Viewpoint

How Gender Stereotypes May Limit Female Faculty Advancement in Communication Sciences and Disorders

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Purpose: The field of communication sciences and disorders (CSD) faces a critical shortage of the faculty essential to train the future workforce of speech-language pathologists and audiologists. Despite a predominance of women in the field, men receive doctoral degrees, tenure status, academic leadership positions, and American Speech-Language-Hearing Association awards at disproportionately higher rates than women. The purpose of this review is to explore how implicit gender bias may contribute to female faculty advancement, including current and projected faculty workforce shortages, and to propose tangible solutions.
Method: The authors present proportions of men and women who receive doctoral degrees, advance to each faculty rank, receive tenure status, hold department chairs in CSD, and receive American Speech-Language-Hearing Association

honors and awards. They review ways in which cultural stereotypes give rise to implicit gender bias and discuss myriad ways that implicit gender bias may influence the decisions of students considering an academic career in CSD and their career trajectories.
Conclusions: Cultural stereotypes about men and women lead to implicit gender bias that may have real consequences for female faculty advancement in CSD. Such implicit bias can influence career selection and outcomes within the field in multiple ways. To ensure that CSD continues to attract top talent and maintain a robust pipeline of future faculty in doctoral training programs, the field must recognize the existence of implicit gender bias and implement evidence-based strategies to minimize its potentially damaging effects on the future of the profession.

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In 1999, the Council of Academic Programs in Communication Sciences and Disorders (CAPCSD) indicated the potential for a shortage of 150 faculty to train future speech-language pathologists (SLPs) and audiologists in coming years (American Speech-Language-Hearing Association [ASHA], 2008). Because obtaining a doctoral degree is almost universally required for a faculty position, the deficiency in the number of doctors of philosophy (PhDs) being granted in communication sciences and disorders (CSD) is a critical contributor to the projected workforce shortage. A Joint Ad Hoc Committee established by the ASHA Executive Board in 2002 (renewed in 2008) estimated that there will be 408 PhD-level full-time CSD faculty openings between 2012 and 2017. During this same time frame, the number of PhD-level research doctoral graduates who will be available for an academic faculty position is 279, leaving nearly a third (31.6%) of CSD faculty openings unfilled (McNeil et al., 2013). This crippling level of faculty vacancies diminishes the capacity to train a clinical workforce in the face of an aging U.S. population with growing demands for its services, and it markedly weakens SLPs' and audiologists' ability to set and contribute to the national research agenda and public policy in CSD.

Since 2006, the predominance of women as constituents of ASHA has continued to increase, reaching 95.3% at the end of 2016 (see Figure 1; ASHA, 2017a).

These percentages vary slightly by specialty (SLP vs. audiology vs. combination), but the vast majority in both specialties are women (see Table 1).

Despite the small percentage of male ASHA members in 2016 (4.7%), 26.2% of those who held research doctoral degrees were men (ASHA, 2017c). Additionally, the percentage of men enrolling in research doctorate (PhD) programs from 2010 to 2016 ranged from 19% to 22%, and the number receiving research doctorate degrees ranged from 16% to 28% (see Table 2; ASHA, 2017a; CAPCSD & ASHA, 2017).

According to a CAPCSD 2016 survey, men are overrepresented relative to their proportion of ASHA members at all faculty ranks (ASHA, 2015; CAPCSD, 2016). The proportion of male faculty at full professor rank is greater (38%) than for female faculty (25%), a statistically significant difference in proportions of .12, $p < .0001$. A greater proportion of male faculty on a tenure track are tenured (37%) than female faculty on a tenure track (26%), also a statistically significant difference in proportions of .11, $p < .0001$. Additionally, men are overrepresented in academic leadership and as recipients of the ASHA Honors awards, which are largely awarded to senior faculty members for a body of research. Men comprise 33% of the incoming Fellows of the Association and occupy 29% of the department chair positions in speech-language pathology and audiology programs in the United States (according to the websites of 233 CSD programs listed in the U.S. News and World Report rankings). Additionally, the Honors of the Association, which recognizes members for their distinguished contributions and is the highest honor the ASHA bestows, is awarded to men at disproportionately higher rates than women (62% of recipients from 1940 through 2015 were men; see Figure 2). The number of female ASHA Honors recipients has been increasing over the past two decades, and in the last decade, it has surpassed the number of male recipients thus far (56% women; 44% men). Despite this, men have continued to receive awards at disproportionately high rates relative to their representation in the field (see Figure 2). It is possible that this overrepresentation of men in academic leadership and as recipients of the ASHA awards may in turn influence the number of women deciding to pursue careers in academia within CSD.

The purpose of this article is to consider how implicit gender bias may contribute to the advancement of female faculty in CSD, including the faculty shortage, and to suggest solutions to combat the impact of such unintentional bias. To this end, we turn to research on gender stereotypes for conceptually sound and empirically supported explanations for the attraction of CSD predominantly to women and men's disproportionate representation among PhD recipients, faculty at all ranks, the ASHA Honors awardees, and department chair positions in CSD.

We begin by providing an overview of how gender stereotypes result in implicit gender bias in both men and women despite equalitarian beliefs. Next, we discuss seven ways that gender bias may influence female faculty advancement in CSD, including the decision to pursue a doctoral degree, outlined in Figure 3. We also touch on ways in which implicit gender bias may foster and perpetuate a predominantly female CSD workforce. We conclude by providing strategies to mitigate implicit gender bias in CSD academic programs with the ultimate goal of increasing the number of women within the field who pursue doctoral degrees, obtain faculty positions, and advance to leadership positions.

