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The Future of Women in Psychological Science

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Abstract
There has been extensive discussion about gender gaps in representation and career advancement in the sciences. However, psychological science itself has yet to be the focus of discussion or systematic review, despite our field's investment in questions of equity, status, well-being, gender bias, and gender disparities. In the present article, we consider 10 topics relevant for women's career advancement in psychological science. We focus on issues that have been the subject of empirical study, discuss relevant evidence within and outside of psychological science, and draw on established psychological theory and social-science research to begin to chart a path forward. We hope that better understanding of these issues within the field will shed light on areas of existing gender gaps in the discipline and areas where positive change has happened, and spark conversation within our field about how to create lasting change to mitigate remaining gender differences in psychological science.

Keywords
women, gender, gender roles, bias, psychology, science

Women[1] make up a large and growing proportion of today's psychological scientists (American Psychological Association [APA] Committee on Women in Psychology, 2017; Ceci, Ginther, Kahn, & Williams, 2014). Women are increasingly visible in leadership positions: They head prominent laboratories, departments, and professional societies; play key roles in navigating the direction of psychological science; and are mentoring the next generation of scientists. Nevertheless, some gender gaps persist. Women in psychological science who secure tenure-track positions publish less, are cited less, hold fewer grants, are less likely to be represented in the field's most eminent roles, and do not earn salaries comparable with those of men (e.g., APA Committee on Women in Psychology, 2017). In addition, women psychology professors and instructors may be asked to perform less valued roles in their departments and may be judged more negatively by students and trainees compared with men (e.g., Schmidt, 2015).

Psychological science certainly is not the only academic field with gender gaps in career advancement, but it is distinctive in at least two ways. First, psychological science is uniquely positioned to confront these issues because it is a field that studies and intervenes in the mechanisms of human behavior and behavior change. Indeed, psychological scientists have long articulated the importance of considering gender in psychological research and practice (e.g., Deaux & Stewart, 2001; Hyde, Bigler, Joel, Tate, & van Anders, 2018; Lloyd & Archer, 1981). Given that psychological science is at the nexus of other fields (Cacioppo, 2007), effective changes in psychology have the potential to catalyze change for women in the broader academic community and beyond. Second, as we summarize below, psychological science has a greater percentage of women in early career stages than do many other scientific fields. Yet there is some evidence of a numerical imbalance in the opposite direction in later career phases, suggesting that the examination of gender gaps in psychological science may offer insight into the mechanisms or reasons for this balance "flip" in our field and science more broadly. Yet neither a systematic summary of the factors that contribute to existing gender gaps in career outcomes nor suggestions for how to understand and eliminate those gaps in psychological science currently exist.

Our article has three central goals. First, we aim to raise awareness of remaining gender gaps in psychological science within the domains of career advancement, financial compensation, and service (see Fig. 1) and highlight where there are no longer gaps. Throughout this review, we use evidence-based, peer-reviewed studies whenever possible, but note that the most comprehensive review of these issues within psychological science is in the APA Committee on Women in Psychology (2017) report on careers of women in psychology, which was not subjected to peer review. When data specifically relating to psychological science are not available, we discuss and note relevant data from other fields, with the caveat that these findings may or may not be generalizable to our field. Our review suggests historical gender differences in the rates of hiring, tenuring, and promoting women and on many measures of academic success (e.g., grants, eminence) in psychological science. Fortunately, many of these gaps appear to have closed, with evidence that women may even be advantaged in some domains (e.g., hiring, awarding of certain grants). Nonetheless, the data also point to some domains in which gender gaps favoring men remain in our field. For example, women psychology PhDs are less likely to enter tenure-track positions, are less productive (by many metrics), are paid less, are less eminent, and may be asked to spend more time on service than men.

Second, we aim to identify mechanisms to explain why these gender gaps remain in some domains, thus suggesting areas for research and/or intervention. We do so by focusing on three levels of analysis: (a) *systemic*

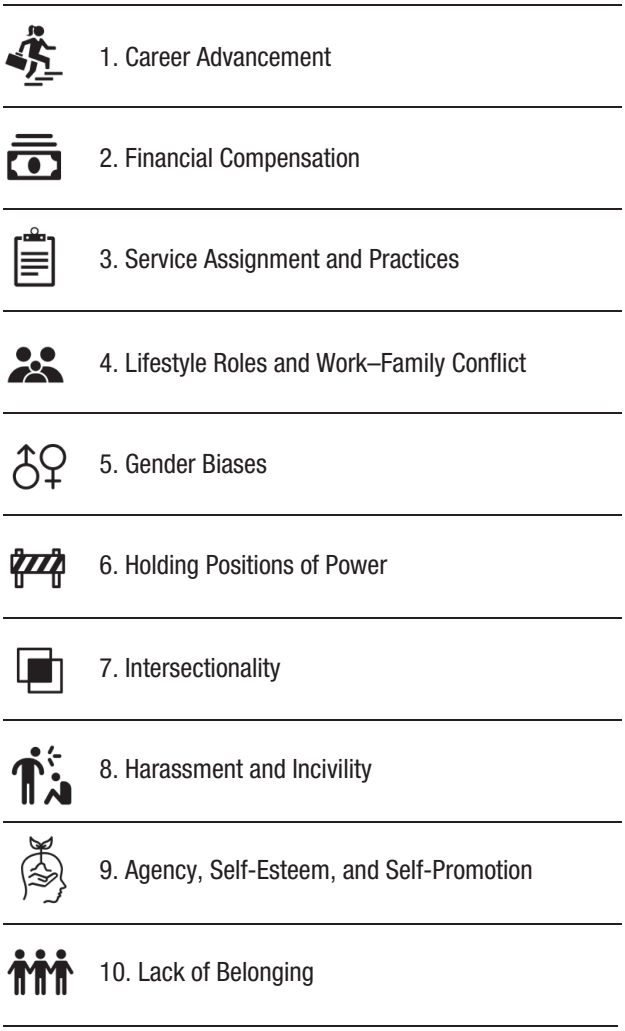

Fig. 1. Ten issues affecting the future of women in psychological science: Issues 1 to 3 involve examples of gender gaps facing women in psychological science. Issues 4 to 10 summarize possible systemic, interpersonal, or intrapersonal mechanisms that may help account for those disparities. This list is not intended to be exhaustive or to be a discussion of all of the relevant issues, or underlying mechanisms, affecting the future of women in psychological science.

or structural factors within the broader culture that affect the different roles that women and men occupy, (b) *interpersonal* factors that affect the degree to which women's contributions are recognized and respected by others in their field, and (c) *intrapersonal* factors that shape women's choices and behaviors. We note that challenges occurring at any of these levels are likely to be interrelated. We also recognize that variation is likely to exist within psychology; some departments, programs, societies, and subdisciplines are doing a better job than others at creating a culture of inclusion that has accountability structures in place, fosters norms of supportive interactions, and generally promotes a sense of belonging for women and men alike. Whenever possible, we focus explicitly on data about, or conducted by, psychological scientists. Although the causes and consequences of the findings are complex and multiply determined and do not always permit strong inferences about putative mechanisms, they do provide a broad working picture of the state of the field and facilitate hypotheses for future research.

Third, we suggest ways in which existing gender-based differences might be reduced. We do so by offering evidence-based solutions, when available, to stimulate discussion within our field about best practices for increasing inclusion and advancement for women, especially those with intersecting identities, and highlighting where future work is needed. We conclude by emphasizing the importance of using this future work to initiate generative discussions in our field.

Gender Gaps in Psychological Science

The first three issues we review concern training and career outcomes between women and men that are relevant to career advancement in psychological science: career advancement (Issue 1), financial compensation (Issue 2), and service assignment and practices (Issue 3).

Issue 1. Career advancement

The field of psychology has changed dramatically over the past century with respect to gender representation. Nonetheless, some gender gaps in career advancement persist across stages of the academic career. As described below, women are initially overrepresented in psychological science at the undergraduate level (and in some graduate subfields), have roughly equal representation in early career stages, but are underrepresented at senior faculty levels. As women's careers progress, gender gaps appear in metrics of career success, including publications, citations, grants, and other indicators of eminence (e.g., Eagly & Miller, 2016). Relevant to career advancement, we review five "subissues": (a) training and tenure-track positions, (b) promotion and tenure rates, (c) publication and citation rates, (d) grant submission and receipt, and (e) markers of scholarly eminence.

Training and tenure-track positions. The rate at which women enter the training pipeline in psychological science is at an historic high. In the United States, some estimates indicate that 78% of undergraduates and 71% of graduate students in psychology are women (National Science Foundation [NSF], National Center for Science and Engineering Statistics [NCSES], 2018). Following graduate or postdoctoral training, however, women are less likely

than men to apply for tenure-track positions in psychology (APA Committee on Women in Psychology, 2017; Webber & González Canché, 2018) and are overrepresented among adjunct professors and university administrators (APA, 2017).

In recent decades, the women who do apply for tenure-track jobs are equally if not more likely to be hired than men. Furthermore, single women without children in psychology programs (other than clinical psychology) are 8.7% more likely than single men without children to obtain a tenure-track job within 6 years of receiving a PhD (Ginther & Kahn, 2014). A similar trend is observed across science, engineering, and mathematics over the past two decades (National Research Council, 2010). Experimental evidence also points to a possible hiring advantage *for* women over men in STEM (science, technology, engineering, and mathematics) tenure-track academic positions, including psychology (W. M. Williams & Ceci, 2015). Specifically, when faculty participants were asked to indicate in a survey how much they would want to hire a hypothetical job candidate for an assistant professor position, there was a 2:1 preference for candidates who were women compared with candidates who were men (i.e., 4.28% of women were hired compared with 2.03% of men) when they were described as equally well qualified. However, when a highly qualified woman or man was described as slightly less accomplished than her or his male or female counterpart, respectively, the preference was for the more highly qualified in both cases, indicating a lack of bias (Ceci & Williams, 2015). Thus, women in general appear to fare well with regard to completing doctoral degrees and obtaining tenure-track faculty positions, if they apply for them, compared with men.

Promotion and tenure rates. Longitudinal data indicate that historical gender gaps in promotion and tenure rates are closing or have closed in psychology in recent years (e.g., Ceci et al., 2014; Ginther & Kahn, 2014; Webber & González Canché, 2018). Ginther and Kahn (2014) found no gender differences in tenure rates for social-science faculty members who completed their doctoral degrees after 1999. Box-Steffensmeier et al. (2015) also found that psychology was one of the few social sciences that did not at the time of publication show gender disparities in promotion rates or time to promotion from assistant to associate professor. Thus, psychology appears to be doing well and comparatively better than other fields in closing the gender-parity gap in early career advancement.

There remains a gap, however, between the number of women and men represented in posttenure careers in psychological sciences (Ceci et al., 2014). Multiple sources of data also suggest that women remain underrepresented at the more senior career phases, including the rank of full professor (Ginther & Kahn, 2014). One interpretation of this reduction in more senior women scholars is that there is a "leaky pipeline" (e.g., Alper, 1993) whereby women leave the field at higher rates than men as they progress to more senior phases of their careers. A second interpretation is that the narrowing of gender differences in early-career phases has not yet had time for those women to reach more senior career phases, thus underscoring the need for greater longitudinal, as well as cross-sectional, generational research on this topic. A third interpretation is that there are gender differences in factors that relate to career advancement. We discuss some of these possibilities next.

Publication and citation rates. Evidence indicates that there are gender differences in both publication and citation rates between men and women scientists, although the gender gap in publishing rates has narrowed over time in the sciences as a whole (e.g., Hart, Frangou, & Perlis, 2019; West, Jacquet, King, Correll, & Bergstrom, 2013; see also Duch et al., 2012; Larivière, Ni, Gringas, Cronin, & Sugimoto, 2013; see van den Besselaar & Sandström, 2016, for longitudinal data from the Netherlands). For example, evidence from the JSTOR corpus spanning the sciences and humanities (i.e., not psychological science specifically) indicates that women publish less than men overall (e.g., women are authors on only 27.2% of publications represented in JSTOR between 1990 and 2011), and women are less often listed in leadership roles as first or last author compared with men (West et al., 2013). Furthermore, for every published article found, the first author was nearly two times more likely (1.93) to be a man than to be a woman (Larivière et al., 2013). Early findings suggest that gender gaps in publication rates may be especially apparent during the ongoing coronavirus pandemic (e.g., Viglione, 2020), underscoring the need for future research examining the impact of seismic shifts in work–family life, acute stress, and financial instability on publication rates for women compared with men.

