2018

Confronting Sexism in Science, Technology, Engineering, and Math (STEM): What Are the Consequences?

Eden J.V. Hennessey
Wilfrid Laurier University, henn8280@mylaurier.ca

CONFRONTING SEXISM IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH (STEM): WHAT ARE THE CONSEQUENCES?

By

Eden Jade Valentine Hennessey

Master of Arts, Wilfrid Laurier University (2013)

DISSERTATION

Submitted to the Department of Psychology

in partial fulfillment of the requirement for

Doctor of Philosophy in Psychology

Wilfrid Laurier University

Abstract

Disparaging remarks that female scientists are ‘Distractingly Sexy’ (Waxman, 2015) and ‘Too Pretty to Do Math’ t-shirts (Amazon.com) highlight the common belief that women in science, technology, engineering and math (STEM) violate perceived gender norms. However, by confronting these beliefs, women may incur a ‘double-dose’ of hostility; once for being present in science, and again because of the confrontation itself (Kaiser & Miller, 2001). Across three studies, this research tested how women confronting sexism in STEM contexts would elicit and anticipate social costs. Study 1 showed that male participants rated a hypothetical female confronter in STEM higher in bossiness and stupidity than did female participants. Study 2 showed that female STEM majors who imagined themselves confronting (vs. ignoring) sexism in science anticipated being labelled as bossier, and perceived science as more difficult. Thus, across two studies, social and personal costs of confronting sexism were more strongly elicited and anticipated in STEM versus arts. Study 3 assessed how different sexism types and styles of confrontation influenced social and personal costs among women in STEM. As predicted, those who imagined confronting sexism with anger (vs. education, indirect, or a no confrontation control condition) anticipated the greatest social costs, while those who imagined confronting with education anticipated fewer costs than those imagining anger, but greater costs than those imagining an indirect response or inaction. Those imagining an indirect confrontation anticipated greater social costs than those who imagined ignoring sexism, but lower personal costs such as less STEM difficulty and greater STEM efficacy and identity. Findings suggest the complex nature of women’s responses to sexism, extending previous social costs literature into a scientific context.

Keywords. Women, sexism, STEM, confrontation, social costs, identity, retention

Acknowledgements

I arrived at graduate school an outlier. Not even. An influential observation. Far beyond three standard deviations of what I thought made a ‘good’ graduate student. During this degree, my colleagues kept me afloat – at first, we were single data points, but eventually, we would hang together, a valid and reliable scale. My family (Pot, Pan, Skye, Zen, Kelly, John and Hans), reminded me of what was important, and for whom, and when, clarifying the complex nature of life’s interactive effects. Some days were sunken by floor effects, and others clung to the ceiling, in the face of such extremes, I relied on those around me to regress back to the mean of me.

I express my deepest gratitude to my advisor, Dr. Mindi Foster, and my committee members Dr. Anne Wilson and Dr. Chris Alksnis for keeping me motivated, challenged, and inspired during the research and writing processes. Thank you also to my committee members Dr. Jennifer Steele and Dr. Tammy Schirle for their time and feedback that undoubtedly informed and improved this work.

During my time in graduate school, I learned the value of interdisciplinary collaboration; I am so grateful for the support of all of those who encouraged me to communicate science through art, and to take risks beyond journal articles. A special thanks to my bandmates also, who encouraged creativity and laughter, helping me to re-connect with my musical voice.

This dissertation would not have been possible without the support and participation of women in STEM, including Dr. Shohini Ghose and the Laurier Centre for Women in Science (WinS). In this process, I learned so much about the strength of women in science and their accomplishments: wireless transmissions, computer algorithms, the refrigerator, closed circuit television, Kevlar, the double helix, solar technology, and a flashlight powered by the heat of your hand. All of these were discovered, invented or patented by women. These are incredible contributions considering we live in a world where girls are still told they are pretty before they are capable, cute before curious, and adorable before intelligent.

Throughout this dissertation, I heard women’s stories of working call centre jobs alongside post-docs to qualify for paid maternity leave, and tales of being offered authorship in return for sexual favours. These were stories of women doing it all; whatever it takes to succeed in science. And women have succeeded in science and will continue to do so, in the face of many challenges, including confronting sexism. Despite seemingly insurmountable obstacles, women in science have continued to ask questions, to seek answers to some of life’s most complex problems, and to be guided by a genuine curiosity about why everything *is*.

Scientists of all genders, together we lead the ongoing crusade for reason over opinion; for evidence over anecdotes. It is up to us to imagine what is possible with the full participation of all voices in science. I for one, am hopeful about these possibilities.

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General Introduction

Despite efforts of North American governments to encourage women into science, technology, engineering and mathematics (STEM) with scholarship and hiring initiatives (Office of Science and Technology Policy, 2013; Status of Women Office, 2014), retaining women in STEM remains difficult. In Canada, while women comprise 70% of university graduates, only 30% of STEM graduates are female (Hango, 2013). Further, the number of university degrees awarded to women in STEM in the U.S. has declined between 2000 and 2013 (National Science Board, 2016).

Women's under-representation in STEM is likely multi-determined; however, there is little compelling evidence that it is due to lack of capacity or self-selection. In fact, girls outperform boys in math before they enter university (Hyde, Fennema, & Lamon, 1990; Voyer & Voyer, 2014). Instead, a major barrier to women's retention in STEM is pervasive sexism, experienced across a range of ages and contexts: in early childhood (Buck, Plano Clark, Leslie-Pelecky, Lu, & Cerda-Lizarraga, 2008), in university (De Welde & Laursen, 2011; Knobloch-Westerwick, Glynn, & Huge, 2013), and at work (Blickenstaff, 2005; Hewlett et al., 2008; Rosser, 2006). Sexism refers to attitudes, beliefs, and behaviours, as well as the systemic and cultural practices that promote negative evaluations of people based on gender or support unequal status of women and men (Swim & Hyers, 2009). One might wonder why this sexism is not more frequently or effectively challenged. However, research has consistently shown that confronting sexism generally elicits social and interpersonal costs; namely the negative consequences directed at women by others following confrontation (Kaiser & Miller, 2001; Rasinski, Geers, & Czopp, 2013). Further, the role incongruity model of prejudice (Eagly, 2007; Eagly & Karau, 2002) would suggest that the social costs for women confronting sexism in STEM may be even more severe than in other contexts. These processes may help to account for the difficulty retaining women in science and technology. This research therefore examined whether women confronting sexism in STEM contexts would elicit and anticipate greater social and personal costs than women confronting in another context (e.g., arts).

Sexism in STEM

In day-to-day life, cultural stereotypes suggest that dominant stereotypes about women are inconsistent with dominant conceptions of “science.” Such beliefs are evident in children’s products whose messages undermine efforts to encourage science careers for girls; “Barbie” brand toys, like the recent storybook entitled, “I Can Be a Computer Engineer” (Romano, 2014), portray Barbie as unable to code without assistance from her male friends, or girl’s apparel emblazoned with retrograde statements such as, “I’m too pretty to do math” sold online (Amazon.com). Real-world examples of similar stereotypes are apparent in comments by high-profile academics like former Harvard President Larry Summers who stated that women may be under-represented in science for biological reasons (Dobbs, 2005), Nobel laureate Tim Hunt who stated that women are distracting in the lab due to their attractiveness and their emotionality (Waxman, 2015), and the recent former Google engineer’s memo on gender balance at Google drew fire for overstating the role of biological sex differences to explain the underrepresentation of women in technology (Horton, 2017).

In addition to pervasive messages that women do not belong in science, stories of sexual harassment plague top-tier academic institutions and perpetrate a culture in which female students experience abuses of power from male advisors; for example, world-renowned University of California, Berkeley astronomer Geoffrey Marcy reportedly sexually assaulted female students for a decade before stepping down (Russell, 2017). Despite stereotypic claims, feminine propensities did not historically repel women from STEM fields like computing –

indeed women dominated the early field of digital computer programming (Ensmenger, 2012; Mims, 2017). This example suggests that at least a portion of women's under-representation has occurred not because of lack of interest or ability, but other factors (including an unwelcoming male-dominated culture) that have discouraged their participation.

Sexist Experiences and Stereotyping in STEM

To date, most research on sexism in STEM has focused on the different experiences of men versus women, demonstrating how women experience greater gender discrimination than men. For instance, female scientists experience more sexual harassment and assault on research sites than their male colleagues; in a survey study of field scientists, women (70%) were more likely to report having experienced sexual harassment on research sites than men (40%; Clancy, Nelson, Rutherford, & Hinde, 2014). Further, the same study found that women (26%) were significantly more likely to have experienced sexual assault than men (6%). Other research similarly shows that women in STEM graduate programs are excluded and ignored by male peers and faculty members (Etzkowitz, Kemlgor, & Uzzi, 2000). However, not all sexism in STEM is expressed overtly; although women often encounter instances of sexism from men in the workplace, women in positions of power can also subtly perpetuate gender inequalities (e.g., microaggressions; Bevan & Learmonth, 2013; Kaskan & Ho, 2014; Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012). Short of harassment, sexism in STEM is manifested by negative stereotypes about women's competence.

Research in 34 nations showed that people hold implicit stereotypes associating men with science more than women (Nosek et al., 2009). Further, underlying sexism toward women in science are negative stereotypes about women's capabilities, and in turn, these have serious consequences for how they are perceived by others. Within an academic context, research has shown that science faculty rated the identical job applicant as less employable when the resume featured a woman's rather than a man's name, due to lower competence perceptions; in turn, both male and female faculty members indicated they would offer the male applicant a higher salary and greater mentorship than the female applicant with the same qualifications (Moss-Racusin et al., 2012). Students may also hold beliefs that women are less capable in science: male biology students believe their male colleagues are more knowledgeable about course content than females, even after controlling for performance in the course (Grunspan et al., 2016). Therefore, at various levels of academic training, women's competence is questioned more so than men's.

Negative stereotypes undermining women's competence have been documented in the workplace. Reilly, Rackley and Awad (2017) asked technology professionals to read vignettes in which a male or female intern experienced ability-related or interpersonal issues. Then, they rated interns on competence and qualifications. Female interns with ability issues were viewed as having lower science aptitude than male interns with ability issues, especially by participants with more sexist beliefs. In a similar vein, another study assessed perceptions of women's competence in science as they engaged in daily workplace interactions (Holleran, Whitehead, Schmader, & Mehl, 2011). Using small wearable ear-pieces, researchers recorded workplace conversations among male and female STEM faculty, which were transcribed and coded for content related to either research or socializing. Both men and women were less likely to discuss research with female versus male colleagues, and discussing research with male colleagues was associated with higher disengagement for women, whereas socializing with male colleagues was associated with lower disengagement (Holleran et al., 2011).

Some research links women’s sexist experiences to retention-related variables, such as job satisfaction. A study of science and engineering faculty members examined how gender-based mistreatment impacted perceptions of the workplace and job satisfaction (Settles, Cortina, Buchanan, & Miner, 2013). Results showed a significant gender difference on discrimination measures, such that women reported higher levels of gender discrimination, derogation, organizational sexism, and scholarly alienation than men, which in turn predicted lower job satisfaction. Given low job satisfaction predicts reduced organizational commitment (Lee, Carswell, & Allen, 2000) it could be that dissatisfaction also reduces retention among women in these fields. If gender discrimination reduces job satisfaction in STEM (Settles et al., 2013), and job satisfaction is important for retaining employees, then it is plausible that women's greater experiences of discrimination are leading to their exiting STEM jobs, due to lower job satisfaction. Indeed, a longitudinal study of female college graduates compared career trajectories between STEM and non-STEM professions and showed that women in STEM were more likely to leave their field than other women, due to job dissatisfaction and low organizational commitment (Glass, Sassler, Levitte, & Michelmore, 2013).

Internalizing Negative Stereotypes and Performance

Not only do negative stereotypes about women in science affect how others perceive them, but such stereotypes also negatively impact women’s own performance. When girls and women are presented with gender stereotypes that women are bad at math, they perform worse on subsequent tasks compared to those are not exposed to such stereotypes (Flore & Witcherts, 2015; Johns, Schmader, & Martens, 2005; Logel, Walton, Spencer, Iserman, von Hippel, & Bell 2009; O'Brien & Crandall, 2003; Spencer, Steele, & Quinn, 1999). Stereotype threat research demonstrates that, particularly among women who are highly-identified with math, contexts that activate gender competence stereotypes can produce distraction and anxiety, resulting in underperformance even among women who reject the validity of such stereotypes. Some research suggests this reduced performance may be because girls have internalized the negative stereotypes of women in STEM; when asked to pair images of males and females with math-related pictures, girls paired math images with men more than with women, and rated men (versus women) as liking and being more skilled in math (Steele, 2003). Thus, sexist STEM stereotypes not only affect how others perceive women's performance, but also women’s performance itself, creating a vicious cycle between sexism and reduced participation in science; a cycle that does not exist for men.

Sexism across STEM and Non-STEM Contexts

What has been seldom addressed by research is whether the experiences of women in STEM are unique from women in other contexts. On the one hand, it could be argued that women experience sexism and resulting discrimination in many contexts. However, when an English teacher experiences sexism, it may not elicit the same consequences for women in terms of stereotype threat, because the stereotypes associated with women in STEM are more negative than those associated with women in English, for instance. Even when women are primed with the social category ‘female’ beyond their conscious awareness, they report a preference for arts versus math, whereas women primed with ‘male’ showed no such preference (Steele & Ambady, 2006). This suggests that women themselves consider arts versus science contexts to be more consistent with "woman." In this same set of studies, female participants anticipated that 'students like themselves' possessed more positive attitudes toward arts versus math, suggesting that STEM participation may be less valued by women than arts. An extension of this study showed that even when primed with a non-stereotyped gender identity, women showed a preference for arts versus math. Finally, the same authors measured women’s implicit attitudes towards arts and math following a gender identity or neutral prime. Women in the gender prime condition were faster to associate the word ‘math’ with ‘unpleasant’ than the word ‘arts’ with ‘unpleasant,’ showing that women’s implicit attitudes towards these domains were impacted in a stereotype-consistent fashion when gender identity was made salient. Although these studies did not take into consideration issues of discrimination, they do suggest women’s experiences in STEM may be different than in arts; the role of "woman" is more strongly linked to arts, and more positively so than the role of "man," even among women themselves. However, Steele and Ambady (2006) did not compare experiences of women in STEM versus arts. Therefore, the present research builds on this previous work by directly testing differences between women across arts and science contexts.

The little research that has compared women in STEM versus women in other fields suggests that women in science are more likely to experience sexist events than other women. In one previous study undergraduates were asked to indicate their majors, and complete measures of identification, discrimination, stereotype threat, and desire to change majors (Steele, James, & Barnett, 2002). As expected, women in STEM programs (e.g., math, engineering, computer science) perceived greater gender discrimination and stereotype threat than women in female-dominated disciplines (e.g., arts, humanities), and men in male and female-dominated programs. Although women in STEM programs reported equal identification with their programs as other groups, they were most likely to report thinking about changing majors. This work provides additional evidence in support of the notion that despite being engaged and identified with science, the STEM context may result in greater self-doubt for women, which in turn could reduce retention in science fields. Recently, a survey measured workplace experiences and perceptions of almost five thousand American employees (Funk & Parker, 2018). Women in STEM jobs reported more sexism than women in non-STEM jobs; half (50%) of women in STEM careers reported experiencing at least one type of gender discrimination at work (i.e., earning less than male counterparts, facing perceptions of female incompetence), versus 41% of women in non-STEM jobs, and men in STEM jobs (19%).

In sum, previous research suggests that women (vs. men) in STEM contend with discrimination and internalized negative stereotypes. While women in many contexts experience sexism (Swim, Hyers, Cohen, & Ferguson, 2001), research suggests that women in STEM are considered less competent than men; however, women internalize this stereotype, which decreases their performance. Further, negative stereotypes about women in STEM are more pervasive than in other fields like arts, and they report more sexism than women in non-STEM fields. It is therefore not surprising that women are less likely to be retained in science and technological roles. Given the persistent underrepresentation of women in STEM, one potential means of addressing this disparity is to encourage confrontation in response to perceived discrimination.

The Costs of Confrontation

One possible way to retain more women in STEM is to encourage confronting sexism, which has positive and important outcomes like reducing future bias (Czopp, Monteith, & Mark, 2006; Mallet & Wagner, 2011), increasing women's well-being (Foster, 2013; 2014; 2015), promoting empowerment (Gervais, Hillard, & Vescio, 2010; Haslett & Lipman, 1997), and closure following discrimination (e.g., planning a future response, seeking social support through discussing incidents with others; Hyers, 2007). Settles, Cortina, Stewart, and Malley (2007) argued that having a sense of voice in a STEM context could buffer women from the negative consequences of a sexist climate. Female faculty members in the natural sciences were surveyed about workplace climate perceptions, perceptions of voice (i.e., personal agency or influence), and job satisfaction. Women who viewed their climate as more sexist also reported lower job satisfaction. However, this effect was moderated by voice, such that women who perceived a greater sense of voice within their departments reported greater job satisfaction than those who perceived having less voice. Thus, if women feel they can exercise agency in science and have their voices acknowledged, they may be more likely to be satisfied with their jobs and remain in STEM. Confrontation may be considered an active response to sexism, so it is possible that this could provide a similar buffering effect as perceived voice. However, it is also possible that confrontation could drive women out of STEM because of the perceived consequences of doing so.

Indeed, confrontation is risky, as originally shown by Kaiser and Miller (2001), who asked participants to read about an African-American student who attributed a failing grade to either discrimination or to his own poor-quality work. When participants read that the student attributed the failure to discrimination, he was evaluated more negatively (i.e., as more of a complainer, less liked), than when he attributed failure to poor work quality. This finding has since been replicated among African-American (Czopp & Monteith, 2003; Kaiser & Miller, 2003; Rasinski & Czopp, 2010), and female (Becker, Glick, Ilic, & Bohner, 2011; Dodd, Giuliano, Boutell, & Moran, 2001; Good, Moss-Racusin, & Sanchez, 2012; Raskinski, Geers, & Czopp, 2013) confronters of racism and sexism respectively, showing that targets of prejudice who confront are more negatively perceived than targets who do not confront. The social costs of confronting prejudice are also well-documented in occupational (Ashburn-Nardo, Blanchar, Petersson, Morris, Butler, & Goodwin, 2014; Garcia, Schmitt, Branscombe & Ellemers, 2010, Kaiser & Miller, 2003), interpersonal (Choma & Foster, 2010; Czopp & Monteith, 2003; Dodd et al., 2001; Eliezer & Major, 2012), and educational (Czopp & Monteith, 2003; Kaiser & Miller, 2001; Roy, Weibust, & Miller, 2009) contexts. Within research examining the social costs of confronting sexism in educational and workplace contexts, little has examined the consequences of confronting sexism for women in STEM specifically. This is problematic because there is theoretical reason to believe that the costs of confronting sexism in STEM may be more pronounced than in other contexts.

Role-Incongruity for Women in STEM

According to the role incongruity model of prejudice, hostility is elicited when people enact stereotype-incongruent social roles (Eagly & Karau, 2002). This theory posits that prejudice toward female leaders arises from perceived incongruity between the female gender role (e.g., as communal and kind) and leadership roles (e.g., as agentic and decisive; Eagly, 2007; Eagly & Carli, 2007; Newport, 2001; Schein, 2001). For example, the lack of fit model (Heilman, 1983) proposes that people tend to associate the qualities of leaders with men versus women, therefore when women occupy leadership roles, they are perceived as stereotype-incongruent, and penalties follow (Heilman, 2001; Heilman & Eagly, 2008). In general, women in leadership positions are perceived less favourably than men, and when they succeed in male-dominated fields, they are more derogated and less liked than equally successful men (Heilman, Wallen, Fuchs, & Tamkin, 2004). While women in science may or may not occupy leadership roles, they are stereotype-incongruent (Nosek et al., 2009), and therefore it follows that female scientists could also face backlash for persisting (let alone succeeding) in traditionally masculine domains.

Specific to STEM, negative perceptions of women as leaders and scientists likely arise from an apparent mismatch in gender versus occupational stereotypes. The stereotype content model (Fiske, Cuddy, Glick, & Xu, 2002) proposes that people perceive others along two dimensions of warmth and competence, which are often orthogonal. Women in science may be perceived as violating gender and occupational stereotypes of warmth and competence. Indeed, gender stereotypes suggest that women as a social group are perceived as higher on warmth than competence, however, scientists as a social group are perceived as more competent than warm (Fiske & Dupree, 2014). This inconsistency in stereotype content may be one factor underlying negative reactions to women in science fields, especially if they also confront sexism, violating gendered expectations of female submissiveness. A study of undergraduates showed that dominant acts (e.g., not conceding in an argument) were perceived as more stereotypic of men, while submissive acts (e.g., accepting verbal abuse without defending oneself) were perceived as more stereotypic of women (McCreary & Rhodes, 2001).

Confronting Sexism in STEM

Women who confront sexism in STEM therefore exhibit role incongruity in at least two ways. First and unique to women in STEM versus women in stereotype-consistent occupations such as nursing or teaching, women’s mere presence in STEM is inconsistent with the male-as-scientist stereotype (Nosek et al., 2009). Second, confrontation is inconsistent with the female 'submissive stereotype' (Bem, 1974; McCreary & Rhodes, 2001; Spence & Helmreich, 1978). Indeed, the social costs literature showing that women experience backlash upon performing an stereotype-inconsistent behaviour, such as confronting sexism rather than accepting it, supports the maintenance of that stereotype (e.g., Kaiser & Miller, 2001). However, research has not yet examined the costs of confronting sexism in STEM contexts. The current research fills this gap in knowledge by assessing women's social and personal costs after imagined confrontations of sexism in science versus arts contexts.

To date, research has not assessed the social or personal costs of confronting sexism in a STEM context. However, there are two studies which may provide clues, at least indirectly, as to the costs expected when confronting sexism in STEM (while also underlining the need for further research). The first study assessed perceptions of a man confronting sexism on behalf of a woman in a math class (Boysen, 2013). Participants read a scenario involving a male student, a female student, and a male teacher, wherein the male student commented that 'girls are dumb at math.' Participants then read that the teacher confronted or ignored the male students' statement and reported perceptions of the teacher. Results showed that the teacher was viewed more positively when he confronted versus ignored, suggesting that confronting STEM gender stereotypes in the classroom is perceived positively, at least when confronted by someone who is not a member of the stereotyped group. Using the same design in an additional study, Boysen (2013) similarly showed that if a male student confronted the sexist comment instead of the teacher, female students still viewed the confronter more positively than when he ignored it. These findings are consistent with previous research showing that when an advantaged group (e.g., men) confronts on behalf of a disadvantaged group (e.g., women), the confrontation is perceived as more legitimate and accepted more positively (Dickter, Kittel, Gyurovski, 2012; Gulker, Mark, & Monteith, 2013; Rasinski & Czopp, 2010). While indirectly relevant to the current research, Boysen's (2013) study did not assess the social and personal costs of female confronters of sexism in STEM, nor were male participants measured, which will be essential to test in a STEM context, given it is male-dominated (Hango, 2013).

