

The Effect of Priming Gender Roles on Women's Implicit Gender Beliefs and Career Aspirations

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Abstract. We investigated the effect of priming gender roles on women's implicit gender stereotypes, implicit leadership self-concept, and interest in masculine and feminine careers. Women primed with traditional gender roles (e.g., a male surgeon and a female nurse) showed increased automatic gender stereotypes relative to controls; this effect mediated their reduced interest in masculine occupations. By contrast, exposure to nontraditional roles (e.g., a female surgeon and a male nurse) decreased women's leadership self-concept and lowered their interest in masculine occupations, suggesting that female vanguards (i.e., successful women in male-dominated careers) can provoke upward comparison threat, rather than inspire self-empowerment. Thus, priming either traditional or nontraditional gender roles can threaten progress toward gender equality, albeit through different mechanisms (stereotypes or self-concept, respectively).

Keywords: implicit gender stereotypes, implicit self-concept, priming effects, the Implicit Association Test

The second wave of the Women's Movement dramatically changed American women's lives, but the benefits can be characterized as precarious rather than guaranteed. On the one hand, a majority of women now participate in the labor force, more women than men attend college, and they obtain approximately half of advanced degrees in law, business, and other high status professions (England, 2006; Valian, 1999). On the other hand, women remain underrepresented in the highest echelons of power, are underpaid for their equal efforts, and are overburdened with domestic responsibilities (England, 2006; Ridgeway, 2006; Valian, 1999). Although attitudes toward women's rights and professional ambitions have undergone a revolution since the 1960s, stereotypes that differentially attribute agentic qualities to men and communal qualities to women are remarkably resistant to change and consistent across cultures (Deaux & LaFrance, 1998; Williams & Best, 1990).

How will this mix of change and stability affect women's future progress? According to social role theory (Eagly, 1987; Eagly, Wood, & Diekmann, 2000), gender stereotypes stem from the traditional roles that men and women have historically occupied (breadwinner vs. homemaker). Thus, women's increasing participation in the workforce should impact gender stereotypes. Consistent with this view, research on dynamic stereotypes (i.e., stereotypes projected into the future) shows that people imagine that women decades from now will be as agentic as men; however, sex differences in communality are projected to remain steadfast (Diekmann & Eagly, 2000; Diekmann, Good-

friend, & Goodwin, 2004). Given that perceptions of agency and communality are tied to high and low status roles, respectively (Conway, Pizzamiglio, & Mount, 1996; Eagly & Steffen, 1984; Hoffman & Hurst, 1990), the dynamic stereotype findings suggest that people expect women to make further inroads into high-status masculine domains, whereas they do not expect men to become occupiers of low-status feminine roles. As a result, women of the future are envisioned to be both agentic, high-earning breadwinners and communal, primary caregivers, whereas men's roles and stereotypes are not expected to change (Diekmann & Eagly, 2000; Diekmann et al., 2004). Finally, people asked to imagine women in the future were favorable toward women's increased agency, but reserved their strongest approval for their stable communal qualities (e.g., nurturant and kind; Diekmann & Goodfriend, 2006). In sum, double standards for agency may relax over time as women are propelled into more powerful roles, but insistence on female nurturance may signal a desire to keep women stoking the home fires even as they blaze a path to glory in public spheres.

Implicit Gender Beliefs

Like other forms of knowledge, stereotypes are part of each individual's cultural heritage; moreover, they are learned early in life, often before people have the ability to override them or reject them (Devine, 1989). As a result, people

form *implicit gender stereotypes*, which automatically associate men and women with stereotypic traits, abilities, and roles, even when they disavow these traditional beliefs (Banaji & Hardin, 1996; Nosek, Banaji, & Greenwald, 2002; Rudman & Goodwin, 2004; Rudman, Greenwald, & McGhee, 2001). Because implicit gender stereotypes are so well learned, they can affect perceptions of others without intent or the conscious realization that they have done so (Greenwald & Banaji, 1995; Rudman & Glick, 2001; Rudman & Kilianski, 2000).

In addition to implicit stereotypes, people possess *implicit self-concepts*, which are evidenced by automatic associations between the self and concepts such as personality traits (e.g., power vs. warmth; Rudman, Greenwald et al., 2001), abilities (e.g., science vs. humanities; Nosek et al., 2002), and roles (e.g., student vs. mother; Devos, Blanco, Rico, & Dunn, 2008). The ability to measure implicit associations relies on reaction time – people’s responses in milliseconds – to gain insight into the way people automatically think. Such *implicit measures* (Fazio & Olson, 2003) have the advantage of avoiding people’s tendency to censor or control “politically incorrect” responses. Moreover, even when people are truthful, they can only report what they *think* they believe, which relies on people’s ability to introspect accurately. In other words, people may not be willing or able to accurately report their stereotypes and self-concept. Implicit measures bypass the “willing and able” problem to provide information that cannot be obtained through self-report (explicit) measures.