This publication gap is also evident in psychology, in which men in psychological science publish more articles per year than women across most career stages. Specifically, Odic and Wojcik (2019) examined gender differences in publications and citations in psychology, focusing on 130 high-impact peer-reviewed journals, 770,000 authors, and more than 200,000 unique publications between 2003 and 2018. In results that replicated previous findings in academia more broadly, Odic and Wojcik reported a higher percentage of men (55.8%) than women (44.2%) were authors of psychology articles. There was notable variation by subdiscipline: Sensation and perception (29.9% women authors) and

neuroscience (36.5% women authors) showed the largest gender differences, whereas clinical (48.9% women authors) and health (52.2% women authors) showed gender parity, and developmental psychology showed greater representation of women (59.5%). These numbers are at least partly a function of differences in gender base rates across subdisciplines (e.g., more women in developmental psychology; Odic & Wojcik, 2019). Regardless of discipline, however, the authors reported that the prevalence of women authors declined linearly as the journals' impact factors increased ($\beta = -0.05$, $R^2 = .06$), and one of the largest gender gaps was in review journals: Only 30% of first authors were women (Odic & Wojcik, 2019). Among empirical and review articles, there was little difference in the gender of the first author (indicating a leadership role; 50.4% were women). However, women were significantly less likely to be the last author, which in some fields—and increasingly in psychology, particularly subfields that interface more with biological sciences and medicine, such as neuroscience—is reserved for more senior authors or principal investigators (36.1% women). This recent review points to persistent gender differences in productivity.

Citation rates and *h* indices[2] are an important metric of a researcher's impact and there remain significant gender gaps in both of these metrics. Within psychology, men's articles are cited roughly 1.3 times more than women's are (Odic & Wojcik, 2019; see also Eagly & Miller, 2016), and women's *h* indices are roughly 4.47 points lower, regardless of age or career stage (Geraci, Balsis, & Busch, 2015). The higher base rate of articles published by men compared with women naturally affects citation rates and *h* indices—if women have fewer articles overall, they will be cited less. In addition, if women publish fewer articles in high-impact journals (Odic & Wojcik, 2019), then their work may be cited less frequently. However, Odic and Wojcik (2019) found that even when women do publish in top-tier review journals, their work is cited less frequently than men's. This is especially the case when women are sole authors. Thus, citation differences may not be entirely attributable to productivity differences.

Gender differences in self-citation may also contribute to the observed gender differences in citation rates. Citing one's own work increases an author's overall impact across the sciences (e.g., Fowler & Aksnes, 2007), and men self-cited 56% more than did women across 1.5 million research articles in the JSTOR database published between 1779 and 2011 (King, Bergstrom, Correll, Jacquet, & West, 2017). Among articles published in only the past 20 years, 70% had more self-citations by men than by women (M. M. King et al., 2017). In psychological science, self-citation rates are about 50% higher for men than for women (4.1% of articles with male first authors include self-citations compared with 2.1% for female first authors), and male psychological scientists self-cite more frequently than men in the majority of other academic disciplines (Ghiasi, Larivière, & Sugimoto, 2016).

Taken together, the evidence suggests that at every career stage, men publish about 50% more articles than do women. This gender gap in productivity varies by subdiscipline in psychology but is most pronounced in some of the most influential journals in the field. Not only do men publish more, but also their articles tend to be more highly cited. *h* indices in neuroscience, biology, and evolutionary science are best predicted by number of publications, publishing in top journals, and the number of distinct journals in which one has published (e.g., Acuna, Allesina, & Kording, 2012), which means that gender gaps in publication numbers may ultimately limit women's impact on—as well as advancement in—the field. However, *why* women publish less on average than men remains unclear, and we explore this question in subsequent sections.

Grant submission and receipt. Receiving grant funding is another important index of success in psychological science. In the biomedical and health sciences, gender gaps appear to favor women regarding mentored grant awards[3] received in the early stages of one's career (Ley & Hamilton, 2008). For example, in 2008, women submitted 55% of K01 grant applications and received 57% of the grants awarded; similarly, they submitted 38% of K99 grant applications and received 42% of the grants awarded (see Chart 1 in Polhaus, Jiang, Wagner, Schaffer, & Pinn, 2011). These statistics do not adjust for percentage representation of women, and some studies suggest that, when adjusted, the number of women among initial applicants and grantees is lower than expected (Hechtman et al., 2018; Polhaus et al., 2011). Across disciplines, women apply for (Hechtman et al., 2018; Ley & Hamilton, 2008; Polhaus et al., 2011; U.S. Government Accountability Office, 2015) and hold (Ginther & Kahn, 2014; Polhaus et al., 2011) only a third of Research Project Grants (i.e., R01 grants) from the National Institutes of Health (NIH) although there are no gender differences for first-time grant recipients (Hechtman et al., 2018; Polhaus et al., 2011). When women do secure funding, they are roughly 3% less likely than men to apply for renewals and subsequent grants beyond their first major award. This difference has diminished in recent years, but when women do submit renewals, they are roughly 3% less likely to receive them than men. When men and women are matched on the year of first funding and renewal submission rate, women and men hold grants for similar periods of time across their careers (Hechtman et al., 2018).

Although there is little evidence that the content of women's grants are reviewed more negatively than

men's, women fare worse in grant outcomes if reviewers are asked to overweight the qualities of the researcher over the quality of the proposed research. For example, Witteman, Hendricks, Straus, and Tannenbaum (2019) evaluated gender differences in outcomes for about 24,000 grant applications to the Canadian Institutes of Health Research Program. The researchers directly compared award rates for a grant mechanism that specifically instructed the reviewers to evaluate the project (75% weight) more than the principal investigator (25%) and a mechanism that focused on the PI (75%) more than the project (25%). Gender differences (4% greater funding rates for men) emerged only when ratings of the principal investigators were more heavily weighted than ratings of the science proposed. In other work, a text analysis of summary statements from funded NIH R01 grant renewals revealed that men were more likely than women to be described as "leaders" and "pioneers" in reviews (Magua et al., 2017; see also van der Lee & Ellemers, 2015). These findings seem more likely to be mediated by men's greater productivity (rather than gender stereotypes about women's and men's capabilities as scientists) because other observational studies and meta-analyses have found either no evidence for gender bias in grant reviews or some evidence favoring women (Hechtman et al., 2018; Marsh, Bornmann, Mutz, Daniel, & O'Mara, 2009). Experimental studies also fail to reveal evidence for gender bias among reviewers of R01 grants (Forscher, Cox, Brauer, & Devine, 2019).

Taken together, the evidence indicates that women are less likely to apply for (and therefore hold) grants than are men, as well as less likely to apply for and secure renewals. Most evidence indicates that when women do apply for grants, they receive them at rates comparable to those of men, as long as reviewers are primarily evaluating the perceived quality of the project as opposed to the scientist, which aligns with other work on the role of decision processes in reducing gender bias in hiring decisions (Bohnet, van Geen, & Bazerman, 2015). One caveat here is that these data on grant awards include but are not specific to psychology; further research is needed to discern whether these general findings are true specifically within our own field, or even vary by subdisciplines. In sum, the primary differences in funding appear to be women's lower rates of initial submission and renewal of major research grants, the reasons for which we consider in later sections.

Eminence. Career progression, publication rates, high-impact publication venues, and grants all ultimately contribute to visibility and eminence in the field. In considering eminence as an indicator of career success, we operationalize it by considering both explicit outcomes (who is deemed to be "eminent," "important," "influential," "a public intellectual") and more implicit outcomes (e.g., who is selected for awards and to give invited talks, whose research is publicly visible, and who is selected for leadership roles). There appear to be clear gender discrepancies in eminence within psychological science in both explicit and implicit outcomes (Eagly & Miller, 2016), and this gender gap appears across both scholarly and popular outlets. For example, a list of the 100 most eminent psychologists of the modern era (classified by the authors as the post–World War II era) cited only 14 women (Diener, Oishi, & Park, 2014). With respect to popular outlets, women in psychological science appear to be underrepresented as public intellectuals beyond the field. For instance, as of August 2019, women accounted for approximately a third (51 out of 143, or 36%) of the psychological scientists listed on the Edge website (https://www.edge.org/), a center showcasing the work of important public intellectuals, and only a quarter (115 of 455, or 25%) of the authors published in the Gray Matter section of *The New York Times* (https://www.nytimes.com/column/gray-matter).

Career awards are another explicit measure of eminence. To our knowledge, no research has systematically summarized differences in awards by gender and subdiscipline over time. Such an analysis would be an important contribution (as has been done only recently for publications and citations described above; Odic & Wojcik, 2019). Although a quantitative analysis of these data is beyond our scope, a preliminary tabulation of gender representation in prestigious awards given to junior investigators (i.e., APA Distinguished Scientific Awards for an Early Career Contribution to Psychology; Association for Psychological Science [APS] Janet Taylor Spence Award for Transformative Early Career Contributions) and senior investigators (i.e., APA Award for Distinguished Scientific Contributions; APA Distinguished Scientific Award for the Application of Psychology; APS William James Fellow Award; APS James McKeen Cattell Fellow Award; and APS Mentor Award) was compiled from data available for APA awards between 2008 and 2017 and awards for APS since its inception (see Table S2 in the Supplemental Material). This preliminary tabulation shows that women and men are roughly even among early-career investigators across APA and APS awards: Women were 47% of recipients for both. However, in senior-investigator categories, more men than women received awards: Women were recipients for 20% to 35% of APA senior-investigator awards and 23% to 29% of the APS senior-investigator awards. Research is needed to determine the extent to which these findings reflect (a) base rates of men and women in senior ranks, (b) gender gaps in productivity, and/or (c) gender-based stereotypes in who is deemed eminent.

Another visible form of eminence involves presenting work at invited colloquia and conferences. One analysis found that across six disciplines (including psychology), men were 1.2 times more likely to be invited as colloquium speakers at the top 50 universities in the United States (Nittrouer et al., 2018); these effects could not be explained by the more senior status of men, by women placing less value on colloquium invitations, or by women being more likely than men to decline such invitations. Relative to the base rates of women members in the Society for Personality and Social Psychology, women were underrepresented as speakers in accepted symposia across 13 years of the organization's annual meeting (Johnson, Smith, & Wang, 2017). Note, however, that women's representation in accepted compared with rejected symposia was similar for the 2 years of data available. Further, results by Johnson and colleagues (2017) indicate that the percentage of invited speakers in an accepted symposium who were women was predicted by the gender of the symposium chairs (i.e., those who organize the symposium, invite speakers, and submit the symposium application); notably, the percentage of women invited speakers correlated with the gender of symposium chairs: all-female chairs = 49.6% female speakers, mixed male and female chairs = 42.5% female speakers, all-male chairs = 33.8% female speakers.

Summarizing the evidence reviewed for Issue 1, women are being hired for entry into tenure-track careers at equal or greater rates than men, and their pathway to tenure is equivalent, but men are still overrepresented at more senior levels. The latter appears to be due to history (i.e., equal entry-level hiring rates are relatively new in our field) and the fact that women's careers are characterized by fewer overt markers of research productivity such as publication rates, citation rates, numbers of grants applied for and renewed. More research is needed to understand the mechanisms that drive gender gaps in productivity. We discuss the possible systemic, interpersonal, and intrapersonal reasons in Issues 3 to 10 below.

Issue 2. Financial compensation

The second issue addresses potential gender gaps in financial compensation that appear to characterize psychological science (as well as other academic and nonacademic disciplines; American Association of University Women [AAUW], 2017; Hatch, 2017). Recent data suggest that this pay gap ranges from 68% to 99%, depending on such factors as rank and institution type (APA Committee on Women in Psychology, 2017; NSF NCSES, 2018). Yet comparing salaries of psychological scientists by gender is not as straightforward as it might seem. First, psychological scientists work within a variety of settings, and patterns vary across types of institutions. Existing salary reports do not always differentiate between research-intensive (R1) institutions and small liberal arts colleges (but see below), nor do they include data from 2-year colleges, nontraditional academic (e.g., nonprofit) or industry settings.

Second, the pay gap in psychology has been minimized at the assistant professor level—96% across all institutions and 99% at R1 institutions (Ceci et al., 2014; see also NSF, 2014)—but widens in more senior faculty. Ceci et al. (2014) found that, across all institutions, women make 94% of what men make at the associate-professor level and 91% at the full-professor level; at R1 institutions, those numbers are 90% and 87%, respectively. It is important to note the reversal across institution type: Whereas the gender pay gap was smaller at R1 institutions (compared with all institutions) for assistant professors entering the academy, it was wider for associate professors and wider still for full professors.

