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Stereotypes About Gender and Science: Women ≠ Scientists

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Abstract

We conducted two studies whose primary goal was to assess the similarity between stereotypes about women and men and stereotypes about successful scientists. In addition, we examined the degree to which scientists, men, and women are seen as agentic or communal. Results revealed greater similarity between stereotypes about men and stereotypes about scientists than between stereotypes about women and scientists. Men and scientists were seen as highly agentic, women as highly communal, and scientists as less communal than either men or women. The higher the proportion of women in a scientific field, the more similar the stereotypes of scientists in that field were to stereotypes about women. Female participants perceived more similarity between women and scientists and judged women to be more agentic than male participants did. The results are consistent with role-congruity and lack-of-fit theories that report incompatibility of female gender stereotypes with stereotypes about high-status occupational roles. The results demonstrate that women are perceived to lack the qualities needed to be successful scientists, which may contribute to discrimination and prejudice against female scientists.

Keywords

stereotyped attitudes, role perception, sex role attitudes, sciences, scientists, human sex differences, adulthood (18 years and older)

There is much good news about the improved status of women in science. More women receive baccalaureate degrees in math- and science-related fields today than in the past (see U.S. National Center for Education Statistics, 2010, Tables 310, 316, 323, and 324). In biology, women's representation (46%) nearly matches men's (U.S. Bureau of Labor Statistics, 2015, Table 11). In spite of this progress, men continue to obtain a higher proportion of undergraduate and graduate degrees in the physical sciences, mathematics, computer science, and engineering than women do (U.S. National Center for Education Statistics, 2010, Tables 297, 300, and 303) and women remain underrepresented in science, technology, engineering, and mathematics (STEM) occupations (Hill, Corbett, & Rose, 2010). Women are especially underrepresented in computer science. The Bureau of Labor Statistics (2015, Table 11), which combines computer science and mathematics into one occupational category, reports that only 26% of computer scientists are women.

Why are so few women in STEM-related fields? In this article, we examine the effect of stereotypes as potential obstacles to women in science. We asked whether people hold stereotypes about scientists, women, and men that show that women possess fewer of the qualities needed to be good scientists.

Math and Science Performance

Some scholars have attributed the relative absence of women from STEM fields to gender differences in math and science ability (e.g., Kimura, 2007; Lubinski & Benbow, 2007; Newcombe, 2007; Wai, Cacchio, Putallaz, & Makel, 2010). Although a recent meta-analysis (Lindberg, Hyde, Petersen, & Linn, 2010) revealed slightly higher overall male performance in math, $d = .05$, this effect was dependent on the age of participants and the design of the test. Moreover, math tests tend to be gender-biased, overpredicting male performance and underpredicting female performance in math (see Halpern, Wai, & Saw, 2005; Spelke, 2005). When examining actual performance in math courses, there is little evidence of male superiority. Girls now receive higher grades than boys

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in high school math and science courses (Shettle et al., 2007), and women and men receive the same grades in college-level science and technology courses (U.S. National Center for Education Statistics, 2012). If female inferiority in math and science test performance contributed to the gender gap in choice of STEM major, there should be some relation between test performance and major (Seymour & Hewitt, 1997). However, the gender gap in interest in STEM is not accounted for by gender differences in standardized math and science test scores. A study tracking mathematically precocious 13-year-old adolescents found that boys were much more likely to pursue STEM fields than girls of similar ability (Benbow, Lubinski, Shea, & Eftekhari-Sanjani, 2000). Among college students, it is men, not women, who report that they avoid science and math due to poor academic performance and the excessive competition in science (Committee on Maximizing the Potential of Women in Academic Science, 2007). Furthermore, controlling for prior performance in math and science increases the gender gap in interest in, and likelihood of, majoring in a STEM field (Xie & Shauman, 2003), which demonstrates that women who perform best in math and science are especially unlikely to pursue degrees in science and math.

The Gender Gap in STEM

Even if there are few actual differences in science or math performance, people may believe that such differences exist or that women do not have the necessary qualities to be good scientists. Research has shown that there is consensus about the traits of men and women. People consider men to possess more agentic characteristics than women do, and people believe women possess more communal characteristics than men do. Specifically, men are considered more leader-like, analytical, competitive, and independent, whereas women are considered to be kinder, warmer, and more understanding and helpful (e.g., Newport, 2001; Williams & Best, 1990).

The purpose of our research is to examine the content of stereotypes about scientists and to assess the extent to which the perceived characteristics of scientists are similar or dissimilar to the perceived characteristics of men and of women. Stereotypes are defined as "beliefs about the characteristics, attributes, and behaviors of members of certain groups" (Hilton & von Hippel, 1996, p. 240). Although over 50 studies have explored the overlap in the content of stereotypes about leaders with the stereotypes about men and about women (for a meta-analytic review, see Koenig, Eagly, Mitchell, & Ristikari, 2011), no study has yet examined, using any measure, the overlap of gender stereotypes with stereotypes about scientists.

Women's Lack of Interest or Role Incongruity With STEM

Why is it important to examine the overlap of stereotypes about scientists with those about men and women? Some scholars contend that the gender gap in STEM may be due in large part to gender differences in career preferences (e.g., Benbow et al., 2000; Ceci, Ginther, Kahn, & Williams, 2014). Studies have shown that women rate communal goals as more important than men do (Diekman, Clark, Johnston, Brown, & Steinberg, 2011), and research also shows that women prefer occupations that allow them to interact with and help other people more than men do (Konrad, Ritchie, Lieb, & Corrigall, 2000). Perhaps prejudice and discrimination against women scientists is not a factor in the gender gap in STEM careers and women merely lack interest in science.

However, if the stereotypes about successful scientists are dissimilar to those about women more than to stereotypes about men, then people might generally view women as deficient in the traits needed to be effective scientists, and this could potentially lead to prejudice toward female scientists and to discrimination against them. Consistent with this reasoning, gender scholars from different disciplines do not attribute discrimination against women to a general animus toward women, but to the degree of incongruity in the perceived traits of women with those called for in various social roles (see Heilman & Haynes, 2008; Koch, D'Mello, & Sacket, 2015; Lee, Fiske, & Glick, 2010; Powell, 2011; Ridgeway & Correll, 2004; Rudman, 2005). This research suggests that it is the content of stereotypes about women and men, and the similarity or difference between gender stereotypes and stereotypes associated with social roles (e.g., scientist), that are central to understanding gender prejudice and discrimination.

If women are thought to possess fewer of the traits associated with successful scientists than men, it would lend credibility to claims that women experience obstacles to advancement in science and that women scientists must overcome resistance and discrimination. A number of studies have revealed discrimination against women scientists. For example, a survey of natural and social science faculty at a large university found that women in natural science fields experienced more sexual harassment, gender discrimination, and sexism than women in the social sciences; the amount of discriminatory treatment was associated with decreased job satisfaction and decreased influence, whereas a more supportive environment was associated with increased productivity (Settles, Cortina, Malley, & Stewart, 2006). Another study examining the peer review scores for postdoctoral fellowships in biomedical research found that women had to be 2.5 times more productive than men to receive the same score (Wennerås & Wold, 1997). And an analysis of publications in a biology journal determined that the acceptance rate for female first-authored manuscripts increased when the journal switched from single- to double-blind review (Budden et al., 2007). Studies have also found that university science faculty were more willing to hire men than women with identical credentials for positions as lab managers (Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012). University faculty in doctoral programs, including those in STEM, were

more willing to meet with graduate students who were White men than with those who were White women or ethnic minorities (Milkman, Akinola, & Chugh, 2012), and students were more likely to hire men than women to work on a math task, even when given evidence of female superiority at math tasks (Reuben, Sapienza, & Zingales, 2014). These findings suggest that the gender gap in STEM fields is not merely due to women's lack of interest in science. It may be that people perceive women to have fewer of the traits needed to be good scientists.

According to role congruity (Eagly, 2004) and lack of fit models of gender bias (Heilman, 1983), incompatibility of gender stereotypes with stereotypes about occupational and other social roles are the basis of prejudice and discrimination against women in those roles. Role incongruity has been used extensively to explain prejudice and discrimination against women in leadership roles (see Eagly & Koenig, 2008; Heilman, 2001). A relative lack of fit between stereotypes associated with women and stereotypes associated with successful leaders and other roles has been linked to gender discrimination in hiring (Koch et al., 2015), a devaluation of women's job performance (Heilman, 2001) and resistance to women's influence and agency (Carli, 2015) and negotiation attempts (Stuhlmacher & Linnabery, 2013). As incongruity between the female gender stereotype and the leadership role increases, the more difficulty women have as negotiators (Mazei et al., 2015) and the more prejudice they experience as leaders (Eagly & Karau, 2002). Applying the same logic to women in STEM fields, if a lack of fit exists between stereotypes about successful scientists and women, this potentially could lead to prejudice and discrimination against female scientists. In the present research, we do not assess discrimination against female scientists, but we do test, for the first time, whether there is role incongruity and lack of fit between women and scientists compared with men and scientists.

The Association of Men With Science

Although researchers studying gender discrimination in science attribute the discrimination to gender stereotypes and role incongruity (Aki, 2012; Vedantam, 2012), there is little research to date on the content of stereotypes about scientists (Aki, 2012) and none on role congruity between STEM fields and women and men. Some evidence suggests, however, that people perceive scientists to be more like men than women. Research using the Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998) indicates that people implicitly associate math (Nosek, Banaji, & Greenwald, 2002; Nosek et al., 2007; Nosek & Smyth, 2011) and science (Kessels, Rau, & Hannover, 2006; Lane, Goh, & Driver-Linn, 2012; Nosek et al., 2007) with men more than with women. Moreover, research has found that liking math (Nosek et al., 2002) and the intention to pursue a STEM major or career was associated with implicit stereotypes associating men with scientists (Lane et al., 2012).