Figure 1. ASHA constituents by gender from 2006 through 2016. ASHA = American Speech-Language-Hearing Association.
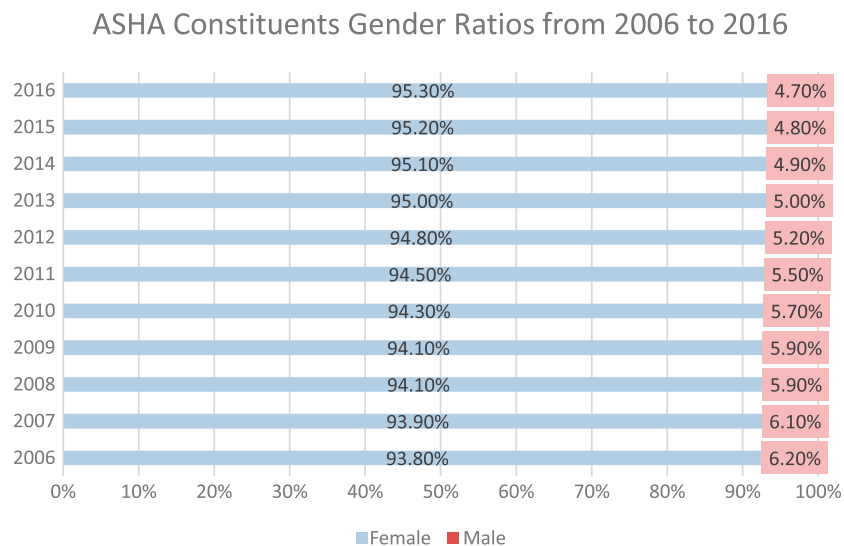

ASHA Constituents Gender Ratios from 2006 to 2016

Year	Female	Male
2016	95.30%	4.70%
2015	95.20%	4.80%
2014	95.10%	4.90%
2013	95.00%	5.00%
2012	94.80%	5.20%
2011	94.50%	5.50%
2010	94.30%	5.70%
2009	94.10%	5.90%
2008	94.10%	5.90%
2007	93.90%	6.10%
2006	93.80%	6.20%

Table 1. Gender breakdown by specialty in 2016.

Gender	All constituents	SLP only	Audiology only	Combination
Male	4.70%	3.70%	14.90%	18.80%
Female	95.30%	96.30%	85.10%	81.20%

Note. SLP = speech-language pathologist.

Gender Stereotypes Lead to Implicit Bias Despite Equalitarian Beliefs

Assumptions about traits and behaviors associated with girls/women and boys/men are well known and continually reinforced through ambient cultural messages. To explain the origins of male and female gender stereotypes, Alice Eagly developed the social role theory, which recognizes the historical division in labor between women, who often assumed responsibilities at home, and men, who often assumed responsibilities outside the home (Eagly, 1987). Due to these sex differences in social behavior, expectations of men and women diverged. In order to conform to such expectations, men have been socialized to adopt traits and behaviors that are "agentic," such as being logical, independent, assertive, strong, bold, and decisive (Eagly & Wood, 1991), whereas women have been socialized to adopt traits and behaviors that are "communal," such as being nurturing, relational, emotional, supportive, modest, and warm (Eagly & Wood, 1991). For example, at an early age, the toys and games selected for children are often unconsciously intended to socialize them into appropriate gender roles. Because women are expected to be more nurturing than men, girls are often given dolls to play with, fostering the value of caring for others. Boys, however, are often given dolls in the form of action figures designed to bring out their alleged male aggressive tendencies. A large body of research confirms that assumptions based on gender stereotypes have profound and pervasive effects on judgments, attitudes, decision making, and behaviors. Although there are no longer explicit laws or policies in the United States that reinforce gender roles by prohibiting women's access to work, education, property ownership, or casting votes, gender

Table 2. Number of males and females enrolling and completing Communication Sciences and Disorders research doctoral programs by year.

Variable	First year enrollment		Degrees granted	
	Male # (%)	Female # (%)	Male # (%)	Female # (%)
2010–2011	34 (22)	121 (78)	20 (25)	59 (75)
2011–2012	34 (22)	121 (78)	23 (21)	84 (79)
2012–2013	32 (21)	123 (79)	22 (18)	99 (82)
2013–2014	23 (19)	98 (81)	49 (28)	123 (72)
2014–2015	32 (20)	128 (80)	23 (16)	118 (84)
2015–2016	29 (21)	106 (79)	40 (28)	105 (72)

roles affect chosen courses of action in many situations (Carnes, 2012).

The unwitting and unintentional discrimination that arises from the mere existence of cultural stereotypes—or "implicit bias"—has been identified as a root cause of the persistent and cumulative disadvantages faced by individuals from historically low status groups (e.g., women and non-White ethnic/racial groups; Chapman, Kaatz, & Carnes, 2013; Dovidio, Kawakami, & Gaertner, 2002; Filut, Kaatz, & Carnes, 2017). Although one's conscious (explicit) beliefs may not reflect stereotype-based bias, unconscious (implicit) processes may drive judgment and decision making (Devine, 1989). Therefore, individuals are frequently unaware of these implicit processes or "habits of mind" (Carnes et al., 2015; Devine, 1989). This is why it is so common to hear someone say with all sincerity, "I think women are as capable as men and I have no gender bias" while they are paying their female employees less than comparable males, preferentially hiring male over equivalently qualified female applicants, encouraging women to consider clinical and men to consider researcher paths, and nominating men over women for prestigious awards (Kaatz & Carnes, 2014).

Implicit gender bias is present in all individuals, regardless of gender, due to exposure to stereotypes through common socialization experiences (Devine, 1989; Ehrlich, 1973; Hamilton, 2015). A frequent misconception is that a female scientist would not hold implicit bias against women in science. Although this individual's personal beliefs are likely that women can excel in science fields, her lifelong exposure to cultural messages reinforcing the association of science with male (e.g., logical, analytical) but not female (e.g., bad at math, emotional) stereotypes gives her implicit bias against women and science that contradict her personal beliefs (Dasgupta & Asgari, 2004; Heilman, Wallen, Fuchs, & Tamkins, 2004; Nosek et al., 2007; Rudman & Kilianski, 2000). Rudman and Kilianski (2000) confirmed this in studies that found that even when women demonstrated no explicit bias against women in high-authority agentic positions, which included physician, scientist, and professor, they nevertheless demonstrated implicit bias against women in such positions to the same degree as their male counterparts. Also, there was no relationship between implicit and explicit measures of bias. Often outside of conscious awareness, gender stereotypes can implicitly prescribe who "fits" the assumptions of different roles and thereby shape the decisions of who to advise, mentor, admit, hire, promote, or fund. These stereotypes also may influence those who determine whether a speech-language pathology or audiology student should pursue doctoral training and career advancement of women once they become faculty in CSD. We present seven ways that implicit gender bias has the potential to influence career paths of CSD students and limit advancement of female CSD faculty. Figure 3 illustrates these seven points as a pyramid structure with the numeral ordering relating to stages of faculty career advancement and development (e.g., highest point on the pyramid [#7] represents impact at the most advanced career stage).