The Malleability of Implicit Beliefs

Although implicit associations were once thought to be more stable than explicit beliefs, it has now been established that they are sensitive to priming effects and other situational cues (for reviews, see Blair, 2002, Fazio & Olson, 2003; Gawronski & Bodenhausen, 2006). For example, women who vividly imagined strong, Amazonian women showed decreased automatic associations between male-strong and female-weak, relative to a condition in which they imagined a Caribbean vacation (Blair, Ma, & Lenton, 2001). Similarly, Dasgupta and Asgari (2004) found that priming women with famous female leaders (e.g., Madeline Albright, Ruth Bader Ginsberg) reduced women’s male-leader and female-supporter automatic associations, relative to unprimed controls. Further, priming women with stereotypic television ads exacerbated their implicit female stereotypes (e.g., irrational, emotional, indecisive, weak) on a lexical decision task, which accounted for their reduced enthusiasm for a leadership role (Davies, Spencer, & Steele, 2005). Thus, Davies et al.

showed that implicit gender stereotypes can influence women’s ability to imagine *themselves* as successful in masculine roles.

To date, researchers examining the malleability of implicit associations have predominantly focused on racial stereotypes, not gender beliefs. In fact, a recent meta-analysis of the malleability of implicit gender stereotypes found only six published studies (Lenton, Bruder, & Sedikides, 2008). With respect to modifying women’s implicit self-concept, there is even less extant research. In one study, Haines and Kray (2005) found that women assigned to high power groups showed stronger self-power automatic associations, compared with women assigned to low power groups. In a second study, they found that women who were designated leaders of a group (and who controlled their peers’ outcomes) showed greater automatic association between self and masculinity, compared with their subordinate peers.¹ However, the effect of modifying the implicit self-concept on women’s subsequent decisions (e.g., career aspirations) has yet to be examined. Moreover, few studies have tested whether modifying implicit stereotypes influences women’s subsequent decisions (for an exception, see Davies et al., 2005). Thus, there is a clear need for more research targeting the consequences of modifying women’s implicit associations.

Therefore, the principal aim of the present research was to investigate the effect of priming women with traditional or nontraditional gender roles on their automatic power-warmth stereotypes (implicit associations shown to be robust for both genders; Rudman, Greenwald et al., 2001), and their implicit leadership self-concept. In addition, we assessed women’s interest in both masculine and feminine occupations as a means of investigating the consequences of modifying automatic gender stereotypes and self-concept. Past research suggests that women who possess implicit gender stereotypes are less likely to believe they can succeed as a leader (Dasgupta & Asgari, 2004) and they report low interest in graduate work in mathematics (Keifer & Sekaquaptewa, 2007a; for related findings, see Davies, Spencer, Quinn, & Gerhardstein, 2002; Keifer & Sekaquaptewa, 2007b; Nosek et al., 2002). But to date, the literature has focused mainly on math-related outcomes rather than broader interest in traditionally masculine occupations. It has also centered more on stereotypes than self-concept, and comparing the two as predictors of career aspirations would be helpful. If researchers are interested in empowering women to occupy male-dominated domains, including leadership roles, then it is important to determine whether targeting implicit stereotypes or self-concept (or both) would be most effective.

¹ The fact that only two studies have examined the malleability of women’s implicit self-concept is not meant to overlook the evidence that men’s implicit leadership self-concept can be modified (by threatening them with a subordinate role; McCall & Dasgupta, 2007) or that implicit self-esteem is malleable for both genders (e.g., Rudman, Dohn, & Fairchild, 2007; for a review, see Gawronski & Bodenhausen, 2006).

Assimilation Versus Contrast Effects

As described above, past research has shown assimilation effects of primes on women's implicit gender stereotypes, with traditional primes (sexist ads) increasing negative female stereotypes (Davies et al., 2005) and nontraditional primes (famous women leaders) decreasing male-leader stereotypes (Dasgupta & Asgari, 2004). As a result, we predicted that traditional primes (e.g., a male surgeon and a female nurse) would increase implicit gender stereotypes and possibly decrease implicit self-leader concept. Further, in the sole investigation of the malleability of women's self-concept, participants assigned to a powerful role showed increased self-power associations (Haines & Kray, 2005). Thus, we might also expect assimilation effects on women's implicit associations following exposure to traditional and nontraditional primes. In that event, nontraditional primes (e.g., a female surgeon and a male nurse) would be expected to increase self-leader associations (and possibly decrease implicit gender stereotypes), relative to controls.