The more recent NSF (2018) salary-gap data are comparable, although they show a slightly larger pay gap: Across all institutions, women's full- and associate-professor salaries were 88% and 92% of men's. These data suggest that although the gender pay gap at the full-professor level may still reflect history to some extent (on average, men have been full professors longer, so their salaries are higher), there may be other factors at play as well. Thus, it is important that we track current cohorts until they become senior faculty, in part because even small initial pay gaps have consequences as a result of compounding effects and impacts on career advancement. A $2,000-per-year pay gap observed for associate professors (APA Committee on Women in Psychology, 2017) would increase significantly over the course of a career. For example, assuming salaries of $73,000 and $75,000 (for women and men, respectively), and a constant 4% raise, the gender pay gap almost quadruples over a 35-year career to $7,900. The difference is even larger if we include employer contributions to retirement savings. In this context, it is important to note that the pay gap has ramifications for women's careers beyond just the financial: A study of more than 5,000 full-time faculty at 2- and 4-year institutions across disciplines found that greater salary disparities were uniquely and negatively associated with women faculty members' job satisfaction (indirect effect, $b = -0.128$) and also had a strong direct effect on intent to remain in academia ($b = -0.43$; Hagedorn, 1996). The extent to which those intents become actions and contribute to the numerical gender gap in the senior ranks of academia in general, and psychological science in particular, is unknown and bears researching.

In addition to salary pay gaps, one study found that men in the biomedical sciences also receive more financial support outside of salaries than women, including larger research start-up funds (men vs. women: median = $889,000 and $350,000, respectively; interquartile range = $283,000–$1,250,000 and $180,000–$775,000, respectively; Sege, Nykiel-Bub, & Selk, 2015). It is unknown to what extent these start-up gaps exist in psychological science and within its subdisciplines; research is needed on this topic not only because it is important per se, but also because of its ramifications. That is, if the differential start-up packages observed in other disciplines also affect women in psychological science, this may contribute to women's lower scholarly productivity relative to peers who are men (e.g., by reducing the ability to collect pilot data to support grant submissions) and may reduce opportunities for conference or other travel that may advance national or international reputation, typically an important metric for promotion.

We turn now to a discussion of factors that may underlie the observed gender pay gap. One obvious possibility is that men are more research productive, as we documented earlier, and thus are given larger raises. Further evidence in support of this hypothesis is the fact that the male–female pay gap widens as one moves through the ranks at R1 institutions (compared with all institutions; Ceci et al., 2014). That is, if research productivity drives salary, then this effect presumably would be stronger for research-intensive positions (e.g., at R1 universities), which does seem to be the case. This explanation, however, raises the question of *why* women are less productive, and smaller start-up funding is a plausible explanation that needs further research. Starting in Section 4, we discuss other potential systemic, interpersonal, and intrapersonal explanations.

An important analysis of gender pay gaps across all academics in New Zealand found that even women with productivity similar to that of men are paid less (Brower & James, 2020), indicating that the pay gap cannot be entirely explained by productivity differences. One researched possibility is how perceived or actual gender norms (Amanatullah & Morris, 2010) may influence a women's ability to negotiate successfully and persistently in the workplace and may particularly contribute to the gender gap (e.g., Kray & Gelfand, 2009). A meta-analysis conducted by psychological scientists sampling over 17,000 participants (including both students and employees) found that women were less likely to initiate negotiations compared with men (Kugler, Reif, Kaschner, & Brodbeck, 2018). Likewise, Babcock, Gelfand, Small, and Stayn (2006) found that men are 2 to 4 times more likely than women to initiate negotiations. Yet other recent data reveal that women may negotiate for increased salary as frequently as men but are less likely to have their requests honored (Artz, Goodall, & Oswald, 2018). Gender differences related to negotiation are relevant not only during first-time employment offers—which involve start-up and summer funding and laboratory space as well as salary—but also with regard to retention offers, which men obtain with higher frequency than women in academia (Blackaby, Booth, & Frank, 2005). One study estimated that 48% of male professors and 37% of female professors receive such retention offers (O'Meara, Fink, & White-Lewis, 2017).

Another large meta-analysis of economic outcomes of negotiation across a wide range of settings (i.e., beyond academia; Mazei et al., 2015) found the same main effect of more positive outcomes for men but went a step further. On the basis of role-congruity theory (Eagly & Karau, 2002), Mazei et al. (2015) identified five moderators that can create a major challenge for women in the context of negotiation. For example, high role incongruity between qualities that have main effects of positive outcomes (e.g., self-assertiveness) and female gender norms puts women in a double-bind: Being both assertive and accommodating in negotiations results in women receiving less. However, these researchers also showed that certain moderators—primarily experience and gaining clarity regarding the parameters of the negotiation (e.g., the possible salary range)—*increased* female role congruity in negotiations and could reverse the main effect of more positive outcomes for men.

In sum, gender gaps in salary levels between women and men remain apparent, primarily at the associate- and full-professor ranks. The gender gap in productivity likely explains part of the gender pay gap, as does less successful negotiation of start-up and retention packages. However, future work is needed to examine whether other systemic, interpersonal, and intrapersonal factors may contribute to these gaps. If gender pay gaps contribute significantly to women's maintained participation in academic fields (Hagedorn, 1996), then future work should examine how gender differences in the rate at which promotion and salary increases are granted (Artz et al., 2018) contribute to women's self-efficacy and job-related satisfaction in psychological science.

Issue 3. Service assignment and practices

Service to one's department, university, and broader scholarly community is an integral part of academic life. Although service is typically required of faculty, it is not typically well rewarded by tenure-and-promotion systems. Very little research has specifically examined the service rates of women within psychology departments,

so we examine gender differences in service at the academy as a whole unless otherwise noted, and we consider the implications of these findings for women in psychological science.

Existing qualitative research indicates important gender disparities in service. For example, women report feeling more overburdened by service (e.g., Acker, 2014) and doing more relational service (e.g., mentoring) than task-oriented service (e.g., committee work) than men do (Hanasono et al., 2018). Yet evidence from quantitative studies provides a less clear pattern of results with respect to gender differences in service (e.g., Antonio, Astin, & Cress, 2000; Guarino & Borden, 2017; S. M. Mitchell & Hesli, 2013). Some studies report that women spend up to 0.6 more hr per week on service than men do (Guarino & Borden, 2017; Link, Swann, & Bozeman, 2008), even after controlling for relevant covariates such as rank, ethnicity, and field (Guarino & Borden, 2017). Other studies find no gender differences in reports of service before (e.g., National Research Council, 2010; Toutkoushian & Bellas, 1999) or after accounting for covariates (e.g., Misra, Lundquist, & Templer, 2012).

Moderating factors may help explain these mixed findings. For example, in the social sciences, when the departmental chair was a man rather than a woman, women performed more than double the departmental service activities per year (Guarino & Borden, 2017). Faculty rank may also play a role in service rates. Whereas little evidence indicates that gender differences exist for assistant professors (who often are explicitly protected from high levels of service), they have been found at more advanced career phases, including both associate professors (nearly 5 hr per week more service for women; Misra, Lundquist, Holmes, & Agiomavritis, 2011; but see also Misra et al., 2012 for no difference when controlling for covariates) and full professors (Guarino & Borden, 2017). By the associate-professor years, women across academic departments reported spending 1.34 more hr per week on service and 1.72 fewer hr per week on research than men do, despite spending more time at work overall (Link et al., 2008).

Findings also suggest that women perform more service that is considered of lower rather than higher status, as well as service that may go unaccounted for (Antonio et al., 2000; S. M. Mitchell & Hesli, 2013; Monroe, Ozyurt, Wrigley, & Alexander, 2008). For example, in a sample of 1,400 political science faculty, women reported supervising the same number of graduate students as men but reported supervising two to three additional undergraduate students (S. M. Mitchell & Hesli, 2013). In this same sample, women were more likely to provide internal service (e.g., departmental committees), whereas men were more likely to provide higher status external service (S. M. Mitchell & Hesli, 2013).

Taken as a whole, the evidence of gender differences in service is sufficient to suggest that they are real, at least by some metrics and in some contexts. However, there is also enough null evidence to suggest that these differences may be inconsistent or variable across institutions, are likely modest in effect size, and may hinge on the type of service being assessed and how it is measured. Moreover, work is needed to examine whether similar differences are found within psychological science specifically. It is also crucial to incorporate data from diverse samples in light of preliminary evidence that women of color experience particularly heavy service loads and may be expected to engage in additional service relating to diversity (Harley, 2008; Turner, 2002). These data highlight the fact that there is much more to learn about the nature, origins, and mechanisms of gender differences in service. It is also important that future research determine the degree to which gender differences in service are linked to observed gender gaps in research productivity.

Summary of Issues 1 to 3

The evidence reviewed thus far suggests some positive news for women in psychological science. Women are attracted to psychology in record numbers as trainees and earn more doctoral degrees in psychology than do men. Moreover, women who choose to enter the academy as assistant professors are as likely as men—or even more likely than men—to be hired and are as likely as men to obtain tenure. These are significant achievements for women in psychological science and signal a positive sea change, especially for early-career scientists.

At the same time, notable gender gaps still exist and warrant attention and greater investigation. Women remain underrepresented in more senior ranks and are less likely to receive distinguished scientist awards and salaries comparable to those of men in these senior positions. Across career stages, compared with men, women are less likely to submit, renew, and hold grants; to have comparable publication and citation rates; or to achieve metrics of eminence such as being considered a public intellectual. Mixed evidence exists for service, although data indicate that women may perform more lower status service than men, and gender gaps in service rates may be most apparent at the associate- and full-professor levels. Women and men spend comparable time at work, but differences in how they use their time (e.g., on teaching and service compared with research) may contribute to differences in productivity and ultimately to other markers of career success (see Ceci et al., 2014).

The extent to which gender differences in publication rates, citations, and grants are affected by broader psychosocial influences that could constrain women's success at institutional, interpersonal, and intrapersonal levels of analysis is unclear and is discussed in subsequent sections. It is critical for future research tracking these gender gaps over time to account for cohort effects; for instance, some reports note contemporary gender parity for assistant professors but gender gaps for associate and full professors. It will be important for additional research to examine and explain variability within psychology, given that these and other factors may be sensitive to professional, organizational, or local norms that are likely to vary by career subfield. We next examine mechanisms that may contribute to gender gaps in Issues 4 to 10 below.

Why Gender Gaps Exist in Psychological Science

Psychological research delineates several ways in which systemic, interpersonal, and intrapersonal factors that are not distinct but rather are interwoven with each other may contribute to existing gender differences. We first focus on the broadest *systemic* mechanisms (Issue 4) and then on *interpersonal* processes that may shape men's and women's behaviors and perceptions (Issues 4–10). We also consider the *intrapersonal* processes that affect women's choices and preferences and may affect career advancement and success (Issues 7, 9, and 10). Note that these levels of analysis are not mutually exclusive; that is, mechanisms that can be traced to broader cultural norms also influence people's interpersonal relationships and preferences. However, identifying these levels of analysis can be a helpful heuristic in beginning to probe what might give rise to gender differences as well as in isolating points for intervention and pursuing a new path forward.

Issue 4. Lifestyle roles and work–family conflict

Systemic factors. We discuss how gender-prescribed lifestyle roles and work–family conflicts that women differentially face may give rise to, or influence, some of the gender gaps described above. We note up front, however, that these issues are not limited to psychological scientists and are confronted by women across virtually all career fields. An overarching *systemic* factor that could explain gender differences in career success is the different culturally prescribed social roles of men and women. Social-role theory suggests that gender segregation into different roles and occupations leads to prevalent cultural stereotypes that men are assertive breadwinners who focus on self-achievement and women are nurturant caregivers who focus on communal goals (e.g., Eagly, 1987; Eagly & Steffen, 1984; Wood & Eagly, 2012). These gender-based stereotypes, along with the biological practicalities of childbirth and early child rearing, contribute to societal systems in which women are expected to be—and frequently are—the primary caregiver in heterosexual families. For example, in 2016, American mothers reported spending 75% more hr per week on childcare than did fathers (14.0 vs. 8.0 hr; Geiger, Livingston, & Bialik, 2019).