Figure 2. Gender ratios for ASHA Honors recipients. ASHA = American Speech-Language-Hearing Association.

Distribution of ASHA Honors
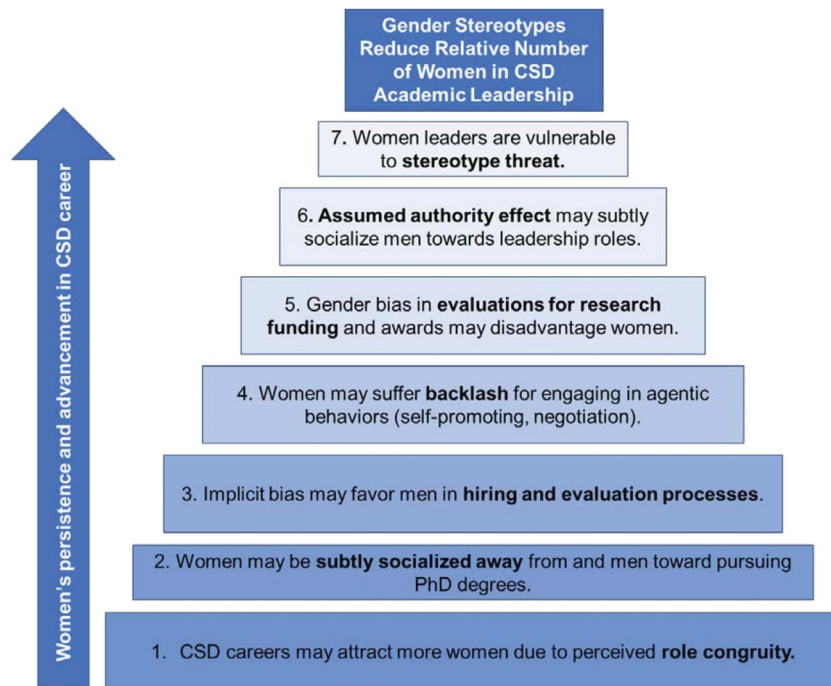

Male ■ *Female* ■

DECADE

NUMBER OF AWARDS
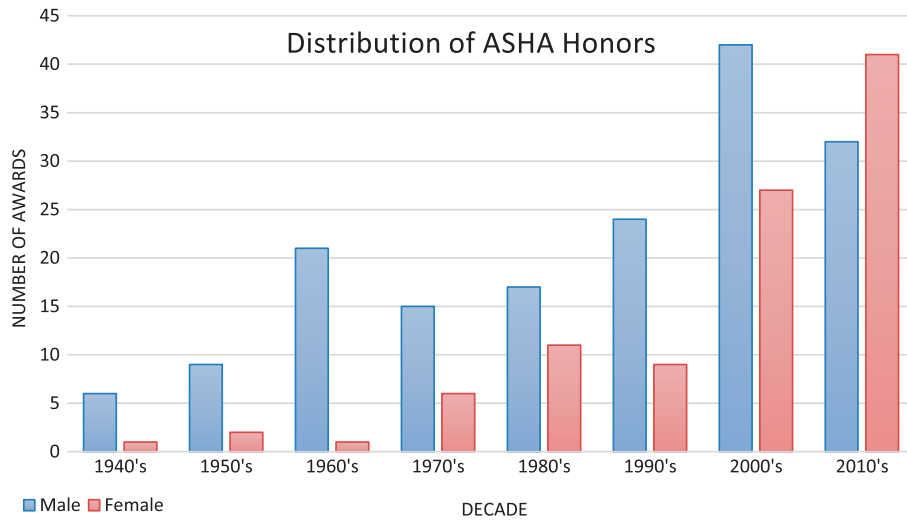
1. CSD Careers May Attract More Women Due to Perceived Role Congruity

Eagly and Karau (2002) introduced the concept of role congruity, which facilitates the entry of men into occupations and roles dominated by men and women into those dominated by women. Conversely, when women aspire to enter occupations or roles that are male typed (e.g., orthopedic surgeon, department chair) or when men aspire to enter those that are female typed (e.g., child care provider, nursing assistant), they suffer from an implicit lack of fit from role incongruity. Gender role congruity

Figure 3. How implicit gender bias can influence academic careers in CSD. This figure illustrates seven ways that implicit gender bias may influence career advancement of female faculty in CSD. The numerical ordering corresponds to the stages of career advancement and development, with #1 representing the earliest career stage and #7 representing the most advanced career stage. CSD = communication sciences and disorders.

Gender Stereotypes Reduce Relative Number of Women in CSD Academic Leadership

7. Women leaders are vulnerable to **stereotype threat.**

6. **Assumed authority effect** may subtly socialize men towards leadership roles.

5. Gender bias in **evaluations for research funding** and awards may disadvantage women.

4. Women may suffer **backlash** for engaging in agentic behaviors (self-promoting, negotiation).

3. Implicit bias may favor men in **hiring and evaluation processes**.

2. Women may be **subtly socialized away** from and men toward pursuing PhD degrees.

1. CSD careers may attract more women due to perceived **role congruity.**

Women's persistence and advancement in CSD career

reinforces and maintains occupational sex segregation by fostering a sense of belonging for women in female-dominated occupations and for men in male-dominated occupations and by introducing implicit bias into the way decision-makers evaluate those individuals and their work in gender-congruent and -incongruent occupations (Filut et al., 2017; Foschi, 1996; Rudman, Mescher, & Moss-Racusin, 2013; Sczesny, Spreemann, & Stahlberg, 2006).

Decades of research confirm that the mental image of occupations and roles are actually images of the people who hold them. When at least 75% of the occupants of a job are men, the job is assumed to require stereotypically male, agentic qualities, and when at least 75% are women, the job is assumed to require stereotypically female, communal qualities (Cejka & Eagly, 1999; Glick, Wilk, & Perreault, 1995). Thus, in mutually reinforcing ways, occupations become sex-segregated. The predominance of women in CSD is consistent with other allied health professions, such as nursing and occupational therapy (Porter, 1992). Findings from a study by Greenwood, Wright, and Bithell (2006) suggest that speech-language pathology is perceived as lacking a scientific basis or prestige as a career choice. Such perceptions may underlie the low proportion of men entering the profession given that both science and high status are more strongly linked to male than female stereotypes (Filut et al., 2017; Nosek et al., 2007). In addition, explicit career advice to male undergraduate students against entering speech-language pathology based on the perception that it is "female territory" (e.g., role incongruity for men) may contribute to the decision to pursue other fields (Fitzmaurice & Coyle, 1995). Taken together, gender role congruity for female students and role incongruity for male students may help account for CSD attracting a large proportion of women.

