



Forecasting the experience of stereotype threat for others



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HIGHLIGHTS

- Forecasters overestimated the affect of female experiencers under threat.
- Forecasters also overestimated the performance expectations of these women.
- Forecasters saw threat as a motivating challenge that women could overcome.
- Forecasts did not significantly differ by participant gender.
- Forecasting discrepancies emerged after controlling for alternative explanations.

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ABSTRACT

Women can underperform when they are concerned about confirming negative gender-based math stereotypes; however, little research has investigated whether female and male perceivers have insight into the experiences of stereotype-threatened women. Female and male participants were randomly assigned to take a math test under stereotype-threatening conditions (experiencers) or predict how a woman taking a math test would feel and perform in the same situation (forecasters). Although female and male forecasters expected female experiencers to have more negative emotional reactions than they actually did, forecasters believed that female experiencers would overcome these emotional reactions and perform at a high level—a much higher level than female experiencers actually performed. This discrepancy for performance expectations was driven by forecasters' beliefs that female experiencers could overcome threat. This research suggests that strengthening the perceived link between stereotype threat's impact on emotional experiences and performance outcomes could foster others' appreciation of its insidious influence.

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Introduction

Women can perform worse than their past performance would suggest due to concerns about confirming the negative, gender-based stereotype that “women are bad at math” (Nguyen & Ryan, 2008; Spencer, Steele, & Quinn, 1999; Steele, Spencer, & Aronson, 2002). Indeed, stereotype threat research reveals that when this stereotype is made salient, women experience heightened anxiety and worries (e.g., Cadinu, Maass, Rosabianca, & Kiesner, 2005; Osborne, 2001) and lowered performance expectations (e.g., Stangor, Carr, & Kiang, 1998). Concerns about personally confirming negative group stereotypes usurps cognitive resources needed to complete difficult math problems (e.g., Schmader, Johns, & Forbes, 2008), thereby impairing women's performance (e.g., Schmader & Johns, 2003). Although the

stereotype threat literature has extensively examined how this experience unfolds for people targeted by negative stereotypes (e.g., Inzlicht & Schmader, 2012; Steele et al., 2002), less is known about whether people's experiences of threat are perceived and understood by individuals who are not in the position to confirm these stereotypes themselves. Can perceivers accurately predict how a woman under stereotype threat feels, thinks, and will perform?

Past research has examined whether a woman's math experiences affect a perceiver's outcomes. For example, female students' math achievement is negatively impacted by their female teachers' self-reported math anxiety (Beilock, Gunderson, Ramirez, & Levine, 2010). Moreover, women experience lower self-esteem and math efficacy when they believe that another woman might confirm gender stereotypes (i.e., collective threat; Cohen & Garcia, 2005). However, this past work has exclusively assessed the effect of women's limiting beliefs and underperformance on female perceivers' experiences of stereotype threat—examining whether threat is “contagious”. Whether people can predict women's experiences under stereotype threat, when they themselves are not in a position to confirm negative stereotypes, is an

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unexplored question as no published studies have directly asked female and male perceivers how stereotype-threatened women think, feel, and perform when contending with this identity-threatening predicament.

The current research directly explores whether lay people expect a woman to experience stereotype threat in a context that is known, by researchers, to reliably inspire it (i.e., taking a difficult, potentially gender-biased math test; e.g., Beilock, Rydell, & McConnell, 2007; O'Brien & Crandall, 2003; Spencer et al., 1999). Specifically, female and male “forecasters”, who did not expect to take the math test themselves, made predictions of the performance concerns and expectations that a woman in the stereotype-threatening situation might have. We examined the accuracy of these forecasts by comparing them to the self-reported experiences of women who expected to perform in the stereotype-threatening situation (i.e., “experiencers”). We were particularly interested in whether women and men would forecast the heightened performance anxiety and lowered performance expectations that stem from experiencing stereotype threat.

Forecasts of emotional experiences

Based on the past stereotype threat research (e.g., Cadinu et al., 2005; Osborne, 2001), female experiencers should report greater anxiety in stereotype-threatening situations than male experiencers. However, a comparison of women's experiences with forecasters' predictions may reveal discrepancies. Although it is possible that forecasters' predictions will strongly correspond with the actual anxiety of women under stereotype threat, forecasts are likely susceptible to durable biases in which predictions of anxiety are overestimated. That is, affective forecasting errors may occur among forecasters (for a review, see Wilson & Gilbert, 2003).