However, another interesting possibility is a contrast effect on women's self-concept, such that exposure to successful women in male-dominated occupations might reduce women's self-leader associations. Such a contrast effect is suggested by recent research showing that exposure to a successful female executive decreased women's perceptions of their own competence (Parks-Stamm, Heilman, & Hearn, 2008). Parks-Stamm and colleagues' goal was to illuminate why women are just as likely as men to penalize female vanguards by viewing them as socially unattractive – a phenomenon termed *backlash effects* (Rudman, 1998; see also Heilman, Wallen, Fuchs, & Tamkins, 2004; Phelan, Moss-Racussin, & Rudman, 2008; Rudman & Glick, 1999, 2001; Rudman & Phelan, 2008). The authors suspected that a successful female executive might provoke upward social comparison for women and thus threaten their own perceived competence, rather than inspire admiration (Festinger, 1954). If so, a contrast effect would be revealed (e.g., "I'm not as competent as she is"; see also Dijksterhuis et al., 1998). Parks-Stamm et al. found this contrast effect using explicit measures (i.e., women's self-ratings of skillful, competent, and capable), in support of their hypothesis. Interestingly, the effect was eliminated when women were allowed to administer backlash, suggesting that backlash functions to protect women's own sense of competency. Although men similarly administered backlash, their self-competency was unaffected by the female executive, likely because they did not use her as a standard for comparison (Brown, Novick, Lord, & Richards, 1992).

When targets are self-relevant, social comparison is an automatic process (i.e., engaged in even when not intended; Gilbert, Giesler, & Morris, 1995) and therefore, an implicit measure should be an effective assessment strategy. As noted, implicit measures also have the advantage of disrupting

the ability to control responses, which could weaken the power to find social comparison effects on women's self-competence. We used the Implicit Association Test (IAT) to measure both stereotypes and self-concept because its sensitivity to context effects and predictive utility is well established (Blair, 2002; Greenwald, Poehlman, Uhlmann, & Banaji, 2009), and it is relatively free from social desirability bias and other types of distortion (Banse, Seise, & Zerbes, 2001; Egloff & Schmukle, 2002; Foroni & Mayr, 2005; Kim, 2003).

Overview of the Present Research and Hypotheses

Our primary goal was to ascertain the effects of priming women with traditional or nontraditional gender roles on their power-warmth stereotypes and their leadership self-concept. A control condition used animals as primes. In all conditions, people were told to study the information for a memory test, and they had their memory tested twice (to reinforce the salience of the information). In a departure from Dasgupta and Asgari (2004), we included primes of both genders (crossed on gender roles) because the stereotype IAT is a relative instrument (i.e., men and women are categorized with power and warmth). By presenting both genders in communal and leadership roles, we provided information pertinent to both sets of contrasts in the gender stereotype IAT.

In the traditional (hereafter, typical) priming condition, primes consisted of men who occupied traditionally male roles (e.g., Stanford business school professor, chief transplant surgeon, and business executive), and women who occupied traditionally female roles (e.g., elementary school teacher, nurse, and homemaker). This condition was expected to exacerbate gender stereotypes and reduce women's interest in masculine jobs, relative to controls. Further, we expected implicit gender stereotypes to mediate the effect of the primes on women's interest in masculine jobs. These findings would replicate and extend Davies et al. (2005) research using a different implicit measure, stereotypes, primes, and outcome variables.

In the nontraditional (hereafter, atypical) priming condition, we reversed the gender of the role occupant so that women occupied the traditionally male roles, and men occupied the traditionally female roles. If upward social comparison leads to a self-related contrast effect, exposure to female vanguards should reduce women's implicit leadership self-concept and their interest in masculine jobs, relative to controls. By using multiple female vanguards (as opposed to just one) and relying on the IAT (to obviate edited responses), we provided a stronger test of whether nontraditional, successful women can threaten, rather than inspire, other women (Parks-Stamm et al., 2008).