2. Women May Be Subtly Socialized Away From and Men Toward Pursing PhD Degrees

Once students have selected CSD as a field, role congruity may continue to differentially influence the career decisions of male and female students. Training that leads to perceived communal aspects of the field (providing care, helping others) may be expected to have more role congruity for female students, whereas training that leads to perceived agentic aspects of the field (conducting science, leading an independent research program) would have more role congruity for male students, thus encouraging men to pursue doctoral training. Relevant to this possibility is a study examining the dean's letters written for medical students applying for postgraduate residency training (Isaac, Chertoff, Lee, & Carnes, 2011), which found evidence of subtle socialization of female students toward the relatively communal specialty of family medicine and male students toward more technical, agentic, surgical specialties. In CSD, perceptions regarding the need for those in faculty positions to possess agentic qualities in leading their own research programs, competing for external funding, and serving in national

leadership roles may further discourage women from pursuing this career path.

Consistent with the influence of gender on CSD career outcomes, a survey of CSD graduate students reported that approximately one third of male and female respondents believed that faculty/staff treated male and female students differently (Lof, Mullen, & Rabinowitz, 1999). Interestingly, 24% of men reported that they were treated "better," whereas only 4% of women reported being treated better than male students (13% reported being treated worse; Lof et al., 1999). Assuming that CSD faculty/staff are not intentionally treating men and women differently, implicit gender bias may underlie these findings, subtly encouraging male students and discouraging female students from persisting in CSD toward a PhD.

3. Implicit Bias May Favor Men in Hiring and Evaluation Processes

In 1968, Philip Goldberg conducted the first randomized experiment to demonstrate how implicit gender bias, triggered by the assignment of a male- (John T. McKay) or female-gendered (Joan T. McKay) name as author of an essay, led evaluators to rate identical work differently based on whether they thought it was written by a man or a woman (Goldberg, 1968). This experimental paradigm, subsequently termed the *Goldberg design*, has been used extensively to document existing gender bias in the evaluation of individual men and women or their work and to test the effectiveness of interventions to reduce gender bias. Isaac, Lee, and Carnes (2009) performed a systematic review of all studies that used a Goldberg design to assess gender bias in experimental hiring settings. Taken together, these studies consistently find that, when men and women are applying for positions historically or predominantly held by men, assumed to require agentic behaviors, or any high-status or leadership role, both male and female evaluators, to the same degree, rate women applicants as being less competent, less hirable, and deserving of a lower salary than identically credentialed men. Isaac et al. (2009) found no change in the existing gender bias in evaluating women for employment in such male-gendered roles over 30 years of research.

Multiple experimental studies demonstrate that implicit gender bias disadvantages women in performance evaluations (Biernat & Fuegen, 2001; Castilla, 2008; Goldin & Rouse, 2000). For example, Heilman (1995) showed that, although working managers from a range of industries described female managers as more competent and active than women in general, they also described them more negatively than male managers, specifically as less competent, less active and potent, less emotionally stable, less independent, and less rational. Given that stereotypes of women suggest they will not be successful when engaging in activities traditionally reserved for men, lower expectations for their performance based on these stereotypes influence the interpretation of their performance in a given role in that they are given less credit or viewed less positively for the same

quantity and/or quality of work as a man (Heilman, 2001). Even when a woman produces an identical product to a man, research has shown her work to be regarded more negatively (Heilman, 1995; Nieva & Gutek, 1980). Several conditions have been shown to facilitate this devaluation of women's performance, including ambiguity in evaluation criteria that can lead to distortion of information so that it fits preconceived ideas (Fiske & Taylor, 1984; Heilman, 2001; Nieva & Gutek, 1980), lack of structure in the evaluation process that allows room for cognitive distortion (Heilman, 2001), and denying of credit to women for successes (Deaux & Emswiller, 1974; Heilman, 2001, 2012). These conditions can be addressed through the implementation of clearly outlined promotion decision processes that are based on judgment of quantifiable or objective measures of success rather than qualitative measures, such as personality characteristics.

Relevant to the underrepresentation of women among CSD PhD recipients, Moss-Racusin, Dovidio, Brescoll, Graham, and Handelsman (2012) conducted a Goldberg design study to test for differences in faculty perceptions and treatment of an equivalent male (John) or female (Jennifer) student applying for a position in science. They focused on hiring for a laboratory manager position as the primary dependent variable of interest because it functions as a professional launching pad for subsequent opportunities. Results revealed that both male and female faculty in several scientific disciplines judged the female student to be less competent and less worthy of being hired than the identical male student and would also offer her a smaller starting salary and less career mentoring. The findings in this controlled experimental study may be relevant in considering whether similarly performing male and female CSD students are evaluated and mentored differently and whether these differences encourage different career choices within CSD.

4. Women May Suffer Backlash for Engaging in Agentic Behaviors (Self-Promoting, Negotiation)

Gender stereotypes can be merely descriptive (e.g., men are overrepresented among doctoral degree recipients and chair positions in CSD), prescriptive (e.g., men are agentic so they should strive to achieve high-status positions and awards; women are communal so they should occupy subordinate roles), or they can be proscriptive (e.g., women should not compete for high-status awards or positions; men should not be submissive). Research has shown that individuals who violate the resulting "gender rules" are often perceived unfavorably (Heilman, 2001; Heilman et al., 2004; Rudman & Glick, 2001). For example, while self-promotion may be necessary for demonstrating competency in one's profession or negotiating for adequate resources, women who self-promote or negotiate may suffer social reprisals for demonstrating more stereotypically male than female behaviors (Amanatullah & Morris, 2010; Bowles, Babcock, & Lai, 2007; Rudman, 1998). Similarly, women who demonstrate more agentic qualities are more likely to be viewed

as cold (Wiley & Eskilson, 1985), interpersonally hostile, and hard to work for (Heilman & Okimoto, 2007). Importantly, as products of the same system that generates and reinforces these gender rules, men and women both hold these biases against those who violate them (Heilman et al., 2004).