A second study that relates to the present investigation examined the personal costs of confronting in a STEM context. In a study by Gervais et al., (2010) undergraduates participated in a study on leaders and workers in a robotics context, which was piloted to reflect a stereotypically masculine context. Following a sexist remark ostensibly made by another participant, participants publicly indicated (e.g., pressed a button that made their ratings visible to others) how problematic and inappropriate the comment was; higher scores indicated stronger confrontation intentions. For female participants, stronger confrontation intentions predicted greater feelings of competence, self-esteem, and empowerment, but this did not occur for male participants. This work suggests that for women, confronting discrimination in science may reduce negative personal costs. This is congruent with research on the positive well-being effects of confrontation among women in non-STEM specific contexts (Foster, 2013), and suggests that the negative effects of sexism can be somewhat remedied by confrontation, via restoring women’s well-being following discrimination. However, the confrontation was indirect (sending an evaluation virtually rather than face-to-face) so it is unknown whether women would experience the same response in a face-to-face confrontation; further although this study examined a STEM context it did not compare to a non-STEM context. In addition, this study assessed women’s own reactions but did not examine how *others* would perceive a female confronter in a STEM context. Thus, there is mixed evidence from the broader confrontation literature suggesting that confronting discrimination in STEM could benefit women's well-being, but negatively impact how they are perceived by others due to violations of gender stereotypes.

Despite research suggesting that confrontation benefits women's well-being (e.g., Foster, 2013; Gervais et al., 2010), such individual benefits cannot be achieved if there is a barrier to confrontation in the first place, specifically, the potential social costs of confronting. Research shows that how women think they will be perceived and treated after confrontation impacts confrontation intentions; when the potential costs are higher, confrontation becomes less likely (Ayres, Friedman, & Leaper, 2009; Good et al., 2012; Shelton & Stewart, 2004). Thus, understanding the social costs that are directed at, and anticipated by women in STEM may be a necessary first step in understanding how to effectively promote confrontation in scientific contexts, with the end-goal of retaining more women in science.

Overview and Hypotheses

This research will examine two complementary processes: 1) how people perceive female confronters in STEM (Study 1), and 2) what reactions women anticipate when they envision confronting sexism in STEM (Studies 2 and 3). Given that women violate not only gender stereotypes of submission by confronting (McCreary & Rhodes, 2001), and occupational stereotypes of warmth (Fiske et al., 2002; Heilman et al., 2001) by being in STEM, it was expected that women confronting in STEM would elicit and anticipate greater social costs when confronting sexism than women in a non-STEM context. To that end, three studies were conducted. Study 1 exposed undergraduate participants to a hypothetical female target of sexism who confronted or ignored sexism in a STEM or an arts context. Study 2 asked women in STEM or arts to imagine themselves confronting or ignoring sexism in a STEM or an arts context. Study 3 was designed to examine potential moderating factors by asking women in science to imagine themselves confronting hostile or benevolent sexism then responding with assertive/direct confrontations or with non-assertive/indirect responses.

Study 1

To examine the overall climate for university women in STEM, both male and female participants were recruited for an online study in which they read about a hypothetical female confronter 'Jenna.' Jenna was described as confronting a sexist comment either in a STEM or arts context. Data from male participants could provide valuable information about how the average perceiver in STEM might respond to witnessing a confrontation, given men constitute most of the STEM climate (Hango, 2013). Although some work shows that female confronters are evaluated equally negatively by women and men (Choma & Foster, 2010; Kaiser, Hagiwara, Malahy, & Wilkins, 2009), most work shows that female confronters are perceived more negatively by men than by other women (Becker & Barreto, 2014; Dodd et al., 2001; Eliezer & Major, 2012; Saunders & Senn, 2009). Therefore, it was expected that a female confronter in a STEM context would incur more costs from male versus female participants. Thus, a three-way interaction was expected, such that among those who read about a woman confronting (versus ignoring) sexism in STEM (versus arts), male versus female participants would view the woman most unfavourably compared to other groups.

Method

Participants

To achieve power of .80, the goal was to recruit a minimum of 50 participants per condition (Simmons, Nelson, & Simonsohn, 2011) from a Canadian university from within the departmental psychology participation pool. However, male (n = 106) and female (n = 301) undergraduate students volunteered (M_{age} = 21 years, SD = .98), indicating adequate total sample size, but an underrepresentation of male participants (e.g., *n's* = 26 to 28/cell). Self-reported ethnicities were: 57% Caucasian/European, 34% Asian, 6% African-Canadian, and 3% other. Self-reported majors were: 32.9% psychology, 17% health sciences, 11.5% arts, 11.3% business, 10.6% biology, 6.6% communication studies, 4.7% humanities, 2.9% social work, 2% computer science, and .5% mathematics. Participants were compensated with course credit.

Procedure

The study was a 2(Response: confront, ignore) X 2(Context: STEM, arts) X 2(Participant gender: male, female) between-subjects experimental design. To reduce demand characteristics, the study was described as an investigation into classroom competition in small groups. Participants were randomly assigned to read scenarios that varied in terms of confrontation and classroom context, and then completed outcome measures of social (i.e., trait perceptions) and personal costs (i.e., perceived subject difficulty).

Sexism manipulation. Participants read hypothetical scenarios depicting a situation in which a female target confronted or ignored a sexist comment in either a STEM or arts context. To provide participants with a sound justification for a confrontation, a sexist situation was first presented. Consistent with past work (Ashburn-Nardo et al., 2014; Gervais et al., 2010; Swim & Hyers, 1999) sexism was primed with scenarios as opposed to real sexism to provide an ethical means of examining how women respond to discrimination without also eliciting psychological harm. The scenario employed a sexist remark, given that women report commonly hearing sexist remarks in daily life (Ayres et al., 2009). The content of the sexist remark was derived from ambivalent sexism theory which defines two forms of sexism, hostile and benevolent. Hostile sexism refers to attitudes that assume women are inferior to men, whereas benevolent sexism refers to attitudes that women should be protected and cherished by men (Glick & Fiske, 1996). The sexist prime therefore drew on both types of sexism by including information that undermined a women's ability, as hostile sexism does, and reinforced stereotypical gender roles, as in the case of benevolent sexism.

Computer science was selected to represent a STEM context because gender disparities are most pronounced in this field versus other science disciplines; that is, women constitute less than one-third of computer science graduates (Hango, 2013; National Science Foundation, National Center for Science and Engineering Statistics, 2011a). Moreover, computer science has a reputation for being what some tech-writers refer to as a ‘brogrammer culture’ that excludes women (Kumar, 2014; Lobo, 2014). For example, in 2014, the term "gamergate" was employed to refer to the backlash faced by women for confronting sexism in the online video gaming community (Parkin, 2014). Communication studies was selected to portray the arts context as this was the largest program within the Faculty of Arts at the institution in which this research was conducted.

General instructions. All participants first read these instructions: “In this section, you will read a classroom scenario. Please imagine yourself in the situation as realistically as possible. Then, tell us how you might respond if the situation was real.” Participants were then randomly assigned to imagine that they were enrolled in either a computer science course (STEM context) or a communications studies course (arts context) in which the following situation occurred:

> One major component of your final grade is a group work assignment. When pairs are assigned, you see that a male student named Adam is paired with a female student named Jenna. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term. When it comes time to assign roles, Adam says to Jenna, ‘I’ll take the lead, so you don’t mess up anything important; just take notes and look pretty – that’s what girls are good for.’

Confrontation manipulation. Past diary work (Foster, 2013) that asked women to describe their everyday responses to sexism for 28 days, shows that angered confrontation was the most common of behavioural responses to daily sexism. Other diary research (Swim et al., 2001) asked women to document sexist experiences and emotional reactions and showed that 75% of the sexist incidents women reported resulted in feelings of anger. Thus, anger is a common response following women’s daily sexist experiences. As such, the confrontation that participants read about depicted Jenna expressing feelings of anger in response to perceived unfairness.

Those in the **confrontation** condition read:

> Jenna says, "Excuse me? Actually, women run some of the biggest companies in the world. Ever heard of Pepsi or General Motors? Maybe you should just take notes and look pretty while I take the lead."

Those in the **ignore/control** condition read:

> Jenna says nothing and continues reading the assignment sheet.

The control condition was included to provide a comparison for the confrontation condition, and because previous research shows that inaction is also a common response to sexism (Foster, 2009; Foster, 2013; Wright, 2001). Complete scenarios and study materials appear in Appendix A.

Measures

Sexism prime check. Participants rated the extent to which they agreed with a single item (Foster, 2015): “To what extent was the situation you read about sexist?” on a scale from (1) *Strongly Disagree* to (7) *Strongly Agree*.

Social costs. Based on previous work (i.e., Eliezer & Major, 2012; Good & Rudman, 2009; Kaiser & Miller, 2001; 2003; Shelton & Stewart, 2004; Swim & Hyers, 1999), social costs were operationalized as positive and negative trait ascriptions of ‘Jenna’ by participants imagining observing her. A total of 43[1] interspersed descriptors were listed, including negative traits (16 items; e.g., rude, complaining, bossy), positive traits (12 items; e.g., confident, strong), and neutral filler items (15 items; e.g., shy, reserved). Participants rated adjectives using a scale from (1) *Strongly Disagree* to (7) *Strongly Agree*.

Perceived subject difficulty. Given the challenge of retaining women in STEM (Hango, 2013), STEM women's greater intentions to switch majors (vs. non-STEM majors; Steele et al., 2002), and given self-efficacy in STEM predicts intentions to pursue science (Lewis et al., 2017; Marra, Rodgers, Shen, & Bogue, 2009; Stout et al., 2011; Whalen & Shelley, 2010), participants' perceived subject difficulty was assessed and considered as a personal cost. Furthermore, past research has shown task difficulty as a moderator of stereotype threat (Keller, 2007; Spencer et al., 1999). Therefore, participants rated perceived difficulty of the subjects in the scenarios, namely, computer science and communications studies. Other disciplines were included as filler items (e.g., history, geography) but not analyzed. The items were rated on a scale from (1) *Very Easy* to (7) *Very Difficult.*

Results

Exploratory Factor Analyses of Social Costs

Prior to analyses, a factor analysis of the trait ascription measure of social costs was conducted. Neutral and filler items were not analyzed.

Negative traits. The 16 negative items were factor analyzed using principal axis factoring (PAF). With a varimax rotation items loaded onto a single factor (see Figure 1 for scree plot). Initial eigenvalues > 1 indicated that the single-factor solution explained 52.14% of the

[1] Six additional trait items were not included consistently across all studies, and as such, were omitted from analyses (i.e., a rebel, a leader, overreacting, smart, hormonal, nice to work with).

variance in negative trait perceptions. Therefore, these 16 negative items were combined into a single composite score to be tested as a dependent variable (alpha = .930), whereby higher scores indicated more negative trait perceptions.

Positive traits. After removing one item with low inter-item correlations and low communalities with other items (i.e., funny), and three items with cross-loadings > .40 (i.e., respectable, friendly, independent; Costello & Osborne, 2005; Garson, 2010), two factors emerged from the remaining eight positive items. Using a varimax rotation, initial eigenvalues > 1 indicated that the two factors explained 73.89% of the variance in positive trait perceptions. The rotated factor loading matrix for the two-factor solution is in Table 1. The scree plot also supported a two-factor solution to the data, represented by the notable drop-off following the second factor (see Figure 2).

The first factor included four traits: ‘brave,’ 'strong,’ ‘confident,’ and ‘intelligent.’ The second factor also included four traits: ‘a good friend,’ ‘considerate,’ ‘likeable,’ and ‘a good team member.’ Theoretically, these two factors map well onto dimensions of warmth and competence; constructs that may be measured using single items or composite scores (Fiske, Xu, Cuddy, & Glick, 1999). Example items used to measure warmth in previous research include ‘likeable,’ ‘sincere,’ ‘warm,’ and ‘tolerant,’ whereas items assessing competence include ‘confident,’ ‘intelligent,’ ‘competitive,’ and ‘independent.’ Composite scores were therefore created for the two factors, based on the mean of the items which had their primary loadings on each factor. Internal consistency for the two subscales was examined using Cronbach’s alpha. The alphas were good: .826 for warmth, and .910 for competence. The two factors were moderately correlated (r = .383, p < .001). For the remainder of analyses, these two subscales will be referred to as ‘warmth’ and ‘competence.’

Preliminary Analyses

Sexism prime check. For sexism to have been successfully portrayed by the remark, participants should: 1) perceive sexism equally across all conditions and, 2) perceive a sufficient degree of sexism (i.e., greater than the midpoint of the scale; 4). The three-way interaction between confrontation condition, classroom context, and participant gender on perceived sexism was not significant, indicating participants viewed sexism consistently across conditions, F (1, 399) = .625, p = .430, η^2_p = .002. Furthermore, a one-sample t-test showed that the sample mean (M = 6.17, SD = 1.38) was significantly greater than the scale midpoint, t (406) = 31.76, p < .001, 95% CI [2.04, 2.31]. Thus, all participants viewed the scenario as sexist, and this impression was equivalent across conditions.

Main Analysis

Separate three-way analyses of variance (ANOVAs) were conducted on social costs (i.e., trait ratings) and perceived subject difficulty ratings. See Table 2 for cell means and standard deviations across conditions.

Social costs.

Negative traits. First, a three-way ANOVA was conducted on the composite of negative trait ascriptions to Jenna. There was no significant three-way interaction between confrontation condition, context, and participant gender on negative traits, F (1, 398) = 2.29, p = .131, η^2_p = .006, nor were there any significant two-way interaction effects (p's > .127). Consistent with previous research (Kaiser & Miller, 2001), there was a significant main effect of confrontation condition on negative traits, F (1, 398) = 29.69, p < .001, η^2_p = .069, such that those in the confrontation condition reported greater negative trait ascriptions of Jenna (M = 2.79, SE = .078), compared to those in the ignore/control condition (*M* = 2.19, *SE* = .077). Also consistent with previous literature (Dodd et al., 2001), there was a significant main effect of participant gender on negative traits, F (1, 398) = 13.45, $p < .001$, $\eta^2_p = .033$, such that male participants reported more negative trait ascriptions of Jenna (*M* = 2.69, *SE* = .094), compared to female participants (*M* = 2.29, *SE* = .056). There was no significant effect of classroom context on the composite of negative traits, F (1, 398) = .477, $p = .490$, $\eta^2_p = .001$.

Although the factor analysis revealed only a single factor reflecting overall negative perceptions, the questionnaire included a variety of negative trait ascriptions that reflect rather distinct beliefs about competence versus interpersonal qualities. Thus, it is possible that the composite score of negative traits obscured some effects. Therefore, we proceeded to examine specific negative traits as individual outcomes. Of particular interest were items that tapped into the stereotypes that women in science are less competent (Grunspan et al., 2016) and more emotional than men (Gilbert, 2001); as such, participants rated Jenna on the traits, 'stupid' and 'emotional'. As well, because Jenna's confrontation was described as taking back the leadership role in the confrontation condition, the trait, 'bossy' was included, given that women in leadership roles experience backlash (Eagly & Karau, 2002; Heilman et al., 2004; Rudman, & Phelan, 2008). Finally, 'complaining' was also included given past work shows that confronters are perceived as complainers (e.g., Kaiser & Miller, 2004). These four trait ascriptions were examined separately to further clarify the potential, theoretically-relevant, nuances in people's reactions to Jenna.

Complaining. There were no significant three-way interaction effects on complaining, F (1, 398) = 1.97, $p = .162$, $\eta^2_p = .005$, nor were there significant two-way interaction effects (all *p's* > .349), but, consistent with past work (Kaiser & Miller, 2001) there was a main effect of confrontation condition, *F* (1, 398) = 22.10, $p < .001$, $\eta^2_p = .053$, such that those who read about Jenna confronting rated her higher on complaining (*M* = 2.65, *SE* = .107) than those who read about her ignoring (*M* = 1.94, *SE* = .106). There was also a main effect of participant gender on complaining, *F* (1, 398) = 16.01, $p < .001$, $\eta^2_p = .039$, such that male participants rated Jenna higher on complaining (*M* = 2.60, *SE* = .130), than female participants (*M* = 2.00, *SE*= .077). There was no effect of classroom context (STEM or arts) on complaining, *F* (1, 398) = 1.03, *p* = .748, $\eta^2_p = .000$.

Emotional. There were no significant three-way interaction effects on emotional, *F* (1, 397) = 1.17, *p* = .280, $\eta^2_p = .003$, nor were there significant two-way interaction effects (all *p's* > .261), but there was a main effect of confrontation condition, *F* (1, 397) = 13.89, $p < .001$, η^2_p = .034, such that those who read about Jenna confronting perceived her as more emotional (*M* = 3.66, *SE* = .133), than those who read about her ignoring (*M* = 2.96, *SE* = .132). There was also a main effect of participant gender on emotional, *F* (1, 397) = 8.92, *p* = .003, $\eta^2_p = .022$, such that male participants perceived Jenna as more emotional (*M* = 3.59, *SE* = .162), than female participants (*M* = 3.03, *SE* = .096). There was no effect of classroom context on perceptions of Jenna as emotional, *F* (1, 397) = 1.61, *p* = .205, $\eta^2_p = .004$.

Stupid. The three-way interaction between confrontation condition, classroom context and participant gender on stupidity was significant, *F* (1, 397) = 4.43, *p* = .036, $\eta^2_p = .011$. To understand the nature of the interaction, two-way interactions within classroom context were tested. The two-way interaction between confrontation condition and participant gender in the arts context was not significant, *F* (1, 204) = .908, *p* = .342, $\eta^2_p = .004$, but was significant in the STEM context, *F* (1, 193) = 3.93, *p* = .049, $\eta^2_p = .020$. As expected, when participants read about Jenna confronting sexism in STEM, men rated her significantly higher on stupidity than women,

p = .020, 95% CI [.117, 1.33], but there was no gender difference when Jenna ignored sexism in STEM.

Bossy. There was a marginally significant three-way interaction between confrontation condition, classroom context, and participant gender on bossiness, F (1, 398) = 3.56, p = .060, η^2_p = .009. As above, to understand the nature of the interaction, two-way interactions within classroom context were tested. The *a priori* simple contrasts were tested (Iacobucci, 2001) with a Bonferroni correction for two specific comparisons: the gender difference within confrontation and ignoring sexism in the STEM context. As expected, when participants read about Jenna confronting sexism in STEM, men perceived her as bossier than women, p = .011, 95% CI [.196, 1.47], but there was no gender difference when Jenna ignored sexism in the STEM context.

Warmth. There was no three-way interaction between confrontation condition, classroom context, and participant gender on Jenna's perceived warmth, F (1, 395) = .242, p = .623, η^2_p = .001, nor was there a significant two-way interaction between classroom context and participant gender on warmth, F (1, 395) = .622, p = .431, η^2_p = .002. There was a marginally significant interaction between confrontation condition and participant gender on warmth, F (1, 395) = 3.15, p = .077, η^2_p = .008, such that female participants perceived Jenna as warmer when they read about her confronting versus ignoring the sexist comment, $p < .001$, 95% CI [.273, .724]. There was no difference between male participants who read about Jenna confronting versus ignoring sexism, p = .595, 95% CI [-.275, .479]. There was a significant two-way interaction between confrontation condition and classroom context on warmth, F (1, 395) = 3.85, p = .047, η^2_p = .010, such that in the STEM context, participants perceived Jenna as warmer when she confronted versus ignored sexism, $p < .001$, 95% CI [.209, .836], whereas in the arts context, there was no difference between those who read about Jenna confronting versus ignoring sexism, *p* = .619, 95% CI [-.230, .386]. There was a main effect of confrontation condition on warmth, *F* (1, 395) = 7.22, *p* = .008, η^2_p = .018, such that those who imagined Jenna confronting sexism perceived her as warmer (*M* = 4.76, *SE* = .079), than those who imagined her ignoring sexism (*M* = 4.46, *SE* = .079). There were no significant effects of classroom context, *F* (1, 395) = .630, *p* = .428, η^2_p = .002, or participant gender on Jenna's warmth, *F* (1, 395) = 1.91, *p* = .167, η^2_p = .005.

Competence. There was no three-way interaction between confrontation condition, classroom context, and participant gender on Jenna's perceived competence, *F* (1, 397) = .157, *p* = .693, η^2_p = .000. There was a significant two-way interaction between confrontation condition and participant gender, *F* (1, 397) = 12.00, *p* = .001, η^2_p = .029, such that when participants read that Jenna confronted sexism, female participants (*M* = 5.96, *SE* = .076), perceived her as more competent than male participants (*M* = 5.61, *SE* = .130), *p* = .019, 95% CI [.059, .651]. In contrast, when participants read that Jenna ignored sexism, male participants (*M* = 3.34, *SE* = 1.28), perceived her as more competent than female participants (*M* = 2.96, *SE* = .078), *p* = .011, 95% CI [.086, .673]. The other two-way interactions were not significant (*p*'s > .146). There was a main effect of confrontation condition on Jenna's competence, *F* (1, 397) = 619.21, *p* < .001, η^2_p = .609, such that those who imagined her confronting sexism perceived her as more competent (*M* = 5.79, *SE* = .075), than those who imagined Jenna ignoring sexism (*M* = 3.15, *SE* = .075). There were no significant effects of classroom context, *F* (1, 397) = .742, *p* = .390, η^2_p = .002, or participant gender on Jenna's competence, *F* (1, 397) = .013, *p* = .909, η^2_p = .000.

Perceived subject difficulty.

***Computer science difficulty*.** The three-way interaction between confrontation condition, classroom context, and participant gender on perceived difficulty of computer science was significant, *F* (1, 395) = 6.21, *p* = .013, η^2_p = .015. To understand the nature of the interaction, the two-way interactions within classroom context were tested. Within the arts context, the two-way interaction between confrontation condition and participant gender was not significant, F (1, 201) = .134, p = .715, η^2_p = .001, but was significant in the STEM context, F (1, 194) = 17.35, p < .001, η^2_p = .082. Simple contrasts showed that among male participants, those who read about Jenna confronting sexism in STEM reported greater computer science difficulty than male participants who read that Jenna ignored sexism, p < .001, 95% CI [.614, .208]. However, female participants perceived computer science as more difficult when they read that Jenna ignored versus confronted sexism, p = .041, 95% CI [.018, .893].

***Communication studies difficulty*.** The three-way interaction between confrontation condition, classroom context, and participant gender on perceived difficulty of communication studies was not significant, F (1, 395) = 1.25, p = .265, η^2_p = .003. There was a marginally significant two-way interaction between classroom context and participant gender, F (1, 395) = 3.34, p = .068, η^2_p = .008, such that among those who read about communication studies, female participants perceived communication studies as marginally more difficult than male participants, p = .084, 95% CI [-.054, .853]. Among those who read about computer science, there was no difference between male and female participants on the perceived difficulty of communication studies (p = .389). Among male participants, those who read about computer science thought communication studies was marginally more difficult than male participants who read about communication studies, p = .082, 95% CI [-.063, 1.05]. Among female participants, there was no difference between those who read about computer science versus communication studies (p = .519). The other two-way interactions were not significant (*p's* > .159), nor were there significant main effects of confrontation condition, classroom context, or participant gender (*p's* > .244).

