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ORIGINAL ARTICLE

Mars, Venus, or Earth? Sexism and the Exaggeration of Psychological Gender Differences

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Abstract Few studies have examined how people perceive psychological gender differences despite the practical importance of these perceptions for everyday life. In three studies, we examined whether there is a positive association between sexism and the tendency to exaggerate psychological gender differences. Study 1 demonstrated that the more strongly men endorsed hostile sexism and the more strongly women endorsed hostile or benevolent sexism, the larger they perceived gender differences to be across a broad range of psychological traits. Study 2 documented that the more strongly people endorsed hostile or benevolent sexism, the more likely they were to exaggerate the size of gender differences. In Studies 1 and 2, women perceived gender differences to be larger than did men, after accounting for sexism. Finally, Study 3 showed that increasing (decreasing) the perceived size of gender differences predicts corresponding increases (decreases) in sexism. These results support relevant theory, which argues that differentiation between genders underlies sexist ideologies, and they may inform future intervention studies that aim to reduce sexism by targeting exaggerated gender beliefs. Discussion highlights the proposed connection between sexism and the belief that "men are from Mars and women are from Venus".

Keywords Social perception · Sex role attitudes · Sexism · Masculinity · Femininity

Differences between males and females has been one of the longest and most comprehensively studied topics in all of psychological science (Hyde 2014; Rudman and Glick 2008). In contrast with lay messages that espouse large differences between genders, such as best-selling books like *Men are From Mars and Women are From Venus* (Gray 1992) and *You Just Don't Understand: Men and Women in Conversation* (Tannen 1991), emerging data suggest that psychological gender differences are typically small in size (Hyde 2005; Reis and Carothers 2014), which has led some researchers to proclaim that *Men and Women Are From Earth* (Carothers and Reis 2013). To be sure, medium to large gender differences do arise in some domains including physical aggression, spatial ability, and mate preferences, but these sizable differences are relatively rare—on most psychological variables, gender differences would be characterized as small to very small according to standard conventions (Zell et al. 2015).

Much is known, therefore, about the degree to which males and females differ on a variety of psychological traits. Surprisingly, however, little research has examined whether people's perceptions regarding the size of psychological gender differences match these empirical findings (cf. Halpern et al. 2011; Swim 1994). This paucity of research is concerning given that perceptions of males and females have important practical consequences. For example, research on stereotype threat demonstrates that activating the mistaken belief that women are inferior at math can undermine women's math performance (Nguyen and Ryan 2008; Spencer et al. 1999). Additionally, women who overestimate gender differences in science performance underrate their science ability and are less likely to pursue science-related

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activities (Ehrlinger and Dunning 2003). Finally, academic professionals who think that men have higher intelligence than women are more likely to admit men into selective graduate programs (Leslie et al. 2015). Thus, biased beliefs regarding gender differences may ultimately reinforce gender disparities in a variety of fields. Moreover, once gender perceptions are established, confirmation biases may lead people to readily accept information that supports them and reject information that contradicts them (see Ditto and Lopez 1992; Lord et al. 1979), which may reinforce the strength of biased gender perceptions over time.

Given the practical importance of gender perceptions, the current research examines how people perceive gender differences across a broad range of psychological traits and whether the more strongly people endorse sexism, the more likely they are to exaggerate the size of gender differences. Additionally, we explore whether the perceived size of gender differences is malleable and whether altering the perceived size of gender differences has downstream consequences for endorsement of sexist attitudes. In short, the current research is among the first systematic attempts to understand perceived gender differences and whether such gender perceptions are related to sexist ideologies.

Perceived Gender Differences

Researchers have long been interested in evaluating the accuracy of stereotypes pertaining to numerous groups, including stereotypes regarding differences between males and females (Allport 1954). Initial research suggested that people may exaggerate the size of gender differences—that is, participants assumed that there were large gender differences for many psychological traits (e.g., forceful, sensitive), yet estimates of actual gender differences from college student samples showed relatively small differences on the same traits (Allen 1995; Martin 1987). These studies were later criticized, however, because participants made judgments about differences between males and females in the general population but actual trait data used to evaluate perceived gender differences were only obtained from convenience samples of college students (see Jussim et al. 2009). Furthermore, in a cross-cultural study of participants in 26 nations, participants did not exaggerate gender differences in big-five personality; alternatively, participants had accurate perceptions of the personality of the average man and woman in their country (Löckenhoff et al. 2014).

Other data provide converging support for the argument that, in general, people may not necessarily exaggerate psychological gender differences. First, when comparing the perceived magnitude of gender differences to meta-analytic estimates of these differences across 15 psychological traits (e.g., restless, helpful), participants more often underestimated the size of gender differences than overestimated them (Swim 1994, Study 2). Second, when comparing perceptions of males and females across 12 cognitive variables to large-scale behavioral data (e.g., perceived SAT math scores for men and women to actual SAT math scores), participants typically underestimated gender differences (Halpern et al. 2011). Third, research suggests that people have accurate beliefs about the percentage of men and women in different occupations (Cejka and Eagly 1999). Fourth, Hall and Carter (1999) found that beliefs regarding the size of gender differences across over 70 psychological traits were moderately correlated with the actual size of these gender differences as estimated by published meta-analyses. Moreover, their study found less accurate gender beliefs among people who were high in cognitive rigidity (e.g., need for structure), low in social sensitivity (e.g., emotion perception), and among women who were high in benevolent sexism. Hall and Carter's study did not evaluate whether people overestimate gender differences, but their data are relevant in suggesting that people have accurate perceptions regarding which gender differences are relatively large versus small and that there are individual differences in the accuracy of gender perceptions.