Furthermore, the internalization of gender rules by girls and women leads to what Laurie Rudman's research group has called *fear of backlash*. Serving as an internal check to prevent girls/women from behaving too agentically, fear of backlash reinforces and effectively maintains the accepted norms for female behavior (Moss-Racusin & Rudman, 2010). Kolehmainen, Brennan, Filut, Isaac, and Carnes (2014) demonstrated fear of backlash among women physicians who needed to lead cardiopulmonary resuscitation efforts in a highly agentic manner. For example, these physicians repeatedly described their concern about being perceived as "bossy" while they were directing members of the team to perform essential tasks in this literally life-or-death clinical situation. Fear of backlash can lead women in CSD to alter their behavior to avoid breaking gender rules. Specifically, female doctoral applicants or faculty who possess more agentic traits or engage in "self-promotion" may be viewed less favorably by violating these gender rules, which could limit their opportunities for career advancement.

5. Gender Bias in Evaluations for Research Funding and Awards May Disadvantage Women

Competing successfully for funding to support a research program is essential to academic career advancement in any health-related field. Typically, junior faculty compete for the National Institutes of Health (NIH) Career Development (K) Awards—K01s support investigators with research doctorates (i.e., PhD), and K08s and K23s support clinical doctorate holders (e.g., MD, DDS, or clinical PhD) performing basic or patient-oriented research, respectively (NIH, 2011). The purpose of the K award is to prepare investigators to lead an independent research program, most commonly realized through subsequent receipt of an investigator-initiated award such as an NIH R01 (NIH Office of Extramural Research, 2015). Although slightly more male than female investigators apply for K awards each year, similar award rates are observed for male ($M = 37.5\%$) and female applicants ($M = 36.9\%$; Figure 1; Jagsi et al., 2011; Jagsi, Motomura, Griffith, Rangarajan, & Ubel, 2009; Ledin, Bornmann, Gannon, & Wallon, 2007; Ley & Hamilton, 2008; Martinez et al., 2007; NIH, 2014a, 2014b, 2014c, August 29, 2011, pp. 32–53; Pohlhaus, Jiang, Wagner, Schaffer, & Pinn, 2011). However, proportionately fewer female than male K awardees apply for subsequent R01 awards ($M = 56.7\%$ vs. 68%), and female K awardees have lower R01 award rates than males ($M = 65.3\%$ vs. 71.6%). Studies of K awardees find that women receive lower salaries and fewer resources (including less administrative and technical support), experience more unfair treatment, and face more barriers to developing mentor relationships and

negotiating work–life balance than men (Jagsi et al., 2011, 2012). Interviews with former K awardees and their mentors by DeCastro, Sambuco, Ubel, Stewart, and Jagsi (2013) have also revealed that academic career persistence can hinge on the ability to respond proactively to critical feedback from peer review and that male scientists may be more resilient than females to negative feedback. In a content analysis of written critiques of K award recipients, Kaatz, Dattalo, Regner, Filut, and Carnes (2016) found subtle evidence of more encouragement and detailed advice to male than female applicants.

The ability to obtain and renew Research Project Grant (R01) funding from the NIH is critical to advance within academic science. Although male and female applicants are similarly successful in obtaining new (Type 1) R01s, female investigators have lower success rates for R01 renewals (Type 2), and this has remained consistent over the past 15 years (NIH, 2015). Implicit bias favoring men in both science and leadership predicts that these senior women investigators who are scientific leaders would be most disadvantaged in evaluation. Text analysis of written critiques of NIH R01 reviewers lends some support to this. In this study, Kaatz, Lee, et al. (2016) examined 739 NIH R01 critiques and scoring for differences due to the sex of the principal investigator. They used seven word categories for text analysis (ability, achievement, agentic, negative evaluation, positive evaluation, research, and standout adjectives). Significantly, more Type 2 applications from female investigators had words of praise and standout adjectives (e.g., "excellent," "outstanding"), but their applications had been assigned significantly worse priority, approach, and significance scores than those from comparable male investigators. These findings suggest that subtle gender bias may operate in scientific grant peer review, especially for R01 renewals.

As noted above, ambiguity in performance criteria creates a situation ripe for the influence of implicit bias, because well-established stereotypes will be assumed in the absence of specific information. This is especially likely to occur when highly abstract terms that trigger a male stereotype are used in the performance evaluation. Carnes and colleagues (Carnes, 2006; Carnes et al., 2005) noted that the frequent mention of the male gender–associated words such as *risk*, *high risk*, and *technological breakthroughs* by the NIH in emphasizing the type of scientist envisioned for funding in the first round of the NIH Director's Pioneer Award may have accounted for the absence of women in the first round, especially when removal of this emphasis resulted in women among award recipients in subsequent rounds. Marchant, Bhattacharya, and Carnes (2007) examined whether use of the word *leader* in the tenure criteria of 24 top-ranked academic medical centers influenced a woman's likelihood of promotion. They found the tenure criteria with "leader" were ambiguous and may promote activation of subtle gender bias that holds women back from advancing (more male applicants will be described as leaders than female applicants; Marchant et al., 2007). Whether it is a female doctoral student applying for a training award (F31, F32), a female early-career faculty member in CSD

applying for a K award, or a more established female faculty member in CSD attempting to obtain her first R01, all of these women in CSD, regardless of career stage, are susceptible to the effects of implicit gender bias on the NIH funding success. Obtaining research program funding is an important determinant of academic career success, and women considering academic CSD careers may be discouraged by a hypercompetitive funding environment that also places women scientists at a significant disadvantage.

6. Assumed Authority Effect May Subtly Socialize Men Toward and Women Away From Leadership Roles

Men and male-associated traits and behaviors are imbued with higher status in our society than women and female-associated traits and behaviors, providing a role congruity advantage for men in all high-status and leadership roles (Ridgeway, 2001). The opposite is true for women in that the role incongruity for women in leadership positions may result in socialization of women away from the pursuit of such roles. This explains why, even in the face of data confirming no difference in the effectiveness of men and women in any professional or leadership role (Eagly, Johannesen-Schmidt, & van Engen, 2003; Rosser, 2003), there remains the implicit assumption that occupational roles predominantly performed by men are more valuable (e.g., require more innate gifts, command higher salaries) than those performed by women and that work performed by men in all fields is more valuable than work performed by women (Ridgeway, Bourg, Eagly, Beall, & Sternberg, 2004). Women who excel in roles that are traditionally male in our culture, thereby violating gender stereotypes, may advance through the lower ranks of their organization but may be hindered in their promotion to a higher level due to the perceived role incongruity and discordance between their gender and the position (Heilman, 2001; Lyness & Judiesch, 1999).