Discussion

In Study 1, it was expected that a hypothetical woman confronting sexism in a STEM (versus arts) context would elicit greater social costs, and that this effect may be stronger among male participants. Results provided some support for this expectation. Although ‘Jenna-the-confronter’ was considered more emotional and a complainer more so by men than women, regardless of context, the hypothesis was supported by the finding that when 'Jenna' was confronting in a STEM context, male participants viewed her as more stupid and bossier than did female participants, but there were no such differences when Jenna was ignoring sexism in STEM or when Jenna was confronting sexism in an arts context. This pattern of findings is consistent with past research showing that men perceive confronters more negatively than women (Dodd et al., 2001; Gervais & Hillard, 2014), however, it is the first research to demonstrate this gender difference in a STEM context.

In line with previous research showing that male participants view confronters more negatively than female participants (Dodd et al., 2001), Study 1 findings suggest that male and female participants perceived women’s responses to sexism differently. Regardless of classroom context, the current findings showed that female participants perceived Jenna as warmer when she confronted versus ignored the sexist comment, yet, this difference did not occur among male participants. One potential explanation for this gender difference could be that female participants share a social identity with the female target and perhaps, a sense of common fate in the face of sexism (Campbell, 1958). Research shows that common fate increases perceptions of in-group similarity and enhances group boundaries (Turner, 1981). For example, a shared sense of fate was demonstrated among victims of the Boston Bombing in 2005, whereby survivors experienced increased common fate and a sense of concern for one another’s well-being (Drury, Cocking, & Reicher, 2009b). If a shared common fate makes women see themselves in one another's shoes, then perhaps female participants perceived Jenna-the-confronter as warmer than Jenna-the-ignorer because they could imagine themselves in her position and would therefore support an active response. Findings from Study 1 also showed that when participants read about the computer science context and imagined Jenna confronting (versus ignoring), they perceived her as warmer. One potential reason for this perception may be that participants were aware of the chilly STEM context (Settles et al., 2006), so imagining a woman confronting sexism in a stereotypically unwelcoming environment could have elicited feelings of admiration or empathy.

Additionally, Study 1 findings highlight the complex nature of women's responses to sexism; that men perceived Jenna-the-confronter one way, but women perceived her another way. According to our results, women may face consequences for speaking out from men (i.e., for whom confronting increased Jenna's stupidity), but they may also face consequences from other women for not speaking out (i.e., for whom ignoring decreased Jenna's perceived competence). It is therefore possible that regardless of how women respond to sexism, they will incur social costs, however, the nature of such costs may differ by gender, creating a "damned if she does, damned if she doesn't" kind of paradox. It should also be noted though that while Study 1 main effects replicate past work on the costs of confrontation (Kaiser & Miller, 2001), whereby confronters faced more negative perceptions than ignorers, the pattern of main effects on warmth and competence perceptions in the current study suggest that Jenna-the-confronter was liked more and perceived as smarter than Jenna-the-ignorer. It is therefore the case, based on the current findings, that confronting is associated with social costs, but also with some benefits (Dodd et al., 2001).

Study 1 findings also showed that Jenna's confronting behaviour impacted how participants viewed the difficulty of computer science, a factor related to stereotype threat in STEM fields (Spencer et al., 1999). For women, reading about Jenna confronting sexism in STEM was beneficial; when they read about Jenna-the-confronter, they rated computer science as less difficult than when they read about Jenna-the-ignorer. Yet for men, Jenna-the-confronter made computer science seem more difficult than Jenna-the-ignorer. One possible explanation for these findings is that female confrontation in a male-dominated context threatens male identity. This proposition is consistent with precarious manhood theory (Vandello, Bosson, Cohen, Burnaford, & Weaver, 2008), which argues that unlike womanhood, manhood is a precarious state in which men require continual social proof and validation of their masculinity, and research showing that men feel more threatened by women in leadership roles than women (Netchaeva, Kouchaki, & Sheppard, 2015). Although Jenna-the-confronter was not explicitly portrayed as being in a leadership role, it is conceivable that her assertive confrontation, wherein she attempted to take back the leadership role (i.e., 'while I take the lead ') was perceived as threatening to men. Thus, a woman confronting in a science context appears to incur costs that were not apparent in the arts context, providing additional support for the notion of the 'chilly climate' in STEM (i.e., a climate that is unwelcoming to women; Flam, 1991; Settles, Cortina, Malley & Stewart, 2006). Further, not only does confronting sexism in STEM elicit more negative social costs from men, but it appears that it might threaten men's confidence in their own studies. Another possible explanation for this finding is that men reported increased difficulty in a STEM subject to rationalize excluding women. If for instance, men endorse the stereotype that women are less competent in science than men, they may then perceive science as very difficult as a means of justifying the existence of that stereotype.

Study 1 showed only few of the hypothesized three-way interactions between confrontation condition, classroom context, and participant gender. One possible explanation as to why these effects were absent may be that the classroom context manipulation was not relevant to participants from the general student body. In other words, it could be that manipulating classroom context to reflect a STEM or arts climate was unimportant unless the context corresponded to participants' own subject areas. Thus, one goal of Study 2 was to test participants' own majors as a factor instead of participant gender as in Study 1. Additionally, although Study 1 findings underline the important role of gender in how social costs are directed toward a female confronter, this initial study did not assess how women themselves may anticipate the social costs of confronting sexism across different contexts. Thus, Study 2 recruited female participants for a study on the anticipated costs of confronting or ignoring sexism in STEM or arts contexts.

Study 2

Most work on the costs of confrontation has focused on how others perceive female confronters (e.g., Becker et al., 2011; Dodd et al., 2001; Gervais & Hillard, 2014), however, much less research has examined how women themselves anticipate the costs of confronting. The few exceptions that have studied anticipated costs have generally found that confrontation is inhibited by high-cost situations (Shelton & Stewart, 2004), and depends on the characteristics of the perpetrator (e.g., familiarity and status) and the type of discrimination (e.g., unwanted sexual attention versus sexist comments; Ayres et al., 2009). However, none of this past research has assessed the anticipated costs of confronting sexism in an explicitly science-based context (Ayres et al., 2009; Good et al., 2012; Shelton & Stewart, 2004). It is imperative to research how women themselves anticipate the costs of confronting sexism across different contexts, because this could provide a greater understanding of contributors to women's attrition from STEM programs and careers. Furthermore, it is relevant to study how women outside of STEM (i.e., non-STEM majors) perceive the costs of confronting sexism in science contexts, as this could influence the ability to recruit and retain women in these fields. Thus, Study 2 sought to replicate the effects of Study 1 among women themselves instead of observers, to assess the social and personal costs they anticipate when imagining confrontation (versus ignoring) in STEM versus arts contexts.

A three-way interaction was expected, such that women in STEM (versus non-STEM) majors who imagined confrontation (versus ignoring) in their own STEM context (versus arts) would anticipate the greatest social and personal costs compared to other groups. This was predicted because women in STEM are likely more identified with the science context than non-STEM majors (Steele et al., 2002), and so this could make confronting the sexist threat especially costly.

Method

Participants

To achieve power of .80, the goal was to recruit 50 people/condition (N = 300; Simmons et al., 2011). However, given the low number of female STEM majors, a snowballing approach to recruitment was used with social media platforms such as Facebook and Twitter. Undergraduate women (N = 212; M_{age} = 22 years, SD = 1.78) volunteered to participate. Self-reported ethnicities were: 45.8% Asian, 38.7% Caucasian/European, 8% other, 2.8% preferred not to say, 2.4% African-Canadian, 1.4% Arab, and .9% Aboriginal. Participant majors were 18.4% psychology, 14.2% health sciences, 12.7% humanities, 11.8% business, 11.8% arts, 9.9% biology, 4.7% chemistry, 4.2% communication studies, 3.3% social work, 2.8% mathematics, 2.4% engineering, 1.9% computer science, and 1.9% physics. Academic majors were categorized as STEM (i.e., biology, chemistry, mathematics, psychology[2], computer science, health sciences, physics, and engineering; 56.1% of the sample), and non-STEM majors (i.e., arts, communication studies, humanities, business, and social work; 49.3% of the sample) based on previous research (Funk & Parker, 2018). Those recruited on-campus were offered course credit and those recruited otherwise were offered gift cards to a coffee vendor.

Procedure

The study was a 2(Participant major: STEM, non-STEM) X 2(Response: confront, ignore) X 2(Context: STEM, arts) between-subjects experimental design. The same cover story, procedure and scenarios as in Study 1 were used; however, instructions and some phrases in the scenarios were altered so that instead of observing a confrontation (Study 1) participants would imagine themselves confronting or ignoring a sexist comment in a STEM or arts classroom from a first-person perspective (Libby & Eibach, 2002).

General instructions. All participants first read the following instructions: "In this section, you will read a classroom scenario. Please imagine yourself in the situation as realistically as possible. Then, tell us how you might respond if the situation was real." Participants were then randomly assigned to imagine they were enrolled either in a computer science or a communications studies course in which they either confronted or ignored a sexist comment, before completing outcome measures. Complete scenarios and study materials appear in Appendix B.

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[2] Psychology was included in STEM majors because 1) it is located within the Faculty of Science in the institution where the research was conducted, and 2) because STEM majors include computers, mathematics and statistics, biological, agricultural and environmental sciences, physical and earth sciences, engineering, architecture, health-related fields, such as nursing, and STEM education, like science or math teacher education (Funk & Parker, 2018).

Measures

Sexism prime check. The same measure of perceived sexism used in Study 1 was administered.

Social costs. The same traits as in Study 1 were used; however, the instructions were altered so participants responded as if they were in the scenario themselves. For example, participants rated, “To what extent would others think you were bossy?” on a scale from (1) *Strongly Disagree* to (7) *Strongly Agree*.

Perceived subject difficulty. Also, as in Study 1, participants rated how difficult they found computer science and communication studies on a scale from (1) *Very Easy* to (7) *Very Difficult*.

Results

Exploratory Factor Analyses of Social Costs

As in Study 1, a factor analysis of the trait ascription measure of social costs was conducted. Neutral and filler items were not analyzed.

Negative traits. The 16 negative items were factor analyzed using principal axis factoring (PAF), with a varimax rotation and, as in Study 1, items loaded onto a single factor. Initial eigenvalues > 1 indicated that the single-factor solution explained 56.67% of the variance in negative traits. Therefore, these items were combined into a single composite score to be tested as a dependent variable ($\alpha = .942$).

Positive traits. As in Study 1, the item ‘funny’ was removed from the subset of positive items for having low inter-item correlations and communalities (Costello & Osborne, 2005; Garson, 2010), however, unlike Study 1, there were no items with cross-loadings > .40. Also, as in Study 1, two factors emerged from the remaining 11 positive items, again in line with dimensions of warmth and competence (Fiske et al., 1999). Initial eigenvalues indicated that two factors explained 68.55% of the variance, using a varimax rotation. The rotated factor loading matrix for the final solution is in Table 3. The scree plot also supported a two-factor solution to the data, represented by the notable drop-off following the second factor (see Figure 3). The first factor included six traits: ‘brave,’ 'strong,’ ‘confident,’ ‘intelligent,’ ‘independent,’ and ‘respectable.’ The second factor included five traits: ‘a good friend,’ ‘considerate,’ ‘likeable,’ ‘friendly’ and ‘a good team member.’ Composite scores were created for each of the factors, and internal consistencies were good: .860 for warmth, and .912 for competence. The two factors were moderately correlated (r = .253, p < .001).

Preliminary Analyses

Sexism prime check. Descriptive statistics showed that eight participants did not see the situation as particularly sexist; that is, their scores were below three standard deviations from the mean. Therefore, prior to analyses, these cases were removed as outliers. To assess whether sexism was adequately portrayed, the overall amount of sexism was assessed using a one-sample t-test. Results showed that participants rated the scenario as significantly more sexist (M = 6.46, SD = 1.05 on a 1-7 scale) than the scale midpoint (i.e., 4), t (202) = 33.59, p < .001, 95% CI [2.32, 2.61].

Moreover, to assess whether equal amounts of sexism were perceived across conditions, the three-way interaction between confrontation condition, classroom context, and participant major on sexist perceptions was tested. Unlike Study 1, this three-way interaction was significant, F (1, 203) = 5.18, p = .024, η^2_p = .025. Because of differences across conditions, sexism was included as a covariate in subsequent analyses. As in Study 1, interactions between sexist perceptions, confrontation condition, context, and participant major were conducted on dependent measures. There were no significant interactions between sexist perceptions and the other factors, permitting the inclusion of sexist perceptions as a covariate.

Main Analysis

Three-way univariate analyses of covariance (ANCOVAs) were conducted on outcomes. See Table 4 for cell means and standard deviations across all conditions.

Social costs.

Negative traits. A three-way ANCOVA was conducted on the composite score of negative traits. The covariate was marginally significant, F (1, 193) = 3.62, p = .059, η^2_p = .018, however, there was no significant three-way interaction between confrontation condition, context, and participant major on negative traits, F (1, 193) = .542, p = .463, η^2_p = .003, nor were there any significant two-way interaction effects (p's > .451). Consistent with Study 1, and previous research (Kaiser & Miller, 2001), there was a significant main effect of confrontation condition on negative traits, F (1, 193) = 41.95, p < .001, η^2_p = .179, such that those in the confrontation condition anticipated greater negative trait perceptions (M = 4.55, SE = .127), than those in the ignore/control condition (M = 3.40, SE = .121). There was a marginal main effect of classroom context on negative traits, F (1, 193) = 3.29, p = .071, η^2_p = .017, such that those who imagined themselves in an arts context anticipated greater negative trait perceptions (M = 4.13, SE = .125), compared to those who imagined themselves in a STEM context (M = 3.82, SE = .120). There was no significant main effect of participant major on negative trait perceptions.

Following Study 1 methodology, the same negative traits were tested as individual outcomes (i.e., complaining, emotional, stupid, bossy).

Complaining. The perceived sexism covariate was significant F (1, 192) = 5.58, p = .019, η^2_p = .028. Controlling for perceived sexism, there was no significant three-way interaction effects on complaining, F (1, 192) = 1.70, p = .194, η^2_p = .009, nor were there significant two-way interaction effects (all *p's* > .221). As in Study 1, there was a significant main effect of confrontation condition, F (1, 192) = 16.87, $p < .001$, $\eta^2_p = .081$, such that those who imagined confronting sexism (M = 4.54, SE = .186), thought others would perceive them as complaining more than those who imagined ignoring sexism (M = 3.48, SE = .178). There was also a marginal main effect of classroom context on complaining, F (1, 192) = 3.59, p = .060, $\eta^2_p = .018$, such that those who imagined themselves in an arts context (M = 4.25, SE = .184), thought others would see them as complaining more than those who imagined themselves in a STEM context (M = 3.77, SE = .177). There was no main effect of participant major on complaining, F (1, 192) = 1.27, p = .262, $\eta^2_p = .007$.

Emotional. The perceived sexism covariate was significant, F (1, 193) = 5.04, p = .026, η^2_p = .025. Controlling for perceived sexism, there were no significant three-way interaction effects on emotional, F (1, 193) = .052, p = .821, $\eta^2_p = .000$, nor were there significant two-way interaction effects (all *p's* > .274). There was a main effect of confrontation condition, F (1, 193) = 14.22, $p < .001$, $\eta^2_p = .069$, such that those who imagined themselves confronting sexism (M = 4.83, SE = .186) thought that others would see them as more emotional than those who imagined themselves ignoring sexism (M = 3.85, SE = .177). There were no main effects of classroom context, F (1, 193) = 1.00, p = .318, $\eta^2_p = .005$, or participant major on emotional, F (1, 193) = .174, p = .677, $\eta^2_p = .001$.

Stupid. The perceived sexism covariate was not significant F (1, 192) = .009, p = .923, $\eta^2_p = .000$. Controlling for perceived sexism, there was a significant three-way interaction between confrontation condition, classroom context, and participant major on the degree to which participants believed others would see them as stupid, F (1, 192) = 3.75, p = .054, η^2_p = .019. To understand the nature of the interaction, the two-way interactions within classroom context were tested. In contrast to Study 1, the three-way interaction was driven by a significant two-way interaction between confrontation condition and participant major in the arts context, F (1, 90) = 4.93, p = .029, η^2_p = .052, rather than the STEM context, F (1, 101) = .032, p = .858, η^2_p = .000. Simple contrasts showed that when STEM majors imagined confronting sexism in arts, they believed others would see them as less stupid than when ignoring sexism, p = .002, 95% CI [-2.80, -.675]. However, this difference was not significant among non-STEM majors, p = .752, 95% CI [-1.10, .797]. There was also a marginally significant two-way interaction between confrontation condition and participant major, F (1, 192) = 3.30, p = .071, η^2_p = .017, such that among STEM majors, those who imagined themselves ignoring sexism anticipated greater perceptions of stupidity than those who imagined confronting the sexist remark, p < .001, 95% CI [-1.10, .797]. Conversely, non-STEM majors did not differ in anticipated perceptions of stupidity (p = .226). Finally, there was a significant main effect of confrontation condition, F (1, 192) = 12.66, p < .001, η^2_p = .062, such that participants reported anticipating lower stupidity perceptions when they imagined confronting (M = 3.06, SE = .175) versus ignoring sexism (M = 3.93, SE = .167).

Bossy. The perceived sexism covariate was not significant F (1, 192) = 2.06, p = .153, η^2_p = .011. Controlling for perceived sexism, there was a significant three-way interaction between confrontation condition, classroom context, and participant major on the degree to which participants believed others would see them as bossy, F (1, 192) = 5.07, p = .026, η^2_p = .026. Within the arts context, the two-way interaction between confrontation condition and participant major was not significant, F (1, 90) = 1.65, p = .202, η^2_p = .018. However, in the STEM context, the two-way interaction between confrontation condition and participant major was marginally significant, F (1, 101) = 3.41, p = .068, η^2_p = .033, such that STEM majors confronting in a

STEM context felt they would be perceived as bossier than those who imagined ignoring sexism, $p < .001$, 95% CI [.636, 2.19]. However, this difference was also significant among non-STEM majors in the STEM context, $p < .001$, 95% CI [1.59, 3.59].[3] Although the effect was not significant, means showed that among those who imagined confronting sexism, non-STEM majors ($M = 5.48$, $SE = .358$), believed others would perceive them as bossier than STEM majors ($M = 4.79$, $SE = .272$, $p = .127$, 95% CI [-.200, 1.58]), whereas among those who imagined ignoring sexism, STEM majors ($M = 3.37$, $SE = .281$), thought others would see them as bossier than non-STEM majors ($M = 2.89$, $SE = .354$, $p = .288$, 95% CI [-.413, 1.38). There were no significant two-way interactions on bossy perceptions (p's > .297), or main effects of classroom context or participant major (p's > .445), however, there was a significant main effect of confrontation condition, F (1, 192) = 46.45, $p < .001$, $\eta^2_p = .195$, showing that those who imagined confronting sexism ($M = 5.09$, $SE = .18$) thought others would see them as bossier than those who imagined ignoring sexism ($M = 3.37$, $SE = .17$).

Warmth. The perceived sexism covariate was marginally significant, F (1, 191) = 2.93, p = .089, $\eta^2_p = .015$. There was no significant three-way interaction between confrontation condition, classroom context, and participant major on participants' perceived warmth, F (1, 191) = .063, p = .802, $\eta^2_p = .000$, nor were there significant two-way interactions (all p's > .474). There was a significant main effect of confrontation condition, F (1, 191) = 9.83, $p = .002$, $\eta^2_p = .049$, such that those who imagined themselves confronting sexism ($M = 3.59$, $SE = .125$) thought that others would see them as less warm than those who imagined themselves ignoring sexism (M = 4.14, $SE = .120$). There was also a main effect of classroom context, F (1, 191) = 4.79, $p = .030$,

[3] Effect sizes were statistically equal for non-STEM ($\eta^2_p = .192$) and STEM majors ($\eta^2_p = .162$), as indicated by a non-significant Fishers z transformation ($z = .21$, $p = .834$).

η^2_p = .024, such that those who imagined themselves in a STEM context (*M* = 4.05, *SE* = .118) thought that others would see them as warmer than those who imagined themselves in an arts context (*M* = 3.68, *SE* = .124). There was no significant effect of participant major on participants' anticipated warmth perceptions, F (1, 191) = .317, p = .574, η^2_p = .002.

Competence. The perceived sexism covariate was not significant, F (1, 192) = 1.31, p = .254, η^2_p = .007. Controlling for perceived sexism, there was a marginally significant three-way interaction between confrontation condition, classroom context, and participant major on participants' perceived competence, F (1, 192) = 2.82, p = .095, η^2_p = .014[4]. There was a marginally significant two-way interaction between classroom context and participants major, F (1, 192) = 3.26, p = .072, η^2_p = .017, showing that among participants who imagined themselves in a STEM context, STEM majors anticipated being perceived as more competent than non-STEM majors, p = .033, 95% CI [.047, 1.11)]. In contrast, among those who imagined themselves in an arts context, there was no difference between STEM and non-STEM majors on anticipated competence perceptions (p = .660). The other two-way interactions were not significant (p's > .883). However, there was a significant main effect of confrontation condition, F (1, 192) = 45.67, p < .001, η^2_p = .192, such that those who imagined themselves confronting sexism (*M* = 4.94, *SE* = .141) thought that others would see them as more competent than those who imagined themselves ignoring sexism (*M* = 3.62, *SE* = .134). There were no significant main effects of classroom context, F (1, 192) = .044, p = .834, η^2_p = .000, or participant major on participants' anticipated competence perceptions, F (1, 192) = 1.38, p = .241, η^2_p = .007.

[4] The two-way confrontation condition by participant major interaction was not significant in the STEM context, F (1, 101) = 1.61, p = .207, η^2_p = .016, nor in the arts context, F (1, 90) = 1.28, p = .261, η^2_p = .014.

Perceived subject difficulty.

Computer science difficulty. The perceived sexism covariate was marginally significant *F* (1, 190) = 3.17, *p* = .077, η^2_p = .016. Controlling for perceived sexism, and as in Study 1, the three-way interaction between confrontation condition, classroom context, and participant major on perceived computer science difficulty was significant, *F* (1, 190) = 5.19, *p* = .024, η^2_p = .027. In the arts context, the two-way interaction was not significant, *F* (1, 88) = 1.27, *p* = .263, η^2_p = .014, but was significant within the STEM context, *F* (1, 101) = 5.03, *p* = .027, η^2_p = .047. Simple contrasts showed that among STEM majors, those who imagined confronting sexism perceived computer science as significantly more difficult compared to those who imagined ignoring sexism, *p* = .037, 95% CI [.039, 1.27]. Among non-STEM majors, those who imagined confronting sexism in a STEM context did not differ from those who imagined ignoring sexism, *p* = .233, 95% CI [-1.28, .315].