Consistent with past research demonstrating forecasting errors when participants predicted how angry, fearful, and disgusted they, or another person, would feel as a target of sexism or sexual harassment (e.g., Bosson, Pintel, & Vandello, 2010; Woodzicka & LaFrance, 2001), we expected forecasters to overestimate the anxiety reported by women in a stereotype-threatening situation. While gender and performance stereotypes should be equally salient to forecasters and female experiencers (as all participants read a math test introduction that contained stereotype threat cues), forecasters might expect women receiving such instructions to experience higher levels of anxiety than female experiencers actually feel. Furthermore, we predicted that female and male forecasters would show equivalent forecasting errors for anxiety (and all other forecasting outcomes) since forecasters of both genders were exposed to the same, explicit cues to stereotype threat.

Anxiety and worries are theorized to be the predominant emotions experienced in stereotype-threatening situations (e.g., Steele, 1997; Steele et al., 2002); however, targets may also experience performance pressure and additional negative affect such as anger and feeling disrespected. We, therefore, tested whether affective forecasting errors emerged for these emotional states. We expected that forecasters would overestimate how much performance pressure women under stereotype threat experience. In line with Bosson et al. (2010) and Woodzicka and LaFrance (2001), forecasters should also predict that a woman who has negative stereotypes applied to her will be angrier and feel more disrespected in the stereotype-threatening situation than stereotype-threatened women actually feel.

Forecasts of performance

Consistent with the past work (e.g., Stangor et al., 1998), female experiencers should hold lower performance expectations in stereotype-threatening situations than male experiencers. Will forecasters have insight to these expectations? Here, we investigated competing hypotheses. On one hand, female and male forecasters could expect that experiencing anxiety will impair performance. If

forecasters overestimate female experiencers' anxiety, they may also make forecasting errors of performance by predicting lower performance expectations than those made by female experiencers. On the other hand, female and male forecasters could predict that a woman in a stereotype-threatening situation will perform relatively well—despite the anxiety generated by stereotype threat.

We believed that the latter hypothesis was more likely than the former. Although female and male forecasters may expect a woman experiencing stereotype threat to have high levels of anxiety about the performance situation, forecasters may underestimate the influence of female experiencers' anxiety on their performance. Specifically, forecasters could have higher performance expectations for female experiencers than these women report. This prediction is supported by Cohen and Garcia's (2005) finding that participants rated a peer—presumably under stereotype threat—as having relatively high intellectual ability, even when the peer stated performance concerns. Thus, anxiety may be viewed as an important but not sufficient precondition for impaired performance because female and male forecasters may believe that female experiencers possess the ability to cope with their anxiety and will expend enough effort to overcome its negative influence.

To examine whether these assumptions about coping ability and effort account for potential discrepancies between forecasters' and female experiencers' performance expectations, we assessed forecasters' predictions of coping ability and effort. Compared to male experiencers, female experiencers may expend more effort (e.g., Jamieson & Harkins, 2007) and report lower coping ability (e.g., Cohen & Garcia, 2005; Major & O'Brien, 2005). However, we expected forecasters to believe that a woman under stereotype threat will apply more effort and feel efficacious; that is, that stereotype threat will be motivating, rather than debilitating, and this motivation should buffer performance. Therefore, we predicted that female and male forecasters would overestimate the extent to which a woman in a stereotype-threatening situation will try hard and feel efficacious, and these beliefs should explain the discrepancy between forecasters' and female experiencers' performance expectations.

To demonstrate that discrepant performance expectations were due to differences in beliefs about the effort and coping ability of women in this particular stereotype threat situation and not due to differences in forecasters' and experiencers' beliefs about how anxiety and performance are related in general, participants' personal beliefs about the anxiety-performance link were measured. Although forecasters may believe that there are ways to mitigate anxiety's negative impact on performance (i.e., through effort and coping strategies), we expected all participants, regardless of role, to endorse the general lay belief that anxiety impairs performance to a similar extent. Because we did not predict role differences in this general belief, we did not expect the strength of its endorsement to account for potential forecaster-experiencer discrepancies for performance expectations.

