organization and reduced job satisfaction. Parallel findings have been obtained among women in STEM domains. For example, research carried out with female faculty members in university science departments indicated that experiencing gender bias was associated with decreased job satisfaction (Settles, Cortina, Malley & Stewart, 2006). In addition, Brown and Leaper (2010) found that adolescent girls who experienced gender bias in STEM domains were more likely than other girls to have low self-concept in math and science.

Although the implications of experiencing gender bias appear to be negative, Folkman and colleagues (1986) noted that one's preferred coping method can either mitigate or exacerbate the severity of these implications. For example, Foster (2009) found that after experiencing discrimination, women's psychosocial outcomes varied depending on their choice of coping method. Specifically, women who utilized inactive coping strategies (e.g., acceptance) after encountering discrimination showed decreased wellbeing one year later. Other research suggests that coping strategies that involve confronting the perpetrator can reduce discriminatory behavior and attitudes (Czopp, Monteith & Mark, 2006). However, it is important to keep in mind that members of stigmatized groups (e.g., women or ethnic minorities) may not feel comfortable utilizing confrontational methods owing to the threat of interpersonal or organizational backlash (e.g., Czopp et al., 2006; Wasti & Cortina, 2002).

The eight coping methods considered in the current study can be classified into two higher-order coping strategies: active and passive. *Active coping* focuses on eliminating the stressor or reducing its emotional impact, whereas *passive coping* focuses on accepting the stressor (Folkman et al., 1986; Hall, Everett & Hamilton-

Mason, 2012). Active coping strategies in response to encountering gender bias in STEM might include reporting the incident to a faculty member or seeking support from other STEM students. Conversely, passive coping strategies might include avoiding the perpetrator or denying that the incident constituted unfair treatment.

One's choice of coping strategy can vary on the basis of context and culture (Cortina & Wasti, 2005; Folkman et al., 1986; Wasti & Cortina, 2002). As described below, the current research took context into account by examining whether the findings differed for participants in different phases of education or areas of study. We also tested for variation as a function of ethnic background by comparing the coping preferences of Asian American, European American, and Latina participants.

Predictors of Active and Passive Coping

Beyond assessing the prevalence of various coping responses, the current study also aimed to identify predictors of active and passive coping. A brief overview of each predictor variable is provided below. The predictors are organized according to whether they reflect *background characteristics*, features of the *educational context*, or *STEM-related beliefs*. After this background information has been provided, the research questions and hypotheses assessed in the current study are described.

Background characteristics

It was expected that two background characteristics would contribute to participants' preferred coping responses. First, ethnic background was included as a predictor in the regression models because prior research illustrates that gender-role ideologies vary on the basis of ethnicity (e.g., Harnois, 2005; Kane, 2000), which may lead to disparities in how women of differing ethnic backgrounds respond to gender bias. In addition, Wasti and Cortina (2002) argued that women from collectivist cultures may be more likely than women from individualist cultures to engage in passive coping methods such as denial. Thus, in the current study, Asian American and Latina participants were expected to endorse passive coping to a greater extent than were participants from other ethnic backgrounds.

The second background characteristic that was considered in the current research was parental education level. Prior research suggests that parents who have greater experience with formal schooling are more likely than other parents to raise daughters with egalitarian views pertaining to gender (e.g., Ex & Janssens, 1998). For this reason, it was hypothesized that participants whose parents had higher levels of education would be more likely to endorse active coping in response to gender bias.

Features of the educational context

Recent reviews have noted that specific STEM fields (e.g., biology vs. physics) may differ from one another with regard to their norms and the types of challenge that women typically encounter (e.g., Ceci et al., 2014; Wang & Degol, 2013). Therefore, two features of the educational context were included as predictors in the current research: participants' phase of education (high school, college, graduate school) and their area of study (life sciences vs. math-intensive). Women

become more poorly represented in STEM fields as they progress from one phase of education to the next, and women also tend to be more poorly represented in math-intensive fields than they are in the life sciences (AAUW, 2010; NSF, 2012). This is noteworthy, given that women may be less likely to use active coping if they are strongly outnumbered by men in their workplace (e.g., Cortina & Wasti, 2005). Therefore, it was expected that participants in graduate school and participants in math-intensive fields of study would be more likely than other participants to endorse passive coping and less likely to endorse active coping.