Altogether, existing data challenge the position that people exaggerate psychological gender differences (Jussim 2012; Jussim et al. 2009). Nonetheless, although there may not be a general tendency to exaggerate gender differences, it remains possible that some segments of the population are more likely to exaggerate gender differences than are others. Going beyond past studies that focused primarily on characterizing the overall accuracy of perceived gender differences, the current report examined whether there are critical individual difference variables that are associated with exaggerated gender beliefs. We propose that sexism is positively associated with perceived gender differences, such that the more strongly people endorse sexism the larger they perceive psychological gender differences to be.

Sexism and Perceived Gender Differences

Sexism involves prejudice and discrimination on the basis of gender, typically in favor of men over women. Sexism is a pernicious problem in many societies across the globe, including the United States (World Economic Forum 2015), and is reflected by several outcomes including gender discrimination in the workplace, the wage gap (i.e., the tendency for women to earn less than men), and incidences of sexual harassment (e.g., Swim et al. 2001). Psychologists have identified two primary types of sexism: hostile and benevolent (Glick and Fiske 1996, 1997). *Hostile sexism* is an adversarial view of gender relations in which women are perceived as seeking control over men. *Benevolent sexism* is a subjectively positive view of gender relations in which women are perceived as

pure creatures who ought to be protected, supported, and adored; as necessary companions to make a man complete; but as weak and therefore best relegated to traditional gender roles (e.g., homemaker). Hostile and benevolent sexism represent separate, yet moderately correlated factors. Researchers have characterized this positive association between factors as *ambivalent sexism*—people who have negative, hostile attitudes toward women also tend to have apparently positive, benevolent attitudes toward women.

We propose that the more strongly people endorse hostile or benevolent sexism, the more likely they are to perceive psychological gender differences as relatively large and to generally exaggerate the size of gender differences. According to ambivalent sexism theory (Glick and Fiske 2011, 2012; Lee et al. 2010), sexist beliefs may originate in and be reinforced by gender differentiation. Specifically, hostile sexism may be rooted in *competitive gender differentiation*, whereby people assume that men are better (e.g., more competent) than women. Conversely, benevolent sexism may be rooted in *complementary gender differentiation*, whereby people assume that women have favorable traits (e.g., purity, warmth) that contrast with, but ultimately complement, stereotypically masculine characteristics (e.g., competitiveness). Thus, both hostile and benevolent sexism may lead people to perceive large differences between genders in psychological traits, despite emerging scientific data suggesting that gender differences are typically small in size (Hyde 2005; Zell et al. 2015).

Consistent with these arguments, hostile sexism predicts negative reactions toward people in non-traditional roles (e.g., masculine women, feminine men), which suggests that sexist people perceive "male" and "female" as separate categories to which people should adhere (Glick et al. 2015). Additionally, benevolent sexism is significantly associated with justification of the status quo (Connelly and Heesacker 2012), and priming benevolent sexism triggers system justification motives (Jost and Kay 2005), which suggests that gender differentiation beliefs may serve as "legitimizing myths" that rationalize the lower status afforded to women in society (Glick and Fiske 2012; Hoffman and Hurst 1990). Finally, research indicates that activating system justification motives increases the tendency to perceive gender differences as unchangeable and biologically based (Brescoll et al. 2013), further suggesting that gender attitudes may reflect people's ideologies (also see Brescoll and LaFrance 2004; Keller 2005). Despite this indirect support, it remains unclear whether, as articulated by ambivalent sexism theory, there is a positive association between sexism and the tendency to perceive psychological gender differences as relatively large. The current research fills this gap by directly testing whether there is a connection between sexism and exaggerated gender beliefs.

Moreover, inspired by recent calls for techniques to reduce sexism (Becker et al. 2014; Lee et al. 2010), we examine whether manipulating the perceived size of psychological gender differences affects endorsement of sexist ideologies. If sexism is rooted in the belief that males and females are highly different, as argued by prior theory, then reducing the perceived size of gender differences might reduce sexism. People are regularly confronted with persuasive messages regarding the magnitude of psychological gender differences. Indeed, Allport (1954, p. 200) proposed that stereotypes are "socially supported, continually revived and hammered in, by our media of mass communication." In some contexts, people are exposed to media which suggest that gender differences are very large (Maestripieri 2012; Viegas 2013), but in other contexts, people are exposed to media which suggest that gender differences are very small (Barber 2016; Sample 2015). Because these media often reference scientific authorities when making their claims, we propose that such messages should influence beliefs regarding the size of gender differences and may ultimately result in corresponding shifts in sexism. Specifically, media espousing large gender differences might increase the perceived size of gender differences and result in corresponding increases in sexism.

Gender and Perceived Gender Differences

Although our main focus was on the relation between sexism and perceived gender differences, we also explored whether men and women differ in their gender perceptions. Some data suggests that men might perceive gender differences to be larger than do women. For example, men across the world report higher levels of hostile and benevolent sexism than do women (Glick et al. 2000) and may, therefore, perceive gender differences to be larger due to their increased sexism. However, it remains unclear whether gender has an independent association with perceived gender differences after accounting for sexism. Further, men report greater *gender dichotomization*, where they perceive the group "men" as being more masculine than the group "women" is feminine and they perceive the group "men" as being less feminine than the group "women" is masculine (Bosson and Michniewicz 2013). These data suggest that men perceive a larger gap between genders than do women when examining highly masculine (e.g., assertive) and feminine (e.g., sensitive) traits, but do not pertain to the broader issue of how people perceive men and women across a variety of psychological traits, including those that are not strongly associated with masculinity or femininity. Finally, although men are more likely to endorse biological explanations for gender differences than are women (i.e., endorse gender essentialism; Brescoll et al. 2013), these data pertain to how people explain gender differences and may not reflect perceptions regarding the size of gender differences.