The conflation of gender and status is observed even within female-dominated fields where men are overrepresented in leadership and receive higher salaries for comparable work. For example, nursing is a profession with 7%–9% men, yet male nurses are paid approximately $5,148 more per year when adjusted for factors such as education and experience (Muench, Sindelar, Busch, & Buerhaus, 2015; Pecci, 2015). In a series of interviews with male librarians and nurses, Simpson found that men acknowledged benefitting from assumptions that they had leadership ability (the assumed authority effect), by being given differential treatment (the special consideration effect) and being associated with a more careerist attitude to work (the career effect; Simpson, 2004). As in CSD, men are more likely than women to ascend into leadership positions in multiple female-dominated fields. This assumed authority effect may also impact male students in that they may receive more opportunities for leadership in research at earlier stages in their training as compared with women, resulting in more impressive applications for doctoral programs.

In academic environments, research is of higher status than clinical work, and success in research is required for access to all subsequent high-status achievements, such as recruitment into a faculty position, eligibility for prestigious awards, and advancement to department chair. Implicit gender bias robs all fields of potential contributions of talented women. However, even with a diminished pipeline of potential leaders, as long as an academic field has a sufficient number of men earning PhDs entering academic careers, it can replenish its ranks at all levels. It appears that this is not the case in CSD where there are too few men to fill its faculty vacancies. Cultural stereotypes and the implicit gender bias and role congruity they give rise to may be particularly damaging to CSD because these cognitive processes—however unintentionally—could play a consequential role in gender disparities in CSD career pathways and research awards that pave the way for success and lead to faculty positions in numbers sufficient to sustain the field.

7. Women Leaders Are Vulnerable to Stereotype Threat

When implicit bias is present, it can be manifested in a variety of ways that are often not apparent to the individual or to those they are interacting with. *Stereotype threat* refers to a person's anxiety or fear that their performance on a difficult task will confirm a negative stereotype about their group (Pennington, Heim, Levy, & Larkin, 2016; Steele, 1997). Studies have also shown that women, but not men, expect to be negatively stereotyped with lower expectations for their leadership performance (Cohen & Swim, 1995; Nosek, Banaji, & Greenwald, 2002). Being a token minority or having solo status as the only member of a group can trigger stereotype threat. One study showed that women who were randomly assigned to perform a math test in the absence of other women performed poorer than those who performed the test in the presence of other women (Sekaquaptewa & Thompson, 2003). Schmader, Johns, and Forbes (2008) examined the processes underlying these stereotype threat effects and proposed that performance is affected in three distinct but interrelated ways: (a) heightened physiological stress responses that impair prefrontal processing, (b) a tendency to actively monitor performance, and (c) efforts to suppress negative thoughts and emotions in the service of self-regulation. These combined mechanisms consume executive resources and deplete working memory, thereby affecting performance. Burgess et al. (2012) noted that many features of environment in academic medicine could invoke stereotype threat in women leaders. Despite this stereotype threat, women were found to be at least as effective leaders as men in academic settings (Rosser, 2003).

These conditions are not unique to academic medicine and can be relevant to women's career advancement toward faculty positions and leadership in CSD. They include the frequent emphasis on leadership job requirements that are inconsistent with female gender stereotypes (e.g., strong, decisive leader who will take charge) rather than emphasizing neutral or stereotypically female stereotypes (e.g., collaborative, able to develop beneficial relationships within and beyond the organization); women's token minority and solo status in leadership, which makes gender salient; reinforcement of gender hierarchy because supportive nonleadership roles are filled largely by women; and overt sexism, discrimination, and harassment. Even when women advance (into doctoral programs or faculty or faculty leadership), these conditions, if present, have the potential to induce stereotype threat.

Others Factors That May Contribute to the Faculty Shortage in CSD

While it is paramount to critically examine implicit gender bias in relation to the CSD faculty shortage, it is also important to recognize other potential underlying forces. Within the PhD programs in a CSD report published in 2016, the low number of quality applicants was one of the top two reasons cited by those interviewed from 73 CSD programs regarding the challenges faced in recruiting and retaining doctoral students (ASHA, 2016). Given that the majority of applicants to CSD doctoral programs are women, implicit bias could certainly impact the evaluation of program candidates resulting in a greater number being considered "low quality." However, it could also be that undergraduates are not adequately exposed to research or given opportunities in CSD programs affecting their readiness for doctoral training. This same report included a list of other factors that, either alone or in conjunction with implicit gender bias, likely contribute to the issue (ASHA, 2016). These factors can be broadly characterized as related to either the academic environment or personal factors. The academic environment factors are interrelated and include limited research experience opportunities for undergraduate and master's degree students, insufficient faculty/mentor availability, difficulty in sustaining funding streams, and a low number of quality applicants. Personal factors identified include geography with respect to CSD doctoral programs, life circumstances (e.g., unable/unwilling to relocate), and family commitments (ASHA, 2016). Although it is advantageous to examine each of these factors independently, it is difficult to assess them without at least considering the potential contributions of implicit gender bias in each case. For example, given that the rate of males entering doctoral programs in CSD is already disproportionately high, statements about low numbers of qualified applicants can be interpreted as an inadequate number of qualified female applicants. For the several reasons highlighted above, implicit gender bias may disadvantage female students in terms of seeking out leadership roles, self-promoting, seeking out appropriate mentorship, and engaging in research experiences that will make them competitive doctoral program applicants.

Some have suggested personal or family factors when explaining differences in promotions and salaries, but data are conflicting (Edmunds et al., 2016). One study controlled for location and being on tenure track and still found that

men were more likely to be promoted and tenured (Wright et al., 2003), suggesting that it is more complex than not relocating geographically for promotional opportunities or tenure intentions.