STEM-related beliefs

The final set of predictors included two STEM-related beliefs. First, participants' perceptions of the severity of gender bias in STEM were assessed. We reasoned that participants who viewed gender bias as a fairly serious problem would be especially likely to endorse active coping. Conversely, we anticipated that participants who viewed gender bias as a less serious problem would be especially likely to endorse passive coping. This reasoning was derived from research indicating that awareness of inequality may be associated with a greater likelihood of using active coping methods after encountering gender bias (e.g., Jaschik-Herman & Fisk, 1995; Swim & Hyres, 1999).

The current study also examined whether participants' preferred coping methods were associated with their valuing of STEM. According to expectancy–value theory (Eccles & Wigfield, 2002), the extent to which individuals value and enjoy a given academic domain contributes to their likelihood of eventually pursuing a career in that field. Accordingly, girls and women who value STEM highly are likely to be strongly committed to obtaining a degree or career in STEM fields of study. For these girls and women, gender bias may be perceived as particularly unjust, which may contribute to an enhanced likelihood of endorsing active coping methods. Conversely, girls and women who value STEM less may be less invested in obtaining a degree or career in STEM, which may in turn relate to a greater likelihood of endorsing passive coping.

The Present Study

As noted, the current study was designed to assess girls' and women's preferred methods of coping with gender bias in STEM fields. Specifically, participants were presented with a vignette that described overt forms of gender bias perpetrated by their male peers in STEM. They were then asked to consider how they would respond. Given the dearth of research in this domain, two exploratory research questions were examined first:

> RQ1: When presented with a vignette that describes gender bias perpetrated within a STEM context, which coping responses do girls and women most strongly endorse?
>
> RQ2: Do participants' preferred coping responses differ on the basis of their ethnicity, phase of education, or area of study?

Beyond assessing the prevalence of different forms of coping, the current study also aimed to identify predictors of endorsing active and passive coping. On the basis of the research described above, the following hypotheses were advanced:

H1: Endorsement of *active coping* will be significantly associated with participants' background characteristics, features of the educational context, and STEM-related beliefs. In particular, endorsement of active coping was expected to be associated with higher parental education, the belief that gender bias is a problem in STEM fields, and higher STEM value. In addition, European American women were expected to endorse active coping to a greater degree than were their Asian American and Latina counterparts. Lastly, active coping was anticipated to be more strongly endorsed among participants who were less severely under-represented within their educational context (i.e., participants in high school/college; participants in the life sciences).

H2: Endorsement of *passive coping* will be significantly associated with participants' background characteristics, features of the educational context, and STEM-related beliefs. In particular, endorsement of passive coping was expected to be associated with lower parental education, the belief that gender bias in STEM is not a problem, and lower STEM value. In addition, Asian American and Latina women were expected to endorse passive coping to a greater degree than were their European American counterparts. Lastly, passive coping was anticipated to be more strongly endorsed among participants who were more severely under-represented within their educational context (i.e., participants in graduate school; participants in math-intensive fields).

METHOD

Participants

High school

Girls were recruited from two high schools in the Western United States. Preliminary analyses illustrated that girls from the two high schools did not differ in mean levels of the variables examined in the current study. Four hundred girls participated, but analyses focused on a subset of girls who reported that they were interested in pursuing a STEM major in college. Specifically, the final sample included 105 girls whose mean age was 16.55 years (*SD* = .95). Participants predominantly identified as European American (48%); other ethnic groups that were represented include Asian American (34%), Latina (14%), and Multiple/Other (4%). Most participants (63%) planned to pursue a major in the life sciences; the remainder (37%) planned to pursue a major in math-intensive fields (i.e., the physical sciences, computer science, engineering, or math).