The *systemic* pressure for women to serve disproportionately as caregivers may also contribute to women's lower rates of publishing and research eminence as well as higher rates of service across many academic fields (e.g., Finkel & Olswang, 1996; Wolfinger, Mason, & Goulden, 2008). First, pressure to serve as caregivers may make women opt out of tenure-track positions in the first place. Women who endorse traditional systemic gender roles (e.g., that women are caring and men are competitive) may opt out of STEM fields at greater rates compared with stereotypically feminine careers (b = 0.85, $\beta = 0.43$, $p < .001$; Diekman, Brown, Johnston, & Clark, 2010). In a survey of doctoral students in the sciences, including psychology, who had shifted away from becoming a professor with a research emphasis, 44% of women (compared with 20% of men) cited child-rearing issues as a reason (Goulden, Mason, & Frasch, 2011). Moreover, among graduate students, including those in psychology, preferences to enter the tenure track are dampened by the lack of visible women mentors who have children (e.g., women doctoral students are 34% more likely to consider research-intensive universities to be family friendly if they are in departments in which women faculty have children; Mason, Wolfinger, & Goulden, 2013). Such structural factors may contribute to women in psychology being more reluctant to disclose information regarding parenting or pregnancy status or more hesitant to discuss family plans with advisors (e.g., Goulden et al., 2011). Given prevailing gender norms for caregiving, these factors do not affect men in equal measure.[4]

Second, caregiving responsibilities may affect productivity for women on the tenure track. Even once women's careers are established, other logistical *systemic* issues present work–family challenges. For example, scheduling of courses and faculty meetings outside normal childcare hours (e.g., early evenings) may create conflicts, especially for junior and non-tenure-track faculty who often have the least autonomy over scheduling. Academia also involves many commitments that extend beyond the time when children are in school or child care is available, such as traveling to and attending conferences. Women who opt out of these

commitments because of childcare demands, which disproportionately fall to women, lose opportunities for collaboration and visibility, which may negatively affect career eminence (discussed in Issue 1; for a review and suggested solutions, see Calisi & Working Group of Mothers in Science, 2018). Time spent on childcare may also detract from time spent on research for psychological scientists. Female assistant professors of psychology who have children publish less than those without children, although it should be noted that the causality of this effect cannot be determined from the data (i.e., having children may reduce productivity or less productive researchers may choose to have children; Ceci et al., 2014). Moreover, this effect does not hold across all sciences (Ceci et al., 2014).

Access to parental leave may help mitigate the impacts of caregiving on women's careers. However, not all faculty have access to those policies and such accommodations are seldom extended to graduate students and postdocs. For example, only 13% of graduate trainees, 23% of postdoctoral scholars, and 58% of faculty are offered 6 weeks of paid maternity leave at research universities (e.g., Goulden et al., 2011). Women on U.S. federally funded training fellowships (e.g., NIH postdoctoral fellowships) are ineligible for state disability benefits that cover parental leave. Trainees may arrange ad hoc agreements with their supervisors, but these arrangements depend on cooperative mentors and institutions. Access to high-quality, affordable childcare is another factor that has an impact on career trajectories and is highly inconsistent depending on career stage, location, and other variables.

Although there are many ways to create a family, the fertility window for women remains a biologically determined barrier to career success for most women that simply does not exist for men. Women's fertility begins to decline around age 32, decreasing even more rapidly after age 37 (American College of Obstetricians and Gynecologists Committee on Gynecologic Practice and The Practice Committee of the American Society for Reproductive Medicine, 2014). Yet the median age for women completing a doctorate in psychology in the United States is 31.1 years (see Table 62 in NSF NCSES, 2018). As a result, women who wish to have children find that, during training and early years as a faculty member, childbearing and rearing can have an effect on productivity and compromise tenure prospects (Mason et al., 2013). However, delaying childbearing can increase the risk of fertility challenges and complications, which carry substantial costs to finances, physical health, and mental health. Neither advances in reproductive technology (e.g., egg freezing, in vitro fertilization) nor adaptations to workplace policies have been able to solve the coincidence of the peak-fertility window with the years in which women's investment in their career is most likely to pay off. This is a problem that does not affect men, at least not directly.

The effects of other forms of caregiving on academic careers are relatively less studied but are relevant for understanding the impact that systemic social roles may have on women's career productivity. Sixty percent of Americans who engage in family and elder care are women (National Alliance for Caregiving and the AARP Public Policy Institute, 2015), many of whom may be carrying out these roles in addition to childcare responsibilities. Future research should examine the extent to which these caregiving roles detract from research productivity and/or affect women's job satisfaction.

Interpersonal factors. It is important to consider interpersonal factors related to intimate partnerships that are found to be associated with women's career options. For example, across academia, married women are less likely than married men to enter a tenure-track job (Wolfinger et al., 2008), and married women with young children are less likely than men with young children to obtain a tenure-track job within 6 years after receiving a PhD (Ginther & Kahn, 2014). That said, unmarried women were 9% to 16% more likely to get a tenure-track job than unmarried men in comparisons across STEM fields, the humanities, and social sciences (Ginther & Kahn, 2014; Wolfinger et al., 2008), suggesting that marrying and having children affect women more than they do men. Among people whose partners work outside the home, women are roughly 30% less likely than men are to consider their career "primary" (Schiebinger, Davies Henderson, & Gilmartin, 2008). Married women are also more likely to defer to their spouse's career when a "two-body problem" arises (Mason et al., 2013). Among partnered academic faculty, women are more likely than men are to be in dual-career partnerships; one estimate was 18.2% of women compared with 12.5% of men (Jacobs, 2004), but those figures may already be outdated. Academic women are also less likely than men are to have a stay-at-home partner to assist in childcare responsibilities—estimates range from 5% of women and 20% of men in Schiebinger et al. (2008) to 11.5% of women and 43.8% of men in Jacobs (2004), thus underscoring that Jacobs's data may be outdated).

Note that some findings do not suggest gender-related effects. For example, having a child under the age of 6 did not differentially affect tenure decisions by gender (Wolfinger et al., 2008). Experiments involving mock hiring scenarios also do not find gender-based discrimination toward academic job candidates with children (Ceci & Williams, 2015). A study of all faculty hired at a research institution from 1998 to 2002 found no effect of tenure-clock-stopping policies on

tenure rates but did find that consideration of parental or other family reasons constrained pay regardless of gender (Manchester, Leslie, & Kramer, 2010); however, interpretation of the findings was unclear, indicating that much more research is needed on these policies and their effects. More generally, the mix of findings illustrates the range of gender-related effects possible with respect to lifestyle roles, and the need for more research.

Taken together, the cumulative body of research to date suggests that both systemic and interpersonal factors connected to social role expectations for women compared with men, and their impact on child rearing and on partnership choices and dynamics, may directly affect gender differences in productivity and other indicators of career success for women. Because these gender-role constraints often exist at the societal level, they are not unique to psychological scientists. Indeed, psychological scientists report working an average of more than 60 hr a week (Leslie, Cimpian, Meyer, & Freeland, 2015), a workload that objectively is difficult to balance with family responsibilities. More evidence is needed within the field to understand whether women in psychology, or in certain subdisciplines of the field, experience more or less work–family conflict compared with women in other STEM disciplines and whether organizational policies or cultural norms in the field or in specific departments may help to mitigate those effects.

Issue 5. Gender biases

We next consider how some of the gender differences described in Issues 1 to 3 may also stem from interpersonal and intrapersonal processes, beginning with gender bias. Gender bias includes differential attitudes toward, and stereotypes about, a group of individuals that are based solely on their membership in that group.[5] These stereotypes are culturally shared beliefs that have the potential to shape both interpersonal perception and behavior as well as intrapersonal motivation and beliefs about the self. Although such biases can be—and historically were—expressed quite explicitly, their effect is often (and perhaps increasingly) more subtle, possibly unintentional, and enacted by men and women alike (Parks-Stamm, Heilman, & Hearns, 2008). That said, these biases are by no means inevitable and whereas some cultural biases are likely to constrain women's outcomes across a range of careers, others may be less prevalent in psychology compared with more male-dominated disciplines.

Cultural stereotypes about women and work have changed over time but still exist. Likely related to long standing gender-role differences, gender stereotypes generally prescribe women as being better suited to domestic roles (e.g., mother, caregiver) that require communal qualities (e.g., warmth, patience), whereas men are better suited to high-status roles (e.g., professor, CEO) that require agentic traits (e.g., dominance, ambition; Eagly, 1987; Heilman & Parks-Stamm, 2007; Prentice & Carranza, 2002). Some positive stereotypes for women (e.g., helpful, warm) have unfortunately tended to be associated with lower status, supportive roles in the workplace and are thus perceived to be at odds with more agentic qualities (e.g., independent, ambitious; Glick & Fiske, 2001). Moreover, a recent meta-analysis of U.S. public-opinion polls from 1946 to 2018 revealed that the stereotype of women as more communal than men has increased over the past several decades (Eagly, Nater, Miller, Kaufmann, & Sczesny, 2019). The stereotype of men as more agentic (e.g., dominant) has showed no change, but women are now perceived to be somewhat more competent than men.

Other research has focused more specifically on gender stereotypes of scientists and yielded four consistent findings: (a) A traditional stereotype both implicitly and explicitly associates science with men more than with women (Charlesworth & Banaji, 2019; Miller, Eagly, & Linn, 2015; Miller, Nolla, Eagly, & Uttal, 2018; Van Camp, Gilbert, & O'Brien, 2019); (b) this stereotype has decreased over time but is still present (Miller et al., 2018); (c) this decrease is likely driven by increased exposure to women scientists (Miller et al., 2015), especially if that exposure has been made explicit (Van Camp et al., 2019); and (d) the decrease can be largely attributed to changes in women's stereotypes of their own gender, which historically were nearly as strong as men's (Charlesworth & Banaji, 2019; Miller et al., 2018). It is important to note, however, that these studies examine stereotypes about scientists in general, not psychologists in particular.

Finally, a third type of stereotype that has been investigated is the tendency to associate men more than women with brilliance (or a related special aptitude or ability that cannot be taught). In contrast to the abovementioned finding that women are now perceived to be equally or even more competent and intelligent than men (Eagly et al., 2019), other research points to a tendency to believe that men are overrepresented at the highest levels of intelligence or ability. This stereotype emerges among both girls and boys as young as 6 years old who are otherwise equivalent in academic metrics such as classroom grades (e.g., Bian, Leslie, & Cimpian, 2017) and may, in turn, affect girls' and women's interest in, or sense of whether they belong in or are qualified for, careers or roles that require brilliance/special aptitude/ability (e.g., see Bian, Leslie, Murphy, & Cimpian, 2018). Across academic disciplines, women

are most underrepresented in those fields in which faculty and students believe that success depends on brilliance (Cimpian & Leslie, 2015; Leslie et al., 2015; although alternative explanations for disciplinary variation in female representation also exist, Ginther & Kahn, 2015).

Psychology is *not* one such field, at least on the whole, which may be one reason why women are disproportionately attracted to it compared with other academic fields (Leslie et al., 2015). Even so, the stereotype may still place constraints on women's advancement within the field. That is, the "brilliant = male" stereotype could still bias decisions about who is the most deserving of awards, who should be invited as keynote speakers, and who should receive grants that emphasize leadership. Because such stereotypes are also internalized by women (although perhaps to a lesser extent), they may also shape their own ambitions and career choices within the field. Moreover, these stereotypes may be particularly relevant for certain subfields of psychology that are more closely affiliated with basic science or math (e.g., neuroscience, computational modeling). That said, the research on these biases is relatively new, and more work is needed to examine the degree to which such stereotypes can and do affect women's outcomes within psychology.

If one or more of these stereotypes exist for psychology, how might they contribute to any of the gender gaps that remain in the field? The perceptions of women as more communal (e.g., warm, caregiving) and men as more agentic (e.g., ambitious, brilliant), may jointly lead perceivers to have more doubts about women's ability or potential to excel in academia. For example, work conducted by psychological scientists (Madera, Hebl, Dial, Martin, & Valian, 2019) found that both women and men are significantly more likely to raise doubts about women candidates when writing letters of recommendation for assistant-professor positions (54% of letters written for women compared with 51% of those written for men included at least one doubt, and 13% compared with 7%, respectively, included two or more doubts). Note that these gender-related differences persisted even after controlling for objective indicators of the quality of the candidate (e.g., number of publications, quality of school, impact factor of the scholar's work). Moreover, there was no main effect of the gender of the letter writer, nor did letter-writer gender interact with applicant gender. Other researchers find both evidence for (e.g., Dutt, Pfaff, Bernstein, Dillard, & Block, 2016; Schmader, Whitehead, & Wysoki, 2007) and against (e.g., Li et al., 2017; Messner & Shimahara, 2008) gender differences in raising doubts about the quality of women's work in other STEM and biomedical fields so, again, further research is needed to examine when and where such differences occur.

Another area in which gender-based stereotypes have the potential to affect women's career outcomes negatively is in student evaluations of women in academia. A review of 39 studies published between 1932 and 1991 concluded that "the average association between gender and overall evaluation, while favoring women (average $r = .02$), is so small as to be insignificant in practical terms" (Feldman, 1993, p. 151; see also Lueck, Endres, & Caplan, 1993). More recently, a comprehensive review of more than 80 years of student-ratings research (Linse, 2017) acknowledged this work, stating that most "legitimate research on student ratings indicates that they are a more reliable and valid representation of teaching quality than any other method of evaluating teaching" (e.g., peer observation), as well as being "highly correlated with other measures of teaching effectiveness" (p. 97). Others, however, continue to report finding that metrics of academic performance (e.g., grades) and student learning are weakly correlated with student ratings in both experimental studies or real-world teaching contexts (Boring, 2017; Boring, Ottoboni, & Stark, 2016; Mengel, Sauermann, & Zölitz, 2018; Uttl, White, & Gonzalez, 2017). Linse (2017) offers a resolution of this persistent discrepancy in research on gender bias in student evaluations of teaching by (a) acknowledging, in particular, that gender biases in STEM are "more difficult to detect" (p. 98) owing to the gender imbalance in these disciplines, (b) stating that these biases "definitely exist . . . but rarely, if ever, fully explain the student rating results," and (c) concluding that "Over time, a growing body of research has been able to document gender effects on student ratings, but these effects are neither uniform nor consistent across all disciplines, nor do they apply to all women" (p. 98). Given that the gender balance in psychology is changing over time, has largely been achieved at the entry level, but decreases with increasing rank, it will be important for future research to determine the extent to which these gender-based differences in student perceptions exist in psychological science specifically.