Furthermore, other data suggest that women might perceive gender differences to be larger than do men. Research indicates that the tendency to perceive one's own gender group more favorably than the opposing group is significantly stronger among women than among men, both when observing implicit and explicit measures (Rudman and Goodwin 2004). Women are also more strongly affected by gender discrimination than are men (Schmitt et al. 2014), which may lead women to identify more strongly with their gender and see gender as a more powerful influence on life outcomes than do men. In sum, given the stronger tendency among women to favor their own gender and to experience harmful effects of gender discrimination, it is possible that women perceive larger gender differences than do men. In the current research, we evaluated these competing predictions by testing whether men perceive psychological gender differences to be significantly larger or smaller than do women.

The Present Studies

We conducted three studies to explore the connection between sexism and perceived gender differences. In our initial study, we explored whether sexism is associated with the perceived size of gender differences across a broad range of psychological characteristics. In a follow-up study, we tested whether sexism is associated with the tendency to exaggerate the size of psychological gender differences. Finally, in our third study we tested whether beliefs regarding the size of gender differences are malleable and whether altering such beliefs predicts changes in hostile and benevolent sexism. Where possible, we included participants' gender in our analyses to explore whether men perceive gender differences to be larger or smaller than do women, after adjusting for sexism.

Study 1

Method

Participants

Initial participants were 329 American adults who were recruited via Amazon's Mechanical Turk (mTurk) in exchange for a small payment. We excluded data from 15 participants (4.6 % of the sample) who incorrectly answered one or more attention checks and data from 2 participants (.01 % of the sample) who did not provide gender information required for our primary analyses, yielding a final sample of 312 U.S. participants: 189 (61 %) women, 228 (73 %) Caucasian, M_{age} = 35.9 (SD = 12.5, range = 18–76). Of the female participants, there were 19 (10 %) African Americans, 7 (4 %) Asian Americans, 135 (71 %) Caucasians, 13 (7 %) Hispanic Americans, and 15 (8 %) women of a different race/ethnicity. Of the 123 male participants, there were 8 (7 %) African Americans, 10 (8 %) Asian Americans, 93 (76 %) Caucasians, 8 (7 %) Hispanic Americans, and 4 (3 %) men of a different race/ethnicity. In all studies described in the current report, the pattern of results was identical when excluded participants were retained.

Procedure

After providing consent, participants were first presented with a list of 48 traits (e.g., physically aggressive, risk seeking, forgiving; see the Appendix for a full list) and asked to estimate how large the difference is between males and females on each trait. The 48 traits were selected because they had been extensively studied in prior psychological research, including large meta-analyses, and because they could be quickly described in a non-technical manner that is understandable to laypersons. For each trait, judgments regarding the size of psychological gender differences were made using a 1–99 scale, where 20, 50, and 80 were said to reflect small, moderate, and large differences, respectively (see Swim 1994 for a similar scale). During test administration, the 48 traits were presented in a randomized order. Judgments across the 48 traits were aggregated to create a single index of perceived gender differences (α = .94, ICC = .26; M = 41.7, SD = 13.6).

Next, participants filled out brief measures of hostile and benevolent sexism (Glick and Fiske 1996). Rather than present the entire scales, we conserved time by selecting the three items for each scale that were found in original studies to have the highest factor loadings. Specifically, the hostile sexism items were: "Women seek power by gaining control over men," "Women seek special favors under guise of equality," and "Women exaggerate problems at work" (α = .82); the benevolent sexism items were: "Women have a quality of purity few men possess," "Men should sacrifice to provide for women," and "Despite accomplishment, men are incomplete without women" (α = .69). Finally, participants completed relevant demographic measures, were thanked for their participation, and compensated.

Results

A regression analysis was used to examine the associations between sexism measures and perceived gender differences. We did not conduct mean-difference analyses to compare perceived effect sizes to meta-analytic effect sizes because these two constructs are measured using different scales and are, therefore, not directly comparable. Zero-order correlations among measures are provided in Tables 1 and 2.

Table 1 Zero-order correlations among variables in studies 1–3

	2	3	4	5
Study 1				
1. Size of perceived gender differences	−.38*	.18*	.26*	.36*
2. Accuracy of perceived gender differences	–	−.17*	−.05	−.19*
3. Gender (1 = female, 0 = male)	–	–	−.23*	−.06
4. Hostile sexism	–	–	–	.44*
5. Benevolent sexism	–	–	–	–
Study 2				
1. Selection of the large differences abstract	.06	.33*	.30*	
2. Gender (1 = female, 0 = male)	–	−.23*	−.12	
3. Hostile sexism	–	–	.38*	
4. Benevolent sexism	–	–	–	
Study 3				
1. Condition (1 = large, 0 = control, -1 = small)	.62*	.02	.06	-.04
2. Size of perceived gender differences	–	−.02	.45*	.26*
3. Gender (1 = female, 0 = male)	–	–	−.22*	−.19*
4. Hostile sexism	–	–	–	.42*
5. Benevolent sexism	–	–	–	–

* $p < .05$

Primary Model

We conducted a regression analysis on perceived gender differences with hostile sexism (centered), benevolent sexism (centered), and gender entered at step 1, all two-way interactions entered at step 2, and the three-way interaction of all predictors entered at step 3 (see Table 3). All predictors were statistically significant at step 1. Specifically, the more strongly participants endorsed hostile or benevolent sexism, the larger they perceived gender differences to be. Additionally, women perceived gender differences to be significantly larger than did men.