Undergraduate

Women who were majoring in STEM at a university in the Western United States were recruited through emails, course announcements, and flyers. In total, 121 women participated. Their mean age was 20.28 years (*SD* = 1.74). Participants predominantly identified as European American (42%); other ethnic groups that

were represented include Asian American (23%), Latina (18%), and Multiple/Other (17%). Approximately half of the participants (51%) were pursuing degrees in the life sciences; the remainder (49%) were pursuing degrees in math-intensive fields.

Graduate
Women who were pursuing STEM doctoral degrees at a university in the Western United States were recruited through emails, course announcements, and flyers. All participants received gift certificates that ranged in value from $10 to $20. In total, 102 women participated. Their mean age was 28.36 years (*SD* = 5.05). Participants predominantly identified as European American (62%); other ethnic groups that were represented include Asian American (19%), Latina (9%), and Multiple/Other (10%). Most participants (70%) were pursuing degrees in math-intensive fields; the remainder (30%) were pursuing degrees in the life sciences.

Procedure
Participants completed a survey that included questions about their experiences, achievement, goals, and self-views in STEM domains. Girls in high school completed the survey in person, whereas women in college and graduate school completed the survey online. Most participants finished the survey within 30 to 40 minutes.

Measures
Parent education
Participants separately rated their mother's and father's highest level of education on a scale ranging from 1 (*Elementary school*) to 7 (*Graduate degree*). Participants could also indicate *Unsure* if they did not know their parents' level of education. When participants provided information about both parents, these values were averaged to create a composite parent education variable.

Field of study
The current study distinguished between the life sciences and math-intensive STEM fields, which is a distinction that has been made in prior theoretical and empirical work (e.g., Ceci & Williams, 2010; Sonnert, Fox & Adkins, 2007). In order to classify high school students according to their field of study, participants were asked to select their preferred college major from a list of 50 possible majors. (As noted earlier, students who selected a non-STEM major were not included in the current study.) College and graduate students were classified according to their current field of study. Disciplines such as biology and ecology were classified as *life sciences*, whereas disciplines such as physics, math, engineering, and computer science were classified as *math-intensive*.

STEM value
STEM value was assessed with a scale developed by Eccles and Wigfield (2002). This scale is composed of seven items, which were each rated on a 4-point scale. Examples include the following: "How important is it to you to do well in your science courses?" (1 = *Not important*, 4 = *Very important*) and "Is the amount of effort it takes to do well in science courses worthwhile to you?" (1 = *Not worthwhile*, 4 = *very worthwhile*). Internal reliability for the measure was acceptable (α = .69).

Perceptions of gender bias in STEM
A single question assessed participants' perceptions of gender bias in STEM. Specifically, participants were provided with a brief definition of gender bias (see Leaper & Brown, 2008). Following the definition, the survey explained that "some individuals think that gender bias is a problem in STEM fields, whereas others do not." Participants were then asked about their own views with the following question: "In your opinion, how serious a problem is gender bias in the field of science?" Participants could respond on a scale ranging from 1 (*Not at all serious*) to 5 (*Very serious*).

Coping with gender bias in STEM
Participants' preferred method of coping with gender bias in STEM was assessed by providing them with a vignette that described several instances of gender bias. The elements of the vignette were derived from prior research that has identified the types of gender bias that girls and women are likely to encounter in STEM (e.g., Herzig, 2004; Leaper & Brown, 2008; Settles, Cortina, Buchanan & Miner, 2013). The purpose of providing a vignette, rather than asking participants to imagine their own example of gender bias, was to ensure that participants had a standardized understanding of how *gender bias* was being defined in the current study (see Leaper & Arias, 2011). The vignette is provided in full below.

> Imagine that you are taking a difficult science class that is very important for your future success in science. You are one of the only women [girls] in your class. Over time, you notice that many of the men [boys] in the class frequently get together to study, but they never ask you or any of the other women [girls] to join them. One day, you answer a question incorrectly during class and you overhear one of the men [boys] mumble, "That's why women [girls] shouldn't take this class." Over time, many of the other men [boys] make similar comments.