Compensation also could influence the gender composition of CSD. The median salary for those practicing clinically in general health care settings is $81,656 as compared with the median salaries for assistant and associate professors in CSD at $65,000 and $75,433, respectively (ASHA, 2017c; CAPCSD, 2016). Despite the fact that women comprised 69% of faculty in CSD in 2016, male faculty had a base salary (M = $86,327) of $9,118 more than female faculty (M = $77,209), $t(1279)$ = 6.1794, p < .0001. When examining salary by gender and rank, this difference was greatest for those at the full professor rank with male faculty receiving a base salary of $11,023 more than female faculty, $t(366)$ = 3.7641, p = .0002 (see Table 3). Given this established pay gap for female faculty in CSD, the difference between clinical and academic salaries is a more substantial margin for women specifically and could therefore influence career choice (Jagsi et al., 2012; Jena, Olenski, & Blumenthal, 2016).

Intersection of Race and Gender Stereotypes

It is important to acknowledge the intersectionality of gender and race because the vast majority of research on the impact of gender stereotypes on women's academic career advancement has focused on White women. The non-White racial composition of ASHA constituents with doctoral degrees is greater than that of overall ASHA membership (14.5% of PhD holders vs. 7.9% of all constituents; ASHA, 2017d). Ghavami and Peplau (2013) found that the general male- and female-gendered cultural stereotypes are those of White men and women, and when asked to consider the intersection of race and gender, the content of the stereotypes differs. For example, Black but not White women were stereotyped as being confident, assertive, and aggressive. Given these differences, Livingston, Rosette, and Washington (2012) set out to determine whether there are different gender rules for White and Black women when they occupy male-typed roles or behave in agentic ways. They found that White but not Black female leaders were rated more negatively for agentic behaviors—presumably because White but not Black women were violating stereotyped assumptions. Black but not White male leaders were also penalized for agentic behaviors. With these findings,

the authors questioned why there are not more Black women in executive positions. They postulated that, even if a Black woman does not experience the same kind of backlash as a White woman for engaging in agentic leadership behaviors, she will still suffer from the stereotyped assumptions of lower competence in these roles both for her gender and her race (Malcom, Hall, & Brown, 1976; Sesko & Biernat, 2010). Therefore, the combined effects of implicit gender and race bias for non-White members of CSD planning to pursue doctoral degrees or faculty positions should be considered and addressed in solutions to mitigate implicit bias.

What Can CSD Do to Mitigate Gender Bias and Foster a Robust Faculty Workforce?

In the discipline of CSD, unlike the field of medicine, little to no research has discussed potential implicit gender bias issues directly. The goal of this article was to initiate dialogue within CSD regarding the potential role of implicit gender bias in the advancement of female faculty and also to spawn future research. It will be important to determine whether the proposed effects of implicit gender bias are tangible barriers that can be identified objectively through rigorous studies. If implicit gender bias is contributing to the female faculty advancement in CSD, a variety of conceptually sound, evidence-based approaches could be considered to help mitigate its impact (see Table 4).

CSD data by gender. It is essential to have objective data to target areas for potential intervention to mitigate the implicit gender bias on career selection and persistence in CSD. Transparency in workforce diversity is a long-used strategy in business, especially when coupled with setting goals and accountability (Bohnet, 2016). National data on the CSD workforce at all levels should be stratified by gender to identify the critical junctures that influence career advancement (i.e., undergraduate recruitment materials, graduate admissions processes, mentorship, award nomination and selection procedures, and leadership opportunities). For instance, the 2015 SLP Health Care Survey Salary report breaks down reported salary data into categories, such as employee status (i.e., full time vs. part time), type of facility, geographic region, years of experience, and other factors known to influence salaries (ASHA, 2015). The current CAPCSD and ASHA joint education survey provides gender data for the number of students enrolled in doctoral programs and the number of students who graduate

Table 3. Average salary in communication sciences and disorders by gender and rank.

Variable	Male assistant professor	Female assistant professor	Male associate professor	Female associate professor	Male full professor	Female full professor
Mean salary	$68,366	$64,941*	$75,983	$77,391	$111,358	$100,335*
SD for salary	$9,804	$10,255	$12,382	$14,370	$31,723	$24,303

*Statistically significant difference between salaries for male and female faculty.

Table 4. Strategies to reduce implicit gender bias to address the faculty shortage in communication sciences and disorders (CSD).

Provide objective data on gender in CAPCSD and ASHA surveys of CSD academic programs.

Emphasize the communal aspects of an academic career in doctoral program recruitment materials to emphasize the caring and improving quality-of-life aspect (role congruity for women) over the technical knowledge and engineering skills required (role congruity for men).

Offer leadership programs during the critical window of the predoctoral years to shape trainees' beliefs about their own abilities and subsequent persistence in science. Illustrate how both men and women are successful CSD scholars to help early trainees envision themselves as researchers and leaders in CSD.

Ensure graduate admissions processes recruitment materials offer a diverse snapshot of the field.

Be specific when describing publications and research accomplishments in reference letters for female doctoral candidates or faculty applicants.

Further research studies on implicit gender bias and role incongruity on the decision to pursue doctoral training for graduate students in speech-language pathology and audiology.

Have mentors for graduate students, postdoctorates, and junior faculty undergo training on stereotypes and their potential influence over career choice.

Have objective, descriptive criteria for program admissions, awards, and honor selections.

Have gender-diverse department chair committees use evidence-based strategies for mitigating the influence of implicit bias on the evaluation of candidates.

Ensure job descriptions are free of stereotypically male-gendered abstract terms, such as *strong*, *charismatic leader*, that will favor male applicants.

Report gender in institutional pay summaries to ensure equitable compensation and resource allocation to support the career advancement of male and female faculty.

Note. CAPCSD = Council of Academic Programs in Communication Sciences and Disorders; ASHA = American Speech-Language-Hearing Association.

but does not provide gender-specific data regarding those who withdraw from doctoral programs, fill postdoctoral positions, apply for faculty positions, fill open faculty positions, are employed part time versus full time as faculty, or receive NIH funding.

Additionally, the data that exist regarding potential explanations and solutions for the faculty shortage in CSD come largely from the current faculty and CSD programs and not from the undergraduate and graduate students considering this career path (ASHA, 2016). It would be potentially more informative to administer surveys to students in CSD in order to gather information regarding reasons to pursue or not pursue doctoral training. One survey focused on defining characteristics of males and females in graduate speech-language pathology programs found that nearly equal numbers (~76%) of males and females at the master's level have considered pursuing a PhD at some time in the future. When asked if they would actually do so in the next 10 years, 67% of males and 77% of females thought there was a greater than 50% likelihood that they would enroll (Lof et al., 1999). Given that a higher proportion of

men in the field end up obtaining doctoral degrees, further research focused on factors that influence the decision to pursue or not pursue doctoral training is needed. These data would inform the design of workshops or courses for students in CSD.