Content analyses of depictions of scientists in secondary school textbooks (Potter & Rosser, 1992; R. R. Powell & Garcia, 1985) or in advertisements in the periodical *Science* (Barbercheck, 2001) have found relatively few images of women. Studies using the Draw-a-Scientist Test, in which participants are simply asked to draw a picture of a scientist, have likewise revealed that drawings more often depict men than women (e.g., Rahm & Charbonneau, 1997; Song & Kim, 1999; Thomas, Henley, & Snell, 2006). The implication from studies on implicit stereotypes and drawings of scientists is that when people think of a scientist, they imagine a man.

The fact that people implicitly associate men with science and spontaneously depict more male scientists than female scientists does not demonstrate that people consider women inadequate as scientists. However, if people believe that the traits of a good scientist are more similar to the traits of men than the traits of women, it would be a direct demonstration that women are perceived as relatively deficient in the qualities needed to be effective scientists. But there is little known about how scientists are perceived.

It is likely that successful scientists are presumed to be highly agentic because success in science, as in other fields, requires persistence, competence, competitiveness, and drive. Career guides for beginning scientists note the importance of communal qualities, such as being able to work well with others, but they emphasize agentic traits over communal ones. Such guides attribute success in science primarily to such characteristics as intelligence, hard work, rigor, persistence, motivation to achieve, assertiveness, and the ability to solve problems (e.g., Bloomfield & El-Fakahany, 2008; Jansen, 2011; Loehe, 2009; Rosei & Johnston, 2006). Researchers have explored the extent to which careers fulfill agentic or communal goals (Diekman, Brown, Johnston, & Clark, 2010). Participants perceived STEM careers as fulfilling agentic goals more than feminine stereotypic careers would, but less than masculine careers would; participants also perceived STEM careers to fulfill communal goals less than either stereotypical masculine or feminine careers would. Priming participants to think about communal goals undermined attraction to STEM-related careers, whereas exposing participants to a description of a communal scientist enhanced their attraction to careers in STEM (Diekman et al., 2011). Although these studies have not examined what people think scientists are like, or if women are suited to be good scientists, they suggest that the role of scientist may be seen as highly agentic but not very communal. One goal in the current research was to empirically test whether people's stereotypes about successful scientists are more similar to stereotypes about men than those about women, demonstrating role incongruity between women and STEM.

Measuring Role Incongruity

The most commonly used and well-established method for assessing gender bias against female leaders is the think

manager-think male paradigm (see Koenig et al., 2011), developed by Schein (1973). Participants rate women, men, or successful leaders on the Schein Descriptive Index, which includes 92 traits. Intraclass correlations are then computed to assess the overlap in perceptions of the traits of successful leaders with men and with women. Results of studies using the Schein Index reveal that the traits of average men are seen as more similar to a successful leader than are the traits of average women, demonstrating that people do not believe that women have the qualities needed to be good leaders, but men do.

In the present research, we computed intraclass correlations using items from the Schein Descriptive Index to test the similarity of stereotypes about women and about men, with those about successful scientists. Because the characteristics in the 92-item Schein Descriptive Index (Schein, 1973) were designed to reflect stereotypes about successful managers and leaders, we modified the items to better reflect perceptions of successful scientists and those in STEM fields. The items *technically skilled*, *mathematical, knowledgeable about science*, *critical*, *need for recognition,* and *risk-taking* were added, along with *artistic*, which was included as a characteristic that would contrast with being scientific. The item *forceful* was changed to *dominant* and *selfish* was changed to *self-absorbed* to be more appropriate to STEM career-related traits. Because the item *not conceited about appearance* seemed very similar to *interested in own appearance*, the former item was changed to *not concerned about physical appearance*. The item *warm* was also added as a communal characteristic commonly associated with women but not reflected in the other items in the Schein Descriptive Index. To keep the total number of items comparable to the items used in previous research, we eliminated several items that we believed did not capture perceptions of scientists: *skilled in business matters*, *value pleasant surroundings*, *need for monetary reward*, *exhibitionist, vulgar,* and *quarrelsome* were omitted, along with *speedy recovery from emotional disturbance* because it was similar to another item on the Index: *emotionally stable*. The total number of items on our list of traits was 93.

Schein's think manager-think male paradigm tests the similarity of stereotypes about successful leaders with those about women and men, but it does not examine the content of those stereotypes or whether any greater overlap in stereotypes about men with those about scientists may be due to the perception that scientists, like men, are perceived as highly agentic but not very communal, whereas women are perceived as highly communal but not very agentic. Indeed, no one has previously tested whether the items in the Schein Index reflect agentic or communal qualities. To determine whether perceptions of scientists, men, and women vary in agency and communion, we conducted an exploratory pretest of each of the 93 traits. We classified the traits according to ratings of agency and communion and then compared participants' perceptions of scientists, men, and women on the classified traits. Our goal was not to create new measures of agency and communion, but to establish whether the amount of overlap in perceptions of scientists with those of men and women, as measured by the Schein paradigm, may be due in part to stereotypes about the agency and communion of women, men, and scientists.

To classify the items in the Schein Index, we applied Wiggins' (1981) taxonomy of agency and communion: In it, agency has two poles, with the high pole, labeled *agency*, reflecting mastery and assertion, and the opposite pole, labeled *passivity*, reflecting weakness and failure. Wiggins' model also has two poles for communion, with the high pole, labeled *communion*, reflecting intimacy and solidarity, and the opposite pole, labeled *dissociation*, reflecting hostility and remoteness. We conducted a pretest to classify the 93 traits according to how they were rated on the dimensions of agency, communion, dissociation, and passivity.

To test whether the traits reflected agency, communion, passivity, or dissociation, we followed a classification procedure used in previous research (e.g., Abele, Uchronski, Suitner, & Wojciszke, 2008; Prentice & Carranza, 2002). Participants rate each trait as high or low on a dimension. For example, Prentice and Carranza (2002) asked participants to rate each of 100 traits, indicating whether each trait was desirable (prescriptive) or undesirable (proscriptive) in men and also whether the traits were desirable or undesirable in women. This allowed them to identify four types of traits: prescriptive traits for men, prescriptive traits for women, proscriptive traits for men, and proscriptive traits for women. Following this procedure, we asked our pretest participants to rate our 93 traits, indicating whether each trait was high (agency) or low (passivity) in agency and high (communion) or low (dissociation) in communion.

Pretest

Method

Participants

The sample for the pretest consisted of 94 volunteers recruited online through Mechanical Turk (MTurk), each of whom received 50 cents in monetary compensation for their participation. Fifty-three of the participants identified their gender as female, 40 as male, and 1 as neither designation. The age of the sample ranged from 18 to 68, with a median of 30 years. Participants classified themselves as White non-Latina/non-Hispanic (80%), Latina/Hispanic (7%), Asian (5%), Black (3%), American Indian (2%), and multiracial (2%).

Procedure

Participants were informed that the study involved making judgments about personality traits. Each participant rated the traits, indicating how agentic and how communal each was.

Half of the participants rated the traits associated with agency before they rated the traits associated with communion and half of the participants made their communion ratings first. We presented participants with definitions of agency and communion that have been used in previous research involving categorizing traits as agentic or communal (see Abele et al., 2008). The definition of agency was described as follows:

> In this section, you will be evaluating a list of personality traits, indicating how agentic they are. "Agency" refers to people striving to be independent, to control their environment, and to assert and expand themselves. Agentic individuals are usually competent and capable of high performance and are autonomous and individualistic; they like to lead and to dominate, are aspiring and strive to achieve their goals, even if they have to conquer obstacles. At high levels, agency shows up as a "hunger for power and superiority" and can result in aggressive, arrogant, or domineering behavior. A lack of agency manifests itself in, for instance, laziness, incompetence, inactivity, and apathy.
>
> Please rate how agentic each trait is on a scale ranging from −2 (*negative*) through 0 (*neutral*) to +2 (*positive*). Traits that show high levels of agency (like *powerful* or *accomplished*) should receive positive scores, traits that show low levels (like *weak* or *apathetic*) should receive negative scores, and traits that have nothing to do with agency (like *funny* or *fashionable*) should receive a 0.

The definition of communion was given as follows:

> In this section, you will be evaluating a list of personality traits, indicating how communal they are. "Communion" refers to a person's striving to be part of a community, to establish close relationships with others, and to subordinate individual needs to the needs of other people. Communal individuals are usually empathic, warm, and understanding. They cooperate with and care for others and are moral, fair, and compassionate. In an excessive fashion, communion shows up as dependence on others, as lack of autonomy, and as self-neglect. A lack of communion manifests itself in, for instance, callousness, selfishness, coldness, and unscrupulousness.
>
> Please rate how communal each trait is on a scale ranging from −2 (*negative*) through 0 (*neutral*) to +2 (*positive*). Traits that show high levels of communion (like *likeable* or *supportive*) should receive positive scores, traits that show low levels (like *cruel* or *hardhearted*) should receive negative scores, and traits that have nothing to do with communion (like *relaxed* or *sporty*) should receive a 0.