Communication studies difficulty. The perceived sexism covariate was not significant, *F* (1, 189) = .093, *p* = .761, η^2_p = .000. Controlling for perceived sexism, the three-way interaction between confrontation condition, classroom context, and participant major was not significant, *F* (1, 189) = 2.23, *p* = .137, η^2_p = .012. There were no significant two-way interaction effects (all *p*'s > .434). There was no main effect of confrontation condition on the perceived difficulty of communication studies, *F* (1, 189) = 1.10, *p* = .295, η^2_p = .006, but there was a significant main effect of classroom context, *F* (1, 189) = 3.93, *p* = .049, η^2_p = .020, such that those who imagined themselves in a STEM context rated communication studies as more difficult (*M* = 3.56, *SE* = .156), compared to those who imagined themselves in an arts context (*M* = 3.11, *SE* = .163). There was a marginal main effect of participant major, *F* (1, 189) = 3.15, *p* = .078, η^2_p = .016, such that non-STEM majors rated communication studies as more difficult (*M* = 3.54, *SE* = .167), compared to STEM majors (*M* = 3.13, *SE* = .153).

Discussion

Study 2 focused on how women in STEM (versus non-STEM disciplines) anticipated social and personal costs after imagining themselves confronting or ignoring a sexist comment in a STEM or arts classroom. Consistent with Study 1, in which Jenna confronting (versus ignoring) in a STEM context was perceived as bossier, when STEM majors in a STEM context imagined themselves confronting versus ignoring sexism, they thought others would see them as bossier. This effect did, however, also occur for non-STEM majors in a STEM context. This suggests that for women in STEM and non-STEM disciplines alike, imagining confronting sexism in a science context was associated with the perception of being labelled as bossier. The fact that this was especially true among women in non-STEM programs suggests that the reputation for science as a chilly climate persists beyond STEM (Settles et al., 2006). The perception of science as a non-conducive context for confrontation could therefore be one reason underlying the difficulty retaining women in science. Indeed, it may be the case that women in non-STEM disciplines are also attuned to some of the costs of confronting in a STEM context; even though this context may be less familiar to them, perhaps women outside of STEM perceived many of the same outcomes as STEM majors (sometimes even more so). Therefore, perceptions that STEM is not a context in which to confront sexism could even dissuade non-STEM majors from considering participation in STEM fields. However, Study 2 findings also suggest that aside from some social costs (e.g., being perceived more negatively in general, more emotional) women perceive some advantages to confrontation, like anticipating that others will see them as more competent. For women in STEM, it may be more valuable to confront and be perceived as competent than to ignore sexism and be liked, similar to past research showing that in interracial interactions, participants from racial minority groups want to be respected and perceived as competent more than White participants, however, White participants want to be perceived as moral and warm to a greater extent than racial minorities (Bergsieker, Shelton & Richeson, 2010).

Study 2 findings also showed that non-STEM majors imagining confrontation in a STEM context felt communication studies was more difficult than STEM majors. This may be because the STEM context is perceived more challenging than arts in general, and this perception affects how non-STEM majors feel about their own fields. In contrast, STEM majors may have been unlikely to perceive communication studies as difficult relative to their own disciplines. Although this pattern should be interpreted cautiously given its marginal significance, it is worth noting in that the STEM context itself may influence how even non-STEM majors perceive their own fields of study.

Although in Study 1, Jenna-the-confronter elicited higher stupidity ratings in a STEM context, in Study 2 STEM women imagining themselves confronting in a STEM context did not anticipate being labelled as more stupid. However, there may nevertheless be a hidden social cost for STEM women facing sexism in other contexts like arts: they anticipated being perceived as more stupid if they *ignored* sexism, whereas non-STEM majors did not anticipate this cost. It could be that STEM women feel the burden of confronting in other disciplines because they have less to risk than they would for confronting in their own disciplines; as such they may believe that others expect them to act more assertively. Consistent with work showing that people can derogate women when they fail to act agentically in leadership roles (Bongiorno, Bain, & David, 2014), it could be that STEM women feel compelled to act agentically in contexts beyond science. Alternately, given STEM women report more sexist experiences than non-STEM women in general (Funk & Parker, 2018), perhaps having experienced more sexist events, women in science anticipate more confrontation, developing hypervigilance in response to discrimination even beyond their own disciplines.

Consistent with Study 1 results, and past research on the costs of confronting (Kaiser & Miller, 2001), women in Study 2 anticipated more negative perceptions for confronting versus ignoring sexism (i.e., more of a complainer, more emotional). However, in contrast to Study 1, when women in Study 2 imagined themselves confronting versus ignoring sexism, they anticipated that others would perceive them as less warm. This finding is however, in line with previous research showing negative perceptions of confronters as complainers (Kaiser & Miller, 2001). In Study 2, although participants anticipated perceptions of lower warmth if they imagined themselves confronting sexism, those who imagined confrontation also believed others would see them as more competent. This finding is congruent with previous work suggesting the psychological benefits of women's confrontations (Gervais et al., 2010; Foster, 2009), and the cold but competent trade off documented in previous research showing that women tend to be viewed as more warm than competent, whereas scientists are viewed as more competent than warm (Cuddy, Fiske, & Glick, 2008).

Interestingly, in Study 2, the pattern of results for perceived difficulty of computer science was opposite to Study 1; whereas in Study 1, reading about Jenna confronting in STEM led female participants to rate computer science as easier than those reading about Jenna-the-ignorer, in Study 2, computer science was perceived as more difficult when STEM majors imagined themselves confronting versus ignoring. This difference could be an 'easier said than done' phenomenon due to the difference in perspective; there may be fewer perceived costs when imagining someone else's confrontation than when imagining one's own. Additionally, some evidence suggests that when women in STEM engage in work-related conversations with male colleagues, they experience stereotype threat (i.e., fear that one will act in accordance with a negative stereotype of one’s social group, such as women are bad at math; Spencer et al., 1999), which then interferes with cognitive processing (Holleran et al., 2011), and working memory (Schmader & Johns, 2003). Therefore, confrontation imagined in a first-person-perspective may have required greater cognitive resources than when imagined in a third-person-perspective (as in Study 1) resulting in fewer resources allotted for tackling challenging tasks, like computer science. If imagining having to confront sexism in STEM leads to greater perceived science difficulty, this might provide some insight as to why women indicate interest in science, but often leave to pursue other areas (see Hill, Corbett, & St Rose, 2010 and Shapiro & Sax, 2011 for a review of factors related to women’s attrition from STEM; e.g., inadequate preparation in early education, gender discrimination).

Taken together, Studies 1 and 2 highlight the costs of confrontation that occur across disciplines, and in some cases particularly so for women in STEM. It is notable that although the STEM context did not always elicit different responses from the non-STEM context, confronting consistently elicited a different response from ignoring (i.e., being viewed as more negative, a complainer, emotional, and bossy). This suggests two possible ways that confronting can be costly in STEM – first, because sexism may be encountered more frequently (Funk & Parker, 2018), confrontation may become costly due to repeated encounters. Second, in some cases, confronting in STEM may in fact lead to additional costs. However, supporting past research demonstrating that confrontation intentions were positively linked to women’s perceived competence (Gervais et al., 2010) women in Study 2 also anticipated being perceived as more competent when they imagined confronting versus ignoring the sexist remark, suggesting that confrontation might impact a woman's anticipated social costs, but not her competence costs.

Studies 1 and 2 included similar sexism primes, and the same confrontation manipulation. However, in everyday contexts, sexism takes various forms; sometimes hostile and other times benevolent. Confrontation can also occur in a range of ways. Study 3 was therefore designed to broaden the scope of inquiry to examine responses to two types of sexism, benevolent and hostile (Glick & Fiske, 1996) and two types of confrontation, namely assertive and non-confrontational responses (Becker & Barreto, 2014; Gervais & Hillard, 2014; Saunders & Senn, 2009).

Study 3

In Studies 1 and 2, it is possible the confrontation manipulation conflated two different confrontation styles, assertive/direct and non-assertive/indirect responses. Assertive/direct confrontations are theoretically defined as those which specifically "communicate one's displeasure in a way that is visible to the perpetrator" (Swim et al., 1998, p. 50), whereas non-assertive/indirect responses do not. For example, in Studies 1 and 2 the confronter's citing of information about female CEO's was an attempt to educate the perpetrator, a form of assertive/direct confrontation (Hyers, 2007; Hyers, 2010; Lalonde, Stroink & Aleem, 2002; Swim, Cohen & Hyers, 1998). However, the scenario also included a sarcastic comment, which is considered non-assertive/indirect because it softens the effect of actual discontent with humour (LaFrance & Harris, 2004). Therefore, the confrontation manipulation included elements of assertive/direct and non-assertive/indirect approaches.

Conflating different confrontation styles is problematic, given some research shows that confronters face more severe consequences for using assertive/direct approaches versus non-assertive/indirect approaches (Becker & Barreto, 2014; Saunders & Senn, 2009; Swim et al., 1998; Choma & Foster, 2010). For example, one such study (Saunders & Senn, 2009) asked male undergraduates to read scenarios in which a woman confronted sexism using one of four confrontation styles: non-hostile assertive (i.e., “Your behaviour is inappropriate. What you are doing is sexual harassment, so please don’t act that way again”), hostile assertive (i.e., “Listen a**hole, stop making all of those pathetic sexually harassing comments”), exclamation (i.e., “Oh my god! I can’t believe you said that!”), and humorous/sarcastic (i.e., “Said in a laughing voice: Hey buddy, do these charming comments always impress the ladies, or am I the only one who doesn’t like to be sexually harassed?”). There was also a control condition with no confrontation. As expected, men who read scenarios in which the woman confronted using the hostile assertive confrontation were more likely to rate the confronter as irritating, argumentative, and unlikeable in comparison to the other groups (except for the humorous/sarcastic group). Thus, assertive/direct confrontations, when hostile in nature may lead to increased social costs versus other types of confrontation. However, this study measured social costs directed at female confronters, and as such, did not address women’s anticipated costs of enacting assertive/direct versus non-assertive/indirect confrontations.

Contrasting research suggests that non-assertive/indirect confrontations can elicit more severe social costs than assertive/direct confrontations. For instance, in one study (Gervais & Hillard, 2014), participants read scenarios in which a sexist remark was confronted using an assertive/direct statement (i.e., “That last comment you made seemed very sexist. Perhaps the women would also be interested in doing that?”), or a non-assertive/indirect statement (i.e., “That last comment you made seemed a little unfair. Perhaps the women would also be interested in doing that?”). Confrontation statements also varied in terms of a public or private context. Those who read about a woman confronting indirectly and publicly perceived her less positively overall, and viewed her as less competent, and as a worse leader versus other conditions. Thus, non-assertive/indirect confrontations may also elicit negative social costs for female confronters. However, despite some evidence that non-assertive/indirect confrontations can elicit negative social costs, most past research suggests that assertive/direct confrontations are costlier. Yet, the differences between assertive/direct and non-assertive/indirect confrontations on anticipated social costs have never been tested in a STEM context.

Importantly, research has also identified nuances within different assertive/direct confrontations, such that angered versus other approaches like education, elicits greater social costs. Specifically, assertive/direct confrontations utilizing anger and hostility (versus other responses) are associated with more negative evaluations and decreased support for the confronter. For example, in one study (Becker & Barreto, 2014), participants read scenarios about a woman confronting sexism aggressively (i.e., with an angered remark and slapping the perpetrator across the face), non-aggressively (i.e., with an explanatory remark about how sexist the perpetrator had been and why), or not at all (control). Then, participants rated the confronter on various traits and reported hostility toward her. As expected, those who read about the woman confronting aggressively reported lower positive evaluations of her and reported more hostility toward her compared to other conditions. However, in this study, aggressive confrontation was operationalized by an angered comment and slapping the perpetrator across the face, an extreme action which most would perceive as eliciting greater social repercussions than an angered remark alone. Thus, in this study, it is unclear whether the confronter elicited greater social costs because of the use of physical aggression or because of expressing verbalized anger.

To disentangle the effects of different forms of assertive/direct confrontations on social costs, Choma and Foster (2010) investigated how participants viewed a woman after reading that she confronted sexism in one of five different styles. Two confrontations were considered assertive/direct (i.e., anger, operationalized as a hostile remark, and education, operationalized as a statement explaining problematic gender stereotypes), and three were considered non-assertive/indirect (i.e., humour, operationalized as a sarcastic comment, a non-verbal response operationalized by sighing and eye rolling, and active disengagement operationalized by standing up and tossing out the sexist prime; Choma & Foster, 2010). Interestingly by disentangling the two assertive/direct confrontation strategies, differences in social costs emerged, such that compared to all other confrontation styles, participants who read about the confronter using an educational approach rated her more favourably, whereas those who read about the confronter using anger or humour rated her most unfavourably. Assertive/direct confrontation styles may in fact elicit greater social costs than non-assertive/indirect confrontations; however, there are indeed different kinds of assertive/direct confrontations, some of which may elicit increased social costs (i.e., physical aggression) or decreased social costs (i.e., education). Therefore, Study 3 was designed to disentangle the impact of various confrontation styles on women's anticipated social and personal costs.

These nuances may be especially important to understand so that research can best inform women in STEM about what confrontation style to enact when they encounter sexism. Confronting with anger may elicit the worst social costs (Choma & Foster, 2010). Although Choma and Foster (2010) found that those who read about the female confronter in the educational confrontation condition viewed her more favourably than in other conditions, at the same time, those who read about the educational confrontation also rated the confronter higher on complaining than other conditions. Given that educational confrontation still communicates discontent, it is also possible that women who imagine themselves confronting sexism with education would anticipate greater social costs compared to those imagining an indirect confrontation and inaction. Finally, given indirect confrontation still includes a non-verbal behaviour communicating discontent, it was predicted that women who imagined themselves responding indirectly would report greater social costs than those who imagined ignoring the sexist comment altogether.

In addition to assessing the impact of different confrontation styles on women’s outcomes, Study 3 was also designed to test differences between types of sexism because the prime previously used did not explicitly distinguish hostile from benevolent sexism. Hostile sexism refers to attitudes that assume women are inferior to men, whereas benevolent sexism refers to the set of attitudes that women should be protected and cherished by men (Glick & Fiske, 1996). The previous sexism manipulations however, contained elements of both types of sexism. On the one hand, the perpetrator’s comment in the previous two studies could have been considered hostile, in that it implied a negative stereotype about women’s abilities (e.g., 'don't mess anything up'). At the same time however, benevolent sexism can be disguised as complimentary and thus, the additional remark about 'looking pretty' could have been interpreted as benevolent sexism. It is necessary to parse out the independent effects of each type of sexism given each may differentially impact social costs and retention variables. For example, hostile sexism has been found to increase collective action, whereas benevolent sexism decreases collective action (Becker & Wright, 2011). As such, it is possible that women may anticipate greater social costs after confronting hostile sexism because the more action they take, the more negatively they may be perceived.

Understanding the effect of different sexism types may be especially important to assess in a STEM context as both forms of sexism have been salient in recent years. Real-world examples from science and technology suggest the hostility faced by women who confront sexism in STEM. For example, when feminist media critic and blogger Anita Sarkeesian created videos challenging misogyny in the video gaming industry, she was sent images showing video-game characters raping her and received death threats that caused her to flee her home (Parkin, 2014). When science writer Rose Eveleth expressed dislike for a scientist's shirt that featured partially nude female comic book characters, she was met with invitations to kill herself (Bianco, 2014). However, women in STEM also face stereotypes that are benevolently sexist, for example, Tim Hunt's concerns about mixed-gender labs articulated that women in science are 'distractingly sexy' and men fall in love with them (Waxman, 2015). Even though women experience both forms of sexism in STEM, it is unclear from which type of sexism they will anticipate greater social costs.

There is sparse research comparing the costs of confronting hostile and benevolent sexism. On the one hand, there is some research suggesting that confronting benevolent sexism could elicit greater social costs. Becker et al., (2011) tested whether female targets who confronted (operationalized as refusing help), versus accepted benevolent help faced greater social costs like decreased warmth. As predicted, when the target confronted by refusing an offer of benevolent help, she was perceived as less warm than when she accepted it. Thus, there is evidence that confronting benevolent sexism elicits social costs; however, this study did not compare the costs of confronting benevolent versus hostile sexism.

Reilly et al., (2017) measured hostile and benevolent sexism and asked a sample of professionals in the technology industry to read scenarios in which a male or female intern experienced either interpersonal difficulties (e.g., trouble acting professionally) or ability-related difficulties (e.g., trouble completing tasks). Then, participants rated the hypothetical interns on aptitude measures, including competence. Results showed that among participants who read about the intern having ability-related difficulties people high on hostile and benevolent sexism rated the female intern lower on aptitude compared to the male intern. Given both types of sexism negatively related to women's aptitude perceptions, it is possible that sexism type would not differently impact women's anticipated costs of confronting. However, this study did not experimentally vary hostile and benevolent sexism but instead measured sexist attitudes as a predictor of women's aptitude perceptions.

Dardenne, Dumont, and Bollier (2007) did manipulate types of sexism. They recruited women for a study ostensibly about training for job interviews. Participants were told that a chemical plant was hiring but was required to adhere to new regulations specifying the number of women offered positions (sexism threat). Specifically, participants were randomly assigned to one of three conditions: in the hostile sexism condition, participants read that the "industry is now restricted to employ a given percentage of people of the weaker sex," in the benevolent sexism condition participants read that the "industry is now restricted to choose women instead of men in case of equal performance," or in the non-sexist control condition the recruiter did not express sexist attitudes. Then, participants completed a test that was ostensibly diagnostic of their eligibility for hire. Results showed that women in the benevolent sexism condition performed worse on the test than those in the hostile sexism condition or the control condition, suggesting the negative consequences of a seemingly covert threat on women's cognitive functioning. Although this study did not examine social costs, it may also be the case that greater cognitive load induced by benevolent sexism could lead women to anticipate greater costs if they confront. However, to date there has been no direct test of the social costs of confronting under hostile or benevolently sexist conditions.

Given the inconclusiveness of existing research evidence, it is possible to make two predictions about how sexism type may influence social costs; based on Becker et al., 2011, confronting benevolent sexism elicited greater social costs, however, in this case, women's outcomes may have been affected by the confrontation response as well as the type of sexism. Yet, research has also found that hostile sexism is considered more legitimate (Dardenne et al., 2007), so it is possible that confronting hostile sexism may lead to fewer anticipated social costs because confronting obvious injustice it is justified. Alternately, if women confront benevolent sexism, that is considered more difficult to detect than hostile sexism (Barreto & Ellemers, 2005), they may anticipate greater social and personal costs because they could perceive their confrontation as unwarranted or as an overreaction.

Study 3 was therefore designed to distinguish between the effects of different sexism types (i.e., hostile, benevolent) and confrontation styles (i.e., angered, educational, indirect, ignore/control) on STEM women's anticipated social and personal costs. Furthermore, in Study 3, only women in STEM were recruited given this was the specific population of interest. As such, three additional retention variables were tested including STEM efficacy, STEM identity, and self-esteem, given self-esteem is positively linked to self-efficacy (Judge, Erez, Bono, & Thoresen, 2002).

A main effect of confrontation style was expected, such that those imagining angered confrontation would anticipate the greatest social costs compared to other groups. Further, it was expected that those imagining an educational confrontation would anticipate lower social costs than those imagining angered confrontation, but greater social costs than those imagining an indirect confrontation or inaction, given education is still assertive. Finally, it was expected that those imagining an indirect confrontation would anticipate greater social costs that those in the ignore/control condition, given even indirect confrontations can elicit some costs. Interaction effects between sexism type and confrontation style were tested, but hypotheses were exploratory.

Method

Participants

Again, the goal was to recruit 50 women/condition to achieve power of .80 (Simmons et al., 2011) using a snowballing recruitment strategy via online forums (e.g., Reddit, Facebook, Twitter). Women in STEM from across Canada (N = 255) agreed to participate. Most participants were students (n = 201) although there were some working in STEM careers (n = 41). The majority (79%) of participants were between 18-24 years old, 16% were between 25-34 years old, and 4% were between 35-44 years old. Self-reported ethnicities were: 61.2% Caucasian/European, 30.2% Asian, 3.9% other, 2.7% African-Canadian, 1.6% Latin-Canadian, and .4% preferred not to say. Participants selected their own area of study or work from a list of 14 possible options. Self-reported subject areas were 29.4 % biology, 25.5% health sciences, 10.6% computer science, 8.2% engineering, 7.1% chemistry, 5.1% mathematics, 4.7% physics, and 4.7% biochemistry, 2% pharmacy, 2% statistical sciences, .4% geology, and .4% optometry. Participants were compensated with an e-gift card to a coffee vendor.

Procedure

The study was a 2(Sexism type: hostile versus benevolent) X 4(Confrontation style: angered, educational, indirect, ignore) between-subjects experimental design. All participants were sent an electronic link to the online study, and after consenting completed demographic measures. Because the underrepresentation of women in STEM impacts recruitment ability, this study was described as an investigation into how group situations impact women in STEM. This served to balance the need to increase participation by highlighting STEM women as a stakeholder in the research, with the need to reduce demand characteristics.

General instructions. All participants first read the following instructions:

> Statistics Canada shows that while approximately 70% of university graduates are female, only 30% of STEM graduates are women (Hango, 2013). As such, you may be the only woman working with men in group settings. We are interested in how this affects you. Today we will ask you to imagine yourself in a situation. You should picture the situation from a first-person perspective. With the first-person-perspective you see the situation as if you were experiencing it yourself if the event was taking place and happening to you. That is, you are looking out at your surroundings through your own eyes; you see yourself in the situation as well as your surroundings.

Sexism type manipulation. Then, participants read a scenario that portrayed either hostile or benevolent sexism. Scenarios were based on items from the hostile and benevolent subscales of the Ambivalent Sexism Inventory (Glick & Fiske, 1996), and manipulations from previous research (Good & Rudman, 2009).

All participants first read the following text:

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says:

Those in the **hostile** sexism condition read: “You should let us do this part - girls can't do it without screwing up.” This statement was rooted in the dominative paternalism component of hostile sexism, characterized by men’s need to possess control over women (Glick & Fiske, 1996). As in previous research, the hostile sexism manipulation suggested that women were incapable of completing the task. For example, in a study by Good and Rudman (2009), hostile sexism was portrayed with a statement that ‘women just aren’t cut out’ for managing the warehouse equipment.

Those in the **benevolent** sexism condition read: “You should let us do this part - we don't want you getting hurt.” This statement was rooted in the protective paternalism component of benevolent sexism, characterized by men’s need to protect and cherish women (Glick & Fiske, 1996). As in previous research, the benevolent sexism manipulation suggested that women were too delicate for the task. For example, in Good and Rudman (2009), benevolent sexism was portrayed with a statement that managing warehouse equipment was too dangerous for women.

All participants read that the rest of the group members nodded their heads and smiled in agreement.

Participants next completed the sexism manipulation check measure and then read the following:

“We’d again like you to put yourself back in the situation, but now, you respond. Here's the scenario you previously read with your response added to the bottom. Please focus on how you respond.” Participants were then randomly assigned to re-read the original scenario they saw, but with a confrontation response added.

Confrontation style manipulations. Confrontation manipulations were based on scenarios used in previous research (Choma & Foster, 2010).

Those assigned to an **angered** confrontation condition read that they responded by saying: “Screw you! That’s so sexist!”

Those assigned to an **educational** confrontation condition read that they responded by saying: “I understand that you might believe that, but I think you're making an unfair assumption about all women.”

Those assigned to an **indirect** confrontation condition read that they responded by looking at the perpetrator and rolling their eyes.