Following the vignette, participants were presented with the following prompt: "If I were in the situation described above, I would…" Following the prompt were examples of various coping behaviors. Participants rated their likelihood of engaging in each coping behavior by responding to a scale ranging from 1 (*Strongly disagree*) to 6 (*Strongly agree*).

In total, 24 items were used to assess eight forms of coping. These items were adapted from the Ways of Coping measure developed by Folkman and colleagues (1986). The following forms of coping were assessed: (1) emotional support ("Go to a friend for sympathy or understanding."; α = .76); (2) instrumental support ("Ask a friend for advice."; α = .76); (3) report ("Tell an authority figure about the men's behavior."; α = .90); (4) confront ("Confront the men who do things that bother you."; α = .81); (5) accept ("Accept that nothing can be done to change the men's behavior."; α = .88); (6) behavioral disengagement ("Put less effort into the course."; α = .57); (7) increase effort ("Work even harder on the course."; α = .92); and (8) do nothing/not be bothered ("Do nothing; the men's behavior wouldn't bother me."; α = .89).

In the regression analyses testing Hypothesis 1 and Hypothesis 2, the eight forms of coping were combined into two forms of coping that were described by Hall and colleagues (2012). The first was *active coping*, which included seeking instrumental and social support, reporting the incident, confronting the perpetrator, and increasing effort (α = .86). The second was *passive coping*, which included acceptance, behavioral disengagement, and doing nothing (α = .81).

RESULTS

RQ1 and RQ2: Coping Prevalence Rates and Sources of Variation

To examine Research Questions 1 and 2, the eight forms of coping were subjected to a mixed repeated-measures analysis of variance (ANOVA). The within-subjects variables were the eight forms of coping. The between-subjects variables were ethnicity (Asian American, European American, Latina), area of study (biological sciences, math-intensive), and phase of education (high school, college, graduate school).

Table 1 Preferred Manner of Coping with Gender Bias in STEM as a Function of Participants' Phase of Education

	High School	College	Graduate	Overall
Type of Coping				
Work Harder	5.06	5.11	4.95	5.08_a
Instrumental Support	3.67	3.86	4.43	4.90_b
Emotional Support	3.76	3.88	4.43	4.90_b
Confront	3.53	3.56	3.81	3.53_c
Report	3.38	3.44	3.62	3.28_d
Do Nothing/Not Bothered	3.24	3.01	2.55	3.07_d
Accept	2.76	2.66	2.55	2.86_e
Behavioral Disengagement	1.73	1.97	2.10	1.95_f

Note. Ratings were made on a scale ranging from 1 (*I strongly disagree that I would respond in this manner*) to 6 (*I strongly agree that I would respond in this manner*). Coping responses are sorted in descending order according to their mean rating in the overall sample. Differing subscripts in the *Overall* column reflect coping responses that had significantly different mean levels of endorsement. Graduate students were significantly more likely than high school and college students to endorse *instrumental support* and *emotional support*; less likely to endorse *do nothing/not bothered*; and more likely than high school students to endorse *behavioral disengagement*.

Results revealed a main effect of coping, F (7, 2058) = 106.75, p < .001, η_p^2 = .27. Table 1 presents each form of coping according to its prevalence in the sample. Post-hoc pairwise comparisons revealed that the most strongly endorsed coping response was *work harder*, which had a significantly higher rating than each of the other seven coping responses. The least strongly endorsed coping response was *behavioral disengagement*, which had a significantly lower rating than each of the other seven coping responses.

The aforementioned main effects were qualified by a two-way interaction between coping method and phase of education. Follow-up univariate ANOVAs demonstrated that four forms of coping had significant phase of education mean differences. Specifically, graduate students were significantly more likely than other participants to report that they would use instrumental support (F [2, 313] = 7.67, p = .001, η_p^2 = .05) and social support (F [2, 313] = 9.59, p < .001, η_p^2 = .06) if they encountered gender bias in STEM. Graduate students were also significantly more likely than high school students to report that they would cope with gender bias through behavioral disengagement (F [2, 313] = 4.09, p = .02, η_p^2 = .03). Lastly, graduate students were significantly less likely than other participants to report that they would do nothing/not be bothered by gender bias (F [2, 313] = 6.70, p = .001, η_p^2 = .04).