Results and Discussion

To test whether each characteristic was rated as a high or low amount of communion or agency, single sample *t*-tests were conducted on the raw scores of each of the characteristics. Traits that differed from zero, the neutral point on the scale, were classified as conveying communion or its opposite, dissociation, and agency or its opposite, passivity, depending on the direction of the difference. To create scales that reflected communion, dissociation, agency, or passivity, we eliminated traits that were rated as equally conveying both communion (or dissociation) and agency (or passivity). Dependent *t*-tests were conducted comparing the absolute value of the communal score of each trait with the absolute value of its agentic score. There were 13 characteristics that did not differ in absolute values on communion/dissociation and agency/passivity: *artistic*, *creative, neat, emotionally stable, sophisticated, intuitive, not concerned about physical appearance, aggressive, critical, interested in own appearance,* and *hides emotions*. We also eliminated items that had been used in the definition of communion (i.e., *understanding* and *warm*) or agency (i.e., *assertive, competent, independent*, and *need for power*) for our pretest participants. Differences were obtained for the remaining 74 items. Of these, 17 were rated as conveying communion ($\alpha = .87$) and 5 were rated as conveying dissociation ($\alpha = .82$; see Table 1). Thirty-eight traits were rated as conveying agency ($\alpha = .94$) and 14 were rated as conveying passivity ($\alpha = .90$; see Table 2). These items were used to create scales in two studies. The especially high number of items conveying agency likely occurred because the Schein Index was devised to assess overlap with the traits of leaders.

Study 1

The primary purpose of Study 1 was to test the overlap of stereotypes about scientists and stereotypes about women and about men, following the procedures of the Schein think manager-think male paradigm. Based on past research on implicit gender stereotypes and gender differences in interest in communal goals and science, we predicted, Hypothesis 1, greater overlap (congruity) between the traits of men and scientists than between the traits of women and scientists.

A second objective of this study was to determine whether the gender of the participants would moderate the intraclass correlations between women and scientists. We expected male participants to find less similarity between scientists and women than female participants would. We based these predictions on previous research revealing that men endorse traditional stereotypes more often than women do. For example, in a meta-analysis of the think manager-think male paradigm, the association of female traits with successful management was found to be weaker among men than women (Koenig et al., 2011). Men also hold more traditional attitudes toward women than women do (Twenge, 1997) and are more inclined to justify gender inequality (Jost & Kay, 2005). Male scientists in biology research labs have been reported as less likely to employ female postdocs and graduate students than female scientists were (Sheltzer & Smith, 2014). Based on these findings, we predicted, Hypothesis 2, that the overlap

Table 1. High and Low Communal Traits.

Communion scale	Dissociation scale
Aware of the feelings of others	Bitter
Cheerful	Deceitful
Courteous	Devious
Desires to avoid controversy	Interested in things
Desire for friendship	Self-absorbed
Generous	
Grateful	
Helpful	
Humanitarian	
Kind	
Need for social acceptance	
Need for security	
Sentimental	
Sociable	
Sympathetic	
Tactful	
Talkative	

Table 2. High and Low Agentic Traits.

Agency scale	Passivity scale
Able to separate feelings from ideas	Demure
Adventurous	Easily influenced
Ambitious	Fearful
Analytical ability	Frivolous
Assertive	Hasty
Authoritative	Nervous
Comfort with aggression	Passive
Competitive	Procrastinating
Consistent	Reserved
Curious	Timid
Decisive	Shy
Desires responsibility	Submissive
Direct	Uncertain
Dominant	Wavering
Feelings not easily hurt	
Firm	
Frank	
High self-regard	
Independent	
Industrious	
Intelligent	
Knowledgeable about science	
Knows the ways of the world	
Leadership ability	
Logical	
Mathematical	
Need for achievement	
Need for autonomy	
Need for recognition	
Objective	
Persistent	
Prompt	
Risk-taking	
Self-confident	
Self-reliant	
Steady	
Technically skilled	
Vigorous	
Well-informed	

between the perceptions of women and the perceptions of successful scientists would be smaller for male than for female participants.

Another potential moderator of the intraclass correlations might be the amount of exposure participants have to women scientists. Research has revealed that exposure to female leaders (Asgari, Dasgupta, & Cote, 2010) or scientists (Stout, Dasgupta, Hunsinger, & McManus, 2010) can increase women's identification with leadership or science, respectively. Further, a longitudinal study revealed that increased positive contact with female faculty was associated with more favorable attitudes toward female leadership over time (Dasgupta & Asgari, 2004). Thus, greater contact with female faculty may be associated with a greater overlap in stereotypes about women and leaders.

In general, because there are more female faculty at women's colleges, where women hold 66% of full-time faculty positions (U.S. National Center for Education Statistics IPEDS, 2015), than at coeducational institutions, where women hold 47% of these positions (U.S. National Center for Education Statistics, 2013), we predicted, Hypothesis 3, that women attending women's colleges would see greater similarity between women and scientists than would women attending coeducational institutions. We tested this by including a sample of participants from a women's college, where 52% of STEM faculty are women, a percentage that is higher than the national average of 30% (National Science Foundation, 2013, Tables 9–23) and higher than 18%, the percentage at the coeducational institution (based on the percentages of female faculty in astronomy, biology, chemistry, computer science, and physics) included in this study. Although we expected institution effects on the perception of women and scientists, we did not expect an institution effect on judgments about men and scientists, because previous research on the overlap in stereotypes about men and leadership has shown little variation in perceptions about the similarity of men and leaders across different populations of participants (see Koenig et al., 2011; Schein, 2001).

A final objective of Study 1 was to determine whether the amount of overlap in perception of scientists, men, and women might be due to differences in agency, passivity, communion, and dissociation. We based our four scales on the results from our pretest. Based on previous research on gender stereotyping, for Hypothesis 4, we expected participants to rate women as more communal and less agentic than men or scientists. Given that men resist women's agency more than women do (Carli, 2015), we predicted, Hypothesis 5, that men would rate women as lower in agency than women would rate women.

Method

Participants

The sample consisted of 180 female undergraduates from a small liberal arts single-sex college and 135 (73 female and 61 male) undergraduates from a large private university. Some participants enrolled in exchange for partial fulfillment of psychology research participation requirements. Others were volunteers who were given a choice of candy or money (US$2.00) as compensation. The participants from the women's college ranged in age from 17 to 47, with a median of 19 years. Participants classified themselves as White non-Latina/non-Hispanic (43%), Asian (32%), multiracial (9%), Latina/Hispanic (6%), and Black (5%), with 5% not responding. Of the 73 (41% of the total) students who had declared a major, 33% were majoring in the humanities, 40% in the social sciences, and 27% in the natural sciences or math. Participants from the coeducational university ranged in age from 16 to 26, with a median of 20 and classified themselves as White non-Latina/non-Hispanic (56%), Asian (25%), Black (9%), multiracial (5%), and Latino/Hispanic (3%); 2% did not respond. Of the 120 students who had declared a major, 23% were majoring in the humanities, 45% in the social sciences, and 33% in the natural sciences or math. Because preliminary analyses showed that none of the dependent measures in the study were affected by participants' race/ethnicity or major, the results reported in this study are based on combined samples of participants across race/ethnicity and major.

Procedure

Participants were informed that the study involved giving their impressions of one of several different social groups. They were randomly assigned to one of the three conditions and given a questionnaire asking them to describe the characteristics of an adult man, an adult woman, or a successful scientist. Following the procedure used by Schein (1973), the questionnaire contained the following written instructions:

> On this page, you will find a series of descriptive terms commonly used to characterize people in general. Some of these terms are positive in connotation, others are negative, and some are neither positive nor negative.
>
> Please use the list of terms to describe what you think adult women [adult men, successful scientists] in general are like. In making your judgments, it might be helpful to imagine that you are about to meet someone for the first time and the only information you have in advance is that the person you're meeting is an adult woman [adult man, successful scientist]. Please rate each trait in terms of how characteristic it is of adult women [adult men, successful scientists] in general.

Ratings of each trait were made on a 5-point scale with end points 1 (*not characteristic*) and 5 (*characteristic*). After rating the traits, participants completed demographic information, indicating their major, age, ethnicity, and gender.

Results

Intraclass Correlation Coefficients

Overall effects. Intraclass correlations to assess the absolute agreement (i.e., overlap) of the trait means were computed, measuring the degree of similarity between the descriptions of men and scientists, and between the descriptions of women and scientists. To compute the intraclass correlations, means were first computed for all the traits, separately for each condition, and the means for each trait were then entered as scores on the dependent variable in a two-way (Trait × Condition) randomized blocks analyses of variance (ANOVAs). Each analysis included only those conditions that were being compared (i.e., men vs. scientists or women vs. scientists) as independent variables. Traits were treated as random effects variables and condition was treated as a fixed effects variable (McGraw & Wong, 1996).

As predicted by Hypothesis 1, the intraclass correlations revealed a strong overlap between the traits of men and successful scientists, $r' = .67$, $p < .001$, and no overlap between the traits of women and successful scientists, $r' = .13$, $p = .25$. A contrast comparing the intraclass correlations (see Feldt, Woodruff, & Salih, 1987) for men and scientists with that for women and scientists revealed that men were seen as more similar to scientists than women were, $F(92, 92) = 2.63$, $p < .001$. The intraclass correlations were not fully independent because the same participants rated the scientists for both intraclass correlations. Consequently, these comparisons are conservative underestimates of the differences.