When examining effects at step 2, the interaction between hostile sexism and participants' gender was not statistically significant. That is, the relation between hostile sexism and perceived gender differences did not significantly vary across women and men. However, the interaction between benevolent sexism and gender was statistically significant. We

Table 2 Zero-order correlations among variables in studies 1–3 by gender

	1	2	3	4
Study 1				
1. Size of perceived gender differences	–	−.36*	.26*	.43*
2. Accuracy of perceived gender differences	−.36*	–	−.12	−.22*
3. Hostile sexism	.41*	−.05	–	.45*
4. Benevolent sexism	.27*	−.17	.42*	–
Study 2				
1. Selection of the large differences abstract	–	.29*	.12	
2. Hostile sexism	.40*	–	.17	
3. Benevolent sexism	.44*	.50*	–	
Study 3				
1. Condition (1 = large, 0 = control, -1 = small)	–	.59*	.05	−.05
2. Size of perceived gender differences	.65*	–	.38*	.31*
3. Hostile sexism	.09	.52*	–	.47*
4. Benevolent sexism	−.01	.22	.34*	–

Correlations above the diagonal are for women and correlations below the diagonal are for men

* $p < .05$

Table 3 Regression models for perceived gender differences in study 1

	R^2	*B (SE)*	β	*p*-value
Size of perceived gender differences (Primary model)				
Step 1	.19			
Gender (1 = female, 0 = male)		6.61 (1.46)	.24	< .001
Hostile sexism		2.53 (.80)	.19	.002
Benevolent sexism		4.30 (.85)	.29	< .001
Step 2	.21			
Gender × Hostile sexism		−2.73 (1.60)	−.32	.09
Gender × Benevolent sexism		4.53 (1.72)	.51	.009
Step 3	.22			
Gender × Hostile × Benevolent sexism		−.44 (.48)	−.05	.35
Accuracy of Perceived Gender Differences (Supplemental Analysis)				
Step 1	.07			
Gender (1 = female, 0 = male)		−.60 (.18)	−.19	.001
Hostile sexism		−.001 (.01)	-.003	.96
Benevolent sexism		−.034 (.01)	−.20	.002
Step 2	.07			
Gender × Hostile sexism		−.01 (.02)	−.10	.62
Gender × Benevolent sexism		−.003 (.02)	−.03	.88
Step 3	.07			
Gender × Hostile × Benevolent sexism		.002 (.006)	.024	.68

decomposed this interaction using procedures recommended by Aiken and West (1991). Simple slopes tests indicated that the positive relation between benevolent sexism and perceived gender differences, controlling for hostile sexism, was statistically significant for women ($B = 6.11$, $SE = 1.22$, $t(311) = 5.02$, $p < .001$, $\beta = .41$) but not for men ($B = 1.58$, $SE = 1.22$, $t(311) = 1.30$, $p = .19$, $\beta = .11$). In other words, higher benevolent sexism was associated with larger perceived gender differences for women, but not for men. Finally, the three-way interaction entered at step 3 was not statistically significant.

Supplemental Analysis

Our primary purpose was to examine whether the perceived size of gender differences was associated with sexism, but we also conducted a supplemental analysis to explore whether sexism was associated with accurate judgments regarding the size of gender differences (see Hall and Carter 1999). More specifically, a person-level correlation was computed by comparing the perceived size of each gender difference to the estimated size of that gender difference according to prior meta-analyses (see Zell et al. 2015). This analysis allowed us to explore whether, for each participant, the perceived size of gender differences across the 48 traits corresponded to the actual size of these gender differences according to empirical research. Higher individual-level correlations indicate better knowledge about which gender differences are relatively large and which are relatively small. Overall, participants showed weak to moderate accuracy in their perceptions regarding the size of psychological gender differences (average $r = .16$, $SD = .16$, $p < .001$).

Next, we conducted a regression analysis on the accuracy of perceived gender differences with hostile sexism (centered), benevolent sexism (centered), and gender entered at step 1, all two-way interactions entered at step 2, and the three-way interaction of all predictors entered at step 3 (see Table 3). At step 1, there was a significant effect of benevolent sexism, such that higher benevolent sexism was associated with lower accuracy in perceived gender differences. Additionally, there was a significant effect of gender, such that perceived gender differences were less accurate for women than for men. No other significant effects were obtained in this model. We refer to these supplemental results in the General Discussion.

Discussion

Consistent with predictions, Study 1 demonstrated that hostile and benevolent sexism are associated with the perceived size of psychological gender differences. The relation between benevolent sexism and the perceived size of gender differences was significantly larger for women than for men, but the relation between hostile sexism and the perceived size of gender differences did not significantly vary as a function of gender. In short, these results suggest that the more strongly men

endorsed hostile sexism and the more strongly women endorsed hostile or benevolent sexism, the larger they perceived psychological gender differences to be. Additionally, there was a significant effect of gender such that women perceived gender differences to be larger than did men, after adjusting for sexism.

Study 2

Study 1 demonstrated that sexism is associated with the perceived size of gender differences across 48 traits that represent a wide range of psychological characteristics. Nonetheless, one limitation of Study 1 is that it did not examine whether sexism is associated with the tendency to *exaggerate* the size of psychological gender differences. To address this concern, Study 2 participants read two brief abstracts. Consistent with a large body of research (see Hyde 2005, 2014; Zell et al. 2015), one of the abstracts stated that psychological gender differences are typically small. Alternatively, the other abstract stated that psychological gender differences are typically large. Participants were asked to indicate which of the two abstracts was closest to their personal beliefs. We anticipated that the more strongly participants endorsed hostile or benevolent sexism, the more likely they would be to select the abstract espousing large gender differences as consistent with their personal beliefs.

Method

Participants

Initial participants were 252 American adults who were recruited via mTurk in exchange for a small payment. We excluded data from 22 participants (8.7 % of the sample) who incorrectly answered one or more essay comprehension checks and data from 1 participant (.04 % of the sample) who did not provide gender information required for our primary analyses, yielding a final sample of 229 U.S. participants: 125 (55 %) women, 192 (84 %) Caucasian, M_{age} = 36.4 (SD = 11.3, range 18–71). Of the female participants, there were 9 (7 %) African Americans, 2 (2 %) Asian Americans, 103 (82 %) Caucasians, 3 (2 %) Hispanic Americans, and 8 (6 %) women of a different race/ethnicity. Of the 104 male participants, there were 2 (2 %) African Americans, 7 (7 %) Asian Americans, 89 (86 %) Caucasians, and 6 (6 %) Hispanic Americans.