H1 and H2: Predictors of Active and Passive Coping

The forthcoming analyses are divided into two sections. First, correlations and descriptive statistics are provided for variables included in the regression models. Second, findings are reported from two hierarchical regressions that were carried out to identify predictors of active and passive coping.

Preliminary analyses

Table 2 reports Pearson's correlations among the continuous variables included in the regression models. A multivariate analysis of variance (MANOVA) examined whether mean levels of the continuous variables included in the regression models differed on the basis of ethnicity (Asian American, European American, Latina), area of study (life sciences, math-intensive), or phase of education (high school, college, graduate school). Multivariate main effects were obtained for ethnicity [Wilks' Λ = .83, F (10, 548) = 5.25, p < .001, ηp^2 = .09] as well as phase of education [Wilks' Λ = .84, F (10, 548) = 4.84, p < .001, ηp^2 = .08]. However, the phase of education main effect was subsumed by a two-way interaction between phase of education and area of study [Wilks' Λ = .95, F (10, 548) = .92, p = .01, ηp^2 = .04].

The two-way interaction between phase of education and area of study was probed with follow-up univariate ANOVAs that (a) tested for phase of education effects separately for participants in the life sciences and math-intensive fields and (b) tested for field of study effects separately among participants in high school, college, and graduate school. Findings illustrated that among girls and women in the life sciences, women in graduate school were highest in STEM value, followed by women in college and girls in high school (F [2, 151] = 12.56, p < .001,

η_p^2 = .14). Phase of education main effects did not reach significance among women in math-intensive fields. In addition, graduate students in biology had a significantly stronger preference for active coping than did high school and college students in the life sciences (F [2, 143] = 6.25, p = .003, η_p^2 = .08) as well as graduate students in math-intensive fields (F [1, 93] = 5.04, p = .03, η_p^2 = .05).

Table 2 Descriptive Statistics and Correlation Matrix for Study Variables

Variable		Correlations				
	M (*SD*)	1	2	3	4	5
1. Parent Education	5.21 (1.51)	--				
2. Severity of Bias in STEM	3.05 (1.29)	**.12**	--			
3. STEM Value	3.31 (.41)	**-.12**	.04	--		
4. Active Coping	4.01 (.84)	.04	**.15**	**.15**	--	
5. Passive Coping	2.51 (.82)	**-.14**	-.06	**-.15**	**-.42**	--

Note. Correlation coefficients in boldface are significant and the p < .05 level.

With respect to the main effect of ethnicity, follow-up univariate ANOVAs illustrated that two variables showed significant ethnic differences. First, compared to Asian American and European American participants, Latina participants reported that their parents had significantly less experience with formal education (F [2, 278] = 22.08, p < .001, η_p^2 = .14). Second, European American participants were significantly more likely than Asian American or Latina participants to report that they would use active coping in response to gender bias (F [2, 278] = 5.69, p = .004, η_p^2 = .04).

Hierarchical regression

Hypothesis 1 and Hypothesis 2, which aimed to identify predictors of active and passive coping, respectively, were tested with two hierarchical regressions. The first regression model assessed predictors of active coping, whereas the second assessed predictors of passive coping. The predictors in the two models were identical. Step 1 included background variables: ethnicity and parent education. Two dummy-coded variables were included in the model to test for main effects associated with identifying as Asian American, European American, and Latina; European American participants served as the reference category. Step 2 included educational context variables: phase of education and area of study. Participants in graduate school and participants in the life sciences served as the reference categories. Step 3 included STEM-related beliefs: perceptions of the severity of gender bias in STEM and STEM value. Preliminary analyses illustrated that multicollinearity was not a problem. For example, the variable inflation factor did not exceed 4.0 at any step of the model.