We also need to learn more about the conditions in which gender-based stereotypes are more and less likely to affect student ratings. For example, some research indicates that gender bias can be reduced by cautioning students against the use of stereotypes in the rating instructions (Hoorens, Dekkers, & Deschrijver, 2020; Peterson, Biederman, Andersen, Ditonto, & Roe, 2019). Other research has suggested that gender bias is stronger when students have received negative feedback (Sinclair & Kunda, 2000), have lower grade expectations (e.g., Boring et al., 2016), or have been denied a request or favor (which are also more commonly asked of women professors; El-Alayli, Hansen-Brown, & Ceynar, 2018). Instructors' personal characteristics also correlate with ratings of effectiveness (S. Young, Rush, & Shaw,

2009). Finally, and perhaps most importantly, because students' evaluations of women faculty may affect faculty retention (e.g., especially for teaching faculty) as well as success rates for tenure and promotion (Abrami, d'Apollonia, & Rosenfield, 2007; Benton & Cashin, 2014), we need research that directly examines the effect of student evaluations on women's career satisfaction and progression in psychological science.

Finally, the stereotype that women are more communal and organized may play a role in creating gender gaps in service within academic departments (Heilman & Chen, 2005; Ragins & Cotton, 1993). Although women and men have similar levels of motivation to engage in service (e.g., student mentorship; Ragins & Cotton, 1993), women report greater negative consequences than do men ($b = 0.14$, $p < .01$) for the time they invest in service (e.g., mentoring; Ragins & Cotton, 1993). Studies also show that the association between service and career outcomes is stronger for men than for women (e.g., Allen, 2006; see Bolino, Klotz, Turnley, & Harvey, 2013). For example, men are evaluated positively for engaging in service in business contexts, whereas women are evaluated negatively for withholding service (Heilman & Chen, 2005). In addition, the association between citizenship behavior and promotion is stronger in men ($r = 0.23$, $p < .05$) than in women ($r = 0.01$, n.s.), at least in the business world (Allen, 2006; Lovell et al., 1999). Unfortunately, there is little research on gender bias and service in psychology, so we need to examine whether these same gendered perceptions play a role in our own field.

Taken together, this research points to several prevalent gender stereotypes that have the potential to contribute to gender gaps in women's outcomes in psychology. These include the stereotypes that women are more communal and more competent but are less likely to be brilliant or ambitious. The degree to which these stereotypes are prevalent in psychology and actually bias women's outcomes remains unknown. We also need to know more about the degree to which individuals' own motivations, the norms of a given context, and procedures for accountability may be able to mitigate or even prevent use of implicit associations in judgment and decision-making contexts. For example, in a recent study examining hiring decisions across the scientific spectrum, committees that on average held stronger implicit gender stereotypes did not apply these stereotypes and thus hire fewer women for elite research positions if they also believed that biases hold women back (Régner, Thinus-Blanc, Netter, Schmader, & Huguet, 2019), a finding that is similar to those for student-rating research. Ironically, those who believe that biases are not a problem may be most at risk for using stereotypes when making judgments. Although not specific to psychology, such research suggests that departments and subfields more committed to mitigating implicit biases may be able to create more inclusive cultures where women can thrive.

Issue 6. Holding positions of power

One way to achieve influence in a field is to hold positions of power and authority. Here we consider a variety of processes that may contribute to gender differences in power, including both achieving positions of power (ranging from classroom instructor or lab director to faculty or editorial board member, to head of a professional organization) and wielding the power that typically accompanies such positions once they are obtained. Over the past several decades, women hold a growing proportion of leadership positions in psychology. For example, among prominent interdisciplinary APA and APS journals, as of 2019, 48% of the editors-in-chief were women (see Table S3 in the Supplemental Material). Furthermore, the percentage of women APA presidents was higher in the past decade—70% in 2010 through 2019—compared with the previous four decades, which ranged from 30% in 2000 through 2009 and 1980 through 1989 to 10% in 1990 through 1999. Similarly, the percentage of women APS presidents was also higher in the past decade—70% in 2010 through 2019—compared with the previous two: 30% in 2000 through 2009 and 63%[6] in 1990 through 1999 (see Table S4 in the Supplemental Material). These changes reflect the strides that have been made to improve the representation of women in positions of power and authority.

In other domains, however, gender imbalances in power seem to remain. Still slightly less than half (42%) of associate editors for the same APA and APS journals mentioned above are women (see Table S3 in the Supplemental Material). Furthermore, in 2013, only about 40% of psychology department chairs were women, and approximately one in three APA Fellows were women (APA Committee on Women in Psychology, 2017). These remaining gender imbalances in positions of power may reflect the greater proportion of male senior faculty (Ginther & Kahn, 2014) and/or that men on average are more productive and seen as more eminent than are women (e.g., Eagly & Miller, 2016). However, there may also be other factors that affect women's interest in and/or advancement into positions of power and influence.

Research on the nature of influence suggests two key pathways to gaining status in a social hierarchy: dominance and prestige (J. T. Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013; Henrich & Gil-White, 2001). Traditionally, people have expected and wanted leaders to be dominant figures, which can lead to both

interpersonal and intrapersonal constraints on women's seeking to be or being sought out as leaders. For example, high-status leadership positions are often stereotyped as requiring more masculine traits, including dominance (Koenig, Eagly, Mitchell, & Ristikari, 2011). This leadership-as-dominance model is a better fit for men: Men are often perceived to be more effective in those roles, especially by other men (Eagly, Karau, & Makhijani, 1995; though Eagly & Karau, 2002, describe this as a small effect). Women report feeling that they have a harder time than men eliciting respect and admiration from their subordinates (Vial, Napier, & Brescoll, 2016). Research even reveals that female faces with dominant features (e.g., a prominent brow) are perceived less positively, whereas the same is not true of male faces (Oh, Dotsch, Porter, & Todorov, 2020; Sutherland, Young, Mootz, & Oldmeadow, 2015).

In addition to (though perhaps because of) such interpersonal processes, women can be reluctant to express dominance. Relative to men, women speak less frequently and less loudly and are less likely to interrupt others and to display anger (Brescoll, 2011; Brescoll & Uhlmann, 2008; Eagly & Steffen, 1986; Karpowitz & Mendelberg, 2014) including in academic settings. For example, men asked 1.8 times more questions than women at a biology conference across both older and younger attendees (Hinsley, Sutherland, & Johnston, 2017; see also Carter, Croft, Lukas, & Sandstrom, 2018).

Women's relative reluctance to express dominant behaviors may reflect the fact that they risk experiencing backlash when they do (e.g., Bowles, Babcock, & Lai, 2007; Butler & Geis, 1990; Rudman, 1998; for a recent meta-analysis, see M. J. Williams & Tiedens, 2016). Specifically, women who behave dominantly are seen as less likable than dominant men, but only when they engage in overt dominance such as arguing or making demands (M. J. Williams & Tiedens, 2016). There is no clear evidence that these effects have decreased over time. Such research suggests that if positions of power seem to require a strong hand, women may be perceived as less suitable for such positions and could be disparaged if they exhibit such behavior.

Turning to the "prestige" pathway to leadership, leaders are often equally if not more effective if they achieve the position through respect and admiration from others or for their skills or knowledge (J. T. Cheng et al., 2013). Dominant leaders force their views on others, whereas prestigious leaders inspire others to follow them. Thus, in scientific fields, which value innovation and intellectual impact, leadership by prestige may be more important than leadership by dominance, in which case, perceptions of competence (vs. dominance) should be more important.

On the one hand, given that women in general are now viewed as being as competent as or more competent than men (Eagly et al., 2019), women should be seen to be as suitable as men (or more suitable than men) for prestige-based leadership roles (Eagly & Karau, 2002). Moreover, if a domain is seen to require skills stereotypical of one gender, then perceivers favor a leader of that gender (Lyness & Heilman, 2006; Proudfoot, Kay, & Koval, 2015). Thus, if excelling in psychology (or at least in some of its subdisciplines) is seen as involving an intuitive understanding of people (Leslie et al., 2015), then perhaps in those fields, women are viewed as more competent than men and are thus favored as leaders. Such views may have helped women to achieve greater parity in positions of power in psychology in recent years, although we are aware of no research on this issue.

On the other hand, even a leadership-as-prestige model favors those who are viewed as brilliant and highly productive. As described above, women in psychology still lag behind men in metrics of productivity and may be constrained by an association of men with brilliance. Also in contrast to the finding of an explicit belief in women's competence compared with men (Eagly et al., 2019), implicitly perceivers are less likely to associate women's faces (vs. men's) with competence (Oh, Buck, & Todorov, 2019). Moreover, when a role is currently male-dominated or a domain is perceived as requiring masculine characteristics, then women are perceived as having less expertise, even if the output being evaluated is controlled (Joshi, 2014; Proudfoot et al., 2015). If these two biases are combined with the availability bias, women may not easily come to mind as prototypical eminent scholars of psychological science (Eagly & Miller, 2016) and thus may not be seen by others or even by themselves as the best picks for positions of power in the field.

The joint perception that women are organized and nurturing but not highly productive or ambitious may provide insight into other evidence that women (vs. men) are both offered and choose to accept service tasks and positions that take up time but do not help them achieve power. For example, in experimental economics studies, women (vs. men) are more likely to be asked to take on tasks with relatively little weight in promotion decisions (i.e., low promotability tasks; Babcock, Recalde, Vesterlund, & Weingart, 2017) and are penalized more when they decline such tasks (Babcock, Recalde, & Vesterlund, 2017). Accordingly, after receiving an e-mail from the chair of the faculty senate, women (vs. men) were more than 2.5 times as likely to volunteer for a senate committee (Babcock, Recalde, Vesterlund, & Weingart, 2017). To our

knowledge, no research has specifically examined whether and to what extent such stereotypes may affect when women in psychology are offered, and when they accept, service positions that come with power and prestige.

In addition to the role of these types of biases, it is critical to note that other *institutional* factors described above may place more realistic constraints on women's interest and engagement in positions of power. Perhaps one of the biggest factors is the difference in the amount of time that women and men feel they have to take on positions of power requiring greater responsibility and scheduling commitments. In Issues 3 and 4, we discussed how women disproportionately serve in caregiving and service roles, perhaps making women reluctant to self-nominate or accept positions of leadership that could then interfere with their research productivity. In addition, if women perceive high-power positions as being difficult to achieve or potentially involving unpleasant interpersonal dynamics (e.g., backlash), it would not be surprising if women did not seek them or even declined them when offered. Indeed, among samples of undergraduates at a top university, women associated more negative outcomes with achieving high-power positions than did men and reported that they were less likely to try to obtain them (Gino, Wilmuth, & Brooks, 2015).

Taken together, empirical data on the representation and perceptions of women in power are complex. Women hold a growing proportion of some prominent leadership positions in psychology, but men still hold the majority of many others. The degree to which women are attracted to and thrive in positions of leadership may depend on whether that position is seen as requiring dominance or prestige. Given that leadership in academia is often viewed as a form of service, it is noteworthy that women are more often offered and accept service roles that do not provide a pathway to power compared with those that do (e.g., important committees) or are themselves strong leadership positions. A large caveat to this discussion is that very little research has been done to examine factors that facilitate or constrain women's advancement into positions of power specifically within psychology.

Issue 7. Intersectionality

Intersectionality is the term used to describe how a person's various identities can combine to have additive and often multiplicative exacerbating influences, particularly for those with multiple marginalized identities (Cole, 2009; Crenshaw, 1989). In this section, we consider how systemic, interpersonal, and intrapersonal factors associated with various identities can significantly compound discrepancies in career advancement for women who are also members of marginalized groups. Examples of intersectionality include, but are not limited to, combinations of gender, race, ethnicity, socioeconomic status, sexual orientation, religious expression, and disability. Below we describe research focused on race; on ethnicity; and on lesbian, gay, bisexual, transgender, queer or questioning, intersex, and asexual or allied (LGBTQIA) identities as examples of the challenges faced by women with intersectional identities. We note, however, that the frequency of women with intersectional identities in academia at large (including psychological science) is still so low that specific information is often unavailable, and well-powered data do not exist. These rates may speak to pipeline problems in recruiting and retaining women of intersectional identities in academia.