Procedure

After providing consent, participants were told that they would be presented with 2 brief abstracts on the psychology of gender. Participants were further told that one of the abstracts was based on real scientific research and that the other was bogus. Along these lines, one of the abstracts argued that psychological gender differences are typically small and therefore males and females are highly similar—this abstract was based on recent syntheses of research on psychological gender differences (e.g., Hyde 2005; Zell et al. 2015). The other abstract argued that psychological gender differences are typically large and therefore males and females are highly different—this abstract was completely fabricated. The full text of the abstracts presented to participants is provided below:

> In 2005, psychologists analyzed the difference between males and females across 46 psychological traits, such as aggression, math ability, self-esteem, sexuality, and verbal skills. These researchers concluded from evidence available at the time that males and females are very similar [very different] on most psychological traits. In an updated study, psychologists in 2015 analyzed the difference between males and females across 106 psychological traits. This study examined the same 46 traits analyzed previously and 60 new traits, such as cooperation, impulsivity, language use, and interests. On average, the difference between males and females across the 106 psychological traits was small [large]. Further, the difference between males and females for most of the 106 traits was either small or very small [large or very large]. In sum, existing scientific findings provide compelling support for the argument that the psychology of males and females is very similar [very different].

After reading each abstract, which were presented in a counter-balanced order, participants responded to 3 comprehension checks. Participants who failed one or more of the comprehension checks were excluded from data analyses. Next, participants completed the critical dependent measure which asked them to identify the abstract that best represented their personal beliefs ("Which of the two abstracts is more consistent with your personal beliefs?"). Then, participants filled out the same hostile (α = .85) and benevolent sexism (α = .76) measures used in Study 1 as well as relevant demographic measures. Finally, participants were debriefed and compensated for their participation.

Results

There was no significant effect of abstract order on any of the following analyses, and thus we collapsed across this factor. Zero-order correlations among variables are presented in Table 1. First, we examined participant's selection of which abstract was more consistent with their personal beliefs. These analyses showed that 52 % of participants selected the small

differences abstract and 48 % of participants selected the large differences abstract, reflecting an accuracy rate that was not significantly better than chance (50 %; binomial $p = .51$). Thus, our sample of Internet respondents was almost evenly split between participants who endorsed large gender differences and those who endorsed small gender differences on psychological variables.

Next, we conducted a logistic regression analysis on abstract selection (1 = participant selected the large differences abstract, 0 = participant selected the small differences abstract) with gender, hostile sexism (centered), and benevolent sexism (centered) entered at step 1, all two-way interactions entered at step 2, and the three-way interaction between predictors entered at step 3 (see Table 4). All predictors were statistically significant at step 1. Specifically, the more strongly participants endorsed hostile or benevolent sexism, the more likely they were to select the fabricated, large differences abstract as consistent with their personal beliefs. Additionally, women (50.4 %) were significantly more likely to select the fabricated, large differences abstract as consistent with their personal beliefs than were men (44.2 %). No other significant effects were obtained from this model.

Discussion

Consistent with our first study, Study 2 found that the more strongly participants endorsed sexist ideologies, the more likely they were to select the fabricated, large gender differences abstract as consistent with their personal beliefs. Furthermore, women were significantly more likely than men to select the fabricated, large gender differences abstract as consistent with their personal beliefs, after adjusting for sexism. Finally, unlike Study 1, the relation between benevolent sexism and perceived gender differences was not significantly moderated by gender. In short, Study 2 provides converging evidence for an association between sexist attitudes and the belief that psychological gender differences are relatively large. Of importance, Study 2 demonstrated that the more strongly people endorse sexism the more likely they are to have *exaggerated* (i.e., empirically unsupported) beliefs regarding the size of psychological gender differences. In other words, endorsement of sexism is associated with the belief that psychological gender differences are typically large when empirical data suggest that these differences are typically small.

Study 3

Studies 1 and 2 provide converging evidence suggesting that hostile and benevolent sexism are associated with the notion that males and females are, psychologically speaking, highly different. The direction of these effects, however, remains unclear. We have proposed that beliefs regarding the size of gender differences are malleable and can be affected by situational cues that suggest males and females are fundamentally different (e.g., media depictions stating that *Men are from Mars and Women are From Venus*; Gray 1992). Going further, we argue that shifting people's beliefs regarding the size of gender differences should result in corresponding shifts in sexism. In Study 3, therefore, we used an experimental paradigm to explore whether situational cues that increase the perceived size of gender differences also increase the tendency to espouse sexist attitudes.

Method

Participants

Initial participants were 149 American adults who were recruited via mTurk in exchange for a small payment. We excluded data from 10 participants (6.7 % of the sample) who incorrectly answered one or more attention checks, 11 participants (7.4 % of the sample) who did not comply with essay writing instructions, and 2 participants (1.3 % of the sample) who did not provide gender information, yielding a final sample of 126 U.S. participants: 59 (47 %) women, 103 (82 %)

Table 4 Regression model for selection of the large versus small differences abstract in study 2

	R^2	*B (SE)*	*Wald*	*p*-value
Step 1	.17			
Gender (1 = female, 0 = male)		.76 (.31)	5.99	.01
Hostile sexism		.69 (.17)	15.99	< .001
Benevolent sexism		.52 (.17)	9.85	.002
Step 2	.17			
Gender × Hostile sexism		.005 (.35)	.00	.99
Gender × Benevolent sexism		.54 (.34)	2.54	.11
Step 3	.18			
Gender × Hostile × Benevolent sexism		−.03 (.11)	.07	.79

Caucasian, M_{age} = 33.3 (*SD* = 9.5, range = 21—64). Of the female participants, there were 4 (7 %) African Americans, 1 (2 %) Asian Americans, 50 (85 %) Caucasians, 3 (5 %) Hispanic Americans, and 1 (2 %) woman of a different race/ethnicity. Of the 67 male participants, there was 1 (1 %) African American, 7 (10 %) Asian Americans, 53 (79 %) Caucasians, 5 (7 %) Hispanic Americans, and 1 (1 %) man of a different race/ethnicity.