Actual performance

After making predictions or reporting their current experiences, all participants completed the math test. While forecasters did not anticipate this test, math performance was measured to explore whether performance would differ between the forecaster and experiencer conditions. This procedure allowed us to examine whether performance differences emerged between female forecasters and female experiencers. It is possible that the act of predicting another woman's experience within a stereotyped domain may later elicit stereotype threat for female forecasters when they complete the same difficult math test. Indeed, research by Cohen and Garcia (2005) concerning collective threat supports this possibility as Black participants who were aware of the possible poor performance of a fellow in-group member showed reduced performance themselves. Thus, in

our study, female forecasters' performance may be equivalent to the performance of female experiencers, and women, regardless of assigned role, may perform worse than men.

Method

Participants and design

Female ($n = 79$) and male ($n = 73$) undergraduates at a large, public university in the Midwest participated to fulfill their introductory psychology research participation requirement. No exclusion criteria were used for recruitment. Sessions involved one to seven participants, who always completed the study in separate rooms. Participants were randomly assigned to either the experiencer or forecaster role. Thus, this experiment involved a 2 (assigned role) \times 2 (participant gender) between-subjects factorial design. Sample size was set to at least 30 female and male participants per assigned role, and data collection ended after running the number of experimental sessions that were estimated to be needed to obtain this sample size. No participants were excluded from the study, and no data analyses were conducted during data collection.

Materials and procedure

The stereotype threat message, modified from Beilock et al. (2007), was imbedded into the introduction to this experiment. Specifically, participants were told that the main goal of this study was to investigate why women are generally worse at math than men.

Role manipulation

All participants were then introduced to the problem solving task in which they learned that they had been randomly assigned to one of the two roles for this task: experiencer or forecaster. Experiencers were told that they were randomly assigned to the condition in which we were interested in their thoughts and feelings when completing the problem solving task, and, therefore, they would be completing the problem solving task. Forecasters were told that they were randomly assigned to the condition in which we were interested in how they think others might feel when completing the problem solving task. Forecasters were told several times that since we were only interested in what experiences they thought others would have, they would not be completing the problem solving task. All participants were then told that those assigned to complete the problem solving task would be given 7 min to answer ten difficult multiple-choice math word problems; a sample problem was presented underneath the instructions on the computer screen. Participants were reminded of their assigned role and asked a series of questions about how they currently felt (experiencer condition) or how they thought a woman would feel (forecaster condition) prior to completing the problem solving task.¹

Experiencer pre-performance questionnaire: emotional experiences

Experiencers were asked to report how anxious, worried, and concerned they currently were, how intense these emotions were, and how long they predicted this anxiety would last. For additional negative affect, experiencers were asked to report how angry, disrespected, and slighted they currently felt, how intense these emotions were, and

how long they predicted this negative affect would last. All questions were answered with a scale ranging from 1 (*not at all*) to 7 (*very*) except for the duration items which were answered on a scale ranging from 1 (*very short amount of time*) to 7 (*very long time*). Composites for anxiety ($\alpha = .92$) and negative affect ($\alpha = .84$) included the magnitude, intensity, and duration items.² Higher values correspond with greater experienced anxiety and negative affect. Experiencers were also asked to report how much pressure they felt to perform well on the problem solving task ranging from 1 (*none at all*) to 7 (*a lot*).

Experiencer pre-performance questionnaire: performance expectations, effort, and coping ability

Experiencers were then asked to provide their expectations of how well they would perform on the problem solving task on a scale ranging from 1 (*horribly*) to 7 (*very well*). They were also asked to report how much effort they intended to put forth during the problem solving task and their ability to cope with this performance situation. Specifically, for effort ($\alpha = .84$), experiencers were asked to what extent they would try to do well, how much effort they would give, and to what degree it is important to try hard on the problem solving task on scales ranging from 1 (*not at all or very little*) to 7 (*very much or a lot*). Four items assessed coping ability ($\alpha = .78$): to what extent can you influence this performance situation, how well can you cope with this performance situation, how confident do you feel right now, and to what extent can you control the outcome of this problem solving task. These items were answered on scales ranging from 1 (*not at all or rather poorly*) to 7 (*very much or very well*).