Finally, it was unclear what to expect regarding the effects of the (1) typical primes on women's leadership self-

		Respond left	Respond right
Block 1	20 trials	POWER	WARMTH
Block 2	20 trials	MALE	FEMALE
Block 3	60 trials	MALE+ POWER	FEMALE + WARMTH
Block 4	20 trials	FEMALE	MALE
Block 5	60 trials	FEMALE + POWER	MALE + WARMTH

Figure 1. Illustration of the power-warmth stereotype IAT. The IAT takes 5 minutes to complete and starts by familiarizing participants with the four categories used in the task. Individual stimuli are randomly presented on a computer screen. In Block 1, participants are asked to respond “left” to power words and “right” to warmth words (e.g., by using the “A” and number pad “5” keys). In Block 2, they respond “left” to male names and “right” to female names. The IAT effect is obtained by comparing response latencies in Block 3 (in which male names and power words are assigned to “left” and female names and warmth words are assigned to “right”), to response latencies in Block 5 (in which female and power are assigned to “left” and male and warmth are assigned to “right”). The order in which these tasks are performed is counterbalanced (i.e., half of the respondents perform Block 5 before Block 3), a procedural factor that has little bearing on results. If the participant responds more rapidly when men and power share a response compared with when female and power share a response (i.e., if they show a positive IAT effect), this indicates implicit power-warmth gender stereotypes.

concept and (2) atypical primes on women’s power-warmth stereotypes because past research has not investigated modifying implicit stereotypes and self-concept in tandem. Thus, although primes have shown assimilation effects on women’s gender stereotypes (Dasgupta & Asgari, 2004; Davies et al., 2005), their effect on self-concept is unknown. And while the painful effect of upward social comparison on self-concept is well established (Brickman & Bulman, 1977; Gilbert et al., 1995), there is no theoretical reason (or evidence) to suggest that it should influence group-based stereotypes. Thus, the present study affords a test of whether implicit stereotypes and self-concept would be independently or similarly affected by the primes, and whether self-related and group-related associations would reflect distinct or correlated dependent variables.

Method

Participants

A student sample ($N = 175$ women; M age = 19) participated in exchange for partial research credit toward their Introductory Psychology requirement. Four women were excluded for failing to follow directions on the IAT (i.e., their error rates exceeded 25%), yielding a sample size of 171. Of these, the majority (89%) reported being White.

Materials and Procedure

Priming Manipulation

Thirty black-and-white photos of White men and women (approximately 30 years old) were pretested ($N = 120$, 75 women), yielding a set of 6 photos of each gender viewed as similar in age and attractiveness. The typical priming

condition presented biographical information that described the targets’ occupation as traditional for their gender. For example, John Kerr was described as a Stanford business school professor, whereas Karen Adams was described as an elementary school teacher. The remaining men were described as chief of transplant surgery at a major hospital, a commercial pilot, a police officer, and a business executive. The remaining women were portrayed as a nurse, a flight attendant, a stay-at-home mom, a social worker, and a hairstylist.

The atypical priming condition consisted of reversing the gender for these same roles, so that the targets’ occupation was nontraditional for their gender. That is, the women occupied the traditionally masculine roles, whereas the men occupied the traditionally feminine roles. See the Appendix for examples of atypical stimuli. Finally, in the control condition, information (with accompanying photos) described 12 animals (e.g., gazelles, pumas, and koalas). For example, gazelles were described as “small but graceful antelopes who live in herds on the grassy plains of Africa.” Participants were allowed to study the information for as long as they liked in preparation for a subsequent memory test.

The Memory Test

The memory test in the typical and atypical conditions required participants to choose which of two names (accompanied by photos) matched the displayed occupation. If participants chose the wrong person, they were provided with error feedback by the computer program. Controls were told to choose which of two animals matched the provided behavioral information (e.g., whether koalas or pumas were known to be nocturnal). The purpose of the memory test was to increase the primes’ salience and familiarity. Analyses showed the expected ceiling effect ($M = 11.64$,

$SD = 1.10$) that did not reliably differ across priming conditions, $F(2, 294) = 2.30, p = .10$.

The Gender Stereotype IAT

The gender-stereotype IAT used “Power” and “Warmth” as the attribute labels, represented by stimuli that were matched on positive valence in prior research (Rudman, Greenwald et al., 2001). The power words were *power, strong, confident, dominant, command, assert, and powerful*. The warm words were *warmth, nurture, caring, gentle, kind, nice, and warm*. Target constructs (“Male” and “Female”) were represented by first names common to each gender (e.g., Mark, David, John; Linda, Susan, Debra). This IAT obliges people to categorize male and female with either power or warmth (see Figure 1). Response latencies (in ms) for performing the incompatible task (Female + Power or Male + Warmth) are subtracted from response latencies for performing the compatible tasks (Male + Power or Female + Warmth), so that high scores reflect implicit stereotyping (i.e., associating male more with power and female more with warmth). To compute the recommended D statistic, we divided the mean differences in latencies by participants’ standard deviation, resulting in an effect size similar to Cohen’s d (Greenwald, Nosek, & Banaji, 2003). Small, medium, and large D scores correspond to .15, .30, and .60, respectively (Nosek, Greenwald, & Banaji, 2007).