Procedure

After providing consent, participants were randomly assigned to one of three essay writing conditions. In the *gender differences condition* (n = 42), participants read a fabricated news report which argued that gender differences have been found to be extremely large across many psychological domains including intelligence, math and verbal abilities, personality, aggression, and sexuality (see online Supplemental Materials A). After completing comprehension checks, participants wrote for 5 min about why psychological gender differences are typically large using examples from their own life. This writing exercise has been used in past research to enhance agreement with a variety of persuasive arguments (e.g., Anderson and Kellam 1992). In the *gender similarities condition* (n = 36), participants read a fabricated news report which argued that gender differences have been found to be extremely small across many psychological domains (see online Supplemental Materials B), completed comprehension checks, and wrote for 5 min about why psychological gender differences are typically small using examples from their own life. In a *control condition* (n = 48), participants wrote for 5 min about what they had done in the previous day.

Following the writing task, participants completed 2 items measuring the perceived size of psychological gender differences (*In your opinion, how different are males and females on psychological variables? How would you rate the size of psychological gender differences?*) using 1 (*extremely similar/small*) to 5 (*extremely different/large*) scales. Responses on these items were highly correlated (r = .91) and therefore aggregated to create one index of perceived gender differences. Next, participants filled out the same measures of hostile (α = .89) and benevolent sexism (α = .73) used in Studies 1 and 2, which in Study 3 served as the critical dependent measures. Finally, participants completed relevant demographic measures, were debriefed, and were compensated for their participation.

Results

Primary Analyses

First, we conducted a one-way ANOVA to examine whether the essay writing manipulation significantly influenced perceived gender differences. This analysis yielded a significant omnibus effect, $F(2, 123) = 39.26$, $p < .001$, $\eta_p^2 = .39$. Planned comparisons showed that participants in the gender differences condition (M = 3.73, SD = 1.05) perceived psychological gender differences to be significantly larger than participants in the control condition (M = 2.89, SD = 1.01), $t(125) = 4.12$, $p < .001$, d = .82, and the gender similarities condition (M = 1.78, SD = .80), $t(125) = 8.86$, $p < .001$, d = 2.09. Further, participants in the control condition perceived psychological gender differences to be significantly larger than participants in the gender similarities condition, $t(125) = 5.19$, $p < .001$, d = 1.22. Parallel analyses, however, showed that the essay writing condition did not have a significant omnibus effect on either hostile sexism or benevolent sexism, $Fs < .30$, $ps > .75$.

As in Studies 1 and 2, perceived gender differences were significantly associated with hostile and benevolent sexism, such that the more strongly participants endorsed sexist attitudes the larger they perceived gender differences to be (see Tables 1 and 2). Given the strong effect of the essay writing condition on perceived gender differences, as well as the robust connection between perceived gender differences and sexism, we thought it possible that the essay writing condition had a significant indirect effect on sexism through perceived gender differences. Indeed, modern statistical approaches recognize that a significant indirect effect can be obtained even in the absence of a total effect (Shrout and Bolger 2002; Woody 2011; Zhao et al. 2010).

Mediation Analyses

We conducted bootstrapped mediation analyses with 1000 samples to explore the possibility of an indirect effect (Hayes 2013). Essay writing condition was coded as +1 (*large differences*), 0 (*control*), and −1 (*small differences*). These mediation analyses yielded a significant indirect effect of essay writing condition via perceived gender differences on hostile sexism (B = .57, SE = .12, 95 % CI = .35, .83, β = .42) and benevolent sexism (B = .34, SE = .09, 95 % CI = .19, .57, β = .29) as demonstrated by confidence intervals that did not include 0. In other words, participants who wrote about why gender differences are large versus small perceived gender differences to be significantly larger, and the more participants perceived gender differences to be large the more they espoused hostile and benevolent sexism. Importantly, the reverse mediation paths, whereby the essay writing condition might have an indirect effect on perceived gender differences through hostile sexism (95 % CI = −.07, .15, β = .03) or benevolent sexism (95 % CI = −.11, .06, β = −.01) were not statistically significant. These data rule out the possibility of a reverse causal pathway, whereby increasing sexism increases the perceived size of gender differences, and therefore provide additional evidence in favor of the causal pathway that we

propose, namely, that increasing the perceived size of gender differences increases sexism.

The lack of significant total effect alongside a significant indirect effect is consistent with what prior scholars have referred to as *competitive mediation* (Zhao et al. 2010). A total effect is the sum of the direct effect and any indirect effects. In some contexts, these direct and indirect effects are all in the same direction. In other cases, these effects may be in opposite directions and compete with each other when summed, potentially resulting in a non-significant total effect. The lack of a significant total effect of the essay writing manipulation on hostile and benevolent sexism alongside a significant indirect effect of the manipulation through perceived gender differences, indicates that either the direct effect is in the opposite direction or that there are indirect effects in the opposite direction that are not accounted for by this model.