Forecaster questionnaire

Forecasters were asked modified versions of all the experiencers' questions. Participants were instructed, instead of answering these questions based on their own thoughts and feelings, to give their opinions of how another person, specifically a woman, would think and feel while taking the problem solving task ($\alpha s = .60-.84$). For example, forecasters were asked, "How anxious would a woman be when taking the problem solving task?" and "How well do you think that a woman would do on the problem solving task?"

General link between anxiety and performance

As the last item in the questionnaire, all participants rated the extent to which they personally disagreed or agreed that anxiety negatively influences performance on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Problem solving task

Next, experiencers were immediately presented with the problem solving task. Forecasters were first told to wait as the computer program advanced them to the next part of the experiment. After 15 s, an error message appeared on the computer screen stating that we did not have enough participants who had completed the problem solving task, so we now needed them to complete this task. Forecasters were reminded of the task instructions before beginning the same problem solving task as was presented to experiencers. Thus, all participants, regardless of assigned role, completed the problem solving task. Forecasters were presented with the problem solving task in order to explore whether math performance differed between the assigned role conditions. Forecasters were not told that they would complete the problem solving task at the outset of the experiment because their forecasts for another person could have been impacted by their own

¹ A condition in which female and male participants made forecasts for a man was not included for several reasons. First, we were most interested in how female and male participants forecasted the experience of stereotype threat for the negatively stereotyped group that is most vulnerable to stereotype threat (i.e., women in this math setting). Male experiencers were included solely to compare their responses and performance to female experiencers in order to demonstrate that female experiencers were indeed experiencing stereotype threat in this paradigm. Second, although we think it would be interesting to examine female and male participants' forecasts for a man (see Discussion), we ultimately chose not to include this condition in this study because of concerns related to the large number of statistical comparisons that this addition would necessitate.

² Forecasters reliably overestimate the magnitude, intensity, and duration of affect. We expected, and found, the same pattern of forecasting errors across these dimensions, so we combined them into composites for anxiety and negative affect.

thoughts and feelings if they anticipated completing the problem solving task themselves.

Ten difficult math word problems from past versions of the GRE, used in past stereotype threat research (Schmader & Johns, 2003), were included in this task. Participants had 7 min to complete these problems. Each problem had five potential answers, and participants were required to provide an answer before moving on to the next problem. Participants were not given scrap paper to use when solving the presented problems. Math performance was assessed by examining the percentage of correct responses, which was computed by taking the number of correct answers divided by the number of problems attempted; higher percentages of correct responses reflect greater math accuracy. Math accuracy ranged from 0–100% correct.

Post-performance questionnaire

All participants completed a post-performance questionnaire that included potential covariates of pre-performance questionnaire responses. We assessed participants' self-presentational concerns and their endorsement of gender stereotypes. A composite for self-presentational concerns ($\alpha = .60$) was created by averaging responses to the following items: how tempted were you to misreport your feelings, how much did you want to appear as dealing with the performance situation better than others, how worried were you about utilizing gender stereotypes, and how worried were you about being seen as sexist; responses were made on a scale ranging from 1 (*not at all*) to 7 (*very*). A composite for stereotype endorsement ($\alpha = .60$) was created by averaging responses to the following two items: in our society, most people think that women do worse at math than men; and I personally think that women do worse at math than men. Responses for these items were made on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Lastly, participants denoted their gender among other demographic information.

Results

Pre-performance questionnaire analyses

Data analysis strategy

The pre-performance questionnaire items were analyzed in two ways. First, 2 (assigned role) \times 2 (participant gender) ANOVAs were conducted for each composite or item to examine whether gender differences emerge among experiencers and forecasters. Second, pre-planned contrasts were conducted in order to test the more specific forecasting error hypotheses; for these analyses, the responses of male experiencers were excluded because male and female forecasters only predicted the responses of female experiencers. Specifically, the predictions made by female forecasters (-1) and male forecasters (-1) were compared to the reports made by female experiencers ($+2$) for each composite or item.

Table 1

Pre-performance questionnaire responses as a function of assigned role and participant gender.