The first hierarchical regression assessed predictors of endorsing active coping. Results are presented in Table 3. The model was nonsignificant at Step 1 and Step 2, illustrating that background characteristics and educational context were not strongly associated with participants' use of active coping. The model reached significance at Step 3 (F [8, 285] = 3.03, p = .003), and the R^2-change was significant (p = .001). At Step 3, the model explained 8% of the variance in participants' likelihood of endorsing active coping.

Table 3 Hierarchical Regression Assessing Predictors of Active Coping

	Step 1	Step 2	Step 3
	β	β	β
Step 1: Background			
Parent Education	.05	.07	.06
Ethnicity: Asian American	.09	.01	.02
Ethnicity: Latina	.08	-.06	-.06
Step 2: Educational Context			
Phase of Education: HS		-.18*	-.16†
Phase of Education: CL		-.10	-.07
Area of Study		.01	-.10
Step 3: STEM Beliefs			
Severity of Bias in STEM			.13*
STEM Value			.18**
F_{model}	1.42	1.48	3.03**
R^2_{change}	.02	.02	.05
F_{change}	1.42	1.53	7.48***

Note. HS = high school; CL = college. The model was interpreted at Step 3. Ethnic groups (reference category: *European American*), phase of education (reference category: *Graduate*), and area of study (0 = *life sciences*; 1 = *math-intensive*) are dummy-coded.
$^{\dagger}p < .10$ $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

Table 4 Hierarchical Regression Assessing Predictors of Passive Coping

	Step 1	Step 2	Step 3
	β	β	β
Step 1: Background			
Parent Education	-.16*	-.17*	-.17*
Ethnicity: Asian American	.19**	.18*	.16*
Ethnicity: Latina	.11	.11	.10
Step 2: Educational Context			
Phase of Education: HS		.04	.01
Phase of Education: CL		.03	.01
Area of Study		.06	.37†
Step 3: STEM Beliefs			
Severity of Bias in STEM			-.05
STEM Value			-.16**
F_{model}	6.82***	3.57**	3.76***
R^2_{change}	.07	.01	.03
F_{change}	6.82***	.36	4.11*

Note. HS = high school; CL = college. The model was interpreted at Step 3. Ethnic groups (reference category: *European American*), phase of education (reference category: *Graduate*), and area of study (0 = *life sciences*; 1 = *math-intensive*) are dummy-coded.
$^{\dagger}p < .10$ $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

The model was interpreted at Step 3. In this step of the model, there was a significant positive association between endorsing active coping and (a) believing that gender bias in STEM is a problem (β = .18, p = .002) and (b) STEM value (β = .13, p = .03). Also, compared to participants in graduate school, participants in high school (β = -.16, p = .08) were marginally less likely to endorse active coping.

The second hierarchical regression assessed predictors of endorsing passive coping. Results are presented in Table 4. The model reached significance at Step 1 (F [3, 285] = 6.82, p < .001) and remained significant through Step 3 (F [8, 285] = 3.76, p < .001). Moreover, the R^2-change was significant at Step 1 (p < .001) and Step 3 (p = .02). At Step 3, the model explained 10% of the variance in participants' likelihood of endorsing passive coping.

The model was interpreted at Step 3. In this step of the model, endorsing passive coping was negatively associated with parent education (β = -.17, p = .01) and STEM value (β = -.16, p = .008). In addition, compared to European American participants, Asian American participants were significantly more likely to endorse passive coping (β = .16, p = .02). Lastly, there was a marginally significant association between endorsing passive coping and being in a math-intensive field of study (β = .37, p = .10).

DISCUSSION

The current study was designed to shed light on the coping responses that girls and women in STEM endorse in response to gender bias. The first goal was to establish which types of coping responses are most strongly endorsed, and to examine whether participants from different ethnic backgrounds and educational contexts tend to endorse different forms of coping. The second goal was to identify predictors of active and passive coping. The findings pertaining to both of these goals are detailed below, followed by several limitations and corresponding directions for future research.