The most recent census indicates that the heterogeneous "non-White" group accounts for approximately 39% of the U.S. population (U.S. Census Bureau, 2019), and the 2017 Council of Graduate Schools' *Survey of Graduate Enrollment and Degrees* (Okahana & Zhou, 2018) indicated that, across disciplines, approximately one third of female graduate students were underrepresented minorities (e.g., American Indian/Alaska Native, Black/African American, or Hispanic/Latino; Okahana & Zhou, 2018). Ryu (2010) reported that among women who are Black, indigenous, or people of color (BIPOC) who complete a graduate degree and enter academia, the representation of BIPOC women decreases with rising academic rank; for example, BIPOC women constituted 10% of instructors and lecturers, 10% of assistant professors, 7% of associate professors, and 3% of full professors.

The relative underrepresentation of BIPOC women in academia raises the possibility that many face compounded barriers throughout the entry points to psychological science (e.g., Carey et al., 2018). To get into graduate school, a student needs, among other things, research opportunities, which are often facilitated through both formal and informal contact with faculty. Yet research examining faculty responses to prospective students' e-mails across academic disciplines (including psychology) showed that women and BIPOC individuals were less likely to get a response to e-mail requests to future meetings with professors relative to White men; among women, White women were almost twice as likely to get a response as Black women (Milkman, Akinola, & Chugh, 2012, 2015). When BIPOC women do successfully enter psychology, they may face continued barriers to success. BIPOC scholars are systematically underrepresented as writers and editors in psychology, even on topics related to race (Roberts, Bareket-Shavit, Dollins, Goldie, & Mortenson, 2020).

Interpersonally, BIPOC women invest more time and resources navigating social interactions as a result of their dual identities. For example, in a business setting, many Black women must learn to deal with tokenism and such stereotypes as being perceived as caregiving "mammies" and/or as angry Black women (Reynolds-Dobbs, Thomas, & Harrison, 2008). Other earlier research suggested that faculty and students of all ethnicities and genders may feel threatened when BIPOC women deviate from their expected or stereotyped roles (Pleck, 1990). Not surprisingly, research on faculty members across the sciences shows that women and BIPOC academics are more likely to report feeling socially isolated (Carter-Sowell, Dickens, Miller, & Zimmerman, 2016; J. W. Smith & Calasanti, 2005; Zimmerman, Carter-Sowell, & Xu, 2016).

Sexual- and gender-minority statuses represent additional and understudied areas of intersectionality. Unfortunately, most universities do not collect data on LGBTQIA status, and many do not include gender- or sexual-minority status in their institutional definitions of diversity (C. Cheng, 2016). As a result, there is a dearth of data on the prevalence or retention of sexual- or gender-minority faculty nationally. According to a recent Gallup poll, LGBTQIA individuals make up 4.5% of the U.S. population (Newport, 2018). One of the most comprehensive surveys of faculty to date concluded that only 3% of faculty at 12 universities in Pennsylvania identified as LGBTQIA, suggesting possible underrepresentation (C. Cheng, 2016); however, this survey was limited in geographical scope, which underscores the need for more research on the topic.

Other data point to a negative climate for LGBTQIA individuals in academia, especially for women. In particular, LGBTQIA individuals report low institutional support and perceived discouragement from expressing their identity (or "heteroprofessionalism"; Mizzi, 2013). In the largest study to date, Yoder and Mattheis (2016) surveyed 1,427 STEM professors, students, and other professionals spanning the United States, Canada, Great Britain, and Australia who identified as LGBTQIA. They found that 43% had disclosed their identity to fewer than half of their colleagues and slightly less than one third (29%) had disclosed to few or no colleagues. Likewise, in a survey of 637 LGBTQIA scientists in the United Kingdom jointly run by the Institute of Physics, the Royal Astronomical Society, and the Royal Society of Chemistry, 32% transgender but only 15% of cisgender individuals reported experiencing harassment, bullying, or other exclusionary behavior in the workplace (Gibney, 2019).

Taken together, these data reveal the important intersection between sexual identity and gender-minority status that may affect access to and advancement in an academic career. Although there is no evidence to suggest that the situation in psychology is different, more research that tracks women's experiences over time is needed to understand how psychology is creating a level playing field and supportive culture for women with diverse backgrounds and intersecting identities. We suspect that some subfields and departments may be more successful than others in doing so; a thorough examination might reveal best practices.

Issue 8. Harassment and incivility

In this section, we review evidence on sexual harassment as well as more limited evidence on other types of harassment (e.g., bullying and incivility). We focus exclusively on evidence from academia in general because, to our knowledge, there is no rigorous work that explicitly examines psychology. Nonetheless, psychology has recently experienced several high-profile cases of alleged sexual harassment or misconduct (e.g., Somerville, 2018), indicating that the field is not immune to these problems (J. L. Young & Hegarty, 2019). Whereas many of the interpersonal processes discussed in Issues 4 to 7 involve subtle or implicit bias, this section considers how more overt forms of interpersonal processes may pose direct impediments to women's civil rights, equal education, and employment opportunities and interfere with career participation and advancement.

To begin, sexual harassment—including unwelcome sexual advances, sex-based slurs or put-downs (e.g., derogatory labels, sexist comments and jokes), and sexually crude displays (e.g., pornography)—continues to occur in academia for both trainees and professionals. A campus-climate study by the Association of American Universities (Cantor et al., 2015) showed that more than half (61.9%) of women undergraduate students across fields reported being sexually harassed, including receiving inappropriate comments about body, behavior, or appearance (37.7%) as well as sexual, insulting, and/or offensive comments, including jokes or stories (29.5%). Despite its prevalence, many student victims do not report sexual misconduct because they think it will not be taken seriously by the university (26.6%), that retaliation is very or extremely likely (22.2%), and/or that nothing will be done in response to the complaint (29.0%; Cantor et al., 2015). With respect to women faculty, a 2018 National Academies of Sciences, Engineering, and Medicine study of professional women noted that 56% of women stated that they did not think the experienced incident was serious enough to report.

Indeed, sexual harassment between students and faculty members has been discussed within psychology

going back at least three decades (Herbenick et al., 2019; Koss & Oros, 1982; Oberlander & Barnett, 2005; Zakrzewski, 2006). As one example, the Society for Personality and Social Psychology (SPSP) Sexual Harassment Task Force issued their final report in 2019, which stated that women were significantly more likely to report experiencing sexual harassment than were men (28% vs. 5%) at an SPSP event during their careers (see Society for Personality and Social Psychology Sexual Harassment Task Force, 2019). These findings suggest that more current and systematic research needs to be done on sexual harassment and its consequences for women—both students and faculty—in psychological science.

Importantly, there may be broader systemic impediments to addressing sexual harassment: Psychological research suggests that sexual harassment is a function of dominance or power and that those who sexually harass often associate sexuality with power and may even be primed by power to experience sexual urges (e.g., Bargh, Raymond, Pryor, & Strack, 1995). Thus, to the extent that power-based stereotypes about men and women persist, sexual harassment is likely to continue to be an issue in the workplace, particularly for women. Growing attention is also being paid to nonsexual harassment, such as bullying and incivility, which are characterized by repeated mistreatment that is threatening, humiliating, or intimidating to another person. A 2017 survey indicated that 66% of bullying targets are women (Workplace Bullying Institute, 2017). Whether women are more likely to be the targets of scientific bullying, including the persistent and often public challenging of one's scientific integrity, conduct, and/or findings, is unknown. Also unknown is whether women who witness scientific bullying (of women or men) are more likely to leave academia for other pursuits. We suggest tracking these behaviors in psychological science to allow for future studies.

Issue 9. Agency, self-esteem, and self-promotion

Distinct from external structural factors and interpersonal biases, intrapersonal factors such as one's own values and preferences also influence how careers unfold (Eagly, 2018). We consider how such intrapersonal processes as agency, self-esteem, and self-promotion may improve understanding of gender differences in career success (e.g., publications, grant submissions, eminence) as well as acknowledgment for those successes (e.g., financial compensation).

Biological differences may set the stage for some gender differences in personality, preferences, and behaviors. However, social-role theory suggests that women and men are primarily socialized to conform to gender stereotypes. The pervasive stereotypes (i.e., that men are agentic and self-promotional and women are less agentic and communal) can lead people to seek out careers and positions that conform to these cultural stereotypes (e.g., Eagly, 1987; Eagly & Steffen, 1984; Eagly & Wood, 2012). Thus, social roles that are taught during development, and rewarded and affirmed across the life span, can constrain one's own intrapersonal beliefs about what men and women can and should do (Abele, 2003).

There is clear evidence for gender differences in people's self-views but also evidence that these perceptions vary over time and across culture. For example, there are medium-sized gender differences favoring men in self-reported agency or masculinity ($d = -0.55$) and large differences favoring women in self-reported communion or femininity ($d = 0.72$; Donnelly & Twenge, 2017). Women's self-ratings of agency have increased as women increasingly have entered the workforce but the gap with men's self-ratings remains. Likewise, research within and outside of psychology has found gender gaps in competitiveness that appear to be, at least in part, by-products of cultural norms and socialization. For example, a cross-cultural study found that men (vs. women) preferred competitive situations in nearly all of the 36 countries examined (mean $d = 0.36$, range = 0.63 [U.S.] to 0.13 [Slovak Republic]; Bönte, 2015; see also Gneezy & Rustichini, 2004). Some research reveals that by age 6, boys value "being the best" more than girls do (Block, Gonzalez, Schmader, & Baron, 2018). A study in India indicated that a gender gap in competitiveness emerged around middle childhood to early adolescence, at least in patrilineal subcultures ($d = -1.1$; Andersen, Ertac, Gneezy, List, & Maximiano, 2013); no difference was observed in matrilineal subcultures ($d = 0.18$). Other research has found that gender-based differences in competitiveness are less pronounced for competitions involving skills stereotypically associated with women (e.g., verbal vs. math tasks in Sweden; Dreber, von Essen, & Ranehill, 2014; beadwork vs. upper-body strength in a Tanzanian hunter-gatherer community; Apicella & Dreber, 2015) and that gender-based differences are attenuated in girls who attend single-sex schools rather than mixed-sex schools (Booth & Nolen, 2012). Taken together, gender differences in agency and competitiveness may predict gender differences observed in such career outcomes as publication rates, grant funding, and behaviors that contribute to eminence (e.g., self-nomination for awards, writing for the popular press).

A similar set of findings exists for self-esteem, which may separately predict outcomes or may interact with stereotypes about agency. That is, girls, compared with

boys, are socialized to focus on their relational status rather than their personal actions (see Schwalbe & Staples, 1991, for a discussion). Meta-analyses of both cross-sectional and longitudinal data have found small but stable gender differences in global self-esteem favoring men (e.g., $d = 0.21$, Kling, Hyde, Showers, & Buswell, 1999; Orth, Erol, & Luciano, 2018). Results are mixed on whether the developmental trajectory of self-esteem varies by gender; some researchers have found the largest difference in adolescence (e.g., Kling et al., 1999) and others have found no gender-based moderation of trajectory (Orth et al., 2018). In the context of psychology and other sciences, women's somewhat less positive self-view relative to men's may interact with stereotypes about scientists (see Issue 5 on gender biases) to shape self-selective behavior. For instance, there is evidence that women authors are less likely to use positive words to describe their research findings (e.g., "novel" or "excellent") compared with men. Specifically, Lerchenmueller, Sorenson, and Jena (2019) reported that among published articles in clinical journals between 2002 and 2017 in which women were first and last authors, 12.3% used fewer positive terms than published articles in which a male was the first and/or last author; this effect that was greatest for high-impact clinical journals. Positive framing of one's research was associated with a 9.4% increase in subsequent citations of that work (Lerchenmueller et al., 2019).

If roles change with changing societal norms, then stereotypes about women and men are likely to change as well. However, role-congruity theory (Eagly & Karau, 2002) suggests that both women and men encounter resistance and backlash when they try to inhabit stereotype-incongruent roles, which may contribute to women's tendencies both to avoid and to be less practiced and successful at demonstrating self-esteem and self-promotion than are men (Moss-Racusin & Rudman, 2010). This same research suggests that women do not show the same inhibition when it comes to promoting others they work with or mentor, meaning that women's capacities for promotion are limited only to their own work and careers. The academic environment generally rewards agency, self-esteem, and self-promotion, and there is evidence that women who are sensitive to gender-based rejection cues may be more likely than men to avoid engaging in professional activities (London, Downey, Romero-Canyas, Rattan, & Tyson, 2012). Thus, future research should address whether gender differences in agency, self-esteem, and self-promotion contribute to the gender differences observed in rates of publications, self-citations, or scholarly eminence.