Those assigned to the **ignore/control** condition read that they responded by ignoring the comment. Manipulation checks of confrontation type and outcome measures were completed. Complete scenarios and study materials appear in Appendix C.

Measures

Sexism type manipulation check. To check our portrayal of hostile and benevolent sexism, participants completed the 22-item Ambivalent Sexism Inventory (Glick & Fiske, 1996). Participants were instructed to complete the measure from the perspective of *Josh* (instead of their own) using a scale from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). For example, participants were asked to imagine how Josh would rate the following items: “Most women interpret innocent remarks of acts as sexist,” (hostile) and, “No matter how accomplished he is, a man is not truly complete as a person unless he has the love of a woman,” (benevolent). Means of each subscale were computed whereby higher scores indicated greater hostile ($\alpha = .89$) or benevolently ($\alpha = .77$) sexist beliefs.

Confrontation style manipulation check. Given past research has adequately distinguished between confrontation types (Choma & Foster, 2010; Foster, 2013), there was no *a priori* manipulation check for confrontation. However, to explore whether the confrontation styles were perceived differently, differences in how 'active' participants felt after imagining each confrontation were assessed; 'active' was derived from the positive and negative affect schedule

(Watson, Clark, & Tellegan, 1988) that had been included for a different study. Participants indicated on a scale of (1) *Strongly Disagree* to (7) *Strongly Agree* how active they felt after imagining responding to sexism.

Social costs. Social costs were operationalized using the same trait adjectives as in Studies 1 and 2, rated on a scale from (1) *Strongly Disagree* to (7) *Strongly Agree*.

STEM retention variables.

STEM difficulty. Whereas Studies 1 and 2 assessed perceived difficulty with computer science and communication studies, Study 3 asked about the perceived difficulty of participant's own STEM majors to increase relevance of the scenarios. Participants therefore indicated perceived difficulty of their own major on a scale from (1) *Very Easy* to (7) *Very Difficult* and included difficulty as a STEM retention variable.

STEM efficacy. STEM efficacy was also included using seven items adapted from previous research (Stout et al., 2011), answered about participants' own disciplines: E.g., 'I am effective in [participants' own area]' on a scale from (1) *Strongly Disagree* to (7) *Strongly Agree* (α = .90). Efficacy is an important STEM retention variable as it is positively related to intentions to pursue science (Marra et al., 2009; Stout et al., 2011).

STEM identity. To assess how much participants identified with science as a social identity, they completed an adapted 12-item social identity measure (Cameron, 2004). Specifically, participants indicated the extent to which they agreed with each item, adapted again for participants' own disciplines: 'I have a lot in common with other people in [participants' own STEM area]'; 'I feel strong ties to other people in [participants' own STEM area],' on a scale from (1) *Strongly Disagree* to (7) *Strongly Agree*. Items were computed into an average whereby higher scores indicated greater science identity (α = .84).

State self-esteem. Participants completed the 20-item State Self-esteem Scale (Heatherton & Polivy, 1991), indicating the extent to which they agreed with each item at that moment: E.g., ‘I feel confident about my abilities’; ‘I feel frustrated or rattled about my performance,’ on a scale from (1) *Strongly Disagree* to (7) *Strongly Agree*. Items were assessed as a total score, so that higher scores indicated greater state self-esteem (α = .94).

Results

Exploratory Factor Analyses of Social Costs

As in Studies 1 and 2, a factor analysis of the trait ascription measure of social costs was conducted. Neutral and filler items were not analyzed.

Negative traits. The 16 negative items were factor analyzed using principal axis factoring (PAF), and, as in the previous two studies, using a varimax rotation, items loaded onto a single factor. Initial eigenvalues > 1 indicated that the single-factor solution explained 62.86% of the variance in negative traits. Therefore, these items were combined into a single composite score to be tested as a dependent variable (α = .959).

Positive traits. As in Studies 1 and 2, the item ‘funny’ was removed for low inter-item correlations and communalities. As recommended by previous research (Costello & Osborne, 2005; Garson, 2010), two items, ‘respectable’ and ‘intelligent’ were removed for cross-loadings > .40. Like Studies 1 and 2, two factors emerged from the remaining nine positive items. Initial eigenvalues > 1 indicated that two factors explained 64.59% of the variance in positive trait perceptions, using a varimax rotation. The rotated factor loading matrix for the two-factor solution is in Table 5. The scree plot also supported a two-factor solution to the data, represented by the notable drop-off following the second factor (see Figure 4). The first factor included four traits: ‘brave,’ 'strong,’ ‘confident,’ and ‘independent.’ The second factor included five traits: ‘a good friend,' 'considerate,' 'likeable,' 'a good team member,' and 'friendly.' These two factors appeared to again tap into dimensions of warmth and competence (Fiske et al.,1999), however, given the one adjective 'intelligent' was omitted for high cross-loadings, in this study the competence dimension could be re-conceptualized as strength. Therefore, in Study 3, this second factor will be referred to as strength/competence. Composite scores were created for each of the factors, and internal consistencies were good: .853 for warmth, and .814 for strength/competence. The two factors were weakly correlated (r = .181, p = .004).

Preliminary Analyses

Prior to the main analyses, a series of eight independent samples t-tests were conducted to check for differences between students and working women on all dependent measures. Using a Bonferonni correction for eight comparisons (i.e., .05 alpha/8: p = .006), results indicated no consistent pattern of differences between these groups[5], so they were combined into a single sample for all subsequent analyses.

Sexism manipulation check. For sexism to have been appropriately portrayed there should be a main effect of sexism type, such that those exposed to hostile sexism should report higher scores in response to the hostile items from the perspective of Josh versus those exposed to benevolent sexism, and vice versa for the benevolent sexism items. Further, there should be no interaction between sexism type and confrontation style. Results confirmed these expectations, such that the main effect of sexism type on hostile sexism items was significant, F (1, 251) =

[5] Working women (M = 3.95, SD = 1.82) versus students (M = 4.56, SD = 1.73), reported significantly lower perceptions that others would see them as complainers, t (248) = -2.03, p = .044, 95% CI [-1.19, -.017]. Working women (M = 4.79, SD = .91) also reported marginally lower STEM identification than students (M = 5.06, SD = .92), t (248) = -1.73, p = .085, 95% CI [-.58, .04].

16.99, $p < .001$, $\eta^2_p = .181$, showing that participants in the hostile sexism condition reported greater hostile sexism ($M = 5.40$, $SE = .09$), compared to those in the benevolent sexism condition ($M = 4.89$, $SE = .09$). There was no main effect of confrontation style or an interaction between sexism type and confrontation style on hostile sexism items (p's > .181). Also, as predicted, the main effect of sexism type on benevolent sexism items was significant, F (1, 251) = 22.71, $p < .001$, $\eta^2_p = .083$, showing that participants in the benevolent sexism condition reported greater benevolent sexism ($M = 4.07$, $SE = .07$), compared to those in the hostile sexism condition ($M = 3.58$, $SE=.07$). There was no main effect of confrontation style or an interaction between sexism type and confrontation style on benevolent sexism items (p's > .260). Sexism type was therefore successfully manipulated.

Confrontation style manipulation check. To assess that participants perceived differences across the confrontations, special contrasts were conducted comparing those in the angered and educational conditions to those in the indirect and ignore conditions. It was expected that those exposed to angered and educational confrontations would report feeling more active than the other two conditions. An independent samples t-test supported this prediction, such that those in the angered and educational conditions ($M = 4.28$, $SD = 1.52$) reported feeling more active than those in the indirect and ignore/control conditions ($M = 3.71$, $SD = 1.65$), t (253) = 2.84, $p = .005$, 95% CI [.17, .96]. Therefore, the confrontation manipulations were successful.

Main Analysis

A 2(Sexism type: hostile versus benevolent) X 4(Confrontation style: angered, educational, indirect, ignore) between-subjects ANOVA was conducted. Simple effects analyses were conducted in the event of significant interactions. If no interactions emerged, the main effect of confrontation style was examined using three *a priori* orthogonal contrasts, and one non-orthogonal contrast.

First, based on past research that has found angered confrontations elicit the most negative evaluations (Becker & Barreto, 2014; Choma & Foster, 2010) it was expected that those who imagined confronting sexism with anger would anticipate the greatest costs compared to other confrontation styles. Second, despite the fact that education garners more favourable impressions than other confrontation styles, education also elicited higher complainer perceptions (Choma & Foster, 2010), and, education is nevertheless is assertive/direct, which elicits more costs than non-assertive/indirect confrontations (Swim & Hyers, 1999). Therefore overall it was expected that those who imagined enacting an educational response would anticipate greater costs than those in the indirect confrontation or ignore/control conditions. Third, given that non-confronters elicit the fewest social costs compared to confronters (Kaiser & Miller, 2001), it was expected that those who imagined themselves responding indirectly would anticipate greater costs than those in the ignore/control condition. Finally, given the worse costs elicited by anger versus educational confrontations (Choma & Foster, 2010), a fourth, non-orthogonal *a priori* contrast was conducted comparing these two conditions.

Social costs.

Negative traits. The sexism type by confrontation style interaction was tested on the 16-item composite of negative traits. There was no main effect of sexism type, F (1, 247) = .645, p = .423, η^2_p = .003, or interaction between sexism type and confrontation style on the composite score of negative traits, F (3, 247) = .275, p = .844, η^2_p = .003. There was however, a significant main effect of confrontation style, F (3, 247) = 19.75, p < .001, η^2_p = .193. Planned contrasts showed that those who imagined themselves confronting sexism with anger (M = 5.12, SD =

1.09) anticipated more negative trait perceptions compared to all other conditions, *t* (251) = -5.54, *p* < .001. Those in the educational confrontation condition (*M* = 4.53, *SD* = 1.30) anticipated greater negative perceptions than those in the indirect confrontation condition (*M* = 4.33, *SD* = 1.17) and the ignore/control condition (*M* = 3.45, *SD* = 1.38), *t* (251) = -3.64, *p* = .001. Further, those in the indirect confrontation condition anticipated greater negative perceptions than those in the ignore/control condition, *t* (251) = -36.37, *p* < .001. Finally, in line with previous research showing the increased costs of angered versus educational confrontation (Choma & Foster, 2010), those who imagined themselves confronting sexism with anger anticipated more negative trait perceptions compared to those in the educational confrontation condition, *t* (251) = -43.78, *p* < .001.

A complainer. The sexism type by confrontation style interaction was tested on the single item 'a complainer.' There was no main effect of sexism type, *F* (1, 247) = .375, *p* = .541, np^2 = .002, or interaction between sexism type and confrontation style on the degree to which participants believed others would perceive them as complainers, *F* (3, 247) = 1.10, *p* = .350, np^2 = .013. There was a main effect of confrontation style, *F* (3, 247) = 17.01, *p* < .001, np^2 = .171. Planned contrasts showed that those who imagined themselves confronting sexism with anger (*M* = 5.36, *SD* = 1.40) anticipated being perceived as more of a complainer compared to all other conditions, *t* (251) = -4.94, *p* < .001. Those in the educational confrontation condition (*M* = 4.68, *SD* = 1.73) anticipated being perceived as more of a complainer than those in the indirect confrontation condition (*M* = 4.53, *SD* = 1.59) and in the ignore/control condition (*M* = 3.37, *SD* = 1.69), *t* (251) = -2.94, *p* = .004. Those in the indirect confrontation condition anticipated being perceived as more of a complainer than those in the ignore/control condition, *t* (251) = -28.16, *p* < .001. Finally, those who imagined themselves confronting sexism with anger anticipated being perceived as more of a complainer compared to those in the educational confrontation condition, t (251) = -34.55, $p < .001$.

Stupid. The sexism type by confrontation style interaction was tested on the single item 'stupid.' There were no main effects of sexism type, F (1, 247) = .288, p = .592, np^2 = .001, or confrontation style, F (3, 247) = 1.86, p = .138, np^2 = .022 on stupidity, nor was the interaction between sexism type and confrontation style significant, F (1, 247) = .886, p = .449, np^2 = .011. Planned contrasts showed that those who imagined themselves confronting sexism with anger (M = 4.03, SD = 1.65) anticipated being perceived as marginally more stupid than all other conditions, t (251) = -1.81, p = .072, although means were in the predicted direction. However, there was no difference in the degree to which participants believed others would see them as stupid between those in the educational confrontation condition (M = 3.39, SD = 1.78), the indirect confrontation condition (M = 3.53, SD = 1.65), and the ignore/control condition (M = 3.84, SD = 1.66), t (251) = 1.15, p = .253. Those in the indirect confrontation condition anticipated being perceived as less stupid than those in the ignore/control condition, t (251) = -25.09, $p < .001$. Those who imagined themselves confronting sexism with anger anticipated being perceived as more stupid compared to those in the educational confrontation condition, t (251) = -24.40, $p < .001$.

Emotional. The sexism type by confrontation style interaction was tested on the single item 'emotional.' There was no main effect of sexism type, F (1, 247) = .053, p = .818, np^2 = .000, or interaction between sexism type and confrontation style on the degree to which participants believed others would see them as emotional, F (3, 247) = .273, p = .845, np^2 = .003. However, there was a main effect of confrontation style, F (3, 247) = 15.33, $p < .001$, np^2 = .157. Planned contrasts showed that those who imagined themselves confronting sexism with anger (M

= 5.75, *SD* = 1.18) anticipated being perceived as more emotional compared to all other conditions, *t* (251) = -5.19, $p < .001$. Those in the educational confrontation condition (*M* = 5.02, *SD* = 1.65) anticipated being perceived as more emotional than those in the indirect confrontation condition (*M* = 4.72, *SD* = 1.71) and in the ignore/control condition (*M* = 3.84, *SD* = 1.82), *t* (251) = -2.97, *p* = .003. Those in the indirect confrontation condition anticipated being perceived as more emotional than those in the ignore/control condition, *t* (251) = -30.43, $p <$ .001. Those who imagined themselves confronting sexism with anger anticipated being perceived as more emotional compared to those in the educational confrontation condition, *t* (251) = -36.99, $p < .001$.

Bossy. The sexism type by confrontation style interaction was tested on the single item ‘bossy.’ There was no interaction between sexism type and confrontation style on bossy, *F* (3, 247) =.682, *p* = .564, np^2 = .008. However, there was a significant main effect of sexism type on the extent to which participants anticipated being perceived as bossy, *F* (1, 247) = 5.02, *p* = .026, np^2 = .020, such that those who imagined responding to benevolent sexism (*M* = 4.65, *SD* = 1.72) thought others would see them as bossier than those who imagined responding to hostile sexism (*M* = 4.14, *SD* = 1.87). There was also a main effect of confrontation style, *F* (3, 247) = 13.48, $p < .001$, np^2 = .141. Planned contrasts showed that those who imagined themselves confronting sexism with anger (*M* = 5.13, *SD* = 1.44) anticipated being perceived as bossier compared to all other conditions, *t* (251) = -3.86, $p < .001$. Those in the educational confrontation condition (*M* = 4.85, *SD* = 1.68) anticipated being perceived as bossier than those in the indirect confrontation condition (*M* = 4.27, *SD* = 1.69) and those in the ignore/control condition (*M* = 3.40, *SD* = 1.90), *t* (251) = -3.93, *p* = .032. Those in the indirect confrontation condition anticipated being perceived as bossier than those in the ignore/control condition, *t*

(251) = -25.99, $p < .001$. Those who imagined themselves confronting sexism with anger anticipated being perceived as bossier compared to those in the educational confrontation condition, t (251) = -32.71, $p < .001$.

Warmth. The sexism type by confrontation style interaction was tested on the composite score of warmth. There was no main effect of sexism type, F (1, 247) = .447, $p = .504$, np^2 = .002, or interaction between sexism type and confrontation style on the degree to which participants believed others would see them as warm, F (3, 247) = 1.18, $p = .319$, np^2 = .014. There was a main effect of confrontation style, F (3, 247) = 9.34, $p < .001$, np^2 = .102. Planned contrasts showed that those who imagined themselves confronting sexism with anger (M = 3.18, SD = .94) anticipated being perceived as less warm than all other conditions, t (251) = 4.06, $p <$ .001. Those in the educational confrontation condition (M = 3.79, SD = 1.17) did not differ on anticipated warmth perceptions compared to those in the indirect confrontation condition (M = 3.49, SD = 1.00) and the ignore/control condition (M = 4.09, SD = 1.00), t (251) = .033, $p = .973$. Those in the indirect confrontation condition anticipated being perceived as less warm than those in the ignore/control condition, t (251) = -42.32, $p < .001$. Those who imagined themselves confronting sexism with anger anticipated being perceived as less warm compared to those in the educational confrontation condition, t (251) = -37.52, $p < .001$.

Strength/competence. The sexism type by confrontation style interaction was tested on the composite score of strength/competence. There was no main effect of sexism type, F (1, 247) = .519, $p = .472$, np^2 = .002, or interaction between sexism type and confrontation style on the degree to which participants believed others would see them as strong/competent, F (3, 247) = 1.40, $p = .244$, np^2 = .017. There was a main effect of confrontation style, F (3, 247) = 14.91, p < .001, np^2 = .153. Planned contrasts showed that those who imagined themselves confronting sexism with anger (*M* = 4.40, *SD* = .98) anticipated being perceived as stronger/more competent than those in all other conditions, t (251) = -1.95, p = .053. Those in the educational confrontation condition (*M* = 4.77, *SD* = 1.06) anticipated being perceived as more strong/competent than those in the indirect confrontation condition (*M* = 3.98, *SD* = 1.22) and the ignore/control condition (*M* = 3.44, *SD* = 1.35), t (251) = -5.89, $p < .001$. Those in the indirect confrontation condition anticipated being perceived as stronger/more competent than those in the ignore/control condition, t (251) = -36.47, $p < .001$. Those who imagined themselves confronting sexism with anger anticipated being perceived as less strong/competent compared to those in the educational confrontation condition, t (251) = -43.04, $p < .001$.

STEM retention variables.

STEM difficulty. The sexism type by confrontation style interaction was tested on STEM difficulty. There were no significant main effects of sexism type, F (1, 246) = .053, p = .818, np^2 = .000, or confrontation style, F (3, 246) = .706, p = .549, np^2 = .009, nor was there an interaction between sexism type and confrontation style on the perceived difficulty of participants' own STEM areas, F (3, 246) = .151, p = .929, np^2 = .002. Planned contrasts showed that those who imagined themselves confronting sexism with anger (*M* = 5.05, *SD* = 1.41) did not perceive greater STEM subject difficulty compared to other conditions, t (250) = .786, p = .433. Moreover, those in the educational confrontation condition (*M* = 5.11, *SD* = 1.45) did not differ from those in the indirect confrontation condition (*M* = 5.14, *SD* = 1.50) and the ignore/control condition (*M* = 5.38, *SD* = 1.31), t (250) = .670, p = .504. However, those in the indirect confrontation condition reported lower STEM subject difficulty than those in the ignore/control condition, t (250) = -42.69, $p < .001$. Those who imagined themselves confronting sexism with anger reported lower STEM difficulty compared to those in the educational confrontation condition, t (250) = -39.66, $p < .001$.

STEM efficacy. The sexism type by confrontation style interaction was tested on STEM efficacy. There were no significant main effects of sexism type, F (1, 247) = 2.46, p = .118, np^2 = .010, or confrontation style, F (3, 247) = .497, p = .685, np^2 = .006, nor was there an interaction between sexism type and confrontation style on participants' perceived efficacy in STEM, F (3, 247) = .657, p = .580, np^2 = .008. Planned contrasts showed that those who imagined themselves confronting sexism with anger (M = 5.46, SD = 1.15) did not report lower STEM efficacy compared to other conditions, t (251) = .809, p = .420. Further, those in the educational confrontation condition (M = 5.60, SD = .84) did not significantly differ from those in the indirect confrontation condition (M = 5.65, SD = 1.08) and the ignore/control condition (M = 5.50, SD = .93), t (251) = -.157, p = .875. Those in the indirect confrontation condition reported greater STEM efficacy than those in the ignore/control condition, t (251) = -63.77, $p <$ .001. Those who imagined themselves confronting sexism with anger reported lower STEM efficacy compared to those in the educational confrontation condition, t (251) = -61.10, $p < .001$.

STEM identity. The sexism type by confrontation style interaction was tested on STEM identity. There were no significant main effects of sexism type, F (1, 247) = 2.08, p = .150, np^2 = .008, or confrontation style, F (3, 247) = .723, p = .539, np^2 = .009, nor was there an interaction between sexism type and confrontation style on participants' identification in STEM, F (3, 247) = 1.22, p = .304, np^2 = .015. Planned contrasts showed that those who imagined themselves confronting sexism with anger (M = 4.93, SD = .99) did not report lower STEM identity compared to other conditions, t (251) = .854, p = .393. Further, those in the educational confrontation condition (M = 5.08, SD = .93) did not significantly differ from those in the indirect confrontation condition (*M* = 5.12, *SD* = .98) and those in the ignore/control condition (*M* = 4.95, *SD* = .78), *t* (251) = -.350, *p* = .727. Those in the indirect confrontation condition reported greater STEM identity than those in the ignore/control condition, *t* (251) = -62.62, *p* < .001. Those who imagined themselves confronting sexism with anger reported lower STEM identity compared to those in the educational confrontation condition, *t* (251) = -60.18, *p* < .001.

***State self-esteem*.** The sexism type by confrontation style interaction was tested on state self-esteem. There was a significant main effect of sexism type on state self-esteem, *F* (1, 247) = 5.80, *p* = .017, np^2 = .023, such that those in the benevolent sexism condition (*M* = 4.32, *SE* = .10) reported higher state self-esteem than those in the hostile sexism condition (*M* = 3.98, *SE* = .09. The main effect of confrontation style was not significant, *F* (3, 247) = 1.19, *p* = .949, np^2 = .001, however, there was a significant interaction between sexism type and confrontation style on state self-esteem, *F* (3, 247) = 3.22, *p* = .023, np^2 = .038.

The simple effect of confrontation on self-esteem was not significant in the benevolent sexism condition, *F* (3, 247) = 1.26, *p* = .287, np^2 = .015, but was marginally significant in the hostile sexism condition, *F* (3, 247) = 2.14, *p* = .096, np^2 = .025. Within the hostile sexism condition, planned contrasts showed that angered confrontation did not reduce self-esteem compared to other groups, *t* (127) = .728, *p* = .468. Those in the educational confrontation condition reported marginally lower self-esteem than the other conditions, *t* (127) = 1.69, *p* = .094. Those in the indirect confrontation condition reported significantly lower self-esteem than those in the control condition, *t* (127) = -33.30, *p* < .001. Finally, those in the angered confrontation condition reported higher self-esteem than those in the educational confrontation condition, *t* (127) = -29.06, *p* < .001. However, given the marginality of some of the simple contrasts, it appeared the interaction was instead being driven by the effect of sexism type on self-esteem across confrontation style conditions.

Simple effects of sexism type were significant among confrontation styles, such that among those who imagined confronting sexism with anger, those in the hostile sexism condition reported lower state self-esteem than those who read about benevolent sexism, $p = .033$, 95% CI [-1.09, -.051]. Among those who imagined confronting sexism with education, those in the hostile sexism condition reported lower state self-esteem than those who read about benevolent sexism, $p = .012$, 95% CI [.162, 1.29]. There were no differences between those imagining hostile versus benevolent sexism for those in the indirect confrontation condition ($p = .163$) or ignore/control condition ($p = .168$).