The Self-Concept IAT

The self-concept IAT contrasted “Self” (I, me, my, mine, myself) versus “Others” (others, they, them, their, theirs) as the target constructs. It used “Leader” and “Follower” as the attribute labels, and stimuli slightly modified from past research (Haines & Kray, 2005). The leadership words were *leader, bold, confident, successful, assertive, ambitious, and competent*. The follower words were *follower, meek, uncertain, failure, indecisive, confused, and loser*. After computing the D statistic, high scores on this measure indicated association of self with leader more than follower. Both IATs were administered exactly as in prior research (for details, see Rudman, Greenwald et al., 2001). Finally, the correlation between the IATs was negligible, $r(169) = -.09, ns$, and remained weakly negative when examined within each priming condition, suggesting distinct dependent variables.

Job Preferences

Participants indicated their liking for each occupation represented in the two priming conditions (six masculine, six feminine) using scales ranging from 1 (*not at all interested*) to 5 (*very interested*). Reliabilities were acceptable for the

masculine jobs ($\alpha = .69$) and the feminine jobs ($\alpha = .68$). They were therefore averaged within each set to form separate indexes. The two indexes were correlated, $r(169) = .32, p < .05$. Because the IAT is a relative instrument (and it correlates best with relative explicit measures; Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005), a difference score was computed to form the job preference index, such that high scores would reflect greater interest in masculine, compared with feminine, occupations.

Procedure

Participants were recruited for a project ostensibly “concerned with human memory.” They were told that depending on random assignment, they would either learn about people or animals. The experimenter started a computer program that randomly assigned participants to a priming condition. The program presented the primes in random order. After exposure to the primes, participants performed the memory tests. Following this, they performed the self-concept IAT and the gender stereotype IAT (in counterbalanced order, a procedural variable that did not influence results). They then indicated their interest in the 12 masculine and feminine jobs (presented in random order). Participants were subsequently debriefed and compensated.

Results

Effects of the Priming Manipulation

One-way analyses of variance (ANOVAs) tested our predictions. Table 1 shows the means and standard deviations. Results revealed a main effect of priming condition on the stereotype IAT, $F(2, 168) = 3.11, p < .05$. As predicted, women in the typical priming condition scored reliably higher on the power-warmth stereotype than controls, $t(110) = 2.21, p < .05, d = .44$. They also scored marginally higher than women in the atypical prime condition, $t(118) = 1.98, p = .05, d = .36$. Women in the atypical priming condition did not differ from controls, $t(108) < 1.00, ns (d = .08)$.

We also found a main effect for prime on the self-concept IAT, $F(2, 168) = 4.72, p < .01$. Women in the atypical priming condition showed reliably lower scores on the self-concept IAT compared with controls, $t(108) = 3.30, p < .01, d = -.56$, supporting the expected contrast effect (Parks-Stamm et al., 2008). This suggests that female vanguards represent an upward social comparison threat that may reduce, rather than enhance, women’s ability to associate self with leadership, ambition, and success. By contrast, women in the typical priming condition did not differ from controls, $t(110) = 1.51, p = .13, d = -.24$, or from the atypical priming group, $t(118) = 1.56, p = .11 (d = .32)$.

In sum, the typical primes reliably influenced women’s gender stereotypes and career aspirations, but their effect

Table 1. Means and standard deviations as a function of priming condition

Measure	Priming condition					
	Typical		Atypical		Control	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Stereotype IAT	.41 _a	.26	.32 _b	.24	.30 _b	.24
Self-Concept IAT	.64 _a	.37	.53 _b	.36	.72 _a	.35
Job Preference	-.69 _a	1.12	-.94 _a	.89	-.09 _b	1.85
Masculine Jobs	2.34 _a	.81	2.22 _a	.76	2.82 _b	2.91
Feminine Jobs	3.02 _a	1.05	3.16 _a	.89	2.90 _a	1.18

Note. Means not sharing a subscript differ at (at least) the $p = .05$ level. *Ns* for each condition = 61 (typical), 59 (atypical), and 55 (control). IAT effects are shown in *D* statistic form. Small, medium, and large *Ds* correspond to .15, .35, and .60, respectively. Job preference is the difference between interest in masculine and feminine jobs (high score = prefers masculine over feminine jobs).