Messaging in CSD. The images and words used in messages about CSD should be critically examined. Emphasis on the agentic aspects of the field (e.g., technical skills, scientific discoveries) would be predicted to enhance perceived role congruity for male students, encouraging more to pursue academic careers in CSD. Based on the data presented in Table 2, it appears that women and men complete doctoral degrees at similar rates once they have enrolled. Therefore, CSD departments should examine messaging that might increase the appeal of doctoral programs to female students by emphasizing the communal aspects of an academic career, including the ability to mentor others, improve human health, and integrate career and family. Research from Cheryan and colleagues (Cheryan, Master, & Meltzoff, 2015; Cheryan, Plaut, Davies, & Steele, 2009) demonstrated the importance of subtle environmental messages in fostering a sense of belonging in a field. They were able to significantly increase the number of female students who would consider a career in computer science by interviewing them in a room with neutral messaging (nature poster, water bottle, health snacks) compared with one with materials pretested to be stereotypically associated with computer science (Star Trek poster, computer programming books, empty soda cans, and software boxes).

The wording in recruitment materials, position descriptions, and job advertisements should be carefully examined. Gendered wording in job recruitment materials maintains gender inequality in traditionally male-dominated occupations. Gaucher et al. (2011) found that job advertisements for male-dominated occupations employed greater masculine wording (e.g., words associated with male stereotypes such as leader, competitive, dominant) than advertisements in female-dominated areas. Based on these studies and related research, CSD departments should critically examine how they might improve messaging to foster belongingness among women in research environments. Although wording intended to initially recruit individuals into the CSD profession may be more communal (e.g., collaborative, compassion, interpersonal), terms used to describe academic careers in CSD may include wording associated with male stereotypes, which, as a result of role incongruity, discourages women and encourages men to pursue research-focused doctoral degrees and faculty positions.

Avoiding gender bias in reference writing. When providing letters of reference for female students applying to doctoral programs, faculty positions, or ASHA awards, current faculty should carefully examine how the gender of the student may affect the words and descriptors used in their letters. Although experimental studies are lacking, several studies have found that letters written for male and female faculty differed. In general, it is better to be specific (e.g., explicitly mention publications and research accomplishments, avoid reference to applicant's personal life, use

formal titles and surnames for all applicants, emphasize accomplishments and not effort, and avoid abstract descriptors that align with gender stereotypes, such as caring, compassionate, and supportive; Madera, Hebl, & Martin, 2009; Trix & Psenka, 2003).

Using unambiguous criteria for acceptance and promotion. Another strategy that will encourage the advancement of women to doctoral program acceptance, faculty positions, and leadership roles will be the use of clear evaluation criteria for promotion. In music, orchestras have even adopted "blind auditions" to foster the objective selection of musicians who align specifically with hiring criteria (Bohnet, 2016). Quantifiable, objective outcomes that can be tracked should minimize ambiguity during evaluations for acceptance into CSD doctoral programs, faculty searches, and promotion or tenure for faculty. A structured process and timeline for promotion will also be important to minimize the effects of implicit bias on those performing evaluations or deciding when an individual is ready for promotion. Student evaluation metrics that are clearly defined and based on objective milestones will aid in decreasing ambiguity in CSD programs (Gurrera et al., 2014). Training for search committees includes such advice and has been shown to increase the percentage of women recruited into departments that participated in such training compared with those that did not (Sheridan, Fine, Pribbenow, Handelsman, & Carnes, 2010).

Student and faculty bias training workshops. Approaching implicit bias as a potentially remediable habit is one of the few strategies that has been studied in a randomized controlled study. Applying principles of intentional behavioral change used to break other unwanted habits, Carnes et al. (2015) developed and tested a 2.5-hr interactive workshop incorporating principles of behavioral change in a cluster-randomized trial of 92 departments. They found that compared with control departments, faculty in departments that received the workshop intervention reported significantly greater awareness of personal bias, motivation, and self-efficacy to engage in gender equity–promoting behaviors and action to reduce gender bias on a regular basis. Both male and female faculty in the experimental departments compared with the control departments reported significant improvements on feeling respected by colleagues, perceiving that they fit in their department, and being comfortable raising personal obligations even if they conflicted with departmental activities. Most notably for the situation faced by CSD, 2 to 3 years following the bias habit-reducing intervention, departments allocated to the experimental group have a greater percentage of women among new hires than control departments (Devine et al., 2017).

In addition to improving awareness for faculty, educational interventions for students at the undergraduate and graduate level may also be beneficial (Hamilton, 2015). A semester-long course on increasing women's leadership self-efficacy has been shown to result in gains in leadership self-efficacy, personal mastery, and self-esteem (Isaac, Kaatz, Lee, & Carnes, 2012). Incorporating this information as part of the undergraduate speech pathology and audiology

curriculum could encourage more of the female students to pursue doctoral degrees and faculty positions in the future.

Additionally, information regarding implicit gender bias and strategies to address it should be incorporated into ASHA's Leadership Development Program that is offered yearly for ASHA members (ASHA, 2017b). This program currently includes a full-day Leadership Development program face-to-face workshop, webinars over the course of the next year, team participation, and completion of an individual leadership project. A randomized controlled trial in economics used a similar program to treat the "leaky pipeline" with good effects. Developing women leaders—assistant professors—who participated in leadership training aimed specifically for women had more grants and publications than those who did not have the extra training (Blau, Currie, Croson, & Ginther, 2010). Providing bias training to all staff and students and providing female students and faculty with specific leadership and bias-reducing strategies could be effective in establishing gender equity in academic careers within CSD.

Conclusions

In summary, awareness of the multiple ways in which implicit gender bias could limit female faculty advancement in CSD is an essential first step. Once acknowledged, leaders must gather and share data to more clearly understand the extent of the problem. Evidence-based approaches are at hand and must begin with critical examination of the processes and practices at all career levels within CSD. Future research should focus on obtaining and sharing additional data in CSD by gender, designing and assessing the impact of interventions in messaging and gender priming at all recruitment and evaluation junctures in the field, examining the effects of bias habit-reducing workshops to mitigate the impact of implicit gender bias, and implementing leadership self-efficacy training for female students in CSD programs.

Acknowledgments

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