Discussion

Study 3 findings showed several notable patterns. Consistent with the social costs literature demonstrating that confrontation is costlier than ignoring (Kaiser & Miller, 2001; Kaiser & Miller, 2004), the present findings showed that those who imagined themselves taking any form of confrontation versus no confrontation anticipated greater social costs. For example, overall those who imagined confronting using anger, education, or indirect strategies reported greater anticipated perceptions of stupidity, bossiness, being a complainer, and being emotional compared to those who imagined ignoring. Thus, the present findings replicate past work showing that confronting sexism increases social costs, but is the first to do so among a sample of women in STEM who envisioned themselves responding to sexism in a science context.

Also consistent with research on the benefits of using education versus anger to confront sexism (Choma & Foster, 2010), the current findings suggest that using an educational confrontation style in STEM also may decrease social costs compared to anger. For example, women in the educational confrontation condition versus the angered confrontation condition anticipated being perceived less negatively in general, specifically as less of a complainer, less emotional, less bossy, less stupid, and warmer. Therefore, as predicted, it was more beneficial for women's social costs to imagine themselves confronting sexism in science with education versus anger. Furthermore, the current findings lend support to previous research showing that women who confront aggressively versus non-aggressively or not at all elicit more negative social costs (Becker & Barreto, 2014).

While angered confrontation elicited greater negative social costs than educational confrontation, a different pattern emerged on competence costs. Specifically, women who imagined confronting indirectly believed others would see them as less stupid than those who imagined ignoring the comment altogether. Furthermore, even those who imagined using angered confrontation anticipated being viewed as stronger/more competent than all other conditions. This is consistent with past work demonstrating that confrontation is positively associated with women's feelings of competence and empowerment (Gervais et al., 2010), and diary research illustrating the benefits of angered confrontation over time (Foster, 2013). Therefore, while confrontation elicited more anticipated negative *social* costs for women in the present study, the current findings indicated that confrontation did not elicit greater *competence* costs for women.

Another interesting pattern of findings emerged on STEM retention variables, such that those imagining angered confrontations did not perceive more difficulty in their own STEM area than other groups. Furthermore, educational confrontation did not elicit more perceived difficulty. However, those who imagined indirectly confronting sexism reported lower STEM difficulty than those in the ignore/control condition, again, suggesting that confrontation of at least an indirect nature benefited women by lessening the perceived difficulty of STEM subjects. Interestingly, results also showed that anger elicited less STEM subject difficulty than education, which may also indicate the benefit of angered confrontation on women's perceived difficulty, in line with past research on confrontation benefiting women's competence (Gervais et al., 2010). However, for women in STEM, confronting sexism using anger may increase negative social consequences and lessen women's perceived STEM subject difficulty, but decrease efficacy and identity. In contrast, employing indirect approaches may improve important retention variables in STEM fields like social identification and efficacy (Stout et al., 2011).

Confronting indirectly was of most benefit to women's STEM retention variables compared to inaction. Specifically, those who imagined indirectly confronting reported greater STEM efficacy and identity than those in the ignore/control condition. This finding is consistent with past research showing that women's confrontation can be associated with feelings of empowerment (Gervais et al., 2010). It is interesting that indirect confrontation provided benefits to STEM retention variables over inaction, suggesting that while indirect, this strategy communicated some discontent to the extent that social costs were minimized, but personal gains were also evident with greater reported STEM identity, efficacy, and reduced subject difficulty. It is not entirely surprising that indirect confrontation provided some benefit, given it still communicates discontent (LaFrance & Harris, 2004), but does so non-assertively. Given the prominent role of indirect communication in the modern digital context (e.g., computer mediated interaction, usage of emoticons to communicate emotions; Huang, Yen, & Zhang, 2008), future research should focus on developing indirect confrontation strategies that reduce social costs while maintaining women's sense of STEM identity and efficacy.

Finally, Study 3 showed an interaction between sexism type and confrontation style on state self-esteem, such that among those who imagined confronting sexism with anger, those in the hostile sexism condition reported lower state self-esteem than those who read about benevolent sexism, and the same pattern occurred for those who imagined using educational confrontation. This is consistent with literature demonstrating that sexist experiences decrease self-esteem and that perceiving oneself as a target of discrimination negatively impacts psychological well-being (Major, Quinton, & McCoy, 2002). Furthermore, this finding is congruent with past work showing that assertive/direct confrontations elicit greater social costs than non-assertive/indirect confrontations (Becker & Barreto, 2014; Saunders & Senn, 2009; Swim et al., 1998; Choma & Foster, 2010). Thus, for women confronting sexism in a STEM context, assertive/direct confrontations may negatively impact self-esteem, and increase anticipated social costs, but leave STEM retention variables relatively unaffected.

In Study 3, sexism type did not reliably predict women's social costs or STEM retention variables, except for one main effect on bossiness, showing that those who imagined responding to benevolent sexism anticipated being perceived as bossier than those who imagined responding to hostile sexism. This finding fits with previous research showing the danger of confronting benevolent versus hostile sexism, such that women face penalties for accepting versus refusing patronizing help (Becker et al., 2011), and benevolent versus hostile sexism decreases women's performance (Dardenne et al., 2007). It is possible that sexism type did not impact outcomes in a particular pattern because women may have only perceived costs linked to their own behaviour via the confrontation, rather than someone else's in the case of the sexist threat. Thus, the current findings are in line with past work showing hostile and benevolent sexist attitudes are both negatively related to women's aptitude perceptions (Reilly et al., 2017).

One limitation of Study 3 was that there was not an explicit confrontation style manipulation check. However, those in the angered and educational confrontation conditions did report feeling more active than those in the indirect or ignore/control conditions, and, manipulations were closely modelled after previous research (Choma & Foster, 2010; Foster, 2013). Furthermore, the present studies may be limited in terms of generalizability given a snowballing approach was used to recruit women in STEM. However, because of the shortage of women in science, this strategy permitted wider recruitment of the population of interest. In sum, Study 3 illustrated that among this sample of women in STEM, the type of sexism they imagined responding to did not consistently impact social or personal costs in a particular way, whereas the ways in which women imagined confronting sexism had powerful effects on women's anticipated social and personal costs, including STEM retention variables.

General Discussion

Across all three of the present studies, strong main effects of confrontation condition on negative traits were observed, such that more social costs were directed at and anticipated by confronters versus ignorers; consistent with past research on the costs of confrontation (Kaiser & Miller, 2001; Kaiser & Miller, 2004). However, this is the first research to replicate these effects among female confronters in a STEM context. The current studies provide some evidence for the notion that confronting sexism in STEM is at least as costly as confronting in other disciplines; indeed, only sparse interactions were found with context (STEM or arts). In some instances, the current research suggests that the costs of confronting sexism in STEM may be more severe than in other contexts. For example, in Study 1, male versus female participants rated the female confronter as bossier and more stupid for confronting in STEM. Consistent with research on the social costs of confrontation (Kaiser & Miller, 2001), the role incongruity model of prejudice

(Eagly & Karau, 2002), and our expectations, findings suggest that some of the costs of confrontation were more severe in STEM than in arts. Specifically, results emphasized the importance of gender in how participants directed social costs at the hypothetical female confronter; male versus female participants perceived Jenna as bossier and more stupid for confronting sexism in STEM, which is troubling considering that STEM classrooms and workplaces consist of mostly men (Hango, 2013).

According to the present findings, if women in STEM confront sexism in their STEM workplace or classroom, men may see them as bossier and less intelligent than women. Such negative perceptions have the potential to contribute to the chilly climate for which STEM is known (Settles et al., 2006), and to negatively impact women's professional advancement. Given the majority of STEM start-up companies are male-led and dominated (Chang & Kratz, 2012), and most senior management positions in the private business sector are still held by men (Moyser, 2017), women's opportunities for STEM career development could be seriously dampened by the costs of confronting sexism. If, for instance, a male co-worker witnessed a female employee confront sexism, according to our findings, they could perceive her as less competent and bossier, and consequently, be less likely to for example, collaborate with her.

However, the present studies also lend support for the positive outcomes of confrontation (Gervais et al., 2010). For example, participant gender aside, in Study 1 when participants read about Jenna confronting sexism in STEM, they perceived her as warmer. One potential explanation for this finding is that male and female participants expressed warmer evaluations of a confronter in STEM but for different reasons; for women, who share a gender identity, confrontation could elicit more warmth as Jenna acted assertively to benefit the entire gender group (Dodd et al., 2001), and for men, perhaps warmth perceptions were motivated by respect for a woman confronting a man in a male-dominated context.

Another encouraging finding in Study 1 was an interaction between participant gender and confrontation that showed how, congruent with other research (Dodd et al., 2001), female participants saw Jenna as more competent for confronting versus ignoring sexism. While this suggests that similar others may positively evaluate a woman for confronting sexism, it may not be very helpful for women to perceive confronters as more competent in science, if women do not occupy leadership positions through which women can be supported to confront. What is encouraging though, is that if women perceive female confronters positively, as more women come to occupy STEM roles, the STEM context may gradually become more conducive to confronting sexism. In sum, findings in Study 1 painted a picture that suggests that while women who confront may be perceived as bossy or stupid under certain conditions (e.g., by male participants for confronting in STEM), main effects strongly indicated that confronters can also be viewed positively, such that others see them as more competent and warmer than those who ignore sexism.

In Study 2, STEM women anticipated that others would see them as bossier if they imagined confronting versus ignoring sexism in STEM. Perceptions that women are ‘bossy’ can have serious consequences for women in the workplace; for instance, when women adopt a stereotypically male management style (i.e., acting agentically), they are disliked for being aggressive and bossy (Davidson & Cooper, 1992; Jackson 2001). Therefore, if women in science anticipate being perceived as bossy for confronting discrimination, they may avoid engaging in the behavior that would confer this label, averting negative interpersonal consequences but leaving sexism unchecked. However, given non-STEM women also felt they would be perceived as bossier for confronting versus ignoring sexism in science, perhaps the science context itself is non-conducive to confronting sexism, which could discourage women in other fields from pursuing STEM participation. Findings also showed that women in STEM who imagined confronting in a science context reported greater difficulty in their own subject areas versus those who imagined ignoring. This provides further support for the notion that some costs of confronting may be pronounced among women in STEM who confront in their own disciplines.

Study 2 findings also suggest that women in STEM felt they would be perceived as more stupid for ignoring sexism outside of their own context (i.e., arts). This could indicate that STEM women possess a readiness for confrontation that other women do not because of having to be hyper-vigilant in the face of a greater number of sexist experiences compared to non-STEM women (Funk & Parker, 2018). Another possibility is that if women in STEM are accustomed to male-dominated environments, then perhaps they feel compelled to act on behalf of other women beyond STEM. Some research has shown that women's confrontations are more likely if they are the only woman present, possibly because being the only female elicits gender identity salience and prompts a desire to represent all women positively (Swim & Hyers, 1999). Therefore, women in science may perceive some sense of responsibility for confronting sexism outside of their disciplines, and failure to do may have increased anticipated perceptions of stupidity.

One inconsistent finding between Studies 1 and 2 was that while other people saw Jenna-the-confronter as warmer than Jenna-the-ignorer, in Study 2, women themselves anticipated being perceived as less warm for confronting versus ignoring sexism. This presents an interesting discrepancy between the perceptions of others versus the self in terms of the social costs of confronting. If women anticipate being perceived as colder for confronting sexism, this may present a barrier to speaking out, however, the current data suggests this anticipation may not be accurate. However, in line with Study 1 findings, women anticipated being perceived as more competent for confronting versus ignoring sexism. While congruent with past work on the potential psychological benefits of confrontation (Gervais et al., 2010; Foster, 2009), our findings suggest that context aside, women believed that they would be perceived as smarter for confronting rather than ignoring sexism. Thus, for women in STEM, confronting sexism may not threaten their sense of competence, but may decrease the extent to which they think others will see them as warm or likeable. The present findings suggest a double-edged sword, whereby women who confront sexism in STEM may face simultaneous costs and benefits. Thus, the initial studies presented here provided some evidence that confronting (versus ignoring) led to some greater social costs (i.e., being perceived more negatively in general, as more emotional, bossier), but also some advantages (i.e., being perceived as warmer and more competent). Further, the costs incurred for confrontation were somewhat dependent on the gender of the observer (Study 1), and women's own subject areas (Study 2).

Therefore, across Studies 1 and 2, some evidence was found to suggest that women may elicit and anticipate some greater social costs (i.e., how a woman would be perceived when confronting) and personal costs (i.e., beliefs about ability), for confronting sexism in STEM (vs. an arts context). However, Studies 1 and 2 did not address the conditions under which some of the costs of confronting were worse for women in STEM versus other women. Therefore, Study 3 varied different types of sexism and confrontation styles to examine how these factors impacted social costs and STEM retention variables like identity and efficacy.

In Study 3, results consistently showed that sexism type did not predict women's social and personal costs, including STEM retention variables. This is interesting because real-world examples suggest that women in science experience both subtle and overt forms of sexism

(Clancy et al., 2014; Parkin, 2014; Waxman, 2015). According to the present findings, women anticipated that negative perceptions would be equal regardless of the nature of the sexist threat, except for bossiness, which showed that, consistent with previous research (Becker et al., 2011) showing the costs of confronting benevolent help, women who imagined responding to benevolent versus hostile sexism thought others would perceive them as bossier. Despite this isolated effect, in general, based on the present findings, one could conclude that the type of sexism women in science encounter is less pertinent to the social costs they anticipate than the style of confrontation they imagine enacting.

In contrast, the third study underlined the importance of confrontation style on women's anticipated social and personal costs. Replicating past research (Becker & Barreto, 2014; Choma & Foster, 2010), imagining angered confrontations led to greater social costs, whereas, an educational approach somewhat lessened the costs of confronting. However, distinct from previous studies (Becker & Barreto, 2014; Choma & Foster, 2010), the current research replicated the effect of angered confrontation on women's anticipated social and personal costs, rather than focusing on the costs directed at them by observers. It is important to assess women's anticipated costs of confronting, given anticipated costs can be misaligned with others' perceptions. For instance, in Study 2, women who imagined confronting thought others would see them as less warm, whereas in Study 1, participants rated the female confronter as warmer for confronting versus ignoring the sexist comment.

Study 3 findings also suggest that confronting sexism indirectly benefited STEM retention variables, such as efficacy and identity, which is encouraging given factors predict intentions to pursue STEM subjects (Marra et al., 2009; Stout et al., 2011). According to the stereotype inoculation model, identification with STEM predicts retention (Dasgupta 2011; Stout et al. 2011), which may be particularly important because of the value of increasing STEM identification: one study of women in traditional STEM contexts exposed participants to an intervention that welcomed women in science or a control group (Ramsey et al., 2013). Results showed that the intervention decreased stereotyping concerns and indirect STEM stereotyping, and increased implicit STEM identification, exemplifying the critical role of an inclusive environment for women in STEM. If women imagine themselves angrily confronting sexism in science and anticipate feeling negatively and incurring greater social and personal consequences, then this approach does not seem ideal. Instead, other approaches to confrontation like education or responding indirectly may decrease backlash and in turn, be more functional for women in STEM (Choma & Foster, 2010).

However, it should also be noted that participants in Study 3 felt especially bad about themselves after confronting hostile sexism with education versus ignoring. Thus, future research should test ways to buffer women from decreased self-esteem following confrontations that utilize education, given there are also some benefits to this approach as well like anticipating greater competence perceptions. Enhancing STEM identification may be one means of preventing women's decreased self-esteem following confrontations. For instance, stronger identification with science versus gender may protect women's self-esteem after confronting sexism. The rejection-identification model (Branscombe, Schmitt, & Harvey, 1999) suggests that people who encounter discrimination increase social group identification to guard their psychological well-being. Therefore, a potential line of future research could focus on science identification and how this may provide a buffer for women's self-esteem so that confrontation of hostile sexism is perceived as less costly, and in turn, more likely (Shelton & Stewart, 2004).

Real-world, current initiatives encourage more women to pursue STEM by highlighting science and gender-based identities (e.g., Women, Wine and Code; Girls Who Code). However, it is not yet known how emphasizing science or gender identity, or both, in a STEM context may impact women's self-esteem following a confrontation and in turn, predict identification with STEM disciplines. Identification in science will be critical to evaluate in future research on the costs of confronting sexism given the importance of identification to achievement; less perceived compatibility between gender and science is associated with a decreased sense of belongingness and lower academic performance in STEM courses (Ahlqvist, London, & Rosenthal, 2013). However, despite identifying with science, women in STEM contemplate switching majors more than other students (Steele et al., 2002). Thus, identity may be a useful buffer for the costs of confronting sexism in STEM or alternately, it is possible that a salient STEM identity is not sufficient to increase women's retention in science.

Across the present studies, results showed the importance of assessing competence costs and STEM retention variables in addition to measuring social costs. Indeed, in the present work, more negative social costs were consistently elicited by assertive/direct confrontations, however, competence costs and retention variables were relatively unaffected. Given competence is central to the stereotype of a scientist (Fiske & Dupree, 2014) future research should focus on measuring competence costs among women in STEM who confront sexism, so that strategies to maintain women's competence are more thoroughly understood.

Finally, the current findings suggest that the confrontation condition that was most beneficial to women in STEM was indirect. Those who imagined responding indirectly versus inaction reported lower STEM difficulty, and higher STEM efficacy and identity, suggesting that there is something particularly helpful about indirect confrontation for women in science. It could be that indirect confrontation relieves some of the psychological damage of being a target of discrimination, but unlike assertive/direct confrontations, the risk threshold is low. Indeed, while the angered confrontation also lowered STEM difficulty compared to educational confrontation, anger still negatively impacted STEM retention variables. One explanation for this paradox may be that angered confrontation decreased difficulty by relieving psychological discomfort, but decreased identity and efficacy in STEM because of the anticipated social costs of confronting aggressively. Therefore, future studies will have to identify the useful elements of confronting sexism assertively, while capitalizing on the benefits of responding more indirectly. In turn, maximizing the individual and social benefits of confrontation may increase women's retention in STEM fields; indeed, greater efficacy and identity in science predicts intentions to pursue STEM fields (Marra et al., 2009; Stout et al., 2011). This research preliminarily suggests that some kinds of low threat confrontation (like responding indirectly) may enhance women's STEM identity and efficacy compared to inaction, highlighting indirect confrontations a valuable first step toward taking more assertive/direct confrontations.

Limitations and Future Directions

The present research is not without limitations, for example, across three studies hypothetical scenarios were used to provide a situation in which a confrontation could occur. Although this paradigm is commonly used in studies about the costs of confrontation, previous research shows there is a difference between imagined and actual responses to sexism, such that women think they will confront sexism in response to imagined scenarios but will not actually do so when faced with sexism in real life (Woodzicka & LaFrance, 2001). Thus, it is likely that the present findings would only be emphasized if STEM women were confronting sexism in reality versus in response to an imagined scenario. Given the present studies replicated the main effect of confrontation on social costs (e.g., confronters across all three studies incurred greater costs than those who imagined ignoring sexism), it follows that women in science who actually confront sexism in the lab, for instance, would experience and anticipate some negative social costs. However, is also possible that in real life situations, women who confront sexism in STEM could be viewed as competent by some observers, as Study 1 findings would suggest (i.e., female participants perceived the confronter as warm when she confronted) and anticipate being perceived as more competent (Study 2). Therefore, future research should also assess real-world experiences of sexism in STEM and how women respond in daily life to provide external validity to the present findings. At the same time however, scenarios are also valuable as they provide a more ethical alternative to in-lab studies testing the impact of women's confrontations because participants are not actually placed in the situation and therefore not subjected to psychological danger. Furthermore, it is still worthwhile to assess women's anticipated costs of confronting hypothetical sexism in STEM because the costs they imagine anticipating could lead some women to avoid participation in science. Additionally, the present studies may be limited in terms of generalizability given participants were exposed to a single instance of sexism and one confrontation response, whereas in day-to-day life, women encounter repeated instances of sexism, across various contexts (Swim et al., 1998). However, consistent with diary work showing the use of angered confrontation over time benefits women's well-being (Foster, 2013), in Study 3 women who imagined confronting with anger believed others would see them as stronger and more competent. Thus, future studies should test one-time confrontations of sexism versus repeated instances to provide a more comprehensive understanding of women's responses to sexism.

An additional limitation of the present studies is that gender imbalances vary depending on the scientific discipline; for instance, in Canada women are most likely to complete a science degree in biology versus physics or engineering (Hango, 2013). Thus, it could be argued that the present effects would not replicate in disciplines such as biology, where gender disparities are less pronounced. Although recent studies suggest that the climate for women in such disciplines is nevertheless biased (Grunspan et al., 2016), future research would benefit from understanding how confronting sexism across different STEM contexts would differ. Finally, the present studies struggled to obtain adequate sample sizes and statistical power as recommended by Simmons et al., (2011). However, results provided some evidence in support of the hypothesis, suggesting that findings may be even more noticeable if similar studies were conducted in disciplines wherein women's participation remains lowest (e.g., computer science; Hango, 2013).

One possible future direction could be to explore how the gender composition of groups in science may influence the costs of confronting sexism. Self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) states that when a social identity like gender is salient, one's perceptions are impacted by a high 'meta-contrast ratio,' defined as when between-group differences exceed within-group differences. Notably, past research has demonstrated that a greater meta-contrast ratio is associated with greater endorsement of collective action to advance the status of women (Foster, 1999). Considering STEM contexts tend to be male-dominated, this is likely an environment in which women would perceive a high meta-contrast ratio. Thus, future research could recruit women in science and experimentally manipulate meta-contrast ratios (i.e., low or high), to examine the potential buffering effects of confronting sexism in STEM. On the one hand, a high meta-contrast ratio could elicit a shared social identity among women in STEM and as previous research would suggest, encourage active responses to perceived discrimination (Foster, 1999). On the other hand, perhaps a low meta-contrast ratio signaling that women are more different from each other than from men would be more useful in a STEM context. Indeed, it may be more adaptive for women in science to identify more so as 'one of the boys' than with other women, for whom STEM positions may be stigmatized due to role incongruity. Previous research shows that some female scientists avoid overtly feminine practices or gender displays (e.g., make-up, high heels), to avoid negative attention (Ong, 2005; Rhoton, 2011). Although downplaying femininity may be a useful survival strategy for women in STEM, it may not be ideal, given it perpetrates the deeply-ingrained stereotypes that women are inconsistent with science (Nosek et al., 2009).

If women in science perceive the STEM climate as non-conducive to confronting sexism because of the potential costs, they will not likely speak out against discrimination. Indeed, confrontation is less likely to occur when social costs are perceived as high versus low (Shelton & Stewart, 2004). Also, consistent with previous research, perceiving that the costs of confrontation outweigh the benefits can dissuade people from confronting injustice (Ashburn-Nardo, Morris, & Goodwin, 2008). Research must consequently develop and test strategies for women to confront sexism in STEM that will buffer them from the negative consequences of doing so, even in situations with potentially high social costs. One potential way to buffer women in STEM from the costs of confronting sexism could be the use of previous interventions, like affirmation exercises that promote stress management by incorporating different aspects of women's self-identity into their daily lives, or social-belonging interventions that provide a lens through which to interpret challenging experiences while studying STEM (Walton, Logel, Peach, Spencer, & Zanna, 2015).