Additional analyses were conducted to identify competing mediation paths. Counter to the positive, indirect effect of essay writing condition on sexism that is consistent with our theoretical framework, there was also an unanticipated negative direct effect of essay writing condition on hostile sexism ($B = -.48$, $SE = .13$, $p < .001$, $\beta = -.35$) and benevolent sexism ($B = -.37$, $SE = .13$, $p = .004$, $\beta = -.32$). In other words, writing about why gender differences are large reduced sexism after adjusting for perceived gender differences. Reactance theory (Brehm 1966; Brehm and Brehm 1981), which argues that people sometimes react to pressures to change their attitudes by clinging more strongly to their initial viewpoints, provides one explanation for the negative direct effect of essay writing condition on sexism. Specifically, among participants who showed relatively strong endorsement of sexism, writing about why gender differences are small may have lead to reactance and even stronger endorsement of sexism. Conversely, among participants who showed relatively weak endorsement of sexism, writing about why gender differences are large may have lead to reactance and even weaker endorsement of sexism.

Supplemental Analyses

The effect of essay writing condition on the perceived size of psychological gender differences was not significantly moderated by gender, $p > .71$. Additionally, the indirect effect of essay writing condition on hostile sexism (95 % CI women = .16, .81; 95 % CI men = .42, .98) and benevolent sexism (95 % CI women = .16, .66; 95 % CI men = .08, .59) through perceived gender differences was statistically significant in both women and men.

Discussion

As in Studies 1 and 2, Study 3 provided further evidence for a link between sexism and the perceived size of psychological gender differences. Going further, Study 3 demonstrated that beliefs regarding the size of gender differences are malleable, and that shifting such beliefs predicts corresponding shifts in hostile and benevolent sexism. Thus, although strong causal claims cannot be made given the lack of a total effect, Study 3 suggests that exposure to persuasive messages that espouse large psychological gender differences may increase differentiation between genders, which predicts increases in sexism.

General Discussion

Thousands of studies have examined the size of psychological gender differences (see Hyde 2014; Zell et al. 2015), yet relatively few studies have examined people's perceptions of the size of gender differences despite the critical importance such perceptions have for everyday decisions and behavior. Addressing this gap, the current research explored whether the more strongly people endorse sexism, the more likely they are to exaggerate the size of psychological gender differences. Consistent with predictions, Study 1 showed that the more strongly women endorsed benevolent sexism and the more strongly both men and women endorsed hostile sexism, the larger they perceived gender differences to be. Furthermore, Study 2 showed that the more strongly people endorsed hostile or benevolent sexism, the more likely they were to exaggerate the size of gender differences. Finally, Study 3 showed that increasing (decreasing) the perceived size of gender differences predicted corresponding increases (decreases) in sexism. In sum, although past work indicates that people may not generally overestimate the size of psychological gender differences (see Jussim 2012; Jussim et al. 2009), the current research suggests that the more strongly people endorse sexism the more likely they are to exaggerate gender differences and therefore highlights the importance of individual differences in this line of inquiry.

Two other findings are noteworthy. First, in Studies 1 and 2, women perceived gender differences to be larger than men, after adjusting for sexism. Thus, although past work found that men perceive greater distance between genders on traits strongly related to masculinity and femininity (Bosson and Michniewicz 2013), the current research indicates that women may perceive greater distance between genders when examining a broader range of traits. The tendency for women to perceive larger gender differences than men across traits may be a result of women's stronger favoritism toward their gender group (Rudman and Goodwin 2004) and greater experience with gender discrimination (Schmitt et al. 2014), which could lead women to identify more strongly with their gender and view gender as a more potent predictor of life outcomes than men.

Second, the supplemental analyses of Study 1 showed that overall, participants had only moderate accuracy in their

knowledge of which psychological gender differences are relatively large versus which are relatively small. This result conflicts with a prior study which found that participants had strong accuracy in beliefs regarding the magnitude of gender differences (Hall and Carter 1999). However, we caution against a direct comparison of the size of accuracy effects across studies given the numerous methodological differences between them, such as differences in the psychological traits examined, rating scales/anchors used, and populations studied. Moreover, it is important to note that accuracy results obtained in the current research are compatible with the low to moderate accuracy levels observed in other social perception domains (see Nater and Zell 2015), such as accuracy of perceived intelligence (Murphy et al. 2003), emotions (Hall and Schmid Mast 2007), personality (Connelly and Ones 2010), preferences (North et al. 2012), physical pain (Ruben and Hall 2013), and racism (Richeson and Shelton 2005). Finally, whereas Hall and Carter (1999) obtained a negative relation between benevolent sexism and accuracy of gender perceptions in women, Study 1 obtained this effect in both women and men.

Limitations and Future Research Directions

The present findings have important implications for ambivalent sexism theory (Glick and Fiske 1996, 2012), which argues that gender differentiation is associated with and may ultimately contribute to sexist ideologies. To our knowledge, the present studies are among the first to empirically test these hypotheses, and in doing so, provide strong support for the predicted connection between sexism and gender differentiation in broad judgments (Study 2) and in specific judgments across 48 psychological traits (Study 1). Additionally, data obtained in Study 3 suggest that temporarily activating gender differentiation beliefs increases perceived gender differences, which is related to increased sexism. However, the correlational nature of Studies 1 and 2 and the lack of a total effect in Study 3 leave open the possibility of the reverse causal effect (sexism increases perceived gender differences) or a bi-directional association between these variables. Importantly, Study 3 provided evidence against the reverse causal pathway, but additional research is still needed to determine whether perceived gender differences serve as a cause or consequence of hostile and benevolent sexism. Moreover, future research should administer the entire 22-item ambivalent sexism inventory (Glick and Fiske 1996) to ensure that the obtained pattern of results holds when more robust measures are used.