Gender and institution effects. To determine whether the intraclass correlations varied among the three groups of participants, intraclass correlations were computed separately for women at the single-sex college, women at the coeducational university, and men at the coeducational university. Results (see Table 3) showed that, for all three groups of participants, the traits of men overlapped with the traits of scientists and there was no significant overlap between the traits of women and scientists for male or female participants at the coeducational university. The negative intraclass correlation between women and scientists for male participants indicates that the variance between conditions of women and scientists was greater than the variance among the traits generally—that is, men saw more overlap in any randomly selected traits than they saw between women's and scientists' traits. Thus, the intraclass correlation for women and scientists can be considered zero for male participants, showing no overlap.

Among the men, $F(92, 92) = 2.86$, $p < .001$, women at the coed university, $F(92, 92) = 2.16$, $p < .001$, and women at the single-sex college, $F(92, 92) = 2.00$, $p < .001$, the intraclass correlation for men with scientists was larger than the intraclass correlation for women with scientists. However, women

Table 3. Intraclass Correlations Coefficients for Each Participant Group.

	Women in single-sex college	Women in coeducational university	Men in coeducational university
Men and scientists	.68**	.57**	.65**
Women and scientists	$.36^{*}_{a}$	$.07_{b}$	$-.74_{b}$

Note. Asterisks indicate that the intraclass correlation differs significantly from zero; *$p < .05$. **$p < .001$. Intraclass correlations within rows that have different subscripts differ with $p < .05$.

at the single-sex college saw some similarity between women and scientists. Holm–Bonferroni contrasts were conducted to determine whether there were differences between the male participants and the two samples of female participants in their intraclass correlations for men and scientists. No gender differences were found. Directional Holm–Bonferroni contrasts were also conducted for the intraclass correlations for women and scientists. Comparisons between the male participants and the two samples of female participants (using $r' = 0$ for the male participants) revealed partial support of Hypothesis 2: There was no difference between the male and female participants from the coeducational university, but women at the single-sex college more strongly associated successful scientists with women's characteristics than men did, $F(92, 92) = 1.56$, $p < .05$. Finally, in support of Hypothesis 3, women attending the single-sex institution more strongly associated successful scientists with women's characteristics than women at the coeducational institution did, $F(92, 92) = 1.45$, $p < .05$.

Ratings of Women, Men, and Scientists on Agency and Communion

Four scales, created in the pretest, assessed perceived agency, passivity, communion, and dissociation. Two-way ANOVAs (Participant Group × Condition) were conducted on the four scales with participant group (women from a single-sex institution, women from a coed institution, and men from a coed institution) and condition (women, men, and successful scientists) as between-groups independent variables. Results revealed effects of condition for all four scales: agency, $\alpha = .93$, $F(2, 303) = 142.52$, $p < .001$; passivity ($\alpha = .82$), $F(2, 303) = 51.90$, $p < .001$; communion, $\alpha = .90$, $F(2, 304) = 128.26$, $p < .001$; and dissociation, $\alpha = .63$, $F(2, 305) = 12.95$ $p < .001$. Directional Holm–Bonferroni comparisons were conducted on the means to compare the ratings of women with ratings of men and of scientists. Results are shown in Table 4. In support of Hypothesis 4, participants rated women lower on the agency scale and higher on the communion scale than either men or successful scientists. Women were rated as higher in passivity than men or scientists and lower in dissociation than men, but there was no difference in how women and scientists were rated on the dissociation scale. Holm–Bonferroni comparisons were conducted to compare participants' ratings of men and of scientists. Participants rated men lower on the agency and higher on the communion, passivity, and dissociation scales than scientists.

Table 4. Ratings of Women, Men, and Successful Scientists.

Scale	Adult women	Adult men	Successful scientists
Agency scale	3.16_{a}	3.68_{b}	4.05_{c}
Passivity scale	2.99_{a}	2.67_{b}	2.28_{c}
Communion scale	3.83_{a}	3.08_{b}	2.86_{c}
Dissociation scale	2.79_{a}	3.13_{b}	2.69_{a}

Note. Means within rows that do not share a subscript differ with $p < .001$.

The 3 × 3 ANOVA on the agency scale revealed a main effect of participant group, $F(2, 303) = 4.99$, $p < .01$, and an interaction between participant group and condition, $F(4, 303) = 7.01$, $p < .001$. To test Hypothesis 5, a Holm–Bonferroni contrast was performed on ratings of women's agency, comparing the mean for the male participants with the means for the two groups of female participants on the agency scale for women. As predicted, compared with female participants, male participants gave women lower ratings on the agency scale ($M = 3.25$ vs. 2.78, for women and men, respectively), $F(1, 303) = 27.79$, $p < .001$. In addition, the means of the female participants at the single-sex institution were compared to the means of the female participants at the coeducational institution on the agency scale for women. No differences between the groups were found.

Discussion

The results of Study 1 provide evidence that people perceive successful scientists to be more similar in personality characteristics to men than to women. Intraclass correlations were consistently higher for scientists and men than for scientists and women, and this was true among all groups of participants, regardless of gender, major, ethnic background of participant, or institution. On the other hand, there was some effect of participant group on the association of women's characteristics with science. Only women attending a single-sex college saw some similarity between the characteristics of women and scientists. Men and women attending a coeducational institution did not differ in their perception of the similarity between scientists and women. Our prediction that men would be less likely than women to see qualities associated with women as important to science was only

partially supported: Men saw less similarity between characteristics of women and characteristics of scientists than did women from the single-sex college.

The results of Study 1 supported the hypothesis that successful scientists would be perceived as high in agentic qualities, such as competitiveness and risk-taking, and low in passivity-related qualities, such as fearfulness and submissiveness, and low on communal qualities, such as kindness and helpfulness—more so even than how men were perceived to be. Participants perceived women to be lower than both men and scientists in agency and higher in communion and passivity. Prior research shows that STEM careers are considered less likely to fulfill agentic goals than other masculine careers (Diekman et al., 2010), suggesting that scientists may be perceived as less agentic than men in general. However, in the present study, scientists were seen as more agentic than men. Scientists may have been seen as more masculine than feminine, not just because of their lower perceived communion but also because of their high agency and lack of passivity. The only way in which scientists were seen as more similar to women than men is in scientists' lower dissociation, such as deceitfulness and deviousness. Thus, the overall image of successful scientists appears to be one of exaggerated masculinity, but with fewer of the more negative qualities associated with masculinity.

Male participants held more stereotypical impressions of both women and men than female participants did. Compared with their female counterparts, male participants rated women low in agency. These findings are consistent with other research, showing that men have greater resistance to female influence and agency (Carli, 2001, 2004, 2015). Men evaluate women leaders more harshly (Eagly, Makhijani, & Klonsky, 1992), and men are less willing to hire women (Koch et al., 2015). In the current study, women and men shared a view of scientists as highly agentic and low in communion, but women were more inclined to attribute to their own gender a somewhat greater degree of agency, and to perceive a somewhat greater similarity of women to successful scientists.

The results paint a picture of science as less stereotypically compatible with women's characteristics. Still, science refers to a broad range of disciplines, and stereotypes about scientists may well vary across scientific fields. If occupational stereotypes derive from observing men and women enacting occupational roles, as suggested by social role theory (Eagly, 1987), then scientists in disciplines where women are more underrepresented should be perceived as less similar to women than scientists in disciplines where women are more plentiful. In addition, social roles that have been defined in very traditional masculine terms tend to elicit more prejudice against women (Eagly & Karau, 2002). Thus, women may be seen as more similar to scientific fields that are construed as less male-dominated, and women's characteristics are more likely to be seen as typical of successful scientists in these fields. We conducted Study 2 to assess whether role incongruity between scientists and women would be lessened in fields with more women.

Study 2

We designed a second study to explore the perceived similarity of men and women with different types of scientists, four of which fall into traditional STEM fields: biologists, chemists, physicists, and computer scientists. We also included psychologists to reflect an area of science where women predominate. Based on national representative data on employment, women are 72% of psychologists, 46% of biologists, 30% of chemists, 26% of computer scientists, and 21% of physicists (averaged over the last 5 years because the number of physicists is too small to be reliably estimated from sampling within a single year; U.S. Bureau of Labor Statistics, 2015, Table 11). We reasoned that if participants' perceptions of scientists derive from the representation of men and women in each scientific field, then women should be seen as more similar than men to psychologists but less similar than men to the other types of scientists. Nevertheless, the perceived similarity of each scientific field to women should be related to the proportion of women in each field.

When thinking of a scientist, participants are likely to imagine prototypical examples of scientists working in the natural sciences. This is apparent from the Draw-a-Scientist studies; participants often included laboratory equipment and lab coats in their drawings (e.g., Rahm & Charbonneau, 1997; Thomas et al., 2006) and cited such iconic figures as Einstein and Edison as their favorite scientists (Rahm & Charbonneau, 1997; Song & Kim, 1999). However, preliminary research indicates that, when asked for their perceptions of particular types of scientists, participants more often think of less lofty individuals, such as professors they have had in college (Carli, Liano, & Sohn, 2015). As a result, perceptions of different types of scientists are likely to be more idiosyncratic and less idealized. Thus, participants may be likely to perceive greater overlap between women and the different types of scientists than scientists in general, and there should be positive associations between the characteristics of women and those of successful scientists in different fields. It remains likely, however, that all types of successful scientists, regardless of field, would be perceived as relatively high in agency and low in communion, except for psychologists who are likely to be perceived as both highly agentic and highly communal because psychology may be perceived as a helping profession.