Prevalence and Sources of Variation in Coping Responses

In the first set of analyses, eight forms of active and passive coping were assessed to establish prevalence rates and to test for sources of variation. Overall, girls and women tended to endorse active coping strategies more than passive coping strategies. Specifically, the most strongly endorsed methods of coping included working harder and seeking instrumental and social support. Conversely, the least common methods of coping included acceptance and behavioral disengagement (e.g., dropping the course in which the gender bias occurred).

In some respects, the coping prevalence rates are encouraging because passive coping strategies are associated with negative outcomes that could hinder girls' and women's academic progress (e.g., Chan et al., 2008). On the other hand, however, the results also illustrated that the girls and women prefer active coping strategies that are self-focused as opposed to focused on the perpetrator. Specifically, both confrontation and reporting the incident were endorsed significantly less strongly than working harder or seeking social support. This is unfortunate because active

coping strategies that engage the perpetrator are especially likely to reduce or eliminate the negative behavior (Kaiser & Miller, 2004). It bears noting that individuals often resort to self-focused active coping if they anticipate that confrontation or reporting the incident will lead to backlash, which is a common concern among individuals who feel powerless or unsupported in their workplace or area of study (Cortina & Wasti, 2005; Kaiser & Miller, 2004; Wasti & Cortina, 2002). Hence, perhaps participants in the current study strongly endorsed self-focused active coping methods because they did not anticipate that attempts to change the perpetrators' behavior would be successful.

Analyses also indicated that mean endorsement levels for four of the eight forms of coping differed according to participants' phase of education. Most notably, graduate students were significantly more likely than other participants to report that they would seek instrumental and social support after experiencing gender bias. This may be because graduate programs, more so than high school courses or undergraduate majors, afford opportunities to develop close social ties with others who have similar career goals (e.g., Fox, 2000). Hence, perhaps graduate students in the current study were more likely than other participants to endorse support-seeking because they had stronger ties to their STEM peers. It is also possible that graduate students differ from students in earlier phases of education with respect to individual-level characteristics such as maturity or academic motivation, which could play a role in the phase of education effects observed in the current research. Future research should examine whether this is indeed the case.

Predictors of Active and Passive Coping

The second aim of the current research was to identify predictors of active and passive coping. In this set of analyses, the aforementioned eight forms of coping were grouped according to whether they reflected active or passive coping strategies (see Hall et al., 2012). Predictors in the regression models included participant background characteristics, features of the educational context, and STEM-related beliefs.

Findings revealed several significant predictors of active coping and passive coping. First, believing that gender bias in STEM is a problem was associated with significantly higher endorsement of active coping. This finding accords with research that links perceptions of inequality to the use of active coping. For example, Leaper and Arias (2011) found that feminist identity was associated with a higher likelihood of confronting gender bias (see also Swim & Hyers, 1999). Preferences for active coping were also associated with higher STEM value, which is unsurprising given that participants who are high in STEM value are likely to be highly invested in pursuing a STEM career (Eccles & Wigfield, 2002) and may therefore be particularly motivated to reduce the negative impact of gender bias. In line with this point, STEM value was negatively associated with passive coping, suggesting that participants who value STEM more are less likely to respond to bias in a passive manner.

Additional significant predictors provided support for Folkman and colleagues' (1986) contention that coping methods are likely to vary as a function of culture

and context. First, as anticipated, participants whose parents had more experience of formal schooling were less likely than other participants to endorse passive coping methods. Prior research has linked formal education to egalitarian parenting practices (e.g., Ex & Janssens, 1998). Thus, perhaps parents with higher levels of formal schooling are particularly likely to teach their daughters that gender bias should not be tolerated. In addition, Asian American participants were more likely than European American participants to endorse passive coping. This pattern aligns with cross-cultural research indicating that some women from collectivist cultures may gravitate toward indirect or passive coping methods (Cortina & Wasti, 2005; Wasti & Cortina, 2002), which may be because of the collectivist emphasis on harmonious social interactions or related concerns about bringing shame upon the perpetrator (Triandis, Leung, Villareal & Clack, 1985).