Taken together, these internalized intrapersonal processes and stereotypes may inform women's self-views, which, in turn, may shape the different ways in which women and men structure their careers. Women's greater endorsement of communal values may direct their investment toward service, teaching, and mentoring roles that seem most aligned with helping others. Moreover, women's lesser self-perceptions of agency, assertiveness, and competition relative to men's—and the backlash experienced when enacting these gender-incongruent behaviors—may lead to reduced willingness to submit to top journals, apply for grants, self-cite, self-nominate for awards, ask for promotions (see Issue 1 on career advancement), and ask for more resources (see Issue 2 on financial compensation). However, these hypotheses are untested, and more research is needed to determine how these intrapersonal processes may shape women's career development in psychology.

Issue 10. Lack of belonging

Finally, another intrapersonal factor that may shape some women's choices to enter psychological science (or certain subfields), their retention, and their opportunities to advance (e.g., promotion to full professor) is a sense of fit and social belonging (e.g., Schmader & Sedikides, 2018; Walton & Cohen, 2007). Compared with other sciences, psychology is relatively more focused on gender-stereotypical topics such as helping others and is less likely to be perceived as requiring brilliance than other sciences (Leslie et al., 2015); these gender-role-congruent factors may motivate women to pursue training in psychology. That said, factors that may create a sense of belonging initially may not persist across the career ladder or in every subfield. As we discuss below, women in academia generally, and in psychology more specifically, are more likely than men to report not feeling that they belong in their organization. It is noteworthy that a lower sense of belonging may reduce women's involvement in their field or likelihood of choosing to continue through senior ranks (see Issue 1 for gender disparities in senior-level professionals).

The literature points to three main factors that may influence women's sense of belonging: (a) the value of stereotypically feminine versus masculine traits in academia, (b) mismatched beliefs about effort and "fit," and (c) the lower visibility of women, relative to men, in academia. As discussed earlier, academia has traditionally rewarded and valued traits that are stereotypically associated with men (see Issue 5 on gender biases); moreover, when women explicitly express these traits (e.g., demonstrating dominance by making direct requests; M. J. Williams & Tiedens, 2016), they may receive backlash for doing so (see Issue 6 on power). For instance, Gaucher, Friesen, and Kay (2011, Studies 4 and 5) demonstrated the consequences of gender-based stereotypes on belonging by adding stereotypically masculine or feminine descriptors to job advertisements. Women found the advertisements that

used masculine words to be less appealing, an effect explained by lower anticipated sense of belonging in those positions. Men's perception of job appeal and anticipated belonging did not differ according to gendered descriptors.

Although the effect is small, women also believe that they must exert more effort to succeed in STEM fields compared with men (R^2 = .08), which is negatively related to their sense of belonging (b = −0.31) and, indirectly, their motivation (b = −0.16; J. L. Smith, Lewis, Hawthorne, & Hodges, 2013). Such effects can also be triggered experimentally simply by telling women that a field is male-dominated (J. L. Smith et al., 2013) or by exposing women to visual representations in which women are underrepresented relative to men (Murphy, Steele, & Gross, 2007). For instance, Murphy and colleagues (2007) randomly assigned advanced undergraduates in math, science, and engineering to view videos of conferences with unequal gender attendance (3 men:1 woman) or balanced attendance (1 man:1 woman). Women who saw unequal ratios reported less belonging relative to women who saw balanced groups (η_p^2 = .13). Men's sense of belonging was unaffected by gender balance. Given such findings, the visible underrepresentation of women at senior faculty levels, as colloquium speakers (Nittrouer et al., 2018), and as public intellectuals could have tangible effects on women's ability to envision themselves as highly productive and influential scientists in the field. Note that concerns stemming from low belonging likely vary by subfield of psychology and are especially exacerbated for women of color and other intersectionality (J. W. Smith & Calasanti, 2005; see Issue 7 on intersectionality).

To our knowledge, no systematic meta-analyses on belonging exist, so we informally compiled data on belongingness from several publicly available faculty-climate surveys from a range of institutions (for sources and sample findings, see Table S5 in the Supplemental Material). These surveys found that women in schools of arts and sciences (where many psychology departments reside) consistently reported lower levels of belonging than men of equal rank. For example, in one survey, tenure-track women reported significantly lower perceived belonging than did men (e.g., mean = 3.6 for women vs. 4.0 for men on a 1–5 scale; see Table S5). In another, women in STEM disciplines reported feeling significantly more excluded from informal networks or mentoring than did men (e.g., mean = 2.93 for men vs. 3.13 for women on a 1–4 scale assessing fit within the department, which included such items as "I feel excluded from informal networks in my department"; University of New Hampshire, 2014; see Table S5). Several surveys reported that male faculty judged the climate for women to be more positive and less troublesome than did the women themselves (e.g., 60% of women vs. 69% of men at the University of California San Francisco in 2017 said the overall climate for women was good or very good).

Further, recent climate surveys from societies within psychological science suggest potential gender differences that should be studied more formally. As one example, the Society for Personality and Social Psychology published the results from 1,090 respondents to a membership climate survey, ranging in career stage from undergraduates to retired faculty (Garcia, Sanchez, Wout, Carter, & Pauker, 2019). Gender differences in perceptions of professional resources associated with belonging and integration emerged: 47% of women and 40% of men rated their social network as less extensive than those of similar career-stage peers. Although more formal and rigorous research is warranted to draw definitive conclusions, these data suggest that greater attention is needed to unpack women's sense of belonging in psychological science. Future research should also investigate how belonging may moderate other career-relevant behaviors such as women's rates of submitting publications and grants (especially to high-status outlets), seeking positions of leadership, or attending conferences.

Summary of Issues 4 to 10

Our summary of Issues 1 to 3 concluded that although psychology as a discipline has achieved great strides toward gender parity, especially compared with other STEM fields, there are still notable gender gaps in productivity and other metrics of eminence. In our review of Issues 4 to 10, the accumulated data point to interrelated systemic, interpersonal, and intrapersonal factors that may explain these remaining gaps in career success in psychological science. Systemic, interpersonal, and intrapersonal factors are likely to contribute differently across different stages of women's careers and in different subdisciplines. In some cases, these factors may play a direct role in shaping productivity differences that become the proximal cause of other gender gaps in eminence, salary, and research-based grants. More research is clearly needed within our own discipline to understand these processes more fully and would contribute to designing more effective interventions. We discuss current evidence-based approaches next.

The Path Forward: Advancing Women in Psychological Science

What is clear from our review of the literature is that gender gaps in women's representation and career advancement in psychological science have diminished over time in many domains, but some important gaps persist. This final section draws on established

psychological theory and social-science research to propose potential solutions for rectifying remaining gender differences in psychological science across the 10 interconnected issues raised herein that affect the advancement and future of women in psychological science. It is important to stress that many of the suggestions offered are hypotheses to be tested, not empirically established strategies to be enacted. Although we follow the literature whenever possible, research into many issues is too sparse to allow definitive conclusions. Thus, in addition to formal research into the various domains discussed, we recommend that departments and institutions regularly collect both self-report and administrative data to benchmark whether there are gender differences across multiple domains, including climate, job satisfaction, career goals, merit pay, service levels, and perceived bias, to name a few. If these differences exist, departments and institutions should document whether change occurs as procedures and policies are revised with the intent of reducing differences. An important assumption is that institutions vary in policies, practices, and the strength of their gender-inclusive culture. Thus, the general trends reviewed herein may or may not apply to a given department or university.

Raising awareness and developing empirical foundations for further action

A first task is to document the phenomenon and raise awareness of any disparities that are found (for an example, see Massachusetts Institute of Technology, 1999). Two important gender gaps that remain in psychological sciences are in the number of publications and grants and in the level of financial remuneration achieved by men compared with women. More research is needed to understand which, if any, of the systemic, interpersonal, and intrapersonal mechanisms reviewed above contribute to pay and productivity differences. When gender differences are uncovered, it is then important to track empirically the efficacy of actions and interventions so that best practices can be established and shown to be effective. Leaders and constituents may be most motivated to change procedures and/or policies at the local level by first becoming aware of evidence from their own settings and then to retain or revise the procedures and policies depending on whether the desired effects follow.

Reducing gender gaps in career advancement, eminence, and power

The data reviewed here suggest that, if anything, psychology departments in recent years have a preference for hiring women over men, at least at the assistant-professor level (Ceci & Williams, 2015), but that there are still notable gender gaps in other indicators of career advancement that have implications for women's scientific impact, financial compensation, and emotional well-being. These gaps may affect the likelihood that women continue to opt into a career in psychological science. Indeed, it seems crucial that young women continue to see examples of women successfully navigating—and excelling—in psychological science while also representing a variety of identities and family and life circumstances (Mason et al., 2013).

A first step will be to continue to maintain progress in the gender equity observed in new hires and promotions to senior faculty ranks. On an institutional and organizational level, research has tested interventions aimed at senior faculty and selection committees in charge of hiring, promotion, and accolades, such as award selection (e.g., Isaac, Lee, & Carnes, 2009). Such interventions redesign institutional or committee procedures (i.e., decision architecture) so as to acknowledge that explicit or implicit biases can exist and thus nudge committees toward equitable decisions. Bohnet (2016) labels these "signposts," because they are practices that position individuals and groups to recognize how bias may influence their decision-making. Committee members are encouraged to establish concrete criteria for promotions and awards in advance of examining specific candidates, and provide reasons for specific nominations and ratings of candidates in terms of the criteria established. Irrelevant characteristics (e.g., partnership status) should not be considered during discussions of applicants for a position, given research showing that heterosexual women's partnership status is negatively considered in hiring and promotion decisions relative to men's (for reviews, see Bohnet, 2016; Rivera, 2012).

Including women on committees that select colloquium speakers also may improve gender equity in committee decisions (Nittrouer et al., 2018). However, such a strategy should be used cautiously, as serving as the "token" woman or BIPOC scholar on a committee may place implicit responsibility for ensuring equity and diversity considerations on that member's shoulders and result in increased services load for women. Instead (or in addition, given that having diverse representation on committees is a good practice per se), a large research review suggests that when responsibility for diversity is explicitly charged to a specific person (who need not be a woman or BIPOC scholar) on a committee, diversity outcomes in terms of hiring and retention are more positive (Kalev, Dobbin, & Kelly, 2006). We recommend that committees appoint an equity advocate on the committee and document the effect this has on selection processes over time.

Tackling financial disparities

Understanding the multiple sources of gender-related financial disparities within the psychological sciences, and acknowledging differences between public and private institutions, may lead to constructive solutions to correct inequity. We briefly consider several areas for growth in tackling financial disparities that can occur in parallel. First, evidence indicates that gender pay gaps are smaller when compensation information is more widely available (AAUW, 2017). We thus call for greater transparency and dissemination of information related to compensation, such as current salary ranges by rank, for both current and prospective faculty.

Second, we recommend that women at all professional levels of psychology develop effective negotiation skills and become aware of available mechanisms for receiving additional remuneration (e.g., receiving outside offers). Training may take the form of workshops offered through academic institutions or professional organizations. Beyond providing knowledge and skills for women on an individual level, our third recommendation is to encourage more formal ways to bring attention to and enact change in gender pay disparities within institutions where they exist. Movements to create women's faculty groups (e.g., the Women's Faculty Forum in the Department of Psychology at the University of California at Berkeley) have successfully partnered with institutions to conduct more formal gender-equity reviews, and adjustments have been made to salary and other sources of compensation as a result.

Addressing work–family conflict

Resources and policies that address work–family conflict issues could help to ameliorate the challenges that women face and to address issues that may lead some women who obtain PhDs in psychological science not to pursue an academic career. In Germany, the Nüssslein-Volhard Foundation offers stipends to early-career women specifically earmarked for domestic and childcare expenses. Some universities in the U.K. offer financial support to hire a research assistant to minimize the effect of parental leave on research activities.

Universities could undertake actions to redress issues related to caring responsibilities. For example, universities could offer funds to enable parents to travel to conferences and mandate that departments operate core business during family-friendly hours. Universities could provide more support for partner hires, both within and outside the university and hiring packages for parents could include guaranteed placement in high-quality childcare facilities, even creating on-site childcare with sufficient capacity to meet demand on campus should one not exist. Parental-leave policies should further be extended to students and postdoctoral trainees as well as faculty. Experts agree that universities should adopt paid family leave and institute and incentivize partner leave (e.g., Rudman & Mescher, 2013). Progressive companies are increasingly paying for egg freezing (e.g., Argyle, Harper, & Davies, 2016), and universities could adopt this policy as well to allow greater flexibility and autonomy in the timing of childbearing.

Equalizing service across women and men

There is much to learn about the nature and origins of women's service load relative to men's. To understand the prevalence of and possible causes of this disparity more fully, we need objective and more nuanced data from different types of departments and universities, across large and diverse samples. Such data are important given that stereotypes shape not only perceptions of others but also perceptions of oneself (e.g., Levy, 1996; Steele, 1997), such as what tasks one even considers "service." Multisource data at various levels of resolution will enable detection of potential gender differences. Attaining large and diverse samples will allow for more granular distinctions between departments (including psychology departments in particular) and institutions (e.g., research-oriented, liberal arts, professional schools); would allow for a more nuanced understanding of how rank, family status, and other individual differences (e.g., race, age) affect service expectations and rates; and may lead to solutions that help to moderate the link between gender and time spent on service.