	Female forecaster	Male forecaster	Female experiencer	Male experiencer
Anxiety	3.91 (1.12)	3.81 (1.38)	3.41 (1.37)	1.95 (1.13)
Negative affect	3.07 (.92)	3.20 (1.32)	2.11 (1.21)	1.74 (.83)
Performance pressure	5.06 (1.48)	4.72 (1.56)	3.73 (1.91)	2.67 (1.94)
Performance expectations	5.10 (1.31)	5.09 (1.23)	2.90 (1.40)	4.77 (1.63)
Effort	5.82 (.98)	5.76 (.94)	4.94 (1.54)	5.14 (1.37)
Coping ability	4.80 (.89)	4.65 (.93)	4.26 (1.11)	5.47 (1.09)
Anxiety-performance link	5.67 (1.30)	5.51 (1.52)	5.83 (1.37)	4.80 (1.86)

Note: Values outside of the parentheses are group means, while values inside of the parentheses are the standard deviations for these group means.

Predicted or felt anxiety

Main effects of assigned role and participant gender emerged. Forecasters ($M = 3.86$, $SD = 1.24$) predicted greater anxiety for a stereotype-threatened woman than experiencers reported feeling ($M = 2.68$, $SD = 1.45$), $F(1,148) = 32.19$, $p < .001$, $\eta_p^2 = .18$. Further, women ($M = 3.66$, $SD = 1.23$) predicted or felt greater anxiety than men predicted or felt ($M = 2.88$, $SD = 1.57$), $F(1,148) = 14.01$, $p < .001$, $\eta_p^2 = .09$. However, these main effects were qualified by the significant two-way interaction, $F(1,148) = 10.87$, $p = .001$, $\eta_p^2 = .07$ (see Table 1 for group means for each measure). Female and male forecasters' predictions of a stereotype-threatened woman's anxiety did not significantly differ, $F < 1$, while female experiencers reported significantly greater anxiety than male experiencers, $F(1,148) = 20.51$, $p < .001$, $\eta_p^2 = .12$. The pre-planned contrast found that female and male forecasters tended to overestimate the anxiety experienced by female experiencers, $t(119) = -1.67$, $p = .098$, $d = .31$.

Predicted or felt negative affect

A main effect of assigned role emerged. Forecasters ($M = 3.14$, $SD = 1.12$) predicted greater negative affect for a stereotype-threatened woman than experiencers reported feeling ($M = 1.92$, $SD = 1.04$), $F(1,148) = 44.67$, $p < .001$, $\eta_p^2 = .23$. Participant gender did not impact predictions or reports nor did it moderate the influence of assigned role on these responses, $F_s < 1.89$, $p_s > .171$. However, the pre-planned contrast found that female and male forecasters significantly overestimated the negative affect felt by female experiencers, $t(119) = -4.26$, $p < .001$, $d = .78$.

Predicted or felt performance pressure

Main effects of assigned role and participant gender emerged. Forecasters ($M = 4.89$, $SD = 1.52$) predicted greater performance pressure for a stereotype-threatened woman than experiencers reported feeling ($M = 3.20$, $SD = 1.98$), $F(1,148) = 36.36$, $p < .001$, $\eta_p^2 = .20$. Further, women ($M = 4.40$, $SD = 1.77$) predicted or felt greater performance pressure than men predicted or felt ($M = 3.69$, $SD = 1.99$), $F(1,148) = 6.29$, $p = .013$, $\eta_p^2 = .04$. The two-way interaction was not significant, $F(1,148) = 1.68$, $p = .197$, $\eta_p^2 = .01$. However, the pre-planned contrast found that female and male forecasters significantly overestimated the performance pressure felt by female experiencers, $t(119) = -3.39$, $p = .001$, $d = .62$.