Table 2. Correlations as a function of priming condition

	Stereotype IAT	Self-Concept IAT	Job Preference	Masculine Jobs
Typical primes				
Job Preference	-.42**	.22 ⁺		
Masculine Jobs	-.26*	.14	.45***	
Feminine Jobs	.27*	-.13	-.72***	.29*
Atypical primes				
Job Preference	-.14	-.52***		
Masculine Jobs	-.16	-.14	.42**	
Feminine Jobs	.11	.45***	-.64***	.43**
Control primes				
Job Preference	-.25 ⁺	.57***		
Masculine Jobs	-.22	.43**	.80***	
Feminine Jobs	.18	-.51***	-.84***	.34*

Note. ⁺ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

on leadership self-concept was weak. By contrast, the atypical primes influenced women's self-leader associations and career aspirations, but their effect on gender stereotypes was negligible.

For the job preference index, a main effect for prime also emerged, $F(2, 168) = 5.91$, $p < .01$. As predicted, women in the typical priming condition scored lower on the job preference index (indicating less interest in masculine than feminine jobs), compared with controls, $t(110) = 2.10$, $p < .05$, $d = -.44$. Further, women in the atypical priming condition also scored lower on this measure, relative to controls, $t(108) = 3.14$, $p < .01$, $d = -.63$. However, women in the gender role priming conditions did not significantly differ, $t(118) = 1.37$, $p = .17$, $d = -.19$. Analyzing the separate components of the job index revealed that, compared with controls, women in the typical priming condition showed less interest on the masculine job index ($d = -.53$), but not on the feminine job index ($d = .11$). Similarly, women in the atypical priming condition showed less interest in masculine jobs ($d = -.67$), but not feminine jobs ($d = .25$), relative to controls. Thus, the effect of the primes was to specifically dampen enthusiasm for masculine-typed jobs, whether gender roles were traditional or nontraditional.

Effects of Implicit Stereotypes and Self-Concept on Job Preferences

Compared with controls, priming gender roles increased women's gender stereotypes (in the typical condition) and decreased leadership self-concept (in the atypical condition), but would the IATs predict women's career aspirations? Table 2 shows the relevant correlations as a function of priming condition.

In the typical priming condition, the power-warmth stereotype IAT negatively covaried with the job preference index, as well as interest in masculine jobs; the correlation with feminine jobs was reliably positive. Thus, in this condition, the predictive power of gender stereotypes was significant, whereas these relationships were in the same direction but nonsignificant for women in the atypical priming condition and for controls. Tests of the difference between correlations were nonsignificant, all z values < 1.65 , *ns*. This suggests that implicit associations linking men to power and women to warmth generally depress interest in masculine jobs.

In the atypical priming condition, the leadership self-concept IAT was negatively linked to the job preference

index (i.e., the higher the leadership self-concept, the greater the interest in feminine rather than masculine jobs). This relationship is clarified by examining the components of the job preference index separately: The self-concept IAT positively predicted interest in feminine jobs but was not significantly related to interest in masculine jobs. Although counterintuitive, the pattern suggests that women high on self-empowerment may gravitate toward feminine jobs as a means of satisfying their ambitions, rather than risk being thwarted in male-dominated domains, in the wake of upward social comparison threat.

This pattern stands in stark contrast to the control condition, in which the self-concept IAT was positively linked to the job preference index and interest in masculine jobs, but negatively linked to interest in feminine jobs. Thus, when unprimed, the leadership self-concept IAT performed as one might expect, predicting a smaller gap in preference for masculine over feminine jobs. In the typical priming condition, the relationship between self-concept and job preferences was also in the expected positive direction, albeit marginally significant.

Tests of whether the correlations between the self-concept IAT and the job preference index differed as a function of priming condition revealed a significant difference between the atypical and typical priming conditions, $z = 4.16$, $p < .001$, and between the atypical priming condition and controls, $z = 6.28$, $p < .001$.