More broadly, the present findings also support early conceptualizations of prejudice as biased beliefs (Allport 1954). Along these lines, Study 2 results suggest that the more strongly people endorse sexism the more likely they are to espouse exaggerated, empirically unsupported beliefs regarding psychological gender differences. These results align with relevant theories arguing that some people overestimate differences between ingroups and outgroups (e.g., males and females; Tajfel 1981). Future research is needed to examine whether parallel results obtain in other domains of prejudice such as racism and homophobia. For example, future work could test whether the more strongly people endorse racism, the more likely they are to perceive ethnic differences as relatively large and to exaggerate differences between ethnic groups, as would be predicted by social identity theories.

Admittedly, perceived differences between groups may be only one component of prejudice alongside many other contributors, such as competition over limited resources, the fear that outgroups may pose a safety threat to the ingroup, and a general desire to prevent subordinate groups from challenging the dominance and superior status afforded to one's ingroup (see Whitley and Kite 2010). Indeed, a key component of hostile sexism is the fear that women seek to dominate and control men (Glick and Fiske 2011, 2012; Lee et al. 2010). Future research and theoretical development is needed to examine the interplay of perceived differences between groups and other known contributors to prejudice in producing discriminatory behavior.

Practice Implications

In addition to these theoretical implications, the present findings may have important practical consequences. Specifically, in response to recent calls for methods to reduce sexism (Becker et al. 2014; Lee et al. 2010), the findings of Study 3 suggest that exposure to a brief scientific article espousing small gender differences predicts reductions in the perceived size of gender differences, which may then decrease sexism. To be sure, careful intervention studies where people are exposed to a lengthier information campaign and where sexism is measured over an extended period of time are necessary before strong conclusions can be made about the viability of sexism interventions. Nonetheless, the present research provides a promising avenue for future intervention research—using news reports to calibrate exaggerated gender beliefs may predict reductions in hostile and benevolent sexism (see also, Brescoll and LaFrance 2004). Additionally, the present findings suggest that misguided news reports that highlight presumably large psychological gender differences triggers gender differentiation, which may lead to increased sexism. Future studies should examine whether divergent portrayals of males and females through other media, such as movies and video games, increase the perceived size of gender differences and whether such perceptions reinforce sexist attitudes (see Stermer and Burkley 2012).

Moreover, the present studies add to a growing body of scholarship on the practical consequences of biased gender

beliefs. Whereas past work found that biased beliefs regarding gender differences in abilities affect math performance (Nguyen and Ryan 2008; Spencer et al. 1999), interest in science (Ehrlinger and Dunning 2003), and admissions decisions (Leslie et al. 2015), the current research indicates that biased beliefs regarding gender differences may reflect sexist ideologies. These converging findings suggest that exaggerated gender beliefs may perpetuate gender inequalities. Career counselors and other practitioners might consider providing people with accurate gender information (e.g., brief news reports that accurately summarize research on the psychology of gender) to offset the potentially harmful effects of exaggerated gender beliefs. However, the negative direct effect of reading and writing about why gender differences are large on sexism in Study 3, that countered the positive indirect effect, suggests that more work is needed to understand the complex consequences of exposure to gender messages before such strategies are broadly implemented.

Conclusions

Beliefs about psychological gender differences vary widely, with some people perceiving males and females as highly different (*men are from Mars and women are from Venus*) and others perceiving males and females as highly similar (*men and women are from Earth*). The current research indicates that the tendency to perceive males and females as highly different is significantly associated with hostile and benevolent sexism. Further, the current research indicates that decreasing the perceived size of gender differences through persuasive appeals predicts corresponding decreases in sexism. Thus, the present findings support prior theories arguing that differentiation between genders is a hallmark feature of sexism, but also suggest that targeting exaggerated beliefs regarding gender differences may temporarily reduce gender differentiation, which predicts reduced sexism. Future study should continue to study the nature and consequences of beliefs regarding the size of psychological gender differences.

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Appendix

Table 5 List of traits used to assess perceived gender differences in study 1

Trait	*d*
Are physically aggressive toward their spouse	.05
Are risk seeking	.13
Develop a mature personality at an early age	.22
Like personal space	.05
Are stressed out	.12
Like to disclose information about themselves to other people	.18
Are easily influenced by other people	.16
Are helpful	.07
Tend to emerge as the leader of a group	.30
Place high value on physical attractiveness in dating	.53
Are satisfied with their body	.37
Have close bonds with their peers	.51
Expect a lot from their friends	.17
Tend to compromise	.10
Think they have high academic ability	.08
Perform well on verbal tests	.14
Have favorable attitudes toward math	.18
Tend to think about their problems	.24
Have favorable attitudes toward homosexuals	.23
Have high self-esteem	.20
Smile a lot	.38
Think that other people want to have sex with them	.30
Perform well on math tests	.05
Are confident in their physical abilities	.40
Are forgiving	.28
Are easily aroused by pornography	.31
Seek help for psychological problems	.34
Believe that the world is a just and fair place	.12
Experience fear when watching horror movies	.41
Are energetic in the morning	.10
Feel pain easily	.56
Perform well in the workplace	.10
Label inappropriate behavior as sexual harassment	.30
Become jealous when their spouse cheats	.10
Tend to have nightmares	.22
Are good at resisting temptation	.11
Are verbally aggressive toward their spouse	.25
Are good at negotiation	.09
Are interested in working with other people	.49
Think that they are intelligent	.35
Are good at reading other people's emotions	.19
Have a feminine personality	.73
Cope well with traumatic events	.27
Perform well on spatial ability tests	.37
Are good at remembering the location of objects	.25
Have favorable attitudes toward science	.20
Have favorable attitudes toward computers	.23
Sometimes cheat in school	.26

d values are absolute effect sizes, which reflect the magnitude of the difference between males and females in each domain, as reported by prior meta-analyses (see Zell et al. 2015)

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