Alternately, research could explore how exposure to female experts in STEM domains might buffer women from the costs of confronting sexism (Stout et al., 2011), an approach associated with positive outcomes like greater STEM efficacy and self-concept. According to the stereotype inoculation model, increasing exposure to female experts in STEM benefits female student's STEM self-concept and attitudes towards pursuing science careers (Stout et al., 2011). Such exposure promotes greater connection between female students and scientists, inoculating students from negative societal stereotypes suggesting that women do not belong in STEM. Given exposure to female STEM experts can improve female students' STEM self-concept, perhaps similar exposure to same-sex mentors could buffer women from the social and personal costs of confronting sexism in science.

It may even be possible to use indicators of STEM belonging to buffer women from the costs of confronting sexism. Previous research assessed the features of a welcoming environment for women in science. Women in a science-based program (versus those not enrolled in such a program) reported receiving more messages about women in STEM, they were more likely to wear or carry markers of their majors and had more interaction with peer role models in STEM (Ramsey, Betz, & Sekaquaptewa, 2013). Thus, another potential line of future research could emphasize messages about women in STEM (as the stereotype inoculation model poses; Stout et al., 2011) and aim to buffer women's self-esteem, so that costs of confronting sexism are minimized. Furthermore, if women feel increased shared social identity with others in STEM, this could encourage confrontation; indeed, social identity predicts taking collective action to advance the status of one's social group (Van Zomeren, Postmes, & Spears, 2008). Given the benefit of previous interventions (e.g., affirmations, exposure to mentors) on women's scientific interest and retention, it would be valuable to assess if such approaches could also be useful in reducing women's perceptions of the costs associated with confronting sexism in STEM.

Furthermore, findings could inform how other minorities in other fields (e.g., men in early childhood education or caregiving professions) may experience the costs of confronting injustice.

Implications

Theoretically, the current program of research bridges a gap between two traditionally distinct literatures; the literature on the social costs of confrontation has not explicitly examined how these costs may impact STEM women, and research on retaining women in STEM has not explicitly examined how confronting sexism may impact retention-related variables. Although the lack of women in science persists and has the potential to blunt scientific and economic growth, very little has been successful in 'moving the needle' toward greater gender parity (see Fouad & Santana, 2017 for factors related to career choices in STEM among women). It is therefore important to assess socio-cultural determinants of women's retention in STEM fields so that the gender gap in science narrows.

The current research also has practical applications such that for women in STEM, confronting sexism with anger may elicit the most social costs, however, confrontation was also associated with some advantages like fewer competence costs. Moreover, the current research suggests that indirect confrontation was beneficial in relation to women's STEM retention variables. Thus, for women studying and working in STEM fields, it may be especially costly to confront sexism with anger, and more advantageous to instead confront sexism with educational or indirect approaches, given these did not decrease STEM identification or efficacy.

The present work also indicates that the costs of confronting sexism may play a role in how women perceive the STEM climate. This research therefore extends the confrontation and social costs literatures by replicating effects in a new context; one in which the costs can have serious consequences for the women in the situation, but also the larger society through economic costs; lower workforce diversity also has economic consequences, including lower equity returns and sales revenue (Herring, 2009; Organization for Economic Cooperation and Development, 2012). To ensure economic viability and success in science, it is crucial that to understand how to attract and retain women in STEM. The current work suggests that one way to do so may be to reduce the social and personal costs associated with confronting sexism.

Conclusions

In this research, results provide some evidence to suggest confronting sexism in STEM is associated with some social costs (e.g., being perceived as bossier and more stupid by men), but also that confrontation in general can lead to some advantages like being seen as especially competent. Based on the present findings, it is reasonable to argue that one overlooked cause underlying the persistent lack of women in science may be the costs of confronting sexism. Frustratingly, it is imperative for women to confront, because confrontation reduces future discrimination (Mallet & Wagner, 2011), and improves women's psychological well-being (Foster, 2009; 2013). However, the present findings suggest that for women in STEM, confronting sexism using anger may lead to greater anticipated social and personal costs, while responding indirectly may be more useful. While real-world confrontations like the Twitter hashtag #DistractinglySexy suggest that women in STEM will easily confront sexism, this research suggests that such confrontations will be met with a combination of costs and benefits.

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TABLES

Table 1

Study 1 Trait Measure Factor Analysis: Rotated Factor Matrix for Positive Traits

Items	Factor 1	Factor 2
1. Brave	**.929**	.100
2. Strong	**.892**	.174
3. Confident	**.843**	.166
4. Intelligent	**.679**	.241
5. A good friend	.196	**.839**
6. Considerate	.090	**.729**
7. Likeable	.075	**.665**
8. A good team member	.376	**.657**

Notes. Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.

Table 2

Study 1 Cell Means and Standard Deviations for all Dependent Variables by Context, Confrontation, and Participant Gender

Context	STEM Context				Arts Context			
Confrontation Condition	Confront		Ignore		Confront		Ignore	
Participant Gender	Male $n = 26$	Female $n = 72$	Male $n = 26$	Female $n = 74$	Male $n = 26$	Female $n = 81$	Male $n = 28$	Female $n = 73$
Dependent Variables	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*	Mean *(SD)*
Social Costs (Traits)								
1. Negative Traits (Composite)	3.29 *(1.18)*	2.50 *(1.03)*	2.34 *(1.01)*	1.99 *(.874)*	2.75 *(.938)*	2.63 *(.991)*	2.49 *(1.24)*	2.05 *(.802)*
2. Complaining	3.23 *(1.75)*	2.26 *(1.64)*	2.08 *(1.29)*	1.72 *(.944)*	2.77 *(1.37)*	2.35 *(1.45)*	2.32 *(1.52)*	1.66 *(.885)*
3. Emotional	4.38 *(1.70)*	3.39 *(1.77)*	3.19 *(1.52)*	2.76 *(1.60)*	3.58 *(1.72)*	3.30 *(1.77)*	3.21 *(1.69)*	2.68 *(1.47)*
4. Stupid*	2.46[a] *(1.48)*	1.74[b] *(1.10)*	2.68[a] *(1.38)*	2.82[a] *(1.50)*	2.00[b] *(1.23)*	1.86[b] *(1.01)*	3.43[a] *(1.60)*	2.90[a] *(1.45)*
5. Bossy*	3.35[a] *(1.55)*	2.51[b] *(1.62)*	1.96[b] *(1.22)*	1.77[a] *(1.19)*	2.85[b] *(1.46)*	2.98[b] *(1.73)*	2.18[a] *(1.47)*	1.74[a] *(.928)*
6. Warmth	4.58 *(.856)*	5.07 *(1.01)*	4.31 *(.881)*	4.30 *(1.04)*	4.59 *(.728)*	4.80 *(1.03)*	4.65 *(.823)*	4.58 *(1.03)*
7. Competence	5.62 *(.690)*	6.02 *(.812)*	3.23 *(1.05)*	2.82 *(.998)*	5.61 *(.867)*	5.91 *(.772)*	3.45 *(1.31)*	3.10 *(1.04)*
Perceived Subject Difficulty								
1. Computer science*	5.27[a] *(1.46)*	5.15[a] *(1.34)*	3.92[c] *(1.38)*	5.61[b] *(1.28)*	5.46[a] *(1.68)*	5.42[a] *(1.44)*	5.32[a] *(1.79)*	5.46[a] *(1.46)*
2. Communication studies	3.35[a] *(1.36)*	3.36[a] *(1.42)*	3.73[a] *(1.46)*	3.31[a] *(1.40)*	3.27[a] *(1.82)*	3.52[a] *(1.51)*	2.82[a] *(1.25)*	3.37[a] *(1.44)*
Sexism Prime Check								
1. Sexist perceptions	5.85 *(1.49)*	6.36 *(1.20)*	5.88 *(1.34)*	6.26 *(1.45)*	5.88 *(1.21)*	6.22 *(1.37)*	5.68 *(1.72)*	6.37 *(1.35)*

Note. Different superscripts denote statistical differences at $p < .05$.
* Denotes a three-way interaction.

Table 3

Study 2 Trait Measure Factor Analysis: Rotated Factor Matrix for Positive Traits

Items	Factor 1	Factor 2
1. Brave	**.870**	-.028
2. Strong	**.828**	-.061
3. Confident	**.796**	.135
4. Intelligent	**.775**	.184
5. Independent	**.768**	.159
6. Respectable	**.707**	.360
7. A good friend	.129	**.804**
8. Friendly	-.033	**.741**
9. Considerate	.211	**.725**
10. Likeable	.105	**.719**
11. A good team member	.086	**.693**

Notes. Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.

Table 4

Study 2 Cell Means and Standard Deviations for all Dependent Variables by Context, Confrontation, and Participant Major

Context	STEM Context				Arts Context			
Confrontation Condition	Confront		Ignore		Confront		Ignore	
Participant Major Dependent Variables	STEM $n = 34$ Mean *(SD)*	Non-STEM $n = 20$ Mean *(SD)*	STEM $n = 32$ Mean *(SD)*	Non-STEM $n = 20$ Mean *(SD)*	STEM $n = 18$ Mean *(SD)*	Non-STEM $n = 26$ Mean *(SD)*	STEM $n = 28$ Mean *(SD)*	Non-STEM $n = 23$ Mean *(SD)*
Social Costs (Traits)								
1. Negative Traits	4.30	4.56	3.31	3.08	4.47	4.71	3.63	3.70
(composite)	*(1.19)*	*(.698)*	*(1.20)*	*(1.25)*	*(1.28)*	*(.997)*	*(1.58)*	*(1.24)*
2. Complaining	3.82	4.95	3.16	3.10	4.50	4.62	3.96	3.87
	(1.93)	*(.945)*	*(1.61)*	*(1.86)*	*(2.01)*	*(1.79)*	*(2.10)*	*(1.66)*
3. Emotional	4.88	4.60	3.97	3.35	4.44	5.12	4.25	4.00
	(1.59)	*(1.57)*	*(1.85)*	*(1.79)*	*(2.09)*	*(1.56)*	*(2.08)*	*(1.73)*
4. Stupid*	3.12^{a}	3.00^{a}	3.75^{a}	3.70^{a}	2.83^{a}	3.27^{a}	4.82^{b}	3.43^{a}
	(1.75)	*(1.30)*	*(1.70)*	*(1.59)*	*(1.79)*	*(1.87)*	*(1.44)*	*(1.62)*
5. Bossy*	4.79^{a}	5.40^{a}	3.41^{b}	2.90^{b}	5.22^{a}	4.77^{a}	3.39^{b}	3.87^{b}
	(1.67)	*(.883)*	*(1.74)*	*(1.77)*	*(1.44)*	*(1.73)*	*(2.11)*	*(1.94)*
6. Warmth	3.71	3.77	4.42	4.33	3.64	3.38	3.89	3.82
	(1.26)	*(.907)*	*(1.34)*	*(1.14)*	*(1.31)*	*(1.10)*	*(1.26)*	*(.982)*
7. Competence+	5.08	4.83	4.11^{a}	3.17^{b}	4.94	4.83	3.44	3.82
	(1.31)	*(.939)*	*(1.60)*	*(1.50)*	*(1.32)*	*(1.06)*	*(1.46)*	*(1.22)*
Perceived Subject Difficulty								
1. Computer	5.29^{a}	4.90^{a}	4.66^{b}	5.45^{a}	5.00^{a}	5.54^{a}	5.33^{a}	4.95^{a}
Science*	*(1.22)*	*(1.41)*	*(1.45)*	*(.826)*	*(1.94)*	*(1.10)*	*(1.62)*	*(1.65)*
2. Communication	3.15	3.90	3.74	3.45	2.72	3.12	2.93	3.68
Studies	*(1.13)*	*(1.77)*	*(1.77)*	*(1.67)*	*(1.36)*	*(1.71)*	*(1.52)*	*(1.46)*
Sexism Prime Check								
1. Sexist	6.50^{a}	6.15^{a}	6.61^{a}	6.50^{a}	5.83^{a}	6.46^{a}	6.89^{b}	6.42^{a}
Perceptions*	*(1.21)*	*(1.35)*	*(.704)*	*(.513)*	*(1.79)*	*(1.07)*	*(.315)*	*(.830)*

Note. Different superscripts denote statistical differences at $p < .05$.

* Denotes a three-way interaction; + denotes marginal interaction. This analysis includes the perceived sexism covariate.

Table 5

Study 3 Trait Measure Factor Analysis: Rotated Factor Matrix for Positive Traits

Items	Factor 1	Factor 2
1. Brave	**.817**	.008
2. Strong	**.783**	-.003
3. Confident	**.721**	.078
4. Independent	**.567**	.224
5. A good friend	.233	**.731**
6. Friendly	.032	**.573**
7. Considerate	.079	**.808**
8. Likeable	-.057	**.766**
9. A good team member	.079	**.770**

Notes. Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.

Table 6

Study 3 Cell Means and Standard Deviations for all Dependent Variables by Sexism Type and Confrontation Style

Sexism Type	Hostile				Benevolent			
Confrontation Style Dependent Variables	Angered *n* = 29 Mean *(SD)*	Ed. *n* = 33 Mean *(SD)*	Indirect *n* = 33 Mean *(SD)*	Ignore/ Control *n* = 36 Mean *(SD)*	Angered *n* = 32 Mean *(SD)*	Ed. *n* = 29 Mean *(SD)*	Indirect *n* = 31 Mean *(SD)*	Ignore/ Control *n* = 32 Mean *(SD)*
Social Costs (Traits)								
1. Negative Traits (Composite)	5.18^{a}	4.42^{b}	4.24^{b}	3.36^{c}	5.06^{a}	4.66^{b}	4.42^{b}	3.56^{c}
	(1.12)	*(1.36)*	*(1.25)*	*(1.36)*	*(1.06)*	*(1.24)*	*(1.08)*	*(1.41)*
2. A Complainer	5.59^{a}	4.52^{b}	4.52^{b}	3.11^{c}	5.16^{a}	4.86^{b}	4.55^{b}	3.66^{c}
	(1.32)	*(1.86)*	*(1.72)*	*(1.62)*	*(1.46)*	*(1.58)*	*(1.48)*	*(1.75)*
3. Emotional	5.86^{a}	5.03^{b}	4.58^{b}	3.78^{c}	5.66^{b}	5.00^{b}	4.87^{b}	3.91^{c}
	(1.36)	*(1.65)*	*(1.68)*	*(1.81)*	*(1.00)*	*(1.67)*	*(1.77)*	*(1.86)*
4. Stupid	4.07^{a}	3.52^{b}	3.33^{b}	4.08^{a}	4.00^{a}	3.24^{b}	3.74^{b}	3.56^{b}
	(1.60)	*(1.79)*	*(1.58)*	*(1.59)*	*(1.72)*	*(1.79)*	*(1.73)*	*(1.72)*
5. Bossy	5.10^{a}	4.48^{ab}	3.91^{b}	3.25^{b}	5.16^{a}	5.28^{a}	4.65^{a}	3.56^{b}
	(1.42)	*(1.82)*	*(1.74)*	*(1.96)*	*(1.48)*	*(1.41)*	*(1.58)*	*(1.85)*
6. Warmth	3.12^{a}	4.02^{b}	3.48^{b}	4.08^{b}	3.23^{a}	3.52^{a}	3.50^{a}	4.11^{b}
	(.826)	*(1.14)*	*(1.08)*	*(.934)*	*(1.04)*	*(1.16)*	*(.935)*	*(1.08)*
7. Competence	4.27^{a}	4.94^{a}	3.94^{b}	3.23^{b}	4.52^{a}	5.58^{b}	4.02^{b}	3.68^{c}
	(1.20)	*(.958)*	*(1.16)*	*(1.31)*	*(.740)*	*(1.16)*	*(1.30)*	*(1.38)*
STEM Retention Variables								
1. STEM Difficulty	5.03^{a}	5.16^{a}	5.24^{a}	5.33^{a}	5.06^{a}	5.07^{a}	5.03^{a}	5.44^{a}
	(1.21)	*(1.55)*	*(1.28)*	*(1.15)*	*(1.59)*	*(1.36)*	*(1.72)*	*(1.48)*
2. STEM Identity	4.65^{a}	5.09^{a}	5.04^{a}	4.95^{a}	5.19^{a}	5.08^{a}	5.20^{a}	4.94^{a}
	(.914)	*(.866)*	*(1.03)*	*(.756)*	*(1.01)*	*(1.02)*	*(.938)*	*(.816)*
3. STEM Efficacy	5.31^{a}	5.65^{a}	5.47^{a}	5.40^{a}	5.61^{a}	5.55^{a}	5.84^{a}	5.62^{a}
	(1.02)	*(.822)*	*(1.31)*	*(.933)*	*(1.25)*	*(.867)*	*(.734)*	*(.926)*
4. State Self-Esteem*	3.86^{a}	3.77^{a}	3.89^{a}	4.39^{b}	4.48^{a}	4.50^{a}	4.29^{a}	4.01^{b+}
	(1.01)	*(1.08)*	*(1.11)*	*(.934)*	*(1.19)*	*(1.16)*	*(1.29)*	*(1.24)*

Note. * Denotes a two-way interaction. Different superscripts denote post-hoc statistical differences at $p < .05$. $^{+}$superscript refers to marginally significant differences (*p's* = .05 to .10). 'Ed.' refers to the educational confrontation style condition.

FIGURES

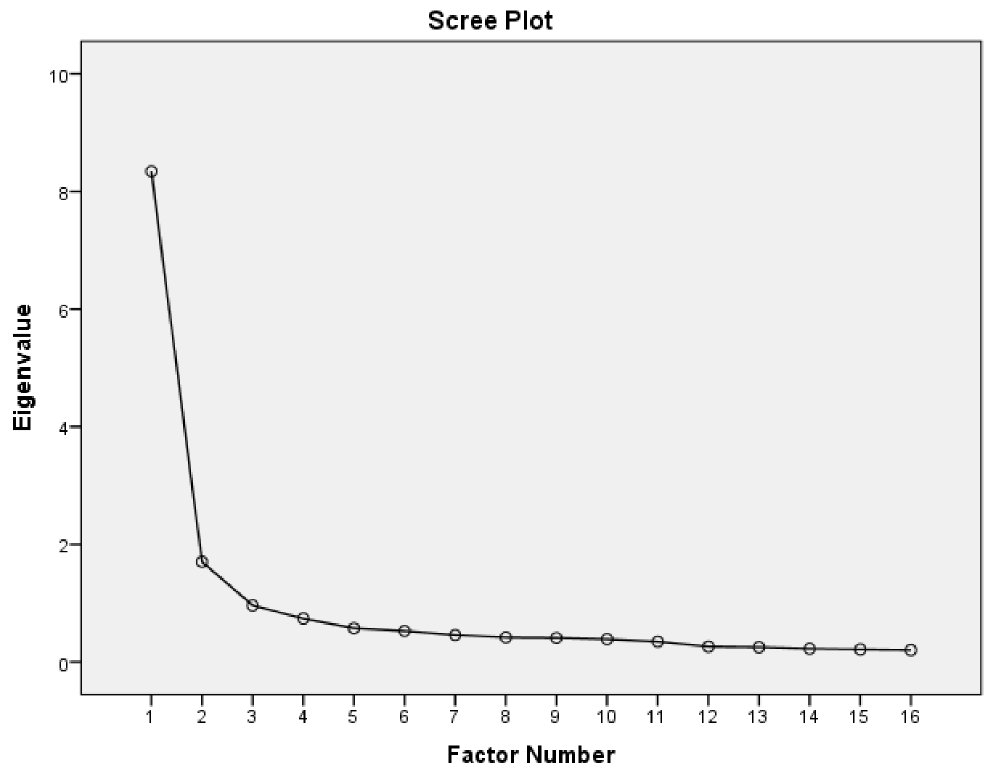

Figure 1. Study 1 Negative Trait Factor Analysis: Scree Plot for Single-Factor Solution

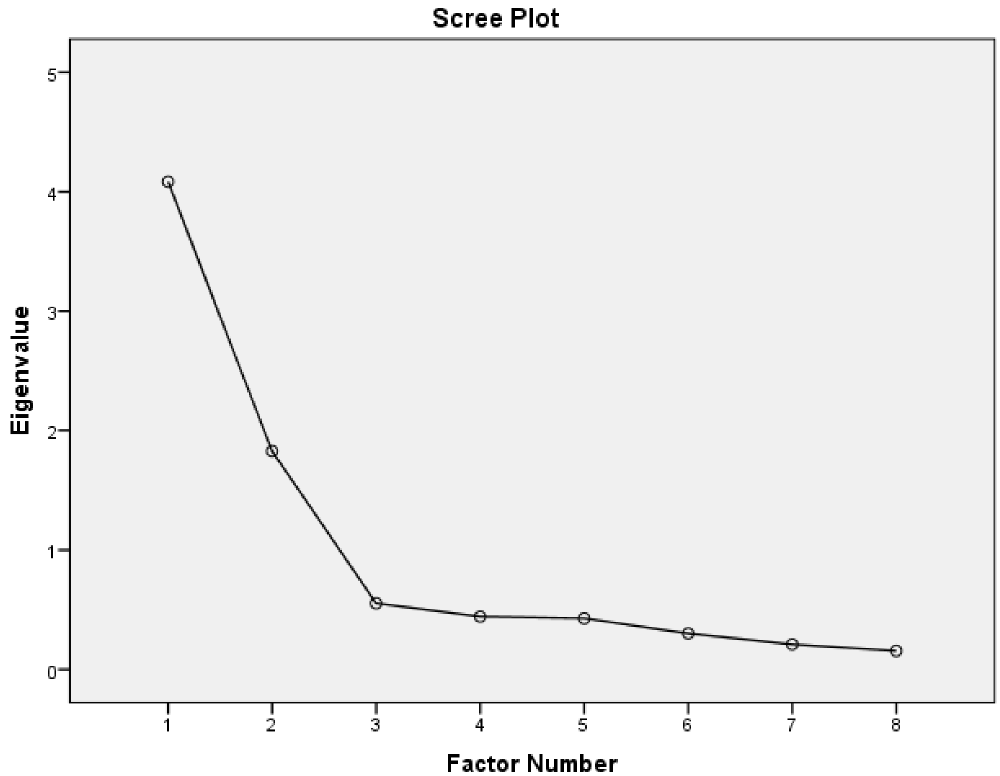

Figure 2. Study 1 Positive Trait Factor Analysis: Scree Plot for Two-Factor Solution