Mediation Analysis

In Davies et al.'s (2005) research, priming women with gender-stereotypical commercials increased their automatic sex stereotypes (using a lexical decision task), which accounted for their lower interest in a leadership role, relative to controls primed with gender-neutral commercials. The present research allowed us to extend this finding using traditional gender roles as primes, the power-warmth IAT as the implicit stereotype measure, and career aspirations as the dependent variable. To do so, variables were converted to z scores and the job preference index was hierarchically regressed on dummy-coded prime conditions (0 = control, 1 = typical) in Step 1, followed by the stereotype IAT in Step 2 (Baron & Kenny, 1986). Results showed that the main effect of prime in Step 1, $\beta = .20$, $p < .05$, was reduced to nonsignificance in Step 2, $\beta = .13$, $p = .15$, whereas the stereotype IAT remained a reliable predictor, $\beta = -.31$, $p = .001$. A Sobel test (one-tailed) indicated successful mediation, $Z = 1.62$, $p = .05$. These results are consistent with the hypothesis that women primed with typical gender roles showed gender-conforming career aspirations because the primes increased their automatic power-warmth stereotypes.²

Discussion

The present research reveals that priming gender roles can influence women's implicit gender stereotypes, self-concept, and career aspirations in (sometimes) surprising ways: Traditional primes yielded increased implicit gender stereotypes and nontraditional primes yielded decreased self-leader associations, and both types of primes resulted in low enthusiasm for masculine occupations. Specifically, extending past research (Davies et al., 2005), exposure to men and women who occupied traditional roles (e.g., a male surgeon and a female nurse) increased women's implicit power-warmth stereotypes and, as a result, reduced their interest in masculine occupations, relative to controls. In fact, mediation analyses suggested that it was because typical gender roles increased automatic gender stereotypes that the primes influenced career aspirations. These findings add much needed evidence that modifying implicit gender stereotypes can have downstream consequences that impact gender equality. Although the primes, the implicit measure, the stereotypes, and the dependent variable deviated from Davies et al.'s (2005) research, remarkably similar effects occurred.

By contrast, nontraditional primes (e.g., a female surgeon and a male nurse) did not influence gender stereotypes. Instead, learning about successful, atypical women decreased women's implicit leadership self-concept, relative to controls. These findings cohere with Parks-Stamm et al. (2008) and further support the hypothesis that female vanguards can threaten women through upward social comparison processes. Moreover, exposure to atypical gender roles significantly decreased women's interest in masculine jobs. Unexpectedly, high scores on the self-concept IAT predicted greater interest in feminine jobs, while having no effect on masculine job interest, but only in the atypical priming condition. This counterintuitive finding suggests that exposure to female vanguards can steer women toward greater interest in female-dominated jobs if they implicitly view themselves as smart and ambitious, perhaps because they feel these domains are those in which they will be most likely to succeed. For example, female vanguards may call to mind the backlash women themselves may expect if they follow a nontraditional path (Rudman & Phelan, 2008); if so, a feminine path to leadership might be more attractive to avoid social rejection.

Finally, the control condition revealed weak evidence that automatic gender stereotypes influence women's career aspirations, but strong evidence for the leadership self-concept IAT as a predictor. Therefore, intervention strategies might best target women's implicit self-empowerment as a means of encouraging them to become female vanguards. How best to achieve that effect requires future re-

² A similar analysis was not possible, substituting the self-concept IAT for the stereotype IAT and the atypical for the typical prime condition, because the influence of the self-concept IAT on job preferences was negative for the atypical prime group, but positive for the control group. This resulted in a missing link between self-concept and job preferences when the two priming conditions were combined.

search. Because exposing women to successful female role models can backfire, discovering how to protect women from upward social comparison threat will be necessary. In Parks-Stamm et al.'s (2008) research, they found that giving women bogus feedback on a management aptitude test (indicating that they, too, could succeed as a manager) eliminated the diminishing effect of a successful, atypical woman on their explicit self-efficacy. Whether this strategy would be effective for buffering women's implicit self-concept is unknown and may be problematic because it requires deception. Nonetheless, it does suggest that self-affirmation might play a role in future interventions. Given that self-affirmation is easily administered without deception (e.g., by having people affirm their values; Steele, 1988), and is an effective threat-protection strategy for implicit self-esteem (Rudman et al., 2007), it may also prove to be a buffer for women's leadership self-concept. Finally, it would be helpful to build on the findings of Haines and Kray (2005), who found that placing women in powerful roles increased their implicit self-leader associations. Whether this effect would translate to their career aspirations is worthy of further investigation, but the present findings for control women suggest that it should.

Limitations and Future Directions

Because the present research investigated women, the effect of the manipulations on men remains to be seen. Past research found that stereotypical commercials increased automatic sex stereotypes for both genders, but only women's subsequent behaviors were influenced (Davies et al., 2002, 2005). However, the commercials Davies and colleagues used did not include men, whereas the primes in the present research did. Because men are not in transition with respect to their roles – at least, not to the extent that women are – men may be less likely to use the male primes as standards for comparison. However, this remains an empirical question; past research suggests that men are also prone to assimilation and contrast effects in the wake of primes (Dijksterhuis et al., 1998).