Performance expectations

Main effects of assigned role and participant gender emerged. Forecasters ($M = 5.10$, $SD = 1.27$) gave higher performance expectations for a stereotype-threatened woman than experiencers self-reported ($M = 3.83$, $SD = 1.78$), $F(1,148) = 30.61$, $p < .001$, $\eta_p^2 = .17$. Further, women ($M = 4.01$, $SD = 1.72$) gave lower performance expectations than men ($M = 4.93$, $SD = 1.41$), $F(1,148) = 16.52$, $p < .001$, $\eta_p^2 = .10$. However, these main effects were qualified by the significant two-way interaction, $F(1,148) = 16.84$, $p < .001$, $\eta_p^2 = .10$. Female and male forecasters' performance expectations for a stereotype-threatened woman did not significantly differ, $F < 1$, while female experiencers gave significantly lower performance expectations than male experiencers, $F(1,148) = 27.61$, $p < .001$, $\eta_p^2 = .16$. The pre-planned contrast found that female and male forecasters significantly overestimated the performance expectations of female experiencers, $t(119) = -8.01$, $p < .001$, $d = 1.47$.

Predicted or intended effort

A main effect of assigned role emerged. Forecasters ($M = 5.79$, $SD = .96$) predicted that a stereotype-threatened woman would apply greater effort than experiencers self-reported ($M = 5.04$, $SD = 1.45$), $F(1,148) = 14.35$, $p < .001$, $\eta_p^2 = .09$. Participant gender did not impact predictions or reports nor did it moderate the influence of assigned role on these responses, $F_s < 1$. The pre-planned

contrast found that female and male forecasters significantly overestimated female experiencers' effort intentions, $t(119) = -3.55$, $p = .001$, $d = .65$.

Predicted or reported coping ability

In general, women ($M = 4.53$, $SD = 1.01$) predicted or reported having lower coping ability than men ($M = 5.06$, $SD = 1.07$), $F(1,148) = 10.43$, $p = .002$, $\eta_p^2 = .07$. However, this main effect was qualified by the significant two-way interaction with assigned role, $F(1,148) = 17.22$, $p < .001$, $\eta_p^2 = .10$. Female and male forecasters' coping ability predictions for a stereotype-threatened woman did not significantly differ, $F < 1$, while female experiencers reported significantly lower coping ability than male experiencers, $F(1,148) = 22.53$, $p < .001$, $\eta_p^2 = .13$. The pre-planned contrast found that female and male forecasters significantly overestimated how well female experiencers felt they could cope with the performance situation, $t(119) = -2.29$, $p = .024$, $d = .42$.

Anxiety-performance link

A main effect of participant gender emerged. Women ($M = 5.75$, $SD = 1.32$) reported stronger agreement with the belief that anxiety reduces performance than men ($M = 5.16$, $SD = 1.69$), $F(1,148) = 5.76$, $p = .018$, $\eta_p^2 = .04$. However, this main effect was qualified by the marginally significant two-way interaction with assigned role, $F(1,148) = 3.06$, $p = .082$, $\eta_p^2 = .02$. Female and male forecasters equally agreed with this belief, $F < 1$, while female experiencers reported significantly stronger agreement with the link between anxiety and performance than did male experiencers, $F(1,148) = 7.13$, $p = .008$, $\eta_p^2 = .05$. The pre-planned contrast found that female and male forecasters agreed with this statement to the same extent as female experiencers, $t < 1$.