We predicted that the intraclass correlation of psychologists and women would be greater than the intraclass correlation of psychologists and men (Hypothesis 6). In addition, we predicted, Hypothesis 7, that the intraclass correlations of biologists, chemists, physicists, and computer scientists with men would be greater than the intraclass correlations of these categories of scientists with women. Based on our results from Study 1, we predicted, Hypothesis 8, that male

participants and female participants from coeducational institutions would have higher intraclass correlations for scientists and men than for scientists and women. We predicted, Hypothesis 9, that women would be perceived as higher in communion and passivity, and lower in agency and dissociation than men and scientists, except for psychologists, and, Hypothesis 10, we predicted that male participants would perceive lower levels of agency in women than female participants would.

Method

Participants

The sample consisted of 294 female undergraduates from a small liberal arts single-sex college and 341 (225 female and 116 male) undergraduates from U.S. coeducational colleges and universities across the United States, who were recruited online and had not participated in the pretest or Study 1. Participants at the single-sex college enrolled in exchange for partial fulfillment of psychology research participation requirements or were given the choice of candy or money (US$2.00) for compensation. Participants recruited online were entered in a lottery to receive one of several monetary prizes (US$50) as compensation. The age of the sample from the women's college ranged from 17 to 25, with a median of 19 years. These participants classified themselves as White non-Latina/non-Hispanic (43%), Asian (36%), multiracial (6%), Latina/Hispanic (9%), and Black (4%), with 1% not responding. Of the 146 students who had declared a major, 24% were majoring in the humanities, 28% in the social sciences, and 47% in the natural sciences or math. The undergraduates from the coeducational universities ranged in age from 17 to 64, with a median of 21 years. These participants classified themselves as White non-Latina/non-Hispanic (57%), Asian (11%), Black (5%), Latino/Hispanic (6%), and multiracial (3%), with 18% not responding. Of the 231 students who had declared a major, 12% were majoring in the humanities, 56% in the social sciences, and 32% in the natural sciences or math. Ratings of seven types of scientists and men and women on the four scales did not interact with the race/ethnicity of participants, so race/ethnicity was not included in subsequent analyses.

Procedure

Participants were informed that the study involved giving their impressions of one of several different social groups. They were randomly assigned to one of the seven conditions and given a questionnaire on which they were asked to describe the characteristics of an adult man, an adult woman, a successful psychologist, a successful biologist, a successful chemist, a successful physicist, or a successful computer scientist. There were some cells with fewer than 10 participants and none of the dependent measures in the study were affected by participants' race/ethnicity. Consequently, the results reported in this study are on combined samples of participants across race/ethnicity and major. The procedure was otherwise identical to that used in Study 1.

Results

Intraclass Correlation Coefficients

Overall effects. The means for each of the characteristics were computed separately for the seven conditions and used to compute the intraclass correlations, just as in Study 1. Intraclass correlations were computed by entering the means for each trait as scores on the dependent variable and conducting a two-way (Characteristic × Condition) randomized blocks ANOVAs on the means. Each analysis included only those conditions that were being compared (i.e., men vs. psychologists, women vs. psychologists, men vs. biologists, etc.) as independent variables. Traits were treated as a random effects variable and condition was treated as a fixed effects variable, as in Study 1.

All the intraclass correlations were significant (see Table 5), revealing overlap between the characteristics of both men and women with each type of successful scientist. To test Hypotheses 6 and 7, directional Holm–Bonferroni contrasts compared the intraclass correlations for women and scientists with those for men and scientists. In support of Hypothesis 6, a comparison of the intraclass correlations for psychologists with women and men revealed that psychologists were perceived as more similar to women than to men, $F(92, 92) = 1.50$, $p < .05$. Hypothesis 7 also was supported. Comparison of the intraclass correlations for each of the other types of scientists with women and men revealed that biologists, $F(92, 92) = 1.91$, $p < .001$; chemists, $F(92, 92) = 2.17$, $p < .001$; physicists, $F(92, 92) = 2.40$, $p < .001$; and computer scientists, $F(92, 92) = 1.62$, $p < .05$, were perceived as more similar to men than to women. A directional Pearson correlation coefficient was computed to test the association of the percentage of women in each scientific field with the intraclass correlations for each type of scientist and women. The higher the percentage of women in a field, the more participants perceived similarity between scientists in that field and women, $r(3) = .89$, $p < .05$. A second Pearson correlation was conducted to test the association of the percentage of men in each scientific field with the intraclass correlations for each type of scientist and men. No association was found.

Gender and institution effects. Using the same procedure as used in Study 1, additional analyses were conducted to determine whether the intraclass correlations varied among the three groups of participants. For these analyses, the means for each of the characteristics were computed averaging across all five types of scientists. Results (see Table 6) revealed that, for all three groups of participants, the characteristics of scientists overlapped both those of men and of women. Consistent with Hypothesis 8, the intraclass correlation for men with scientists was larger than the intraclass correlation for women

Table 5. Intraclass Correlations for Five Types of Scientists.

Type of scientist	Women and scientists	Men and scientists
Psychologists	.92	.88*
Biologists	.79	.89***
Chemists	.74	.88***
Physicists	.76	.90***
Computer scientists	.66	.79**

Note. All intraclass correlations differ significantly from zero with $p < .001$. Intraclass correlations within rows that are marked with asterisks differ significantly; *$p < .05$. **$p < .01$. ***$p < .001$.

with scientists for male participants, $F(92, 92) = 2.50$, $p < .001$, and women at coed institutions, $F(92, 92) = 1.50$, $p < .05$, but not for the women at the single-sex college, $F(92, 92) = 1.27$, $p = .13$. Holm–Bonferroni contrasts were conducted to determine whether there were differences between the male participants and the two samples of female participants in their intraclass correlations for men and scientists. No gender differences were found. Directional Holm–Bonferroni contrasts were also conducted for the intraclass correlations for women and scientists. Comparisons between the male participants and the two samples of female participants revealed partial support for Hypothesis 8: Women at coed institutions, $F(92, 92) = 1.39$, $p < .05$, and women at the single-sex college, $F(92, 92) = 1.32$, $p < .05$, more strongly associated successful scientists with women's characteristics than men did. However, counter to Hypothesis 8, the comparison of the intraclass correlations for the two groups of women revealed no differences.

Ratings of Women, Men, and Different Scientists on Agency and Communion

Two-way ANOVAs (Participant Group × Condition) were conducted on the four scales with participant group (women from a single-sex institution, women from coed institutions, and men from coed institutions) and condition (women, men, psychologist, biologist, chemist, physicist, and computer scientist) as between-groups independent variables. Results revealed effects of condition for agency, $\alpha = .92$, $F(6, 611) = 8.23$, $p < .001$; passivity, $\alpha = .87$, $F(6, 612) = 8.44$, $p < .001$; communion, $\alpha = .88$, $F(6, 313) = 27.61$, $p < .001$; and dissociation, $\alpha = .72$ scales, $F(6, 611) = 7.92$, $p < .001$. Holm–Bonferroni comparisons were conducted separately on the means for the four scales to compare the ratings of (1) women with men, (2) women with psychologists, (3) men with psychologists, (4) women with the other types of scientists, and (5) men with the other types of scientists. Results are presented in Table 7. Hypothesis 9 was supported: Participants rated women to be less agentic and more communal than men and other scientists and more communal than men and scientists other than psychologists. In addition, women were rated as more passive than men and other scientists and less dissociative than other scientists. Participants rated men to be higher in agency and dissociation and lower in communion than psychologists, and higher in communion and lower in passivity than other scientists. Thus, psychologists were perceived as similar to women, except more agentic and less dissociative, and other types of scientists were perceived as similar to men, except less communal and more passive. To test Hypothesis 10, a directional contrast was conducted to compare the means of the male participants to the means of the two groups of female participants on the ratings of women's agency. As predicted, compared with female participants, male participants gave women lower agency ratings ($M = 3.61$ vs. 3.39 for women and men, respectively), $F(1, 611) = 2.81$, $p < .05$. In addition, the means of the female participants at the single-sex institution were compared to the means of the female participants at the coeducational institutions on the agency scale for women. No difference between the groups was found.

Main effects of participant group were found on the passivity, $F(2, 612) = 3.22$, $p < .05$, and dissociation scales, $F(2, 611) = 5.46$, $p < .01$, and an interaction between participant group and condition was found on the dissociation scale, $F(12, 611) = 1.90$, $p < .05$. Post hoc Scheffé contrasts comparing the mean for the male participants with those for the two groups of female participants revealed that, compared with women, men gave marginally higher overall ratings of passivity, Scheffé $F(1, 612) = 2.91$, $p < .10$, ($M = 2.52$ vs. 2.37), and higher overall ratings of dissociation, Scheffé $F(1, 611) = 4.95$, $p < .05$ ($M = 2.67$ vs. 2.57). To examine the interaction, post hoc Scheffé contrasts compared the mean on dissociation for the male participants with those for the two groups of female participants, separately for women, men, and each condition of scientist. No significant effects were found.