Future research should also investigate the implications of the present findings for backlash effects. Although Parks-Stamm et al. (2008) found that a successful female executive reduced women's explicit self-competence and evoked backlash, they did not explore whether the blow to self-competence predicted backlash. As a result, it remains to be tested whether diminished self-competence (either implicit or explicit) carries over to backlash effects for women.

Finally, the likelihood that forming relationships with female vanguards will increase women's implicit leadership self-concept should be investigated. Simply learning about successful women is undoubtedly not as inspiring as when they serve as real-life role models (see Dasgupta & Asgari, 2004, Study 2, and Rudman, Ashmore, & Gary, 2001, for the positive effects of real-life role models on

implicit gender and racial stereotypes, respectively). Therefore, the present results should not be misinterpreted as a sign that successful women are generally threatening to young women's implicit leadership self-concept; the opposite effect is expected to occur when they serve as genuine role models – people whom women admire and with whom they can form emotional bonds.

Conclusion

The present research focused on college-aged women who are in the process of deciding on their future careers. They are therefore a critical population for investigators interested in furthering progress toward gender equality. The findings suggest that exposure to traditional women can reduce women's interest in becoming female vanguards, but so can exposure to nontraditional women, reflecting a double threat. Because atypical women reduced, rather than increased, women's self-leader associations, it cannot be assumed that learning about successful women will always inspire them. In other words, "seeing is not always believing" in *oneself*, but can, instead, provoke upward social comparison threat that can lead to contrast, rather than assimilation effects (Dijksterhuis et al., 1998; Parks-Stamm et al., 2008). This pattern should change over time, as women become more established in traditionally masculine domains. At present, mere exposure to female vanguards may threaten young adult women's implicit leadership self-concept, so that finding ways of ameliorating this influence is essential for ensuring women's progress.

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Appendix

Examples of Female and Male Atypical Primes

Female Primes

Karen Adams: After receiving her MBA from Harvard, Karen took a position as an assistant professor at Northwestern University. She is now a tenured professor at Stanford Business School. She is the current editor of the *Journal of Organizational Behavior*. Hobbies: tennis, scuba diving.

Holly Brewer: During her residency at the University of Pittsburgh, Holly specialized in organ transplantation and was subsequently hired to head the Transplant Center at the

University of Minnesota. Hobbies: serving on the Minneapolis City Council.

Susan Anderton: After graduating from United States Air Force Academy, Susan served as an Air Force officer, flying the F-15 fighter jet. She is currently a commercial pilot for Continental. Hobbies: rock-climbing.

Debra Stangor: After graduating from the Police Academy, Debra was assigned to a SWAT team in Columbus, Ohio. Having spent 4 years with the SWAT unit, Debra is looking forward to her upcoming promotion to detective. Hobbies: amateur boxing.

Ellen Nichols: With a degree in business from the University of Texas, Ellen started out as a marketing intern at American Express. After 8 years of hard work and steady promotions, Ellen has risen to the upper ranks of the com-

pany and is currently president of the Global Financial Services division. Hobbies: golf, surfing the Internet.

Male Primes

John Kerr: After receiving a K-6 teaching certificate at the University of Wisconsin, John taught 1st grade for the Madison school system for 4 years, where he won the state "Teacher of the Year" award. He now teaches 2nd grade in Cranbury, New Jersey. Hobbies: acting in local community theater.

Warren Fiske: After spending three years as a Certified Nurse's Assistant, Warren earned his degree in nursing at DePaul University in Chicago. He is currently a registered nurse at Northwestern Memorial Hospital and specializes in home health care. Hobbies: community gardening, Yoga.

Paul Hoffman: Paul is a stay-at-home dad with two chil-

dren. When not chaperoning one of his children's class fieldtrips or leading his son's Boy Scout troop, Paul helps raise funds for the local Red Cross. Hobbies: restoring antique furniture.

James Arnett: After high school, James channeled his love of traveling into a career. He started as a customer service representative for American Airlines and became a flight attendant 3 years later. Based in Dallas, he flies to South America often. Hobbies: volunteer work, collecting souvenirs from his travels.

Daniel Reed: While working toward his B.A. in social work at Arizona State University, Daniel volunteered in a soup kitchen to help feed homeless families. He's now a case manager with Save the Family, a transitional living program for the homeless in Mesa, Arizona. Hobbies: reading, being a volunteer Big Brother.