Ideas for fostering equity in service include implementing a rotation for service among faculty members, formalizing a pool of eligible individuals when assigning service roles (rather than relying on "on-the-spot" brainstorming that is affected by stereotypes and availability biases), implementing consequences for failure to follow up on service assignments, and formalizing service roles as part of the salary-raise-and-promotion process (e.g., J. Williams, 2001); however, future empirical work is warranted to examine the efficacy of these practices.

Confronting potential gender biases

The challenges associated with reducing biases in decision makers are well recognized, but recent work suggests strategies by which women in science may effectively contend with subtle and not-so-subtle experiences of gender bias (e.g., Powell, 2018). One general strategy is to address individuals directly and encourage them to "break the habit" of implicit and explicit bias by providing (a) workshops to increase understanding

of bias (Carnes et al., 2012; Moss-Racusin et al., 2014), (b) programs that teach strategies to confront and reduce the influence of biases on decision-making (e.g., Carnes et al., 2015; Devine et al., 2017; Forscher, Lai, et al., 2019), and (c) experiential learning opportunities to lessen sexist attitudes (Zawadzki, Shields, Danube, & Swim, 2013). Although evidence suggests that implicit biases themselves are difficult to change in a sustained way (Carnes et al., 2015; Forscher, Lai, et al., 2019; Lai et al., 2016), such programs may reduce faculty members' explicit self-reported sexism and increase faculty motivation to reduce inequities (Carnes et al., 2015; Forscher, Lai, et al., 2019). In addition, as noted above, multiple innovations in diversity efforts are likely needed to enhance their effectiveness (Dobbin & Kalev, 2018).

Altering the context of people's decision-making may be the most effective strategy for actually effecting change (e.g., Isaac et al., 2009). For example, in a study of hiring decisions, participants relied less on gender and more on information about a candidate's performance (i.e., on a math task) when they evaluated targets side by side rather than separately (Bohnet et al., 2015). This effect may occur because in the presence of a concrete comparison people rely less on internal referents (e.g., stereotypes; Kahneman & Miller, 1986). It is difficult to know how to reduce the explicit reliance on citation numbers for hiring and promotion, but at the very least, awareness that there are gender differences in citation rates that are independent of journal quality or subdiscipline (Odic & Wojcik, 2019) may help committees consider additional factors when evaluating women (Ghiasi et al., 2016; Larivière et al., 2013). Further, other metrics used by scholarly departments can be affected by gender bias such as student evaluations of teaching (Arbuckle & Williams, 2003; Boring, 2017; Kierstead, D'Agostino, & Dill, 1988; Mengel et al., 2018). Reducing the influence of student evaluations on hiring, promotion, and salary advancement may be a critical step to reducing gender inequity in the professoriate.

Enabling underrepresented women to advance forward

A movement to reduce gender disparities where they still exist in psychological science should simultaneously combat the effect of racism, classism, and other identity- or circumstance-based barriers to access. Having women from a range of intersectional identities in the field not only produces a stronger and richer educational experience for all students but also enriches the pedagogy, culture, and curricula of psychological sciences.

In academia, many opportunities for talks, collaboration, and awards arise informally through professional networks (Xu & Martin, 2011). One potential approach to increasing these opportunities for women, especially those with intersectional identities, relies on men and women who are already on the inside. For example, when one is going to be dining with colleagues, one might invite an underrepresented colleague *and* ask her to invite another. Opening the door with a "plus one" on the invitation lifts up multiple women—or other underrepresented individuals—simultaneously, and helps to create a welcoming environment (e.g., SPSP Diversity Reception: http://spsp.org/diversity-fund). Likewise, individuals and departments can actively promote programs that mentor and encourage underrepresented voices in psychological science to be heard in the public sphere (see the OpEd Project: https://www.theopedproject.org/what-we-do/). In a similar vein, 500 Women Scientists maintains an open database of female scientists for journalists, educators, policy makers, and scientists seeking an expert opinion (https://500womenscientists.org/request-a-scientist/). Recent discussion has acknowledged the importance of enhancing voices of women in science journalism (e.g., Yong, 2018).

Strengthening mentorship, career advancement, and experience of belonging for women

Advancement in a scientific career is heavily dependent on mentorship by senior scholars, beginning as early as when undergraduates declare their major. Some early findings suggested no gender gaps in mentors for undergraduate and graduate students in psychology (e.g., Cronan-Hillix, Gensheimer, Cronan-Hillix, & Davidson, 1986), with more recent research indicating that women who have role models feel more empowered to engage in leadership behaviors (Latu, Mast, Lammers, & Bombari, 2013) and are more likely to be promoted (Allen, Eby, Poteet, Lentz, & Lima, 2004). Of course, as with service work, placing the full responsibility on women to mentor other women creates an inequitable burden (notwithstanding the rewards of a positive mentoring relationship). We recommend that departments formalize and document expectations for mentorship for all faculty *from* and *for* both women and men. Mentorship should be rewarded in promotion and salary decisions and in awards for research contributions; the influence of contributions to the field from one's students and mentees should be considered an indication of successful scholarship as well.

As noted above, data about women's sense of belonging specific to psychology do not yet exist, and this is an area in need of further study. However, the data regarding a lower sense of belonging among women

in STEM more generally and at a number of research-intensive institutions in particular (described earlier) suggests that the issue deserves further examination. It also is important to examine how belonging differs across career stages as women progress from undergraduates through to faculty positions. Women students with greater exposure to women professors and experts in STEM demonstrated enhanced self-concept, greater effort on tests, and a stronger commitment to pursue careers in STEM (Stout, Dasgupta, Hunsinger, & McManus, 2011). Note that reading about women experts had the same effect as face-to-face contact, suggesting that even in fields with fewer women faculty, concrete changes such as more assigned readings by women and from women-directed labs may have substantive effects on women's perceived fit in a given field. Such efforts to increase the visibility of women in psychology stand to have tangible outcomes: Role models who are members of underrepresented groups have been linked to the success of junior scholars more generally (e.g., Marx & Roman, 2002; McIntyre, Paulson, & Lord, 2003). Taken together, systematic efforts are needed to conduct research and, where gender gaps may exist, to enhance women's sense of belonging in psychological science.

Addressing harassment

Increasingly aware of sexual harassment and misconduct—including several recent cases involving psychology departments—universities have begun to address this national problem. The 2018 National Academies of Sciences, Engineering, and Medicine report suggested the following steps for reducing harassment:

> (1) Create a diverse, inclusive, and respectful environment; (2) diffuse the power structure and reduce isolation; (3) develop supportive structures and systems for those who experience sexual harassment; (4) improve transparency and accountability; (5) ensure there is diverse, effective, and accountable leadership that is unambiguous about its commitment to reducing and eliminating harassment; and (6) develop and use effective sexual harassment training. (pp. 123–124)

Because sexual harassment training programs in the workplace can backfire (Dobbin & Kalev, 2019), teaching bystander interventions may be an important way to provide concrete methods to intervene on behalf of victims who are often reluctant to report. Bystander interventions have demonstrated improvements in bystander efficacy, intention, and intervention in university settings (Kettrey & Marx, 2019; Lee, Hanson, & Cheung, 2019).

It is also important to study more rigorously both the prevalence and potential impact of scientific bullying toward women (e.g., Maxwell, Lau, & Howard, 2015). Unfortunately, some of the same scientific techniques used to ensure the transparency and quality of published research can also serve to impede the scientific progress of women's careers and damage their professional reputations (Lewandowsky & Bishop, 2016). Such techniques include raising awareness of alleged wrongdoing without appropriate investigation (e.g., via social-media posts) or calling for review of an article's methods and analyses for the sole purpose of determining whether retraction is called for. We know of no published empirical studies that have examined whether women are disproportionately affected by scientific bullying or the impact of unproven allegations on women's careers and lives compared with men's. We suggest that this information be tracked to allow for more systematic study and that, moving forward, that a multipronged approach be used to address sexual and nonsexual harassment in psychological science.

Caveats and concluding remarks

There are several important caveats in situating psychological science within this broader discussion. First, as noted throughout the article, there are many important ways in which women in psychological science are *not* negatively affected relative to men, and may even fare better than men, as well as many areas in which progress has been made in recent decades. We believe that these positive findings—some of which are unique to psychology as a field—are notable and should be applauded and built upon.

Second, we do not claim to speak for all women or all issues facing women in psychological science. Our goal in this article was to bring awareness to mechanisms that may affect or impede career advancement for women in our field. We took an organized approach to narrow this list to issues that have been (or could be) studied empirically and that can be addressed. Our goal was to identify a set of issues that appear frequently enough to merit more discussion and action than they have received to date. Further, we believe that discussion of these matters must address the pervasive and complex factors underlying intersectionality for women, given that inequalities due to gender often widen for women who identify as non-White, nonheterosexual, nonbinary or noncisgender, or differently abled. Lasting solutions must positively affect *all* women and, ultimately, all people.

Third, because research is shaped not only by gender but also by other identities, *who* practices science exerts a great deal of influence on what questions are asked

and valued, how questions are framed, and what evidence is collected and analyzed (Leggon, 2006, 2010). Thus, experiences from women, including those who have intersecting identities, that could enrich the scientific enterprise may be missing (e.g., Collins, 2000). However, little is known about the effects of the documented gender differences on what psychological research is carried out, how hypotheses are framed, and which theoretical frameworks are used to ground inquiry. For example, psychological models on mate selection and sexual reproduction suggest that women play a passive role in reproductive processes (e.g., Buss & Barnes, 1986); however, more recent evidence suggests that many female mammals actively choose their mates (e.g., Clutton-Brock & McAuliffe, 2009), and female reproductive systems are programmed to make active, not passive, reproductive choices (e.g., Nadeau, 2017). Within clinical psychology, research has often overlooked the effect of women's hormones and reproductive events, such as pregnancy or menopause, on mood and psychopathology risk (e.g., Mendle, Eisenlohr-Moul, & Kiesner, 2016). Likewise, a large body of research on stress and pain has largely ignored women's experience of childbirth (e.g., Saxbe, 2017). Better representation of women in science as both researchers and as the topic of study may bring to light issues of gender bias in the scientific process itself.

In conclusion, we believe that highlighting the particular role of psychology in the broader discussion of gender differences in career outcomes is important because effective changes made may have enduring and wide-reaching effects for the future of women, not only in psychological science, but also in academia at large. The need to address the issues facing women in psychological science coincides with a particular cultural moment in U.S. and global social history, one in which women are speaking out and taking action in an unprecedented way to address sexual harassment, financial and social inequality, and gender biases. As a field committed to the science of equality, psychology has the opportunity to lead other disciplines in how best to create and maintain a culture of inclusion.

Transparency

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Supplemental Material

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Notes

1. Gender identity can be nonbinary (Richards et al., 2016); however, because the vast majority of the work in this field refers to women and men, we adopt this language and coding throughout to be consistent with this literature.
2. The *h* index, designed to measure both productivity and citation impact, is the number of articles published by an author that have been cited at least that many times (e.g., a scholar with $h = 50$ has published 50 or more articles, each of which has been cited 50 or more times).
3. Mentored grants include supervised grants that provide support by senior faculty to junior faculty for the purpose of career development (e.g., a K01 grant—a National Institutes of Health [NIH] Mentored Research Scientist Development Award) or to postdoctoral researchers to facilitate a timely transition to independent faculty positions (e.g., a K99 grant—an NIH Pathway to Independence Award).
4. Much of the discussed work pertains to two-parent families; however, it is important to acknowledge how these dynamics pertain to single-parent families. Although the research on this topic is limited, the work generally suggests that both single mothers and single fathers are "penalized" in academic hiring decisions (e.g., Wolfinger et al., 2008), although the full set of reasons for this is unknown as is the extent to which the bias goes beyond the hiring process into other aspects of the job, such as promotion.
5. Although there is debate about the extent to which implicit biases influence behavior (e.g., Jost et al., 2009; Tetlock & Mitchell, 2009; but see Greenwald, Banaji, & Nosek, 2015), there is also evidence that women are treated differently from men on the basis of these biases (Cao & Banaji, 2016; Rydell,

McConnell, Strain, Claypool, & Hugenberg, 2007). Further work needs to be done to examine when and how implicit biases may be changed (Cone, Mann, & Ferguson, 2017) and to identify the relative impact of implicit and explicit biases on women in academic psychology.

6. Two men and one woman each served for 2 years, but are counted only once here; if counted twice, the figure is 60%.

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