Discussion

Study 2 provides additional evidence that women are seen as less similar to successful scientists than men are. The intraclass correlations revealed greater perceived similarity between men and biologists, chemists, physicists, and computer scientists than between women and scientists in these specific fields. However, women were seen as more similar to psychologists than men were. As expected, the more women there are in a particular field of science, the higher the intraclass correlation between characteristics of women and those of scientists. Thus, scientific fields where women have greater representation are perceived as more similar to women than those where women are less well represented. In contrast, the perceived similarity of scientific fields to men was unaffected by the proportion of men or women in those fields. Moreover, given the finding that people discriminate against women even in gender-neutral fields (Koch et al., 2015), it may be that women have to predominate in a field before people perceive them as having the same role congruity as men.

Table 6. Intraclass Correlations Coefficients for Each Participant Group.

	Women in single-sex colleges	Women in coeducational universities	Men in coeducational universities
Men and scientists	.85	.88	.90
Women and scientists	$.81_a$	$.82_a$	$.75_b$

Note. All intraclass correlations differ significantly from zero with $p < .001$. Intraclass correlations within rows that do not share a subscript differ with $p < .05$.

Table 7. Ratings of Women, Men, and Successful Scientists.

Scale	Women	Men	Psychologists	Biologists	Chemists	Physicists	Computer scientists
$\text{Agency}_{a,b,c,d}$	3.57	3.95	3.78	3.93	3.92	3.88	3.72
$\text{Passivity}_{a,e}$	2.42	2.16	2.19	2.51	2.45	2.36	2.69
$\text{Communion}_{a,c,d,e}$	3.65	3.34	3.62	3.09	2.92	2.94	2.96
$\text{Dissociation}_{b,c,d}$	2.46	2.62	2.06	2.68	2.71	2.69	2.84

Note. Subscripts reveal significant differences between means with $p < .01$: $_a$women differ from men, $_b$women differ from psychologists, $_c$women differ from other scientists, $_d$men differ from psychologists, and $_e$men differ from other scientists.

As expected, the intraclass correlations were higher in Study 2 than in Study 1, and less stereotypical: Women were seen as similar to all six types of scientists. These findings indicate that people perceive more similarity between women and particular categories of successful scientists, such as biologists, chemists, and so on, than to scientists in general. When thinking of a scientist as a general category, participants imagine iconic examples of scientists, such as Einstein, whereas when asked for their perceptions of particular types of scientists, participants are more likely to think of people they know in those fields, such as their professors (Carli et al., 2015). This may have contributed to the greater perceived overlap between women and the different types of scientists than scientists in general. Like Study 1, the different types of scientists were perceived as high in agency and, except for psychologists, low in communion, even more so than men. Participants also rated scientists other than psychologists as higher in passivity than men and comparable to men in dissociation. In Study 1, scientists as a general category were perceived as more agentic than men and less passive and dissociative. It appears that imagining a successful scientist without reference to a particular field of science evokes an idealized image compared with imagining a successful scientists in a specific field: someone exceptionally agentically competent, emotionally detached, and low in communion but also lacking the defects of passivity—such as nervousness and fearfulness—and those of dissociation—such as deviousness and deceitfulness.

Imagining successful scientists in specific scientific fields paints a slightly different picture, one still low in communion and quite agentic, but less idealized, and possessing more dissociation and passivity. Yet, scientists as a general category and as particular types remain more similar to men than to women. The exception is that of psychologists, who, as expected, were seen as more like women but were also somewhat more idealized than women, men, or other scientists. Psychologists were perceived as highly agentic and communal but also lacking passivity and dissociation. Perhaps participants viewed psychologists as free of such qualities because psychologists are commonly thought of as experts in social relations and mental health and thus may be considered to be particularly mentally healthy.

General Discussion

Overall, our results are consistent with role incongruity (Eagly, 2004) and lack of fit (Heilman, 1983) theories. Women may be at a disadvantage in science because people hold different stereotypes about women than they do about men and successful scientists, particularly in scientific fields where women are less prevalent. All the scientific fields except psychology, which is overwhelmingly female-dominated (U.S. Bureau of Labor Statistics, 2015, Table 11), were perceived as more masculine than feminine. However, our findings also show that the higher the percentage of women in a scientific field, the more people perceive an association of women's traits with the traits of successful scientists.

Although all participants perceived greater fit between science and qualities of men rather than qualities of women, regardless of major, gender, or college, there were some participant effects on the perceived similarity between scientists and women. Male participants perceived women to be less similar to scientists and less agentic than female participants did. In addition, there were differences between women attending a single-sex institution and other participants. In Study 1, only women at the single-sex college saw some similarity between women and scientists, and in Study 2, men and women attending coeducational institutions perceived greater similarity between the different types of scientists with men than with women, but women attending the single-sex college did not.

Practice Implications

The results of our studies indicate that women are thought to possess fewer of the characteristics necessary to be successful scientists than men do. These data suggest that the challenges that women face as potential scientists may go beyond the perception that science is a poor match with women's communal goals or that more scientists are men not women. If science merely fails to fulfill women's preference for occupations that are communal, then the absence of female scientists may simply be a matter of choice—women may just be less interested in science. And if people think of men when they think of scientists, this may not reflect any belief that women are unsuited to be scientists.

Our results show that women are thought of as having less agency and being more communal and more passive than a successful scientist; women are perceived as less similar to scientists than men are. Role incongruity and lack of fit theories attribute prejudice and discrimination against women in occupational and social roles to the perception of greater incongruity between women's traits than men's, with the traits associated with effectiveness in those roles (Eagly, 2004; Heilman, 1983). Researchers also claim that discrimination against women in STEM derives from stereotypes about women that do not fit those about scientists (Aki, 2012). Yet until this study, there has been no evidence that women lack role congruity with scientists. Past research on gender and STEM fields has often focused on differences between male and female cognitive abilities (e.g., Kimura, 2007; Lubinski & Benbow, 2007; Newcombe, 2007; Wai et al., 2010), but stereotypes, which are beliefs about gender and science may be more influential. The perceived relative lack of fit between the female gender role and the role of scientist may undermine people's evaluation of female scientists, who may be seen as overly communal, insufficiently agentic, or too passive to succeed in science. Thus, people should be aware of these potential biases and attempt to compensate for them in evaluating women and girls in STEM.

Limitations and Future Research

A limitation of this research is that it does not directly assess discrimination or prejudice against women scientists, nor does it establish that the degree of lack of fit in the traits of women and scientists is associated with the amount of prejudice or discrimination against women scientists. Future research is needed to test a causal link between stereotypes about women in science and discrimination against women scientists. In addition, the strong association between the percentage of women in the various scientific fields and the intraclass correlation between the traits of women and successful scientists do not demonstrate a causal connection between the percentage of women in a field and the degree to which women are seen as similar to scientists. Nevertheless, it is likely that such a relation exists. In support of this possibility, an experiment demonstrated that when participants were told that various social groups (e.g., White women, Black men, White men, etc.) would have different occupations in the future, participants' stereotypes about those social groups were more affected by future occupational roles than by current group stereotypes (Koenig & Eagly, 2014).

Another limitation of this research is that it did not assess the causal link between the gender of participant and institution and perceptions of women as similar to scientists. For example, it is possible that women who have more favorable views of women scientists are more inclined to apply to and attend a women's college. The presence of a higher percentage of women faculty at women's colleges may not affect the perception that scientists possess higher levels of female traits. Although one study following women's attitudes toward women leaders over time did reveal that more high-quality contact with female professors predicted positive change in attitudes toward female leadership (Dasgupta & Asgari, 2004), this study did not manipulate the amount of contact with faculty. Future research could examine the effects of experimentally exposing men and women to successful female scientists, as a means of testing whether such exposure can change stereotypes about successful scientists, or affect beliefs about scientists and women. In addition, the present research was limited to undergraduate student participants. Future research should include nonstudent samples and scientists to see if the perception of successful scientists is universal, or affected by knowledge about and experience with science. Finally, it would be interesting to explore whether the relative lack of fit between women and scientists applies to women of all races.

Given previous research (see Heilman & Eagly, 2008) showing that the amount of role incongruity is associated with prejudice and discrimination against women leaders, we expected that there would be greater prejudice and discrimination against women in STEM fields with few women and in fields requiring a relatively high amount of agency and low levels of communion. In future research, researchers could present participants with images of scientists whose success derives from collaboration and teamwork rather than dominance and competitiveness. This manipulation may increase the perceived similarity of scientists with women and reduce the perceived similarity of scientists with men, and also may increase the evaluation of women scientists, relative to their male counterparts.

The perception of the successful scientist as extremely agentic but low in communion creates an image of scientists as an embodiment of pure objective reason, an idealized image that may be alienating, and not just to women. Only a minority of first-year college students expresses an initial intention to major in STEM fields. Surveys of college students indicate that most college students who do major in STEM fields ultimately change their minds and defect from STEM; they report they leave, partly because of the perceived

culture of science fields (Committee on Maximizing the Potential of Women in Academic Science, 2007). However, our studies suggest that perceptions of successful scientists are likely to change as more women enter scientific fields. Shifting stereotypes about scientists to a less idealized and more balanced set of traits may ultimately help facilitate increased interest in STEM careers by both and women and men.