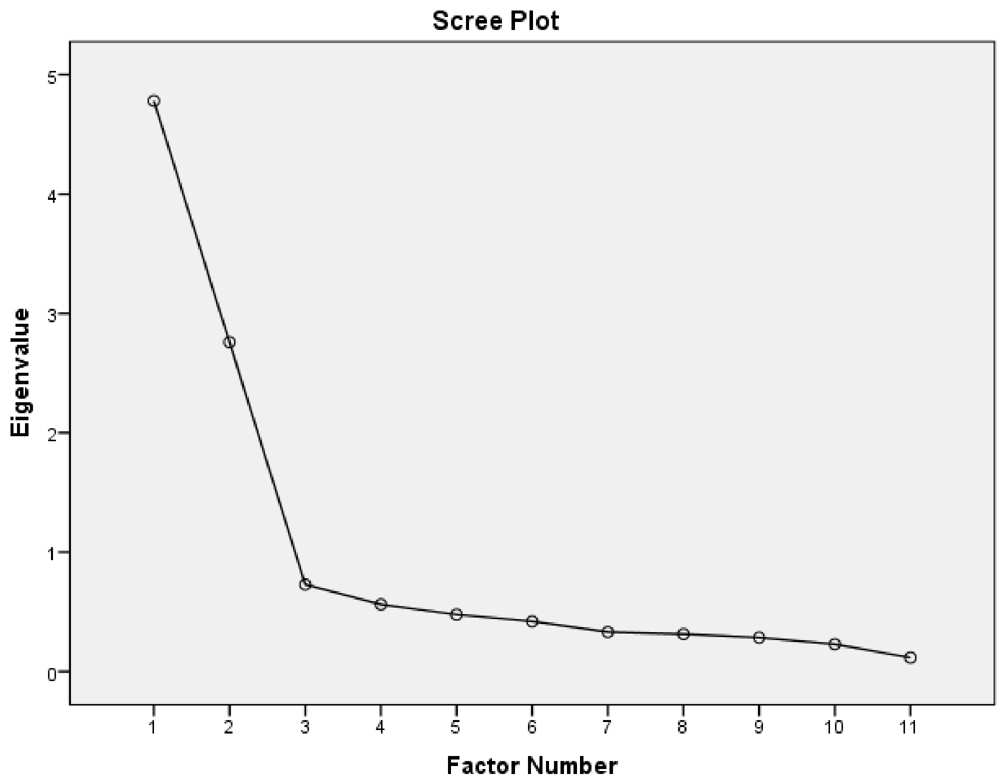

Figure 3. Study 2 Positive Trait Factor Analysis: Scree Plot for Two-Factor Solution

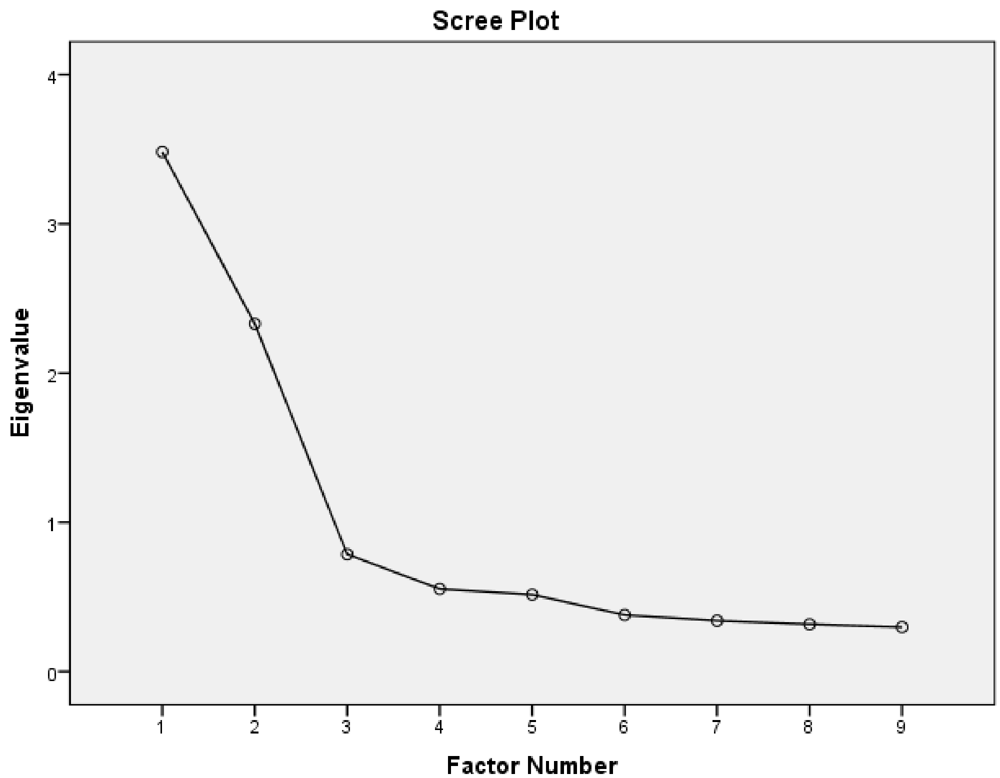

Figure 4. Study 3 Positive Trait Factor Analysis: Scree Plot for Two-Factor Solution

Appendix A

Study 1 Materials and Measures

Introduction

This is a study about how students handle competition in small groups.

As a student, working with others on tasks and assignments is essential for success. Yet, very little is known about how students act when they are faced with competition in group scenarios.

In this study we are interested in how students respond to situations in which they experience competition in the context of small group projects. To do this, today we will ask you to imagine yourself in a situation. Then, we will ask you how you might respond if it was real.

In this section, you will read a classroom scenario. Please imagine yourself in the situation as realistically as possible. You can take notes about the scenario if it will help you remember it in more detail. The situation will be displayed on the screen for 30 seconds before you can move on.

1. STEM context + confrontation condition

Imagine that this term in university, you are enrolled in a Computer Science (CS1002) course. One major component of your final grade is a group work assignment. When pairs are assigned, you see that a male student named Adam is paired with a female student named Jenna. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term.

When it comes time to assign roles, Adam says to Jenna, "I'll take the lead so you don't mess up anything important; just take notes and look pretty – that's what girls are good for."

Jenna confronts Adam. Jenna says, "Excuse me? Actually, women run some of the biggest companies in the world. Ever heard of Pepsi or General Motors? Maybe you should just take notes and look pretty while I take the lead."

2. STEM context + ignore/control condition

Imagine that this term in university, you are enrolled in a Computer Science (CS1002) course. One major component of your final grade is a group work assignment. When pairs are assigned, you see that a male student named Adam is paired with a female student named Jenna. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term.

When it comes time to assign roles, Adam says to Jenna, "I'll take the lead so you don't mess up anything important; just take notes and look pretty – that's what girls are good for."

Jenna does not confront Adam. Instead Jenna says nothing and continues reading the assignment sheet.

3. Non-STEM context + confrontation condition

Imagine that this term in university, you are enrolled in a Communication Studies (CS1002) course. One major component of your final grade is a group work assignment. When pairs are assigned, you see that a male student named Adam is paired with a female student named Jenna. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term.

When it comes time to assign roles, Adam says to Jenna, “I’ll take the lead so you don’t mess up anything important; you just take notes and look pretty – that’s what girls are good for.”

Jenna confronts Adam. Jenna says, “Excuse me? Actually, women run some of the biggest companies in the world. Ever heard of Pepsi or General Motors? Maybe you should just take notes and look pretty while I take the lead.”

4. Non-STEM context + ignore/control condition

Imagine that this term in university, you are enrolled in a Communication Studies (CS1002) course. One major component of your final grade is a group work assignment. When pairs are assigned, you see that a male student named Adam is paired with a female student named Jenna. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term.

When it comes time to assign roles, Adam says to Jenna, “I’ll take the lead so you don’t mess up anything important; you just take notes and look pretty – that’s what girls are good for.”

Jenna does not confront Adam. Instead Jenna says nothing and continues reading the assignment sheet.

Study 1 Dependent Measures

Social Costs: Trait Ascription Measure

Instructions

Please recall the scenario you read. Take a moment to think about Adam's comment and how Jenna responded.

To what extent would you think Jenna was…?

1 (*Strongly Disagree*) to 7 (*Strongly Agree*)

* = neutral/filler items
\+ = positive items
\- = negative items

1. Rude -
2. Trying to cause trouble -
3. Making excuses for her own shortcomings -
4. Emotional -
5. Complaining –
6. Stupid -
7. Bitchy -
8. Bossy -
9. Angry -
10. Irritating -
11. Dramatic -
12. Too sensitive -
13. Argumentative -
14. Irrational -
15. Causing drama -
16. Making a scene -
17. Conservative *
18. Even-tempered *
19. Quiet *
20. Shy *
21. Neutral *
22. Reserved *
23. Having an argument *
24. In a confrontation *
25. Avoiding a fight *
26. In a fight *
27. Chill *
28. Patient *
29. Easygoing *
30. Risky *

31. Justified *
32. Funny +
33. Confident +
34. Intelligent +
35. Friendly +
36. Brave +
37. Strong +
38. Likeable +
39. Independent +
40. Respectable +
41. Considerate +
42. A good friend +
43. A good team member +

*All items were interspersed.

Personal Costs

Please indicate how easy or difficult you perceive the following subjects on the scale provided:
1 (*Not at all difficult*) to 7 (*Extremely difficult*)

1. Arts & Humanities
2. History
3. Sciences
4. English
5. Geography
6. Physical Education

Appendix B

Study 2 Materials and Measures

Introduction

This is a study about how students handle competition in small groups.

As a student, working with others on tasks and assignments is essential for success. Yet, very little is known about how students act when they are faced with competition in group scenarios. In this study we are interested in how students respond to situations in which they experience competition in the context of small group projects. To do this, today we will ask you to imagine yourself in a situation. Then, we will ask you how you might respond if it was real.

In this section, you will read a classroom scenario. Please imagine yourself in the situation as realistically as possible. You can take notes about the scenario if it will help you remember it in more detail. The situation will be displayed on the screen for 30 seconds before you can move on.

1. STEM context + confrontation condition

Imagine that this term in university, you are enrolled in a Computer Science (CS1002) course. One major component of your final grade is a group work assignment. When pairs are assigned, you are paired with a male student named Adam. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term.

When it comes time to assign roles, Adam says to you, “I’ll take the lead so you don’t mess up anything important; just take notes and look pretty – that’s what girls are good for.”

You decide to confront Adam. You say, “Excuse me? Actually, women run some of the biggest companies in the world. Ever heard of Pepsi or General Motors? Maybe you should just take notes and look pretty while I take the lead.”

2. STEM context + ignore/control condition

Imagine that this term in university, you are enrolled in a Computer Science (CS1002) course. One major component of your final grade is a group work assignment. When pairs are assigned, you are paired with a male student named. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term.

When it comes time to assign roles, Adam says to you, “I’ll take the lead so you don’t mess up anything important; just take notes and look pretty – that’s what girls are good for.”

You decide to not confront Adam. Instead you say nothing and continue reading the assignment sheet.

3. Non-STEM context + confrontation condition

Imagine that this term in university, you are enrolled in a Communication Studies (CS1002) course. One major component of your final grade is a group work assignment. When pairs are assigned, you are paired with a male student named. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term.

When it comes time to assign roles, Adam says to you, “I’ll take the lead so you don’t mess up anything important; just take notes and look pretty – that’s what girls are good for.”

You decide to not confront Adam. Instead you say nothing and continue reading the assignment sheet.

4. Non-STEM context + ignore/control condition

Imagine that this term in university, you are enrolled in a Communication Studies (CS1002) course. One major component of your final grade is a group work assignment. When pairs are assigned, you are paired with a male student named. Each pair must select a group leader to direct the project. They will also have the chance to earn bonus points at the end of the term.

When it comes time to assign roles, Adam says to you, “I’ll take the lead so you don’t mess up anything important; just take notes and look pretty – that’s what girls are good for.”

You decide to not confront Adam. Instead you say nothing and continue reading the assignment sheet.

Study 2 Dependent Measures

Social Costs: Trait Ascription Measure

Instructions

Please recall the scenario you read. Take a moment to think about Adam's comment and how you responded.

To what extent would others think you were…?

1 (*Strongly Disagree*) to 7 (*Strongly Agree*)

* = neutral/filler items
+ = positive items
- = negative items

1. Rude -
2. Trying to cause trouble -
3. Making excuses for her own shortcomings -
4. Emotional -
5. Complaining –
6. Stupid -
7. Bitchy -
8. Bossy -
9. Angry -
10. Irritating -
11. Dramatic -
12. Too sensitive -
13. Argumentative -
14. Irrational -
15. Causing drama -
16. Making a scene -
17. Conservative *
18. Even-tempered *
19. Quiet *
20. Shy *
21. Neutral *
22. Reserved *
23. Having an argument *
24. In a confrontation *
25. Avoiding a fight *
26. In a fight *
27. Chill *
28. Patient *
29. Easygoing *
30. Risky *

31. Justified *
32. Funny +
33. Confident +
34. Intelligent +
35. Friendly +
36. Brave +
37. Strong +
38. Likeable +
39. Independent +
40. Respectable +
41. Considerate +
42. A good friend +
43. A good team member +

*All items were interspersed.

Personal Costs

Please indicate how easy or difficult you perceive the following subjects on the scale provided: 1 (*Not at all difficult*) to 7 (*Extremely difficult*)

1. Arts & Humanities
2. History
3. Sciences
4. English
5. Geography
6. Physical Education

Appendix C

Study 3 Materials and Measures

Instructions

Please read this information: Statistics Canada shows that while approximately 70% of university graduates are female, only 30% of STEM graduates are women (Hango, 2013). As such, you may be the only woman working with men in group settings. We are interested in how this affects you. Today we will ask you to imagine yourself in a situation. You should picture the situation from a first-person perspective. With the first-person perspective you see the situation as if you were experiencing it yourself; if the event were actually taking place and happening to you. That is, you are looking out at your surroundings through your own eyes; you see yourself in the situation as well as your surroundings.

After 10 seconds you will be able to advance to the next page >>

Great. Next, we'd like you to read a scenario. Please imagine yourself in the situation as realistically as possible. You can take notes if it helps you remember more detail.

Sexism Manipulations

1. *Hostile sexism condition*

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, "You should let us do this part - girls can't do it without screwing up." The rest of your group members nod their heads and smile in agreement. The situation will be displayed on the screen for 10 seconds before you can move on.

2. *Benevolent sexism condition*

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, "You should let us do this part - we don't want you getting hurt." The rest of your group members nod their heads and smile in agreement. The situation will be displayed on the screen for 10 seconds before you can move on.

Study 3 Measures

Sexism Manipulation Check

Ambivalent Sexism Inventory (Glick & Fiske, 1996).

For these next questions, we'd like you to answer from the perspective of Josh. That is, how much do you think Josh would agree with each statement on the following scale?

1 (*Strongly Disagree*) to 7 (*Strongly Agree*)

1. No matter how accomplished be is, a man is not truly complete as a person unless he has the love of a woman. B
2. Many women are actually seeking special favors, such as hiring policies that favor them over men, under the guise of asking for "equality." H
3. In a disaster, women ought not necessarily to be rescued before men. B*
4. Most women interpret innocent remarks or acts as being sexist. H
5. Women are too easily offended. H
6. People are often truly happy in life without being romantically involved with a member of the other sex. B*
7. Feminists are not seeking for women to have more power than men. H*
8. Many women have a quality of purity that few men possess. B
9. Women should be cherished and protected by men. B
10. Most women fail to appreciate fully all that men do for them. H
11. Women seek to gain power by getting control over men. H
12. Every man ought to have a woman whom he adores. B
13. Men are complete without women. B*
14. Women exaggerate problems they have at work. H
15. Once a woman gets a man to commit to her, she usually tries to put him on a tight leash. H
16. When women lose to men in a fair competition, they typically complain about being discriminated against. H
17. A good woman should be set on a pedestal by her man. B
18. There are actually very few women who get a kick out of teasing men by seeming sexually available and then refusing male advances. H*
19. Women, compared to men, tend to have a superior moral sensibility. B
20. Men should be willing to sacrifice their own wellbeing in order to provide financially for the women in their lives. B
21. Feminists are making entirely reasonable demands of men. H*
22. Women, as compared to men, tend to have a more refined sense of culture and good taste. B

Coding:
H = Hostile Sexism
B = Benevolent Sexism
* Indicates reverse scored item.

Study 3 Materials

Confrontation Manipulations

We'd again like you to put yourself back in the situation, but now, you respond.

Here's the scenario you previously read with your response added to the bottom.

Please focus on how you respond.

1. Hostile + angered confrontation condition

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, "You should let us do this part - girls can't do it without screwing up." The rest of your group members nod their heads and smile in agreement. You look back at Josh and say, "Screw you! That's so sexist!"

2. Hostile + educational confrontation condition

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, "You should let us do this part - girls can't do it without screwing up." The rest of your group members nod their heads and smile in agreement. You look back at Josh and say, "I understand that you might believe that, but I think you're making an unfair assumption about all women."

3. Hostile + indirect confrontation condition

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, "You should let us do this part - girls can't do it without screwing up." The rest of your group members nod their heads and smile in agreement. You look back at Josh and roll your eyes.

4. Hostile + ignore/control condition

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, "You should let us do this part - girls can't do it without screwing up." The rest of your group members nod their heads and smile in agreement. You ignore Josh's comment.

5. Benevolent + angered confrontation condition

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, "You should let us do this part - we don't want you getting hurt." The rest of your group members nod their heads and smile in agreement. You look back at Josh and say, “Screw you! That’s so sexist!”

6. Benevolent + educational confrontation condition

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, “You should let us do this part - we don't want you getting hurt.” The rest of your group members nod their heads and smile in agreement. You look back at Josh and say, “I understand that you might believe that, but I think you're making an unfair assumption about all women.”

7. Benevolent + indirect confrontation condition

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, “You should let us do this part - we don't want you getting hurt.” The rest of your group members nod their heads and smile in agreement. You look back at Josh and roll your eyes.

8. Benevolent + ignore/control condition

You are in an advanced lab of your STEM program. For a group-work project, you are working with Brian, David, and Josh. When it's time to get started, Josh looks at you and says, “You should let us do this part - we don't want you getting hurt.” The rest of your group members nod their heads and smile in agreement. You ignore Josh's comment.

Study 3 Dependent Measures

Social Costs: Trait Ascription Measure

Instructions

Please recall the scenario you read. Take a moment to think about Josh's comment and how you responded.

To what extent would others think you were…?

1 (*Strongly Disagree*) to 7 (*Strongly Agree*)

* = neutral/filler items
+ = positive items
- = negative items

1. Rude -
2. Trying to cause trouble -
3. Making excuses for her own shortcomings -
4. Emotional -
5. Complaining –
6. Stupid -
7. Bitchy -
8. Bossy -
9. Angry -
10. Irritating -
11. Dramatic -
12. Too sensitive -
13. Argumentative -
14. Irrational -
15. Causing drama -
16. Making a scene -
17. Conservative *
18. Even-tempered *
19. Quiet *
20. Shy *
21. Neutral *
22. Reserved *
23. Having an argument *
24. In a confrontation *
25. Avoiding a fight *
26. In a fight *
27. Chill *
28. Patient *
29. Easygoing *
30. Risky *

31. Justified *
32. Funny +
33. Confident +
34. Intelligent +
35. Friendly +
36. Brave +
37. Strong +
38. Likeable +
39. Independent +
40. Respectable +
41. Considerate +
42. A good friend +
43. A good team member +

*All items were interspersed.

Study 3 Dependent Measures

Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegan, 1988)

Please recall Josh's comment and your response. Then, indicate how you think you would feel afterwards if the situation really happened. To what extent would you feel…?

1 (*Strongly Disagree*) to 7 (*Strongly Agree*)

1. Afraid
2. Angry
3. Active *
4. Confident
5. Amazed
6. Scared
7. Alert
8. Disgusted
9. Fearless
10. Nervous
11. Attentive
12. Sad
13. Happy
14. Calm
15. Jittery
16. Determined
17. Delighted
18. Irritable
19. Cheerful
20. Hostile
21. Enthusiastic
22. At ease
23. Surprised
24. Guilty
25. Excited
26. Proud
27. Astonished
28. Ashamed
29. Content
30. Inspired
31. Upset
32. Interested
33. Distressed

* Item used for confrontation manipulation check.

Study 3 Dependent Measures

State Self-esteem Scale (Heatherton & Polivy, 1991)

Please answer these questions as they are true for you right now.

1 (*Strongly Disagree*) to 7 (*Strongly Agree*)

1. I feel confident about my abilities.
2. I am worried about whether I am regarded as a success or failure. *
3. I feel satisfied with the way my body looks right now.
4. I feel frustrated or rattled about my performance. *
5. I feel that I am having trouble understanding things that I read. *
6. I feel that others respect and admire me.
7. I am dissatisfied with my weight. *
8. I feel self-conscious. *
9. I feel as smart as others.
10. I feel displeased with myself. *
11. I feel good about myself.
12. I am pleased with my appearance right now.
13. I am worried about what other people think of me. *
14. I feel confident that I understand things.
15. I feel inferior to others at this moment. *
16. I feel unattractive. *
17. I feel concerned about the impression I am making. *
18. I feel that I have less scholastic ability right now than others. *
19. I feel like I'm not doing well. *
20. I am worried about looking foolish. *

* Indicates reverse scored item.

Study 3 Dependent Measures

STEM Identification (Adapted from Cameron, 2004)

Please complete the following questions from the perspective of a person in {Participants' STEM area}.

1 (*Strongly Disagree*) to 7 (*Strongly Agree*)

1. I have a lot in common with other people in {Participants' STEM area}.
2. I feel strong ties to other people {Participants' STEM area}.
3. I find it difficult to form a bond with other people in {Participants' STEM area}. *
4. I don't feel a sense of being "connected" with other people in {Participants' STEM area}. *
5. I often think about the fact that I am a person in {Participants' STEM area}.
6. Overall, being a person in {Participants' STEM area} has very little to do with how I feel about myself. *
7. In general, being a person in {Participants' STEM area} is an important part of my self-image.
8. The fact that I am a person in {Participants' STEM area} rarely enters my mind. *
9. In general, I'm glad to be a person in {Participants' STEM area}.
10. I often regret that I am a person in {Participants' STEM area}. *
11. I don't feel good about being a person in {Participants' STEM area}. *
12. Generally, I feel good about myself when I think about myself as a person in {Participants' STEM area}.

* Indicates reverse scored item.

Study 3 Dependent Measures

STEM Efficacy (Adapted from Stout et al., 2011)

Please indicate your agreement with the following statements on the scale provided:

1 (*Strongly Disagree*) to 7 (*Strongly Agree*)

1. My opinion of {Participants' STEM area} is good.
2. {Participants' STEM area} is important to me.
3. I really like {Participants' STEM area}.
4. I enjoy being a person in {Participants' STEM area}.
5. I identify with other people in {Participants' STEM area}.
6. {Participants' STEM area} is easy for me.
7. I feel like a part of {Participants' STEM area}.
8. In general, I am good at {Participants' own STEM area}.
9. I am effective in {Participants' own STEM area}.
10. I can be successful in {Participants' own STEM area}.
11. I can pursue a career in {Participants' own STEM area}.
12. I will pursue more education or qualifications in {Participants' own STEM area}.
13. I will stay in the field of {Participants' own STEM area}.
14. I'm glad I chose {Participants' own STEM area}.

Personal Costs

Please indicate how easy or difficult you perceive the following subjects on the scale provided:
1 (*Not at all difficult*) to 7 (*Extremely difficult*)

1. Arts & humanities
2. {Participants' own STEM area}
3. Sciences