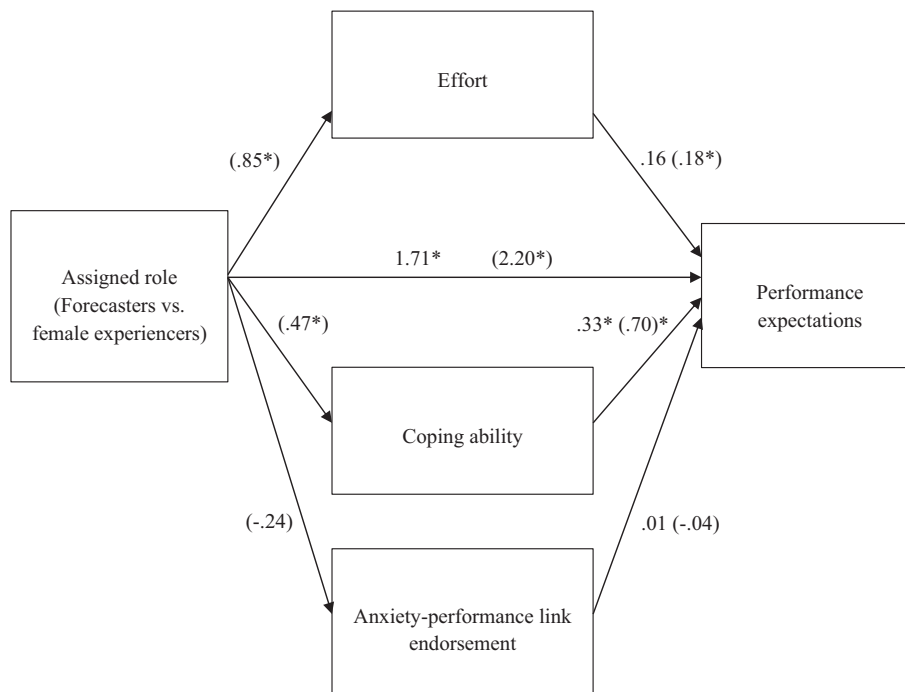
Analyses with covariates

To ensure that the results reported above were not driven by self-presentational concerns or stereotype endorsement, we re-ran the analyses reported above controlling for these variables. Our results hold even when controlling for these covariates; indeed, results were incredibly similar regardless of whether covariates were included.

Mediational analysis

To examine whether the discrepancy between forecasters' and female experiencers' performance expectations was explained by the groups' discrepant beliefs about effort, coping ability, and endorsement of the anxiety-performance link, we used Preacher and Hayes (2008) bias-corrected bootstrapping procedure for models with multiple mediators. Since there were no significant differences between female and male forecasters' predictions for a stereotype-threatened woman, we collapsed across forecaster gender to create one forecaster condition (re-coded as 1). This condition was contrasted with the experiencer condition (re-coded as 0) that included only female experiencers, as in the analyses above. Using 5000 bootstrap resamples, our model simultaneously examined the indirect effects whereby participants' roles predicted each of the three proposed mediators, which in turn predicted performance expectations (see Fig. 1). The model was a good fit to the data, $F(4,117) = 36.89$, $p < .001$, $R^2 = .56$. The direct relation between assigned roles still predicted performance expectations when the three mediators were taken into account, but it was reduced.

The bias-corrected 95% confidence intervals for the indirect effects of effort and coping ability excluded 0 (+.019 to +.431 and +.041 to +.660, respectively), suggesting mediation by these variables. However, the bias-corrected 95% confidence interval for the indirect effect of participants' general belief in the anxiety-performance link included 0 (−.024 to +.113). This analysis indicates that forecasters' discrepant performance expectations are driven by their beliefs



Note: All scores are standardized Beta weights. The direct effects between variables are presented in parentheses. * = $p < .05$

Fig. 1. A path diagram showing the effect of assigned role on performance expectations as mediated through effort, coping ability, and anxiety-performance link endorsement.

that a stereotype-threatened woman would respond with effort and active coping. To summarize, effort and coping ability, and not the endorsement of the anxiety-performance link, mediated the relation between assigned role and performance expectations.

Exploratory math performance

Number of questions attempted

Math performance indices were submitted to 2 (assigned role) \times 2 (participant gender) ANOVAs. For the number of attempted questions, neither the main effects nor the two-way interaction was significant, $F_s < 1$.

Math accuracy

As expected based on past stereotype threat work showing gender differences on difficult math problems when gender-based stereotypes are activated, female participants ($M = .34$, $SD = .21$) performed more poorly on the problem solving task than male participants ($M = .51$, $SD = .24$), $F(1,148) = 19.32$, $p < .001$, $\eta_p^2 = .12$. Assigned role did not impact math accuracy or moderate the influence of participant gender on math accuracy, $F_s < 1$.

Discussion

In this study, we asked whether women's experiences of stereotype threat were perceived and understood by individuals who were not in the position to confirm these stereotypes themselves. Specifically, the current research explored whether lay people could anticipate that a woman would experience the affective and performance consequences that stem from a stereotype-threatening context. We examined the accuracy of forecasts of anxiety, negative affect, performance pressure, and performance expectations by comparing them to the self-reported experiences of women who expected to perform in a stereotype-threatening situation. Based on the affective forecasting literature, we predicted that forecasters would overestimate the anxiety, negative affect, and performance pressure experienced by women under stereotype threat. However, the prediction for performance expectations was more tentative: depending on whether forecasters anticipated the inverse relationship between affect and subsequent performance found in the threat literature, forecasters may provide lower performance expectations—or, if not, higher performance expectations—than the women under stereotype threat actually self-reported.