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References

Abele, A. E., Uchronski, M., Suitner, C., & Wojciszke, B. (2008). Towards an operationalization of the fundamental dimensions of agency and communion: Trait content ratings in five countries considering valence and frequency of word occurrence. *European Journal of Social Psychology*, *38*, 1202–1217. doi:10.1002/ejsp.575

Aki, A. (2012, November 18). Stereotypes deter women from becoming scientists. *Voice of America*. Retrieved from http://www.voanews.com/content/stereotypes-deter-women-from-becoming-scientists/1548504.html

Asgari, S., Dasgupta, N., & Cote, N. (2010). When does contact with successful ingroup members change self-stereotypes? A longitudinal study comparing the effect of quantity vs. quality of contact with successful individuals. *Social Psychology*, *41*, 203–211. doi:10.1027/1864-9335/a000028

Barbercheck, M. (2001). Science, sex, and stereotypical images in scientific advertising. In M. Wyer, M. Barbercheck, D. Giesman, H. Ö. Öztürk, & M. Wayne (Eds.), *Women, science, and technology: A reader in feminist science studies* (2nd ed., pp. 118–132). New York, NY: Cambridge University Press.

Benbow, C. P., Lubinski, D. S., Shea, D. L., & Eftekhari-Sanjani, H. (2000). Sex differences in mathematical reasoning ability at age 13: Their status 20 years later. *Psychological Science*, *11*, 474–480. doi:10.1111/1467-9280.00291

Bloomfield, V. A., & El-Fakahany, E. E. (2008). *The Chicago guide to your career in science: A toolkit for students and postdocs*. Chicago, IL: University of Chicago Press.

Budden, A. E., Tregenza, T., Aarssen, L. W., Koricheva, J., Leimu, T., & Lortie, C. J. (2007). Double-blind review favours increased representation of female authors. *Trends in Ecology and Evolution*, *23*, 4–6. doi:10.1016/j.tree.2007.07.008

Carli, L. L. (2001). Gender and social influence. *Journal of Social Issues*, *57*, 725–742. doi:10.1111/0022-4537.00238

Carli, L. L. (2004). Gender effects on social influence. In J. S. Seiter & R. H. Gass (Eds.), *Perspectives on persuasion, social influence and compliance gaining* (pp. 133–148). Boston, MA: Allyn & Bacon.

Carli, L. L. (in press). Social influence and gender. In K. Williams & S. Harkins (Eds.), *Oxford handbook of social influence*. Oxford, England: Oxford University Press.

Carli, L. L., Liano, S., & Sohn, J. J. (2015). *Name a scientist: Who comes to mind?* (Unpublished manuscript). Department of Psychology, Wellesley College, Wellesley, MA.

Ceci, S. J., Ginther, D. K., Kahn, S., & Williams, W. M. (2014). Women in academic science: A changing landscape. *Psychological Science in the Public Interest*, *15*, 75–141. doi:10.1177/1529100614541236

Committee on Maximizing the Potential of Women in Academic Science and Engineering, Committee on Science, Engineering, and Public Policy, Institute of Medicine, Policy and Global Affairs, National Academy of Sciences, & National Academy of Engineering. (2007). *Beyond bias and barriers: Fulfilling the potential of women in academic science and engineering*. Washington, DC: National Academies Press.

Dasgupta, N., & Asgari, S. (2004). Seeing is believing: Exposure to counterstereotypic women leaders and its effect on the malleability of automatic gender stereotyping. *Journal of Experimental Social Psychology*, *40*, 642–658. doi:10.1016/j.jesp.2004.02.003

Davies, P. G., & Spencer, S. J. (2005). The gender-gap artifact: Women's underperformance in quantitative domains through the lens of stereotype threat. In A. M. Gallagher & J. C. Kaufman (Eds.), *Gender differences in mathematics: An integrative psychological approach* (pp. 172–188). New York, NY: Cambridge University Press.

Diekman, A. B., Brown, E. R., Johnston, A. M., & Clark, E. K. (2010). Seeking congruity between goals and roles: A new look at why women opt out of science, technology, engineering, and mathematics careers. *Psychological Science*, *21*, 1051–1057. doi:10.1177/0956797610377342

Diekman, A. B., Clark, E. K., Johnston, A. M., Brown, E. R., & Steinberg, M. (2011). Malleability in communal goals and beliefs influences attraction to stem careers: Evidence for a goal congruity perspective. *Journal of Personality and Social Psychology*, *101*, 902–918. doi:10.1037/a0025199

Eagly, A. H. (1987). *Sex differences in social behavior: A social role interpretation*. Hillsdale, NJ: Lawrence Erlbaum.

Eagly, A. H. (2004). Prejudice: Toward a more inclusive understanding. In A. H. Eagly, R. M. Baron, & V. L. Hamilton (Eds.), *The social psychology of group identity and social conflict: Theory, application, and practice* (pp. 45–64). Washington, DC: American Psychological Association. doi:10.1037/10683-003

Eagly, A. H., & Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders. *Psychological Review*, *109*, 573–598. doi:10.1037/0033-295X.109.3.573

Eagly, A. H., & Koenig, A. M. (2008). Gender prejudice: On the risks of occupying incongruent roles. In E. Borgida & S. T. Fiske (Eds.), *Beyond common sense: Psychological science in the courtroom* (pp. 63–81). Malden, MA: Blackwell.

Eagly, A. H., Makhijani, M. G., & Klonsky, B. G. (1992). Gender and the evaluation of leaders: A meta-analysis. *Psychological Bulletin*, *111*, 3–22. doi:10.1037/0033-2909.111.1.3

Feldt, L. S., Woodruff, D. J., & Salih, F. A. (1987). Statistical inference for coefficient alpha. *Applied Psychological Measurement*, *11*, 93–103. doi:10.1177/014662168701100107

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*, 1464–1480. doi:10.1037/0022-3514.74.6.1464

Halpern, D. F., Wai, J., & Saw, A. (2005). A psychobiosocial model: Why females are sometimes greater than and sometimes less than males in math achievement. In A. M. Gallagher & J. C. Kaufman (Eds.), *Gender differences in mathematics: An integrative psychological approach* (pp. 48–72). New York, NY: Cambridge University Press.

Heilman, M. E. (1983). Sex bias in work settings: The lack of fit model. In B. Staw & L. Cummings (Eds.), *Research in organizational behavior* (Vol. 5, pp. 269–298). Greenwich, CT: JAI.

Heilman, M. E. (2001). Description and prescription: How gender stereotypes prevent women's ascent up the organizational ladder. *Journal of Social Issues*, *57*, 657–674. doi:10.1111/0022-4537.00234

Heilman, M. E., & Eagly, A. H. (2008). Gender stereotypes are alive, well, and busy producing workplace discrimination. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *1*, 393–398. doi:10.1111/j.1754-9434.2008.00072.x

Heilman, M. E., & Haynes, M. C. (2008). Subjectivity in the appraisal process: A facilitator of gender bias in work settings. In E. Borgida & S. T. Fiske (Eds.), *Beyond common sense: Psychological science in the courtroom* (pp. 127–155). Malden, MA: Blackwell.

Hill, C., Corbett, C., & St. Rose, A. (2010). *Why so few? Women in science, technology, engineering, and mathematics*. Washington, DC: American Association of University Women.

Hilton, J. L., & von Hippel, W. (1996). Stereotypes. *Annual Review of Psychology*, *47*, 237–271. doi:10.1146/annurev.psych.47.1.237

Jansen, R. (2011). *Developing a talent for science: A practical guide for students, postdocs, and their professors*. New York, NY: Cambridge University Press.

Jost, J. T., & Kay, A. C. (2005). Exposure to benevolent sexism and complementary gender stereotypes: Consequences for specific and diffuse forms of system justification. *Journal of Personality and Social Psychology*, *88*, 498–509. doi:10.1037/0022-3514.88.3.498

Kessels, U., Rau, M., & Hannover, B. (2006). What goes well with physics? Measuring and altering the image of science. *British Journal of Educational Psychology*, *76*, 761–780. doi:10.1348/000709905X59961

Kimura, D. (2007). Underrepresention of misrepresentation? In S. J. Ceci & W. M. Williams (Eds.), *Why aren't more women in science? Top researchers debate the evidence* (pp. 39–46). Washington, DC: American Psychological Association. doi:10.1037/11546-003

Koch, A. J., D'Mello, S. D., & Sackett, P. R. (2015). A meta-analysis of gender stereotypes and bias in experimental simulations of employment decision making. *Journal of Applied Psychology*, *100*, 128–161. doi:10.1037/a0036734

Koenig, A. M., & Eagly, A. H. (2014). Evidence for the social role theory of stereotype content: Observations of groups' roles shape stereotypes. *Journal of Personality and Social Psychology*, *107*, 371–392. doi:10.1037/a0037215

Koenig, A. M., Eagly, A. H., Mitchell, A. A., & Ristikari, T. (2011). Are leader stereotypes masculine? A meta-analysis of three research paradigms. *Psychological Bulletin*, *137*, 616–642. doi:10.1037/a0023557

Konrad, A. M., Ritchie, J. E., Jr., Lieb, P., & Corrigall, E. (2000). Sex differences and similarities in job attribute preferences: A meta-analysis. *Psychological Bulletin*, *126*, 593–641. doi:10.1037//0033-2909.126.4.593

Lane, K. A., Goh, J. X., & Driver-Linn, E. (2012). Implicit science stereotypes mediate the relationship between gender and academic participation. *Sex Roles*, *66*, 220–234. doi:10.1007/s11199-011-0036-z

Lee, T. L., Fiske, S. T., & Glick, P. (2010). Next gen ambivalent sexism: Converging correlates, causality in context, and converse causality, an introduction to the special issue. *Sex Roles*, *62*, 395–404. doi:10.1007/s11199-010-9747-9

Lindberg, S. M., Hyde, J., Petersen, J. L., & Linn, M. C. (2010). New trends in gender and mathematics performance: A meta-analysis. *Psychological Bulletin*, *136*, 1123–1135. doi:10.1037/a0021276

Loehe, C. (2009). *Becoming a successful scientist: Strategic thinking for scientific discovery*. New York, NY: Cambridge University Press.