Findings pertaining to the educational context also supported Folkman and colleagues' (1986) model. Specifically, a marginally significant association illustrated that participants who were pursuing careers in math-intensive areas of study were more likely than other participants to endorse passive coping. This was consistent with expectations, which were grounded in the notion that women who are more severely under-represented in their area of study or workplace may resort to passive coping because they perceive fewer avenues for active coping methods such as confrontation or seeking social support. Consistent with this point, Kabat-Farr and Cortina (2014) found that the prevalence of gender bias was negatively correlated with women's representation in the workplace. That is, they demonstrated that gender bias was more common in workplaces with a lower proportion of women. This was the case across diverse workplace settings, including the military, academia, and the court system, which suggests that the connection between women's representation and gender bias is not specific to a particular workplace context, but rather a domain-general phenomenon.

Limitations

The current study has several limitations, which will now be presented along with corresponding directions for future research. First, the current study utilized a hypothetical gender bias scenario to examine participants' preferred coping responses. The purpose of this method was to ensure that participants had a shared understanding of how *gender bias* was defined in the current study. Although Folkman and colleagues (1986; see also Kaiser & Miller, 2004) theorize an overlap between individuals' cognitive appraisals of coping responses and their actual coping responses, it is possible that examining girls' and women's actual responses to gender bias would yield findings that differ in some respects from the current study's findings. For instance, perhaps participants in the current study underestimated their likelihood of utilizing passive coping strategies for reasons related to social desirability or cognitive dissonance. Thus, exposing girls and women to gender bias in an experimental setting and then assessing their coping responses would be one fruitful way to build on the findings obtained in the present study. Moreover, an experimental design would also provide clearer insight into directionality and causality, which can only be inferred from the correlational design utilized in the current research.

Another potential limitation of the current study pertains to the gender bias scenario described in the vignette. Specifically, the vignette describes overt gender bias perpetrated by male peers in STEM, which appears to be fairly common (e.g., Leaper & Brown, 2008). However, gender bias can also be quite subtle, and it can certainly originate from individuals other than peers (e.g., teachers/professors; see Moss-Racusin et al., 2012). For these reasons, it is important to bear in mind that findings from the current study may not generalize to gender bias that differs in nature from the scenario described in the vignette. For example, women may be more likely to employ confrontation when the perpetrator is a peer as opposed to a professor (e.g., Wasti & Cortina, 2002). Future research could formally test this possibility by including a wider range of gender bias scenarios in the stimulus materials.

It is also important to note that the current study explained a relatively small amount of variance in participants' endorsement of active and passive coping (8% and 10%, respectively). This suggests that predictors beyond those examined in the current study play an important role in participants' preferred coping responses. For instance, prior research illustrates that mentors and advisors can strongly influence under-represented students' experiences in STEM fields of study, particularly at the undergraduate and graduate levels (e.g., Chemers, Zurbriggen, Syed, Goza & Bearman, 2011; Herzig, 2004). Hence, future research should examine whether women who have high-quality relationships with their mentors or advisors are more likely than other women to utilize active coping responses. This possibility has received indirect support from work indicating that workplace social support is associated with the coping methods women use in response to sexual harassment (Cortina & Wasti, 2005).

A final direction for future research pertains to potential avenues for intervention. Although the overall prevalence of passive coping strategies was fairly low in the present study, results indicated that these strategies were especially likely to be endorsed by participants whose parents had lower levels of formal education, participants who identified as Asian American, and participants in math-intensive fields of study. Thus, interventions that teach girls and women about active coping strategies may be especially beneficial for members of these groups. The results of the current study also demonstrated that self-focused methods of active coping (e.g., seeking emotional support) were more strongly endorsed than perpetrator-focused methods of active coping (e.g., filing a formal report). Individuals may be reluctant to take steps to stop perpetrators of gender bias unless there is a culture of support within their workplace or department (Cortina & Wasti, 2005). Therefore, it is important that STEM departments make it clear that gender bias will not be tolerated and provide explicit information about how gender bias can be formally reported.

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