Indeed, results revealed that forecasters overestimated the extent of anxiety, negative affect, and performance pressure of female experiencers. Importantly, these results demonstrate that forecasters perceive stereotype-threatening situations to involve heightened concern and pressure for women. However, did forecasters anticipate the performance consequences associated with this concern and pressure? Our results suggest that they did not: forecasters expected a stereotype-threatened woman to report much higher performance expectations than female experiencers actually did. Not only did female experiencers report lower performance expectations than male experiencers, they also performed more poorly than male experiencers.

To understand why perceivers expected the affective but not the performance consequences of stereotype threat, we examined potential sources of this discrepancy. We found that the performance expectations discrepancy was driven by forecasters predicting that a stereotype-threatened woman would expend greater effort and have greater coping ability than female experiencers self-reported. These results suggest that even when cues to stereotype threat are quite blatant, forecasters believed that stereotype threat would be a motivating challenge that women could overcome. These findings advance stereotype threat theory by demonstrating that perceivers do not anticipate the performance consequences of stereotype threat partially because

they expect women to rally their efforts in attempts to disconfirm the negative stereotype that often ironically results in reduced performance (e.g., Jamieson & Harkins, 2007; Oswald & Harvey, 2000–2001).

Interestingly, and as expected, forecasts did not significantly differ by participant gender: being female did not confer more insight to the stereotype-threatened woman's predicament in this particular situation. This lack of forecast gender differences was likely due to forecasters of both genders being exposed to the same, explicit cues to stereotype threat. Gender differences in forecasts may emerge when the situational cues to stereotype threat are more subtle as female forecasters may be more vigilant to such cues (e.g., Murphy, Steele, & Gross, 2007). Moreover, forecasts made by women may differ from men when forecasters expect to take the math test themselves; having this expectation may prompt forecasters to reflect on their own experiences when making their predictions for others, potentially leading female forecasters to have more accurate forecasts for other women. Future research should test these possibilities.

Limitations

One limitation of this study is that we could not control for participants' own math ability in our analyses. Future work should examine the role of math ability in forecasts of stereotype threat. In addition, several of the scales used in this study had lower than desired internal reliability: α s were less than .70 for forecasters' predictions of coping ability and all participants' self-presentational concerns and stereotype endorsement. Although the results for these measures were as expected, they should be viewed tentatively until further research corroborates these findings.

Theoretical contribution and future directions

More broadly, this study extends past work on how perceivers understand and experience threat by assessing perceptions of the target of stereotype threat: we distinguish ourselves from this past work by gauging these perceptions without the target explicitly stating or non-verbally signaling his/her performance expectations. Our work speaks further to the need within the stereotype threat literature to consider the relationships between targets' and perceivers' affective experiences and judgments. It will be critical to explore the downstream consequences of these forecasting errors. Such errors may predict, for example, less support for interventions that mitigate stereotype threat since underperformance is not predicted by forecasters.

This research also contributes to the affective forecasting literature by highlighting conditions under which people may overestimate others' ability to deal with negative events. The discrepancies for performance expectations, effort, and coping ability are particularly intriguing when compared to the large body of evidence suggesting that people make forecasting errors because they underestimate their own ability to cope with negative events (e.g., Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson & Gilbert, 2005). An interesting future direction entails comparing forecasts made for a woman with forecasts made for a man; it is possible that forecasters may appreciate how being a member of a positively stereotyped group (i.e., men in mathematics) can lead to better performance (i.e., stereotype lift; Walton & Cohen, 2003).

Considering that it is unlikely that efforts to mitigate stereotype threat will be made without fully appreciating its effects, the current work has practical implications for stereotype threat-reducing interventions. Because multiple attributions are possible in an evaluative setting, like a classroom, it is unlikely that instructors consider stereotype threat as a possible explanation for students' impaired performance. Finding successful techniques that strengthen the perceived link between students' affective experiences and performance outcomes can aid in the appreciation of stereotype threat's insidious influence. Thoughtful applications of these techniques could help in addressing the

achievement gap for women in math and in increasing the representation and success of underrepresented groups within domains where they are negatively stereotyped.

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