Lubinski, D. S., & Benbow, C. (2007). Sex differences in personal attributes for the development of scientific expertise. In S. J. Ceci & W. M. Williams (Eds.), *Why aren't more women in science? Top researchers debate the evidence* (pp. 79–100). Washington, DC: American Psychological Association. doi:10.1037/11546-007

Mazei, J., Hüffmeier, J., Freund, P. A., Stuhlmacher, A. F., Bilke, L., & Hertel, G. (2015). A meta-analysis on gender differences in negotiation outcomes and their moderators. *Psychological Bulletin*, *141*, 85–104. doi:10.1037/a0038184

McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological Methods*, *1*, 30–46. doi:10.1037/1082-989X.1.1.30

Milkman, K. L., Akinola, M., & Chugh, D. (2012). Temporal distance and discrimination: An audit study in academia. *Psychological Science*, *23*, 710–717. doi:10.1177/0956797611434539

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *PNAS Proceedings of the National Academy of Sciences of the United States of America*, *109*, 16474–16479. doi:10.1073/pnas.1314788111

National Science Foundation, National Center for Science and Engineering Statistics, Directorate for Social, Behavioral and Economic Sciences. (2013). *Women, minorities, and persons with disabilities in science and engineering: 2013*. Retrieved from http://www.nsf.gov/statistics/wmpd/2013/pdf/nsf13304_full.pdf

Newcombe, N. S. (2007). Taking science seriously: Straight thinking about spatial sex differences. In S. J. Ceci & W. M. Williams (Eds.), *Why aren't more women in science? Top researchers debate the evidence* (pp. 69–77). Washington, DC: American Psychological Association. doi:10.1037/11546-006

Newport, F. (2001, February 21). Americans see women as emotional and affectionate, men as more aggressive. *Gallup Poll News Service*. Retrieved from http://www.gallup.com/poll/1978/Americans-See-Women-Emotional-Affectionate-Men-More-Aggressive.aspx

Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). Math = male, me = female, therefore math ≠ me. *Journal of Personality and Social Psychology*, *83*, 44–59. doi:10.1037/0022-3514.83.1.44

Nosek, B. A., & Smyth, F. L. (2011). Implicit social cognitions predict sex differences in math engagement and achievement. *American Educational Research Journal*, *48*, 1125–1156. doi:10.3102/0002831211410683

Nosek, B. A., Smyth, F. L., Hansen, J. J., Devos, T., Lindner, N. M., Ranganath, K. A., … Banaji, M. R. (2007). Pervasiveness and correlates of implicit attitudes and stereotypes. *European Review of Social Psychology*, *18*, 36–88. doi:10.1080/10463280701489053

Potter, E. F., & Rosser, S. V. (1992). Factors in life science textbooks that may deter girls' interest in science. *Journal of Research in Science Teaching*, *29*, 669–686. doi:10.1002/tea.3660290705

Powell, G. N. (2011). The gender and leadership wars. *Organizational Dynamics*, *40*, 1–9. doi:10.1016/j.orgdyn.2010.10.009

Powell, R. R., & Garcia, J. (1985). The portrayal of minorities and women in selected elementary science series. *Journal of Research in Science Teaching*, *22*, 519–533. doi:10.1002/tea.3660220606

Prentice, D. A., & Carranza, E. (2002). What women and men should be, shouldn't be, are allowed to be, and don't have to be: The contents of prescriptive gender stereotypes. *Psychology of Women Quarterly*, *26*, 269–281. doi:10.1111/1471-6402.t01-1-00066

Rahm, J., & Charbonneau, P. (1997). Probing stereotypes through students' drawings of scientists. *American Journal of Physics*, *65*, 774–778. doi:10.1119/1.18647

Reuben, E., Sapienza, P., & Zingales, L. (2014). How stereotypes impair women's careers in science. *PNAS Proceedings of the National Academy of Sciences of the United States of America*, *111*, 4403–4408. doi:10.1073/pnas.1314788111

Ridgeway, C. L., & Correll, S. J. (2004). Unpacking the gender system: A theoretical perspectives on gender beliefs and social relations. *Gender & Society*, *18*, 510–531. doi:10.1177/0891243204265269

Rosei, F., & Johnston, T. (2006). *Survival skills for scientists*. London, England: Imperial College Press.

Rudman, L. A. (2005). Rejection of women? Beyond prejudice as antipathy. In J. F. Dovidio, P. Glick, & L. A. Rudman (Eds.), *On the nature of prejudice: Fifty years after Allport* (pp. 106–120). Malden, MA: Blackwell.

Settles, I. H., Cortina, L. M., Malley, J., & Stewart, A. J. (2006). The climate for women in academic science: The good, the bad, and the changeable. *Psychology of Women Quarterly*, *30*, 47–58. doi:10.1111/j.1471-6402.2006.00261.x

Seymour, E., & Hewitt, N. M. (1997). *Talking about leaving: Why undergraduates leave the sciences*. Boulder, CO: Westview Press.

Schein, V. E. (1973). The relationship between sex role stereotypes and requisite management characteristics. *Journal of Applied Psychology*, *57*, 95–100. doi:10.1037/h0037128

Schein, V. E. (2001). A global look at psychological barriers to women's progress in management. *Journal of Social Issues*, *57*, 675–688. doi:10.1111/0022-4537.00235

Sheltzer, J. M., & Smith, J. C. (2014). Elite male faculty in the life sciences employ fewer women. *Proceedings of the National Academy of Sciences of the United States of America*, *111*, 10107–10112. doi:10.1073/pnas.1403334111

Shettle, C., Roey, S., Mordica, J., Perkins, R., Nord, C., Tedorovic, J., … Kastberg, D. (2007). *The nation's report card: America's high school graduates. Results from the 2005 NAEP High School Transcript Study*. Washington, DC: National Center for Education Statistics. Retrieved from http://nces.ed.gov/nationsreportcard/pdf/studies/2007467.pdf

Song, J., & Kim, K. (1999). How Korean students see scientists: The images of the scientist. *International Journal of Science Education*, *21*, 957–977. doi:10.1080/095006999290255

Spelke, E. S. (2005). Sex differences in intrinsic aptitude for mathematics and science? A critical review. *American Psychologist*, *60*, 950–958. doi:10.1037/0003-066X.60.9.950

Stout, J. G., Dasgupta, N., Hunsinger, M., & McManus, M. A. (2010). STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM). *Journal of Personality and Social Psychology*, *100*, 255–270. doi:10.1037/a0021385

Stuhlmacher, A. F., & Linnabery, E. (2013). Gender and negotiation: A social role analysis. In M. Olekalns & W. Adair (Eds.), *Handbook of research on negotiation research* (pp. 221–248). London, England: Edward Elgar. http://dx.doi.org/10.4337/9781781005903.00018

Thomas, M. D., Henley, T. B., & Snell, C. M. (2006). The draw a scientist test: A different population and a somewhat different story. *College Student Journal*, *40*, 140–148.

Twenge, J. M. (1997). Attitudes toward women, 1970-1995. *Psychology of Women Quarterly*, *21*, 35–51. doi:10.1111/j.1471-6402.1997.tb00099.x

U.S. Bureau of Labor Statistics. (2015). *Labor force statistics from the Current Population Survey*. Retrieved from http://www.bls.gov/cps/tables.htm

U.S. National Center for Education Statistics. (2010). *Digest of education statistics, 2010*. Retrieved from http://nces.ed.gov/programs/digest/d10/tables_3.asp#Ch3aSub4

U.S. National Center for Education Statistics. (2012). *2008–09 Baccalaureate and beyond longitudinal study (B&B:08/09)*. Retrieved from http://nces.ed.gov/datalab/

U.S. National Center for Education Statistics. (2013). *Digest of education statistics, 2010*. Retrieved from http://nces.ed.gov/programs/digest/d13/tables/dt13_315.20.asp

U.S. National Center for Education Statistics Integrated Postsecondary Data System. (2015). *Data center*. Retrieved from http://nces.ed.gov/ipeds/datacenter/

Vedantam, S. (2012, July 12). How stereotypes can drive women to quit science. *National Public Radio*. Retrieved from http://www.npr.org/2012/07/12/156664337/stereotype-threat-why-women-quit-science-jobs

Wai, J., Cacchio, M., Putallaz, M., & Makel, M. C. (2010). Sex differences in the right tail of cognitive abilities: A 30 year examination. *Intelligence*, *38*, 412–423. doi:10.1016/j.intell.2010.04.006

Wennerås, C., & Wold, A. (1997). Nepotism and sexism in peer-review. *Nature*, *387*, 341–343.

Wiggins, J. S. (1991). Agency and communion as conceptual coordinates for the understanding and measurement of interpersonal behavior. In D. Cicchetti & W. M. Grove (Eds.), *Thinking clearly about psychology: Essays in honor of Paul E. Meehl, Vol. 2: Personality and psychopathology* (pp. 89–113). Minneapolis, MN: University of Minnesota Press.

Williams, J. E., & Best, D. L. (1990). *Measuring sex stereotypes: A multinational study*. Newbury Park, CA: Sage.

Xie, Y., & Shauman, K. A. (2003). *Women in science: Career processes and outcomes*. Cambridge, MA: Harvard University Press.